Draft
Environmental Impact Statement
For
Proposed Mortar and Artillery Training At Richardson Training Area, Joint Base Elmendorf-Richardson, Alaska

(Volume I)

2025

PRIVACY ADVISORY

This Environmental Impact Statement (EIS) was provided for public comment in accordance with the National Environmental Policy Act (NEPA) and Environmental Impact Analysis Process (EIAP) (32 CFR Part 989). The EIAP provides an opportunity for public input on United States Department of the Air Force (DAF) decision making, allows the public to offer input on alternative ways for the DAF to accomplish what it is proposing, and solicits comments on DAF's analysis of environmental effects.

Public input allows the DAF to make better-informed decisions. Letters or other written or verbal comments provided may be published in this EIS. Providing personal information is voluntary. Private addresses were compiled to develop a stakeholder inventory. However, only the names of the individuals making comments and specific comments are disclosed. Personal information, home addresses, telephone numbers, and email addresses are not published in this EIS.

COMPLIANCE

Procedurally this EIS was developed in compliance with the NEPA, as amended by Public Law 118-5, Fiscal Responsibility Act of 2023 (42 United States Code 4321 et seq.), and the DAF's EIAP (32 CFR Part 989). The DAF is aware that the President of the United States has issued Executive Order (EO) 14154, *Unleashing American Energy*, which revoked EO 11991, which amended EO 11514. CEQ has proposed to rescind the CEQ NEPA regulations.

ACCESSIBILITY NOTICE

The digital version of this Draft EIS is compliant with Section 508 of the Rehabilitation Act of 1973 because assistive technology (e.g., "screen readers") can be used to help the disabled to understand applicable electronic media. Due to the nature of graphics, figures, tables, and images occurring in the document, accessibility may be limited to a descriptive title for each item.

PROPOSED MORTAR AND ARTILLERY TRAINING AT RICHARDSON TRAINING AREA, JOINT BASE ELMENDORF-RICHARDSON, ALASKA

DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)

a. **Responsible and Cooperating Agencies:** United States Air Force (Air Force) is the Responsible Agency. United States Army (Army) is the proponent and a cooperating agency. National Marine Fisheries Service (NMFS) is a cooperating agency.

b. **Proposed Action:** This EIS addresses the proposal to modify the conditions under which live-fire weapons training and qualification is conducted at Joint Base Elmendorf-Richardson (JBER) to meet the Army's home station training requirements and to ensure Army elements at JBER are fully prepared for operational deployments in support of the United States' evolving Arctic Strategy.

c. **Comments and Inquiries:** Comments may be submitted on the project website at https://JBER-PMART-EIS.com. Comments may also be submitted to: JBER Public Affairs, JBER.PA@US.AF.MIL, (907) 552-8151; (U.S. Post Office) JBER Public Affairs, 10480 Sijan Ave., Suite 123, Joint Base Elmendorf-Richardson, AK 99506.

d. Report Designation: Draft EIS

e. **Abstract:** This EIS has been prepared pursuant to the National Environmental Policy Act of 1969 (NEPA), as amended (42 United States Code § 4321 et seq.); the Air Force Environmental Impact Analysis Process (32 Code of Federal Regulations [CFR] Part 989); and the Army's NEPA implementing regulations (32 CFR Part 651). This EIS has been prepared to ensure that comprehensive and systematic consideration is given to potential environmental impacts that may result from implementing the proposed action or any reasonable alternatives. This EIS assesses the potential environmental consequences that would result from the proposal to modify the conditions under which indirect live-fire weapons training can be conducted at JBER. The proposed action would optimize recurring indirect live-fire weapons training at JBER to meet home station training requirements in accordance with current Army training doctrine. Reasonable alternatives were identified and evaluated based on selection standards by Army Richardson Training Area Installation Range Office personnel. Alternatives that met all established selection standards were considered reasonable and retained for consideration in this EIS. Resources addressed in the EIS include noise, air quality, sub-arctic climate considerations, safety and occupational health, earth resources, water resources, wetlands, biological resources, wildland fire, cultural resources and subsistence, land use and recreation, transportation and circulation, socioeconomics, infrastructure and utilities, hazardous materials and waste, and forest resources. This EIS incorporates the public and interagency comments received during the March–May 2020 scoping period.

SUMMARY

S.1 INTRODUCTION

This is a summary of the Draft Environmental Impact Statement (EIS), which addresses the proposed mortar and artillery training (PMART) at the Richardson Training Area on Joint Base Elmendorf-Richardson (JBER), Alaska. The reader is encouraged to review the entire EIS for details on any subject contained in the Summary.

This EIS has been prepared pursuant to the National Environmental Policy Act of 1969 (NEPA), as amended (42 United States Code § 4321 et seq.), and United States (U.S.) Air Force (Air Force) Environmental Impact Analysis Process (32 Code of Federal Regulations [CFR] Part 989). Under NEPA, federal agencies must analyze and document the impacts of their proposed actions and identify mitigation measures to offset the potential impacts.

The Air Force manages JBER and is responsible for ensuring NEPA compliance for actions on the installation, while the U.S. Army (Army) retains operational responsibility for training areas and ranges and is the project proponent—the agency proposing the PMART action. The Air Force is the lead agency for preparation of this EIS. The Army and the National Marine Fisheries Service (NMFS) are cooperating agencies for the EIS.

S.2 LOCATION AND BACKGROUND

JBER is a 73,041-acre military installation in southcentral Alaska, adjacent to Anchorage, the community of Eagle River, Knik Arm of Cook Inlet, and Chugach State Park. JBER supports Alaskan Command, 11th Air Force, 11th Airborne Division, and more than 90 supported and tenant organizations.

Eagle River Flats (ERF) Impact Area (ERF-IA) is a 2,483-acre explosive munitions impact area on JBER that has been used for weapons training since the 1940s and is currently the only dedicated impact area at JBER. ERF-IA includes ERF, an estuarine salt marsh of approximately 2,092 acres, as well as associated upland buffer areas, and is located at the mouth of Eagle River, which meanders through ERF and discharges into Eagle Bay.

ERF-IA supported heavy all-season use until February 1990, when firing was temporarily suspended due to waterfowl mortality caused by white phosphorus (WP). Since 1991, restrictions have been in place that limit use of ERF-IA to winter months when established ice thickness requirements are met. Remedial action objectives for WP cleanup have been maintained since 2006. Because the winter training window varies annually and does not allow units stationed at JBER to conduct the full range of training tasks at JBER, the Army seeks to expand its capabilities by resuming live-fire weapons training exercises during all seasons. The proposed action focuses on live-fire mortar and artillery training, which requires a dedicated impact area to contain explosive munitions, fragments, and debris. In 2010, a draft EIS was developed to resume all-season firing at JBER. However, a final EIS was never developed, primarily because of changes in the proposed action and identification of a new potential alternative. Based on these factors, a new Draft EIS has been prepared.

S.3 PURPOSE AND NEED FOR THE PROPOSED ACTION

Purpose

The Air Force, Army, and NMFS have coordinated on the EIS to meet each agency's NEPA obligations. The Army's purpose for the proposed action is to increase military readiness by optimizing recurring indirect live-fire weapons training, qualification, and certification at JBER to meet home station training requirements in accordance with current Army training doctrine.

Need

The Army needs to conduct frequent live-fire mortar and artillery training, qualification, and certification exercises under realistic conditions/standards throughout the year to prepare soldiers for combat operations. Units participating in a Combat Training Center rotation must complete all prerequisites at home station, including company Combined Arms Live Fire Exercises (CALFEXs). CALFEX capabilities at JBER are limited by seasonal restrictions and because the current facilities do not provide a realistic training environment. All-season training is necessary to ensure that live-fire training occurs at the required frequency and soldiers achieve and maintain critical combat skills. Under the current live-fire restrictions, units stationed at JBER must travel more than 700 miles (round trip) to Fort Wainwright to train and qualify individual soldiers and weapon system crews. This continual requirement to deploy in order to train reduces readiness, violates the principle and benefit of home station training, places qualification and certification at increased risk, and unnecessarily separates soldiers from families for protracted training exercises.

S.4 PROPOSED ACTION AND ALTERNATIVES

Current indirect-fire training at ERF-IA is conducted only in the winter and involves mortars (60-millimeter [mm], 81-mm, and 120-mm) and artillery (105-mm). The proposed action would expand the training to include non-winter months and add 155-mm artillery to the authorized weapon systems. Types of rounds fired by these weapons systems include high explosive (HE), illumination, smoke, and training rounds. WP rounds, which were previously linked to waterfowl mortality, are no longer fired at ERF-IA and would not be fired under any alternative considered in this EIS. The Air Force requested an incidental take authorization, but NMFS determined it was not necessary for the specified activities because they would not harass (as defined for "a military readiness activity" under 16 United States Code § 1362 [18][B])[1] or result in the mortality of any marine mammal or marine mammal stock.

The Air Force is considering two action alternatives that meet the purpose and need for the proposed action of modifying training conditions at JBER. A No Action Alternative in which training conditions would not be modified is also carried forward for analysis, as required by NEPA. Both action alternatives would remove the winter firing restrictions at ERF-IA, reinstate all-season indirect live-fire training and qualification, and add 155-mm artillery to the authorized weapon systems, which would increase the maximum number of rounds fired into ERF-IA annually compared to the No Action Alternative. Both alternatives would also include built-in protection measures developed to avoid or reduce impacts to Cook Inlet beluga whales (*Delphinapterus leucas*) and other resources, including (but not limited to) habitat buffers based on acoustic modeling, limited fire periods for HE rounds, and redistribution of targets.

The same annual maximum number of rounds would be fired under both action alternatives (Table S-1). The alternatives would differ as far as whether ERF-IA would be expanded and whether travel to Fort Wainwright is likely to occur. The 155-mm rounds would be used under both action alternatives.

Table S-1 Total Number of Rounds Allocated by Alternative each Fiscal Year

Munitions Type	Alternative 1	Alternative 2	No Action Alternative
60-mm Mortar HE Rounds	1,036	1,036	518
60-mm Mortar Other Rounds[1]	3,290	3,290	1,645
81-mm Mortar HE Rounds	592	592	296
81-mm Mortar Other Rounds	1,880	1,880	940
120-mm Mortar HE Rounds	744	744	372

[1] According to 16 United States Code § 1362(18)(B), in the case of a military readiness activity "harassment" has a narrower definition that means the action (1) injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild or (2) disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns to a point where they are abandoned or significantly altered.

Munitions Type	Alternative 1	Alternative 2	No Action Alternative
120-mm Mortar Other Rounds	2,592	2,592	1,296
105-mm Howitzer HE Rounds	2,612	2,612	1,306
105-mm Howitzer Other Rounds	1,334	1,334	714
155-mm Howitzer HE Rounds	144	144	N/A
155-mm Howitzer HE Training Rounds	900	900	N/A
155-mm Howitzer Other Rounds	146	146	N/A
Total Rounds	**15,270**	**15,270**	**7,087**

Note: [1]"Other Rounds" refers to illumination, smoke, blank rounds, and training rounds not containing HE (all training rounds except 155-mm).
Key: HE = high explosive; mm = millimeter; N/A = not applicable

If either Alternative 1 or Alternative 2 is selected in the Record of Decision (ROD), the Army intends to allow units to begin all-season firing in the existing ERF-IA as soon as practicable following the decision. Alternative 2 would not require additional construction; however, if Alternative 1 is selected, the Army anticipates at least one to two construction seasons before the expansion area is ready for use.

Alternative 1—All-Season Live-Fire Training That Meets Training and Certification Requirements with Expanded Impact Area in Order to Fully Meet CALFEX Live-Fire Proficiency in Accordance with Army Training Strategy[2] (Preferred Alternative)

As described above for the proposed action, Alternative 1 would reinstate all-season indirect-fire training and add 155-mm artillery to the authorized weapon systems.

Under Alternative 1, ERF-IA would increase in size to roughly 3,086 acres through its expansion into approximately 585 acres of adjacent upland. Impact area expansion would entail clearing 359 acres of vegetation, creating approximately 1.8 miles of gravel service roads and five vehicle gravel service pads inside the cleared area, and creating a 3-mile firebreak along the boundary of the cleared area. An approximately 226-acre vegetated buffer would remain.

Alternative 1 best meets the Army's need and is the Preferred Alternative. The expanded impact area would allow the Army to fully meet CALFEX live-fire proficiency and certification in accordance with Army regulations and doctrine and would minimize the need to travel to other installations. Although travel to other installations cannot be ruled out for any alternative, Alternative 1 assumes no travel to Fort Wainwright as a realistic scenario.

Alternative 2—All-Season Live-Fire Training at Existing ERF-IA Only That Meets Training and Certification Requirements and Marginally Meets CALFEX Live-Fire Proficiency in Accordance with Army Training Strategy

The key difference between this alternative and Alternative 1 is that ERF-IA would not be expanded, and all mortar and artillery rounds (Table S-1) would be fired within the existing impact area boundary. While resumption of all-season firing and incorporation of 155-mm howitzers would allow for a training environment that marginally fulfills CALFEX certification training requirements, soldiers would not experience realistic wartime conditions (the impacts of mortar and artillery rounds in close proximity) and would not receive the full benefit of a CALFEX. While all training could occur on JBER, this alternative assumes a more likely scenario that some travel to Fort Wainwright would occur.

[2] Throughout this EIS, the full titles of the action alternatives have been shortened to assist the reader. Alternative 1 is referred to as Alternative 1: All-Season Live-Fire Training with Expanded Impact Area, and Alternative 2 is referred to as Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only.

No Action Alternative

Under the No Action Alternative, ERF-IA would continue to be used at the current operations tempo and with the same seasonal restrictions and current habitat buffers. Home station units would deploy to other Army-controlled training lands to conduct required small unit training and would continue to travel to Fort Wainwright to conduct indirect live-fire qualification and training whenever ice cover requirements are not met at ERF-IA. The maximum number of rounds fired at JBER annually would be limited by seasonal restrictions (Table S-1), and all allotted 155-mm rounds would be fired at other installations.

S.5 ENVIRONMENTAL COMPARISON OF ALTERNATIVES

The EIS describes the affected environment and potential environmental consequences for resources that could be affected by the proposed action. Direct, indirect, and cumulative effects from construction (expansion of ERF-IA) and operations (firing and training exercises) are considered.

Table S-2 summarizes the environmental consequences for all alternatives. The summaries provided document potential impacts assuming adherence to existing best management practices (BMPs), standard operating procedures (SOPs), policies, guidance documents, and regulations, and with the protective measures built into the action alternatives. For some resources, additional mitigation (Section S.7) has been identified as a result of the impact analysis. Table S-2 includes those measures identified during the analysis where mitigation would reduce the impact to less than significant.

Table S-2 Environmental Comparison of Alternatives

Acronyms used are defined at the end of the table.

Resource Area	Alternative 1: All-Season Live-Fire Training with Expanded Impact Area	Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only	No Action Alternative
Noise (Section 3.1) This section addresses community noise. Noise impacts on specific resource areas are included in the corresponding resource section.	Impacts would not exceed significance thresholds. Increases to noise in sensitive areas would be limited to seasonal impacts in isolated recreation areas and would remain below significance levels. Long-term community noise impacts associated with increased large arms CDNL noise contours (from increased firing) would encompass a larger area on and off the installation, but only one seasonal noise-sensitive land use within the predicted 62 dB CDNL and above noise contours.	Impacts would not exceed significance thresholds. No temporary construction noise. Noise impacts from large arms training would be identical to those under Alternative 1.	No change in noise levels from baseline conditions.
Air Quality (Section 3.2)	With BMPs to control fugitive dust, impacts from construction would not exceed insignificance thresholds.[1] Short-term increase in emissions associated with land clearing, potential burning of slash, and construction. Release of carbon due to conversion of 350 acres of forest to grass, long-term removal of 9 acres of forest, and thinning of 226 additional acres. Annual emissions associated with prescribed fire to maintain open conditions. Long-term reduced vehicle emissions due to less travel to Fort Wainwright annually. Vehicle emissions associated with increased local travel at JBER would be offset by a corresponding decrease in local travel at Fort Wainwright. Localized, negligible increase in emissions of HAPs during live-fire training with increased number of rounds fired at ERF-IA would not present a human health risk.	Impacts would not exceed insignificance thresholds.[1] No temporary construction emissions. Short-term release of carbon and increase in annual emissions from potential burning of slash and prescribed burning additional acres (Alternative 1) would not be realized. Long-term reduced vehicle emissions would be less than under Alternative 1, as some travel to Fort Wainwright would likely occur. No increased local vehicle emissions at JBER or corresponding decreases at Fort Wainwright. Localized, negligible increase in emission of HAPs would be less than under Alternative 1, although the rounds would be fired elsewhere. Long-term reduction in GHG emissions from reduced vehicle travel would be less than under Alternative 1. Long-term change in carbon sequestration (Alternative 1) would not be realized. Overall, a beneficial impact to air quality is likely.	No change in annual emissions from baseline conditions. Air quality impacts from vehicle travel would be greater than under Alternatives 1 and 2. No temporary construction emissions or annual emissions associated with prescribed fire. No reductions in GHG emissions from reduced vehicle travel. Overall, impacts to air quality likely would be less than under Alternative 1 and greater than under Alternative 2.

Resource Area	Alternative 1: All-Season Live-Fire Training with Expanded Impact Area	Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only	No Action Alternative
	Annual GHG emissions associated with prescribed fire. Long-term reduction in vehicle GHG emissions due to less travel to Fort Wainwright annually. Long-term reduction in carbon sequestration from conversion of forest and maintaining open conditions in the expansion area.		
Sub-arctic Climate Considerations (Section 3.3)	Fewer weather impacts than Alternative 2 and the No Action alternative because training would not be limited by ice thickness, training could occur during all seasons, and the upland expansion area would be less susceptible to flooding and erosion than ERF.	Fewer weather impacts than the No Action Alternative due to all-season training, but greater susceptibility to flooding and erosion than Alternative 1 because the impact area would not be expanded into uplands.	Greater weather impacts than the action alternatives due to ice thickness requirements, more frequent training at Fort Wainwright where red flag days from wildfire are more common, and likely increased flooding and erosion at ERF.
Safety and Occupational Health (Section 3.4)	Impacts would not exceed significance thresholds. Short-term safety risks to contractors performing land clearing and construction in the proposed expansion area, which would be reduced by adhering to required BMPs in applicable safety procedures and standards. Long-term increase in UXO at ERF-IA, increased fire risk in the proposed expansion area, and a beneficial impact to soldier safety from reduced vehicle travel and transport of munitions.	Impacts would not exceed significance thresholds. No short-term safety risks associated with construction. Long-term impacts would be similar to those under Alternative 1, except there would be no increased fire risk, and the beneficial impact from reduced travel would be lower than under Alternative 1 because some travel to Fort Wainwright is likely to occur.	No change in safety risks from baseline conditions. No short-term safety risks associated with construction, no increase in UXO at ERF-IA, and no increased fire risk. Risks to soldier safety from vehicle travel and transport of munitions would be greater than under Alternatives 1 and 2.

Resource Area	Alternative 1: All-Season Live-Fire Training with Expanded Impact Area	Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only	No Action Alternative
Earth Resources (Section 3.5)	Impacts from cratering in the expansion area would exceed significance thresholds. Short-term destabilization of soils associated with 359 acres of clearing in the proposed expansion area. Long-term permanent burial of soils in 3.5 acres and long-term periodic disturbance of soils in 5.8 acres of firebreaks. Increased potential for runoff and erosion. Long-term impacts to up to 1,510 acres of soil spread across existing ERF-IA and the proposed expansion area from disturbance associated with detonation of rounds during non-frozen conditions. Total estimated area of soil disturbance in a given training year would not exceed 6 acres for all target areas combined. Potential for deposition of munitions residues throughout target areas and very low risk of striking gravel-capped areas and discharging sequestered WP.	Impacts would not exceed significance thresholds. No impacts to soils outside the existing ERF-IA. Long-term impacts to up to 1,160 acres of soil in existing ERF-IA from detonation of rounds, which is less than under Alternative 1, and no new areas of soil disturbance. Maximum disturbance area of 6 acres annually would be concentrated over a smaller area if all training occurs at JBER, and the degree of impact to soil in ERF could be greater than under Alternative 1. Potential deposition of munitions residues would occur over a smaller area than under Alternative 1, with greater impacts in existing ERF-IA. Very low risk of striking gravel-capped areas and discharging sequestered WP.	No impacts to soils outside the existing ERF-IA. Soil disturbance would be less than under Alternatives 1 and 2 because frozen conditions would protect soils. Lower risk of damaging gravel caps, and less deposition of munitions residues.
Water Resources (Section 3.6)	Impacts are not expected to exceed significance thresholds. No direct impacts from construction of the proposed expansion area, but potential indirect effects from increased sedimentation from destabilized soils and spills from construction equipment, minimized through BMPs specified in SWPPP. Long-term potential for impacts to water resources in ERF-IA through increased deposition of munitions constituents and soil disturbance from detonation of rounds. Water quality criteria exceedances are not anticipated. No or negligible impacts to groundwater or potential drinking water sources.	Impacts are not expected to exceed significance thresholds. No construction-related impacts, and affected area would be limited to the existing ERF-IA. Potential impacts from live-fire training similar to those under Alternative 1, although it is possible that more munitions would be detonated in ERF-IA.	No construction-related impacts. Long-term potential for impacts to water resources in ERF-IA would not increase from baseline levels and would be less than under Alternatives 1 and 2.

Resource Area	Alternative 1: All-Season Live-Fire Training with Expanded Impact Area	Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only	No Action Alternative
Wetlands (Section 3.7)	Impacts would not exceed significance thresholds. Long-term degradation of up to 59 acres of wetlands in the vegetation buffer, and potential indirect impacts from vegetation clearing of the proposed expansion area. Any unanticipated and unavoidable impacts to wetlands would be compensated for through a mitigation bank or in-lieu fee instrument. Long-term impacts to estuarine wetlands from live-fire training during non-frozen conditions and an increased number of rounds detonated in ERF-IA. Total estimated area of wetland disturbance in a given training year would not exceed 4.8 acres for all target areas combined. Potential phytotoxic impacts from an estimated 54 percent increase in annual deposition of energetic residues relative to the No Action Alternative. The social value component of wetlands would be reduced, but no significant reduction in overall function.	Impacts would not exceed significance thresholds. No impacts to wetlands from construction. Greater degree of wetland impact than under Alternative 1 if all training occurs at JBER. Long-term impacts to up to 6 acres of estuarine wetlands annually. Potential phytotoxic impacts from an estimated 54 percent increase in annual deposition of energetic residues relative to the No Action Alternative. The social value component of wetlands would be reduced, but no significant reduction in overall function.	No impacts to wetlands from construction. No change from baseline conditions. Winter firing restrictions would protect wetlands from disturbance and result in lower potential phytotoxic impacts than under Alternatives 1 and 2.
Biological Resources (Section 3.8)	**Vegetation:** Impacts would not exceed significance thresholds. Direct impacts to 585 acres of vegetation, including 359 acres of clear-cutting, 226 acres of alteration through thinning, and increased fire risk in the expansion area. Indirect impacts from increased risk of erosion, sedimentation, and windthrow over 7 acres from construction and maintenance of the proposed expansion area, and increased risk of windthrow in the thinned vegetation buffer. Increased susceptibility to invasive plant species in the proposed expansion area. Mitigation to monitor and treat invasive species would prevent their spread beyond the ROI. Annual disturbance of up to 6 acres from live-fire training during non-frozen conditions would impact vegetated and non-vegetated areas at ERF-IA. Potential phytotoxic impacts from an estimated 54 percent increase in annual deposition of energetic residues relative to the No Action Alternative. The affected area would be spread across the existing ERF-IA and the proposed expansion area.	**Vegetation:** Impacts would not exceed significance thresholds. No impacts to vegetation from construction. Greater degree of vegetation disturbance than under Alternative 1 if all training occurs at JBER. Annual disturbance of up to 6 acres of vegetation from live-fire training (same as Alternative 1). There is a 54 percent increase in annual deposition of energetic residues relative to the No Action Alternative (same as under Alternative 1). The affected area would be limited to existing ERF-IA.	**Vegetation:** No impacts to vegetation from construction. No change from baseline conditions. Winter firing restrictions would help protect vegetation from disturbance. Lower phytotoxic impacts than under Alternatives 1 and 2.

Resource Area	Alternative 1: All-Season Live-Fire Training with Expanded Impact Area	Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only	No Action Alternative
Biological Resources (Section 3.8)	**Fish:** Impacts could potentially exceed significance thresholds, even with mitigation measures. Potential short-term indirect impacts from sedimentation into fish habitats from clearing and construction would be minimized by BMPs. Potential long-term adverse impacts from live-fire training during ice-free conditions through exposure to underwater noise, munitions strikes, alteration of habitat in unbuffered areas, and exposure to munitions constituents. Protective measures would reduce but not avoid or eliminate impacts.	**Fish:** Impacts could potentially exceed significance thresholds, even with mitigation measures. No construction impacts. Potential long-term impacts similar to those under Alternative 1, but the degree of impact could be greater than under Alternative 1 if all training occurs at JBER because more rounds would detonate in the existing ERF-IA.	**Fish:** No change from baseline conditions. With winter-only firing restrictions and less live-fire training at ERF-IA, outside of adult salmon migration periods, impacts would be lower than under Alternatives 1 and 2.
Biological Resources (Section 3.8)	**Terrestrial Wildlife:** Impacts would not exceed significance thresholds. Short-term impacts from noise disturbance during construction of the proposed expansion area. Long-term loss of 359 acres of forest and woodland habitat, degradation of up to 59 acres of wetland habitat, and alteration of various habitats through thinning in the vegetative buffer, but creation of grassland, edge, and successional habitats. Long-term impacts from live-fire training during all seasons through periodic noise disturbance, habitat alteration, and increased risk of exposure to munitions residues. Degree of impact would depend on the species and timing of training, but most species would temporarily leave or habituate. Risks for direct strikes would be reduced by regulations that require cease fire if wildlife is observed. Very low risk of striking gravel-capped areas from live-fire training during ice-free conditions and discharging sequestered WP that could be ingested by birds.	**Terrestrial Wildlife:** Impacts would not exceed significance thresholds. No loss of forested habitat or construction impacts. No or minimal impacts to forest and woodland species from live-fire training, but the degree of impact to waterfowl and other wildlife that use ERF-IA could be greater than under Alternative 1 if all training occurs at JBER. Risks for direct strikes would be reduced by regulations that require cease fire if wildlife is observed. Very low risk of striking gravel-capped areas from live-fire training during ice-free conditions and discharging sequestered WP that could be ingested by birds.	**Terrestrial Wildlife:** No change from baseline conditions. Live-fire training would continue to be restricted during waterfowl migration periods, and migratory birds would not be present in large numbers during firing activities. Gravel caps would continue to be protected from damage and exposure of WP by winter ice conditions. Impacts would be lower than under Alternatives 1 and 2.

Resource Area	Alternative 1: All-Season Live-Fire Training with Expanded Impact Area	Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only	No Action Alternative
Biological Resources (Section 3.8)	**Marine Mammals:** Impacts are unlikely to exceed significance thresholds with implementation of mitigation measures. Potential short-term indirect impacts from sedimentation into marine mammal habitats from clearing and construction would be minimized by BMPs. Potential long-term impacts from live-fire training during all seasons through periodic noise disturbance, hazardous fragment strikes, habitat alteration, reduction in prey species (fish), and bioaccumulation of munitions constituents from live-fire training. Habitat buffers, seasonal firing restrictions, and other built-in protective measures, BMPs/SOPs, and mitigation developed as a result of the analysis would reduce impacts to less than significant.	**Marine Mammals:** Impacts are unlikely to exceed significance thresholds with implementation of mitigation measures. No construction impacts. Potential long-term impacts similar to those under Alternative 1, but the degree of impact could be greater than under Alternative 1 if all training occurs at JBER because more rounds would detonate in the existing ERF-IA. Habitat buffers, seasonal firing restrictions, and other built-in protective measures, BMPs/SOPs, and mitigation developed as a result of the analysis would reduce impacts to less than significant.	**Marine Mammals:** No change from baseline conditions. With live-fire training limited to periods when Eagle River is frozen over, Eagle Bay has high ice concentrations, and marine mammals have a lower likelihood of being present, impacts would be lower than under Alternatives 1 and 2.
Biological Resources (Section 3.8	**Special Status Species:** Potential impacts to EFH and managed fish species and ESA-listed marine mammals are as described above for fish and marine mammals. Impacts to bald eagles, SGCNs, birds of conservation concern, and other SSCs are as described above for terrestrial wildlife. For rare plants, impacts would not exceed significance thresholds. No rare plants are known to occur in the proposed expansion area, and low risk of impacts to suitable habitat through wetland avoidance. No impacts to rare plants or habitat from live-fire training in the proposed expansion area. No rare plants have been documented in the existing ERF-IA, but suitable habitat is present. Live-fire training during ice-free conditions would have the potential to impact rare plants, if present, through direct disturbance, disturbance of habitat, or phytotoxicity.	**Special Status Species:** Potential impacts to EFH and managed fish species and ESA-listed marine mammals are as described above for fish and marine mammals. Impacts to bald eagles, SGCNs, birds of conservation concern, and other SSCs are as described above for terrestrial wildlife. For rare plants, impacts would not exceed significance thresholds. Impacts to rare plants in ERF-IA would be similar to those under Alternative 1, although there is a potential for more habitat disturbance if all training occurs at JBER.	**Special Status Species:** Impacts to EFH and managed fish species and ESA-listed marine mammals are as described above for fish and marine mammals. Impacts to SSCs are as described above for terrestrial wildlife. No change from baseline conditions. Winter firing restrictions would help protect vegetation from disturbance and would result in lower phytotoxic impacts than under Alternatives 1 and 2.

Resource Area	Alternative 1: All-Season Live-Fire Training with Expanded Impact Area	Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only	No Action Alternative
Wildland Fire (Section 3.9)	Impacts would not exceed significance thresholds. Short-term introduction of new ignition sources during construction. Potential risks from prescribed and wildland fire would be mitigated by following the WFMP. Long-term increase in the annual number of potential ignition sources, introduction of ignition sources into the proposed expansion area, and expansion of live-fire training into the summer fire season.	Impacts would not exceed significance thresholds. No impacts associated with construction or impact area expansion. Long-term increase in the annual number of potential ignition sources and expansion of live-fire training into the summer fire season. While the same number of rounds would be fired as under Alternative 1, ignition risk would be lower, as all potential ignition sources would be targeted into the existing ERF-IA, which has a low fire risk.	No impacts associated with construction or impact area expansion. Winter-only use of ERF-IA would continue to result in low wildland fire risk, and there would be fewer potential ignition sources than under Alternatives 1 and 2.
Cultural Resources and Subsistence (Section 3.10)	**Cultural Resources:** Impacts have the potential to exceed significance thresholds, but with implementation of the PA, direct, indirect, and unanticipated/inadvertent adverse effects would be resolved. Project design of the proposed expansion area avoids direct impacts to documented archaeological sites. Potential for long-term impacts to archaeological sites from live-fire training in the proposed expansion area, and potential for long-term impacts to known or unknown archaeological sites or sites of traditional cultural importance in ERF-IA from training when sediments are unfrozen. **Subsistence:** Impacts would not exceed significance thresholds, and implementation of additional mitigation measures for biological resources would likely help reduce impacts. No direct impacts to subsistence. Potential long-term indirect impacts as a result of impacts to fish and other subsistence resources from live-fire training during periods when these subsistence resources are likely to be present (refer to *Biological Resources* for more information).	**Cultural Resources:** Impacts have the potential to exceed significance thresholds if unidentified cultural resource sites occur in ERF-IA, but with implementation of the PA, unanticipated/inadvertent adverse effects would be resolved. Potential for impacts to cultural resources less than under Alternative 1 because there would be no risks to documented archaeological sites outside of existing ERF-IA. Potential long-term impacts to known or unknown archaeological sites or sites of traditional cultural importance in ERF-IA would be similar to those under Alternative 1. Risks would be slightly higher than under Alternative 1 if all training occurs at JBER. **Subsistence:** Impacts would not exceed significance thresholds, and implementation of additional mitigation measures for biological resources would likely help reduce impacts. Impacts to subsistence similar to and potentially greater than those under Alternative 1, if all training occurs at JBER.	**Cultural Resources:** No increase in risk for impacts to cultural resources from baseline levels, as the impact area would not be expanded and winter firing restrictions would remain in place. **Subsistence:** No increase in risk for impacts to subsistence from baseline levels. Potential impacts would be lower than under Alternatives 1 and 2 because winter firing restrictions would remain in place.

Resource Area	Alternative 1: All-Season Live-Fire Training with Expanded Impact Area	Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only	No Action Alternative
Land Use and Recreation (Section 3.11)	Impacts would not exceed significance thresholds. **Land Use:** No impacts to off-post land uses, and short-term impacts to training uses from construction. Over the long term, expanding the impact area would preclude other types of training over 585 acres, but the changes would meet JBER planning goals. The on- and off-post area subject to noise levels of 57 to >70 dB CDNL during firing activities at ERF-IA would increase, with potential land use incompatibilities over 129 off-post acres. **Recreation:** A total of 30 acres would become off-limits to recreation. Long-term impacts associated with more frequent periodic closures of TAs to recreation and more frequent large arms noise that could be experienced by more recreational users both on and off JBER. Impacts could occur during all seasons.	Impacts would not exceed significance thresholds. **Land Use:** No impacts from construction. Long-term impacts from expanded large arms noise contours would be identical to those under Alternative 1, with potential land use incompatibilities over 129 off-post acres. **Recreation:** No increase in areas off-limits to recreation. Impacts to the recreation experience would be similar to those under Alternative 1 if all training occurs at JBER, but the extent of periodic closures could be less because the impact area would not be expanded.	**Land Use:** No impacts to existing or future land uses on or off JBER. Long-term adverse effect on land use planning goals, as ERF-IA would not be expanded. **Recreation:** No increase in areas off-limits to recreation, and no change in frequency or level of TA closures to recreation and large arms noise experienced by recreational users.
Transportation and Circulation (Section 3.12)	Impacts would not exceed significance thresholds. Short-term localized impacts to transportation and circulation during construction of the proposed expansion area. Long-term beneficial impacts from construction of 1.8 miles of gravel service roads. Long-term beneficial impact on regional off-base transportation network due to reduced travel to Fort Wainwright. More use of on-base roads, as soldiers would deploy less frequently.	Impacts would not exceed significance thresholds. No construction or development of new roads. Long-term beneficial impacts on the off-base transportation would be less than under Alternative 1 because some travel to Fort Wainwright would occur. Use of on-base roads would be greater than under the No Action Alternative, but less than under Alternative 1.	No construction or development of new roads. Travel to Fort Wainwright and associated impacts to off-base transportation would be greater than under Alternatives 1 and 2. Use of on-base roads would be lowest under this alternative.
Socioeconomics (Section 3.13)	Impacts would not exceed significance thresholds. Long-term beneficial impacts to military expenditures and soldier quality of life associated with fewer trips to Fort Wainwright. Estimated annual travel-related cost reduction of up to $618,300. Negligible impacts to economic activity, no impacts to population, no direct impacts on housing, and no indirect impacts on housing values.	Impacts would not exceed significance thresholds. Long-term beneficial impacts would be lower than under Alternative 1 because some travel to Fort Wainwright would likely occur. Estimated annual travel-related cost reduction of up to $262,900, and less time spent at home than under Alternative 1. Negligible impacts on economic activity, no impacts on population, no direct impacts on housing, and no indirect impacts on housing values.	No effect on socioeconomics. Military expenditures would remain unchanged, and soldier quality of life would continue to be adversely impacted by training time spent away from families.

Resource Area	Alternative 1: All-Season Live-Fire Training with Expanded Impact Area	Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only	No Action Alternative
Infrastructure and Utilities (Section 3.14)	Impacts would not exceed significance thresholds. Expansion of ERF-IA would support the military mission. More frequent maintenance of infrastructure assets may be required as a result of increased training at JBER. Long-term increase in annual utility demands at JBER as a result of increased training that would not exceed the available capacity of utility systems.	Impacts would not exceed significance thresholds. No infrastructure improvements would occur. More frequent maintenance of infrastructure assets may be required, but less than under Alternative 1. Long-term increase in annual utility demands would be less than under Alternative 1 and would not exceed the available capacity of utility systems.	No impacts to infrastructure or utility systems. Infrastructure and utility use would remain at current levels.
Hazardous Materials and Waste (Section 3.15)	Impacts would not exceed significance thresholds. Short-term impacts associated with generation of new hazardous materials and waste during construction. Live-fire training would occur when ERF-IA is not frozen and gravel caps are exposed, but the risk of an errant round damaging a gravel cap and redistributing capped or buried WP is very low. Long-term beneficial impacts associated with a reduced risk of spills because of reduced vehicle travel to Fort Wainwright.	Impacts would not exceed significance thresholds. The affected area would be less than under Alternative 1 because ERF-IA would not be expanded. Similar to Alternative 1, very low risk of an errant round damaging a gravel cap and redistributing WP, even with more rounds potentially fired into ERF, if all training occurs at JBER. Long-term beneficial impacts associated with a reduced risk of spills because of reduced vehicle travel, although likely less than under Alternative 1 because some travel to Fort Wainwright would likely occur.	No increase in risk of spills on JBER. Winter firing restrictions would continue to limit the potential for disturbance of gravel caps and associated re-exposure of remediated WP. Risks of spills associated with vehicle travel to Fort Wainwright would be greater than under Alternatives 1 and 2.
Forest Resources (Section 3.16)	Impacts would not exceed significance thresholds. Removal of forest resources in the proposed expansion area equivalent to approximately 1 percent of the total area of the forest types on JBER that would be affected by the clear-cut. Creation of approximately 3 miles of new forest edge, which would increase susceptibility to windthrow and insect pathogens. Increased risk of forest fires associated with increased live-fire training and expanding ERF-IA, which would be minimized by following the WFMP. Increased risk of exacerbating spruce beetle outbreak by cutting and relocating receptive host material, which would be mitigated by following BMPs.	Impacts would not exceed significance thresholds. No removal of forest resources or creation of new forest edge. Potential increase in fire starts with increased live-fire training, but all rounds would be fired in ERF-IA where there are only small stands of trees and risk of wildland fire is low. Risk of fire and outbreak of insect pathogens would be less than under Alternative 1.	No removal of forest resources. Risk of fire and outbreak of insect pathogens would be less than under Alternatives 1 and 2.

Note: [1] In the Air Force Environmental Impact Analysis Process Level II Quantitative Assessment that was completed for this EIS, “Insignificance thresholds” are emission levels for criteria pollutants that are used to identify clearly insignificant impacts and flag potentially significant impacts that warrant additional analysis. The Level II assessment does not use significance thresholds.

Key: BMP = best management practice; CDNL = C-weighted Day-Night Average Noise Level; dB = decibel; EFH = Essential Fish Habitat; EIS = Environmental Impact Statement; ERF = Eagle River Flats; ERF-IA = Eagle River Flats Impact Area; ESA = Endangered Species Act; GHG = greenhouse gas; HAP = hazardous air pollutant; JBER = Joint Base Elmendorf-Richardson; PA = Programmatic Agreement; ROI = Region of Influence; SGCN = Species of Greatest Conservation Needs; SSC = Species of Special Concern; SWPPP = *Storm Water Pollution Prevention Plan*; TA = Training Area; UXO = unexploded ordnances; WFMP = *Wildland Fire Management Plan*; WP = white phosphorus

S.6 CUMULATIVE EFFECTS

The cumulative impacts assessment analyzed the effects on the environment that would result from the incremental impact of the proposed action (Alternatives 1 and 2) when added to the effects of other past, present, and reasonably foreseeable future actions on JBER and the surrounding area. While individually these actions may not lead to notable or significant environmental impacts, they could, when analyzed in the aggregate, generate impacts that are significant. The analysis considers past actions, such as stationing actions at JBER and military training at ERF-IA, development in the region, establishment of parks and game refuges, and the Good Friday Earthquake of 1964. Present and reasonably foreseeable future actions considered included port development, railroad and other transportation projects, oil and gas development, recreational and commercial fishing, and various construction projects on JBER, among others.

Table S-3 provides a summary of the results of the cumulative effects analysis for each resource. It considers the contribution of the proposed action and other projects to cumulative effects, as well as the aggregate cumulative effects when all actions are considered together. Determinations of significance consider SOPs, policies, guidance documents, regulations, protective measures, and additional mitigation identified for each resource. In all instances, determinations are the same for both action alternatives.

Table S-3 Summary of Cumulative Effects by Resource

Resource Area	Proposed Action	Other Cumulative Projects	Cumulative Effects
Legend: ○ – No or negligible contribution of project(s) to cumulative effects, or beneficial effects □ – Impacts would occur but would be less than significant (considers mitigation, where applicable) Δ – Potentially significant impacts; monitoring needed to establish impact and need for additional mitigation ● – Significant and unavoidable impacts even after mitigation			
Noise	□	□	□
Air Quality	□	□	□
Sub-arctic Climate Considerations	○	□	□
Safety and Occupational Health	○	□	□
Earth Resources	●	□	□
Water Resources	□	□	□
Wetlands	□	□	□
Biological Resources – Vegetation	□	□	□
Biological Resources – Fish	Δ	□	Δ
Biological Resources – Terrestrial Wildlife	□	●	●
Biological Resources – Marine Mammals	□	□	□
Biological Resources – Special Status Species	□	●	●
Wildland Fire	□	□	□
Cultural Resources	□	□	□
Subsistence	□	□	□
Land Use and Recreation	○	□	□
Transportation and Circulation	○	○	○
Socioeconomics	○	○	○
Infrastructure and Utilities	□	□	□

Resource Area	Proposed Action	Other Cumulative Projects	Cumulative Effects
Hazardous Materials and Waste	□	○	□
Forest Resources	□	□	□

S.7 MITIGATION MEASURES

Mitigation measures avoid, minimize, or compensate for environmental impact and include the following:

- Avoiding the impact altogether by not taking a certain action or parts of an action.
- Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
- Compensating for the impact by replacing or providing substitute resources or environments.

Mitigation measures identified during the Environmental Impact Analysis Process will be considered during preparation of the Final EIS and ROD. Four types of mitigation measures are considered in the EIS: (1) protective measures built into the proposed action; (2) BMPs and SOPs that would continue to occur under the proposed action; (3) mitigation determined as a result of the impact analysis that the analysis assumes would be selected in the ROD; and (4) additional measures being considered that may not be selected in the ROD but would be considered for future implementation.

Mitigation measures that are included as part of the selected alternative or selected in the ROD will be implemented in a mitigation plan. Measures to avoid or mitigate direct and indirect effects to cultural resources were resolved in a Programmatic Agreement developed through consultation under 36 CFR § 800.6. The Programmatic Agreement is included in Appendix I, and stipulations will be included in the ROD.

On behalf of the Army, the Air Force is coordinating with NMFS on developing mitigation measures through the consultation process. The ROD will document mitigation measures to be implemented in accordance with the mitigation plan. The mitigation plan will identify principal and subordinate organizations responsible for the execution and oversight of specific mitigation measures. The plan will be prepared in accordance with 40 CFR § 1505.3. For the purposes of the Endangered Species Act (ESA) Section 7 consultation, the mitigation measures included in this EIS may be considered by NMFS as beneficial actions taken by the federal agency or applicant (50 CFR § 402.14[g][8]). If necessary to satisfy requirements of the ESA, NMFS may develop an additional set of measures contained in reasonable and prudent alternatives, reasonable and prudent measures, or conservation recommendations in the Biological Opinion for the proposed action. It is the Air Force's responsibility to work with the Army to ensure all required actions are executed as described in the ROD and subsequent mitigation plan.

Table S-4 identifies mitigation measures in each of the four categories, by resource area, that would avoid, minimize, or compensate for potential impacts or identified significant impacts associated with each alternative. Where an alternative would have an unavoidable impact that the Air Force cannot mitigate, such unavoidable impacts are identified in this EIS for decision-makers. Additional management, regulatory, and design elements that will be adhered to but are not considered mitigation measures are included in the individual resource sections of this EIS, generally in the Regulatory Setting discussions.

For additional clarity, Table S-5 lists a subset of mitigation measures in each of the four categories that apply to each munition type that would be fired in ERF-IA under the proposed action.

Table S-4 Mitigation Measures by Resource Area

	Noise	Air Quality	Safety and Occupational Health	Earth Resources	Water Resources	Wetlands	Vegetation	Fish	Terrestrial Wildlife	Marine Mammals	Special Status Species	Wildland Fire	Cultural Resources	Subsistence	Land Use and Recreation	Hazardous Materials/Waste	Forest Resources
Protective Measures Built Into the Proposed Action																	
Implement new habitat protective buffers (fire exclusion zones, No Fire Areas) based on noise modeling results.				•	•			•		•	•		•	•			
Implement limited fire periods for HE rounds during all inundating tide events (predicted and observed).								•		•	•			•			
Implement a limited fire period for HE rounds during the peak beluga whale upriver visitation period (determined to be 9 August through 18 October; dates will be periodically reviewed; HE rounds could still be fired into the upland expansion area during this time).								•	•	•	•			•			
Redistribute targets away from buffer areas.					•			•		•	•			•			
Prohibit use of white phosphorus.[1]				•	•				•		•			•		•	
Target higher elevation areas to protect fish in vegetated low-lying ponds or depressions that cannot be easily observed.					•			•	•	•	•			•			
During inundating tides at night, restrict units to targets outside routinely inundated areas.					•			•	•	•	•			•			
Use visual clearing and slow start prior to firing.									•	•	•			•			
Cease fire if marine mammals are observed (30 minutes for beluga whales, 15 minutes for other marine mammals, or until they are seen moving out of Eagle River).										•	•			•			
Clear unexploded rounds from the expansion area after each training event (Alternative 1).				•	•				•	•				•		•	

	Noise	Air Quality	Safety and Occupational Health	Earth Resources	Water Resources	Wetlands	Vegetation	Fish	Terrestrial Wildlife	Marine Mammals	Special Status Species	Wildland Fire	Cultural Resources	Subsistence	Land Use and Recreation	Hazardous Materials/Waste	Forest Resources
Best Management Practices and Standard Operating Procedures																	
Do not place targets in open waterbodies.					•			•	•	•	•			•			
Do not fire into open navigable waterbodies or observable open water.					•			•	•	•	•			•			
No firing of 155-mm rounds into unbuffered areas near the Eagle River relict channel due to space limitations.					•			•		•	•			•			
Use a Fire Direction Center and other systems for accuracy.				•	•			•	•	•	•			•			
Use forward observers to monitor for observable open water and forward observers or radar to observe rounds impacting or bursting (leads to not firing in most waterbodies), with cease fire and shifting to different targets as needed.					•			•	•	•	•			•			
Use night vision equipment or ILLUM rounds to observe targets at night.				•	•			•	•	•	•			•			
Cease fire and initiate an investigation for any round that impacts outside the target area or is not observed impacting.				•	•			•	•	•	•		•	•		•	
Provide 2-week advance notice and late fire notice to the public.	•														•		
Dampen soil with water during excavation and grading to maintain minimum soil moisture. Water a minimum of twice daily on unpaved/untreated roads and on disturbed soil areas with active operations (Alternative 1).		•															
Prohibit excavation and grading during high winds (i.e., greater than 20 miles per hour) (Alternative 1).		•															
Use tarps during transport of fine materials (Alternative 1).		•															
Dampen stockpiles of soil or other loose material with water (Alternative 1).		•															
Use wind breaks (Alternative 1).		•															

	Noise	Air Quality	Safety and Occupational Health	Earth Resources	Water Resources	Wetlands	Vegetation	Fish	Terrestrial Wildlife	Marine Mammals	Special Status Species	Wildland Fire	Cultural Resources	Subsistence	Land Use and Recreation	Hazardous Materials/Waste	Forest Resources
Reduce speeds of construction vehicles to 15 miles per hour if excessive fugitive dust is observed (Alternative 1).		•															
Maintain construction equipment in good operational condition (Alternative 1).		•															
Track Sustainability Development Indicators as detailed in the IDP to demonstrate progress toward Air Force and DoD policies and initiatives and in support of Goal 6 of the IDP: improve JBER as a sustainable installation.		•															
Implement the WFMP within the RTA at JBER.		•										•					•
Adhere to all existing applicable safety regulations and BMPs for range use; munitions storage, use, and transport; construction; prescribed burns; and vehicle travel.			•														
Implement the Sustainable Range Awareness Program to provide education to soldiers to ensure operations and activities at ERF-IA are carried out in a sustainable manner.				•	•	•	•	•	•	•	•		•	•			
Adhere to spill prevention and cleanup procedures outlined in the most current INRMP and JBER Spill Prevention, Control, and Countermeasures Plan.				•	•			•		•	•			•		•	
Adhere to the most current JBER Industrial SWPPP.				•	•			•		•	•			•		•	
Adhere to the project-specific Construction General Permit and SWPPP during construction to minimize potential construction impacts (Alternative 1).				•	•			•		•	•					•	
Place targets strategically to minimize the risk of increased erosion from project activities.				•	•												
Adhere to construction BMPs that minimize erosion and sedimentation (Alternative 1).				•	•	•	•	•		•	•						
Do not place targets on capped areas.				•	•			•	•		•			•		•	
Avoid remediated areas during training exercises to the extent practicable.				•	•			•	•		•			•		•	

	Noise	Air Quality	Safety and Occupational Health	Earth Resources	Water Resources	Wetlands	Vegetation	Fish	Terrestrial Wildlife	Marine Mammals	Special Status Species	Wildland Fire	Cultural Resources	Subsistence	Land Use and Recreation	Hazardous Materials/Waste	Forest Resources
Follow the most recent guidance and recommendations on using types of munitions that minimize impacts to aquatic receptors to the maximum extent practicable.					•			•	•	•	•			•			
Manage wetland habitat in a manner that incurs no net loss of wetland acreage or functions unless necessary to support mission requirements, as prescribed in the INRMP.						•											
Adhere to riparian setbacks and habitat protection buffers set forth in the INRMP.					•	•	•	•	•	•	•			•			
Avoid thinning in wetlands to the extent possible (Alternative 1).						•											
Remove trees in wetlands by hand (Alternative 1).						•											
Limit tree removal in wetlands to no more than one-third of the basal area per acre (Alternative 1).						•											
Limit thinning in wetlands to winter months when soils are frozen (Alternative 1).						•											
During thinning in wetlands, avoid disturbance of the organic duff layer and below the ground surface (Alternative 1).						•											
Monitor installation ecosystems through the Long-Term Ecological Monitoring Plots per the INRMP.							•										
Manage vegetation at existing firing points, as prescribed in the INRMP.							•										
Adhere to BMPs and recommendations of JBER's *Invasive Species Management Plan* to limit the likelihood of introduction and extent of infestation of invasive plant species, which includes implementing equipment cleaning practices for construction equipment (Alternative 1).							•										
Regularly control invasive plant species in the proposed expansion area in accordance with the *Invasive Species Management Plan* and *Integrated Pest Management Plan* (Alternative 1).							•				•						

	Noise	Air Quality	Safety and Occupational Health	Earth Resources	Water Resources	Wetlands	Vegetation	Fish	Terrestrial Wildlife	Marine Mammals	Special Status Species	Wildland Fire	Cultural Resources	Subsistence	Land Use and Recreation	Hazardous Materials/Waste	Forest Resources
Use weed-free soil, seeding mix, and other construction materials to minimize the introduction of invasive plant propagules to the proposed expansion area (Alternative 1).							•				•						
Adhere to the most current INRMP, which contains specific actions to protect, inventory, maintain, and improve fisheries and wildlife resources and their habitats. This document is continually reviewed and revised to respond to new or increasing impacts on fisheries and wildlife resources.								•	•		•			•			
Adhere to state and federal regulations as they relate to fish and wildlife resources. These include, but are not limited to, prohibition on harassment of fish and wildlife.								•	•	•	•			•			
Adhere to federal guidelines for clearing vegetation that detail provisions to minimize take of migratory birds, including avoiding construction activities during the nesting season (Alternative 1).									•		•			•			
Adhere to USFWS bald eagle management guidance.									•		•						
Adhere to regulations that require units that discover wildlife on training ranges or in training areas while conducting live-fire activities to immediately cease fire and report the number/location of animals. Prior to firing, areas around targets are visually cleared for all observable wildlife, such as waterfowl, shorebirds, and moose. Wildlife is not purposefully targeted, harassed, or killed.									•		•			•			
Confer and cooperate with the USFWS to ensure compliance with the MBTA and BGEPA, which may require additional conservation measures for migratory birds.									•		•			•			
Monitor responses and productivity of bald eagles nesting on/using ERF-IA.									•		•						
Maintain all tree-cutting and removal equipment and firefighting equipment in good condition and inspect prior to use to confirm that equipment is in compliance with fire safety standards, including but not limited to spark arrestors, fire extinguishers, and other firefighting equipment.		•										•					•

	Noise	Air Quality	Safety and Occupational Health	Earth Resources	Water Resources	Wetlands	Vegetation	Fish	Terrestrial Wildlife	Marine Mammals	Special Status Species	Wildland Fire	Cultural Resources	Subsistence	Land Use and Recreation	Hazardous Materials/Waste	Forest Resources
Mark clearing limits prior to cutting/vegetation removal in the expansion area (Alternative 1)													•				
Monitor forest thinning in the cultural resources buffer by an archaeologist (Alternative 1).													•				
Require all contractors to produce their own SPCC Plan (Alternative 1)																•	
Require all personnel who access ERF-IA and associated firing points to adhere to JBER's SPCC/C-Plan, *Integrated Hazardous Material Plan*, and *Hazardous Waste Management Plan* regarding spills and hazardous materials and waste management.																•	
Perform a Munitions and Explosives of Concern Investigation prior to clearing the expansion area (Alternative 1).																•	
Maintain access controls to restrict access to the impact area.																•	
Delimb all felled trees and pile logging slash in a location away from live spruce stands. Process all spruce logging slash on-site by either chipping, burning, or burying (Alternative 1).																	•
If contract sale is not possible, move all felled logs to an established woodlot for disposal through the personal use firewood cutting program. Woodlot must be in direct sunlight (Alternative 1).																	•
If contract sale is not possible, stack felled spruce away from live spruce trees. Debark all spruce trees (at logging site prior to moving to woodlot) to expedite the drying of the logs and prevent use of logs by spruce beetles as host material (Alternative 1).																	•
If contract sale is not possible, for hardwoods, either debark or apply a saw-kerf cut the length of the log to expedite drying of material. Cut logs into lengths no greater than 72 inches (Alternative 1).																	•

	Noise	Air Quality	Safety and Occupational Health	Earth Resources	Water Resources	Wetlands	Vegetation	Fish	Terrestrial Wildlife	Marine Mammals	Special Status Species	Wildland Fire	Cultural Resources	Subsistence	Land Use and Recreation	Hazardous Materials/Waste	Forest Resources
Mitigation Determined as a Result of Analysis																	
Following initial clearing of the proposed expansion area, use non-burning methods of slash disposal to the degree practicable (Alternative 1).		•															
Prohibit use of delay fuzes to minimize ground penetration.				•	•				•					•		•	
Make GIS-based tables and a map of remediated areas in ERF-IA available to the units that train at ERF-IA.				•	•				•					•		•	
If an errant round strikes a gravel cap, assume damage and place gravel in the affected area when practicable.				•	•				•					•		•	
Expand the protective measure that specifies limited fire periods for HE rounds to include 155-mm training rounds. This means that 155-mm training rounds, like full HE rounds, would not be fired into inundated areas during inundating tide events and would not be fired into ERF during the seasonal closure period (9 August through 18 October); 155-mm training rounds could still be fired into the proposed expansion area during this time.					•			•	•	•				•			
Appropriately compensate for unavoidable adverse impacts to wetlands through participation in an approved off-site mitigation bank or in-lieu fee instrument (if needed).						•											
Conduct preliminary treatment for management of existing invasive plant species populations and continue regular monitoring and treatment as needed (Alternative 1).							•										
Continue to evaluate rearing and residency of juvenile salmon and/or other fish species using trap surveys and/or eDNA (or other methods as appropriate) to monitor productivity in and adjacent to the ROI.								•		•				•			
Continue fisheries harvest management, population studies (annual salmon enumeration studies), and habitat protection efforts at Sixmile Lake, Eagle River, and Otter Creek to ensure fish resources are effectively managed on JBER.					•			•		•				•			

	Noise	Air Quality	Safety and Occupational Health	Earth Resources	Water Resources	Wetlands	Vegetation	Fish	Terrestrial Wildlife	Marine Mammals	Special Status Species	Wildland Fire	Cultural Resources	Subsistence	Land Use and Recreation	Hazardous Materials/Waste	Forest Resources
Monitor responses of birds to noise disturbance at ERF to inform future bird aircraft strike management decisions.									•					•			
During ice-off conditions, ensure that for each weapon fired (mortar and artillery), the weapon system impact area (target area, 8PE, and 12PE portions of SDZ) does not overlap habitat protective buffers, Eagle Bay, or Eagle River.								•		•				•			
During ice-off conditions, ensure that for each weapon fired (mortar and artillery), Areas A, B, and C of the SDZ do not overlap portions of Eagle Bay, Eagle River, or Otter Creek that have 130- or 500-meter buffers.								•		•				•			
During ice-off conditions, for portions of Upper Eagle River, Otter Creek, and the Otter Creek complex that have a 50-meter buffer, ensure that for artillery, Areas A, B, and C of the SDZ do not overlap the river/creek.								•		•				•			
During ice-off conditions, for portions of Upper Eagle River, Otter Creek, and the Otter Creek complex that have a 50-meter buffer, ensure that for mortars, Area B of the SDZs does not overlap the river/creek. For mortars that overfly the river/creek, ensure the minimum safety distances in DA-Pam 385-63 are applied to areas that overlap the river/creek.								•		•				•			
Implement a *Marine Mammal Monitoring and Mitigation Plan*, which will be submitted to and approved by NMFS prior to implementation of the proposed action. This plan will include a year-round marine mammal monitoring and mitigation program that includes synthesis of visual and acoustic data collection techniques.										•				•			
Conduct pile-burning of logging slash after the onset of fall rains or during the spring prescribed burn window, which occurs between loss of snow cover and green-up (Alternative 1).		•										•					
Provide fire suppression resources with UXO and impact area maps to use when planning suppression response if an ignition is detected.		•										•					•

	Noise	Air Quality	Safety and Occupational Health	Earth Resources	Water Resources	Wetlands	Vegetation	Fish	Terrestrial Wildlife	Marine Mammals	Special Status Species	Wildland Fire	Cultural Resources	Subsistence	Land Use and Recreation	Hazardous Materials/Waste	Forest Resources
If previous cultural surveys of the proposed expansion are more than 10 years old, complete a new survey to evaluate NRHP eligibility of cultural resources present prior to construction (Alternative 1).													•				
Implement protective measures to prevent impacts to eligible historic properties in the proposed expansion area, including vegetation buffers at least 200 feet around affected properties, placement of barriers along the vegetation buffer, prohibiting training and maintenance activities within 200 feet of properties, and monitoring of site conditions annually (Alternative 1).													•				
Prepare a data recovery plan that includes excavation and systematic subsurface testing to identify stratified features and activity areas at the four NRHP-eligible archaeological sites in the proposed expansion area and implement the plan prior to construction (Alternative 1).													•				
Implement the Inadvertent Discovery, Unanticipated Effects, and Discovery of Human Remains protocols, as described further in the Programmatic Agreement.													•				
Conduct pile-burning on-site before winter snow prohibits burning or hydroax/mulch/chip as an alternative to burning (Alternative 1).																	•

	Noise	Air Quality	Safety and Occupational Health	Earth Resources	Water Resources	Wetlands	Vegetation	Fish	Terrestrial Wildlife	Marine Mammals	Special Status Species	Wildland Fire	Cultural Resources	Subsistence	Land Use and Recreation	Hazardous Materials/Waste	Forest Resources
Additional Measures Being Considered																	
Develop and implement appropriate efforts for comparative sampling and monitoring of hydrologic and biometric conditions in areas within and adjacent to ERF-IA.					•			•		•				•			
Consider opportunities to protect, enhance, and/or restore salmon habitat in the affected area, including within and outside the JBER installation boundary.					•			•		•				•			
Maximize use of the expansion area to reduce impacts to areas where juvenile fish may be present and during the height of salmon runs (mid-June through August) (Alternative 1).					•			•		•				•			
Consider the practicability of acoustic testing on the effects of managed fish species within the proposed project area.								•		•				•			

Note: [1] By regulation, WP is prohibited from use in wetlands or other bodies of water. This protective measure prohibits its use throughout ERF-IA, including the expansion area and other upland areas.

Key: BGEPA = Bald and Golden Eagle Protection Act; BMP = best management practice; C-Plan = Oil Discharge Prevention and Contingency Plan; DA Pam = Department of the Army Pamphlet; DoD = Department of Defense; ERF = Eagle River Flats; ERF-IA = Eagle River Flats Impact Area; GIS = Geographic Information System; HE = high explosive; IDP = *Installation Development Plan*; ILLUM = illumination; INRMP = *Integrated Natural Resources Management Plan*; JBER = Joint Base Elmendorf-Richardson; MBTA = Migratory Bird Treaty Act; mm = millimeter; NMFS = National Marine Fisheries Service; NRHP = National Register of Historic Places; ROI = Region of Influence; RTA = Richardson Training Area; SDZ = Surface Danger Zone; SPCC = *Spill Prevention Control and Countermeasure*; SWPPP = *Storm Water Pollution Prevention Plan*; TA = Training Area; USFWS = United States Fish and Wildlife Service; UXO = unexploded ordnances; WFMP = *Wildland Fire Management Plan*; WP = white phosphorus

Table S-5 Mitigation Measures by Munitions Type

	All Full HE Rounds	155-mm Training Rounds	Full HE Howitzers	Full HE Mortars	All 155-mm Rounds	Other Rounds
Protective Measures Built Into the Proposed Action						
Implement new habitat protective buffers (fire exclusion zones, No Fire Areas) based on noise modeling results.	•	•	•	•	•	•
Implement limited fire periods for HE rounds during all inundating tide events (predicted and observed).	•		•	•		
Implement a limited fire period for HE rounds during the peak beluga whale upriver visitation period (determined to be 9 August through 18 October; dates will be periodically reviewed; HE rounds could still be fired into the upland expansion area during this time).	•		•	•		
Redistribute targets away from buffer areas.	•	•	•	•	•	•
Prohibit use of white phosphorus.[1]	NA	NA	NA	NA	NA	•
Target higher elevation areas to protect fish in vegetated low-lying ponds or depressions that cannot be easily observed.	•	•	•	•	•	•
During inundating tides at night, restrict units to targets outside routinely inundated areas.	•	•	•	•	•	•
Use visual clearing and slow start prior to firing.	•	•	•	•	•	•
Cease fire if marine mammals are observed (30 minutes for beluga whales, 15 minutes for other marine mammals, or until they are seen moving out of Eagle River).	•	•	•	•	•	•
Clear unexploded rounds from the expansion area after each training event (Alternative 1 only).	•	•	•	•	•	•
Best Management Practices and Standard Operating Procedures						
Do not place targets in open waterbodies.	•	•	•	•	•	•
Do not fire into navigable waterbodies or observable open water.	•	•	•	•	•	•
No firing of 155-mm rounds into the unbuffered areas near the Eagle River relict channel due to space limitations.		•			•	
Use a Fire Direction Center and other systems for accuracy.	•	•	•	•	•	•
Use forward observers or radar to monitor for observable open water and forward observers or radar to observe rounds impacting or bursting (leads to not firing in most waterbodies), with cease fire and shifting to different targets as needed.	•	•	•	•	•	•

	All Full HE Rounds	155-mm Training Rounds	Full HE Howitzers	Full HE Mortars	All 155-mm Rounds	Other Rounds
Use night vision equipment or ILLUM rounds to observe targets at night.	•	•	•	•	•	•
Cease fire and conduct an investigation for any round that impacts outside the target area or is not observed impacting.	•	•	•	•	•	•
Do not place targets on capped areas	•	•	•	•	•	•
Mitigation Measures Determined as a Result of Analysis						
Expand the protective measure that specifies limited fire periods for HE rounds to include 155-mm training rounds. This means that 155-mm training rounds, like full HE rounds, would not be fired into inundated areas during inundating tide events and would not be fired into ERF during the seasonal closure period (9 August through 18 October); 155-mm training rounds could still be fired into the proposed expansion area during this time.		•				
Implement 200-foot vegetative buffers around identified historic properties in the proposed expansion area (Alternative 1).	•	•	•	•	•	•
Prohibit use of delay fuzes to minimize ground penetration.	•	•	•	•	•	•
During ice-off conditions, ensure that for each weapon fired (mortar and artillery), the weapon system impact area (target area, 8PE, and 12PE portions of SDZ) does not overlap habitat protective buffers, Eagle Bay, or Eagle River.	•					
During ice-off conditions, ensure that for each weapon fired (mortar and artillery), Areas A, B, and C of the SDZ do not overlap portions of Eagle Bay, Eagle River, or Otter Creek that have 130- or 500-meter buffers.	•					
During ice-off conditions, for portions of Upper Eagle River, Otter Creek, and the Otter Creek complex that have a 50-meter buffer, ensure that for artillery, Areas A, B, and C of the SDZ do not overlap the river/creek.			•			
During ice-off conditions, for portions of Upper Eagle River, Otter Creek, and the Otter Creek complex that have a 50-meter buffer, ensure that for mortars, Area B of the SDZs does not overlap the river/creek. For mortars that overfly the river/creek, ensure the minimum safety distances in DA-Pam 385-63 are applied to areas that overlap the river/creek.				•		
Additional Measures Being Considered						
Maximize use of the expansion area to reduce impacts to areas where juvenile fish may be present and during the height of salmon runs (mid-June through August) (Alternative 1).	•	•	•	•	•	•

Note: [1] By regulation, WP is prohibited from use in wetlands or other bodies of water. This protective measure prohibits its use throughout ERF-IA, including the expansion area and other upland areas.

Key: ERF-IA = Eagle River Flats Impact Area; HE = high explosive; ILLUM = illumination; mm = millimeter; NA = measure is not applicable to this munition type; SDZ = Surface Danger Zone

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LIST OF ACRONYMS AND ABBREVIATIONS

ºF	degrees Fahrenheit
µg/g	microgram per gram
µg/L	microgram per liter
µPa	microPascal
AAC	Alaska Administrative Code
ABN	Airborne
ACAM	Air Conformity Applicability Model
ACCS	Alaska Center for Conservation Science
AD	Anno Domini
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
ADOT&PF	Alaska Department of Transportation and Public Facilities
ADP	Army Doctrine Publication
AFB	Air Force Base
AFH	Air Force Handbook
AFI	Air Force Instruction
AFMAN	Air Force Manual
AICUZ	Air Installation Compatible Use Zone
Air Force	United States Air Force
AMMOP	Alaska Marine Mammal Observer Program
ANC	Ted Stevens Anchorage International Airport
ANCSA	Alaska Native Claims Settlement Act
ANILCA	Alaska National Interest Lands Conservation Act
APE	Area of Potential Effect
AR	Army Regulation
Army	United States Army
ARRC	Alaska Railroad Corporation
AS	Alaska Statute
ATP	Army Techniques Publication
AUD INJ	auditory injury
BA	Biological Assessment
BCT	Brigade Combat Team
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BMP	best management practice
BNOISE2	Blast Noise Model version 2
cal BP	calibrated years before the present
CALFEX	Combined Arms Live Fire Exercise
CDNL	C-weighted Day-Night Average Noise Level
CES	Civil Engineer Squadron
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations

cfs	cubic feet per second
CMT	culturally modified trees
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
C-Plan	*Oil Discharge Prevention and Contingency Plan*
CRREL	Cold Regions Research and Engineering Laboratory
CTR Project	Cargo Terminals Replacement Project
CWA	Clean Water Act
CY	calendar year
DAF	Department of the Air Force
DAFI	Department of the Air Force Instruction
DA Pam	Department of the Army Pamphlet
dB	decibel
dBA	A-weighted decibel
dBC	C-weighted decibel
DDT	dichlorodiphenyltrichloroethane
DNL	day-night average sound level (synonymous with Ldn)
DNT	dinitrotoluene
DoD	Department of Defense
DoDI	Department of Defense Instruction
DPS	Distinct Population Segment
DTE	Distance to Effect
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EO	Executive Order
EOD	Explosive Ordnance Disposal
ERF	Eagle River Flats
ERF-IA	Eagle River Flats Impact Area
ERP	Environmental Restoration Program
ESA	Endangered Species Act
ESQD	explosive safety quantity-distance
FA	field artillery
FAA	Federal Aviation Administration
FDC	Fire Direction Center
FHWA	Federal Highway Administration
FONSI	Finding of No Significant Impact
FR	*Federal Register*
FRPC	Full Range Practice Cartridge
FY	fiscal year
GHG	greenhouse gas
GIS	Geographic Information System

HAP	hazardous air pollutant
HC	hexachloroethane
HE	high explosive
HMX	High Melting Explosive
HO	high-order
IBCT (ABN)	Infantry Brigade Combat Team (Airborne)
ICRMP	*Integrated Cultural Resources Management Plan*
IDP	*Installation Development Plan*
IHA	Incidental Harassment Authorization
ILLUM	illumination
IM	insensitive munition
IPaC	Information for Planning and Conservation
INRMP	*Integrated Natural Resources Management Plan*
IRP	Installation Restoration Program
ITA	incidental take authorization
IWTS	Integrated Weapons Training Strategy
JBER	Joint Base Elmendorf-Richardson
Lmax	maximum sound level
LO	low-order
Lpk	Peak Sound Pressure Level
MBTA	Migratory Bird Treaty Act
mg/L	milligrams per liter
MLLW	Mean Lower Low Water
mm	millimeter
MMAP	Marine Mammal Authorization Program
MMO	marine mammal observer
MMPA	Marine Mammal Protection Act
MMRP	Military Munitions Response Program
MOA	Memorandum of Agreement
mph	miles per hour
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSAT	mobile source air toxics
MSB	Matanuska–Susitna Borough
NAAQS	National Ambient Air Quality Standards
NALA	North Anchorage Land Agreement
Navy	U.S. Department of the Navy
NEPA	National Environmental Policy Act
NES1 Project	North Extension Stabilization Project
NEW	Net Explosive Weight
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent

NOx	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPS	National Park Service
NRHP	National Register of Historic Places
OP	Observation Point
OSHA	Occupational Safety and Health Administration
OU	operable unit
PA	Programmatic Agreement
PAH	polycyclic aromatic hydrocarbon
PAMP	Port of Alaska Modernization Program
PBF	physical or biological feature
PCB	polychlorinated biphenyl
PM_{10}	particulate matter less than or equal to 10 micrometers in diameter
$PM_{2.5}$	particulate matter less than or equal to 2.5 micrometers in diameter
PMART	proposed mortar and artillery training
POA	Port of Alaska
POL	petroleum, oil, or lubricant
PTS	permanent threshold shift
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation and Recovery Act
RDX	Royal Demolition Explosive
ROD	Record of Decision
ROI	Region of Influence
RP	red phosphorus
RTA	Richardson Training Area
SDWA	Safe Drinking Water Act
SDZ	Surface Danger Zone
SERDP	Strategic Environmental Research and Development Program
SGCN	Species of Greatest Conservation Needs
SHPO	State Historic Preservation Officer
SIP	*State Implementation Plan*
SOP	standard operating procedure
SPCC	*Spill Prevention Control and Countermeasure*
SRA	Sustainable Range Awareness
SSC	Species of Special Concern
SWPPP	*Storm Water Pollution Prevention Plan*
TA	Training Area
TC	Training Circular
TNT	trinitrotoluene
TSS	total suspended solids
TTS	temporary threshold shift
U.S.	United States
USACE	U.S. Army Corps of Engineers

USARAK	U.S. Army Alaska
USARAL	U.S. Army Alaska (as denoted in 1947)
U.S.C.	United States Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USNVC	U.S. National Vegetation Classification
UXO	unexploded ordnance
VOC	volatile organic compound
WFMP	*Wildland Fire Management Plan*
WOTUS	waters of the U.S.
WP	white phosphorus

1.0 PURPOSE AND NEED FOR THE PROPOSED MORTAR AND ARTILLERY TRAINING

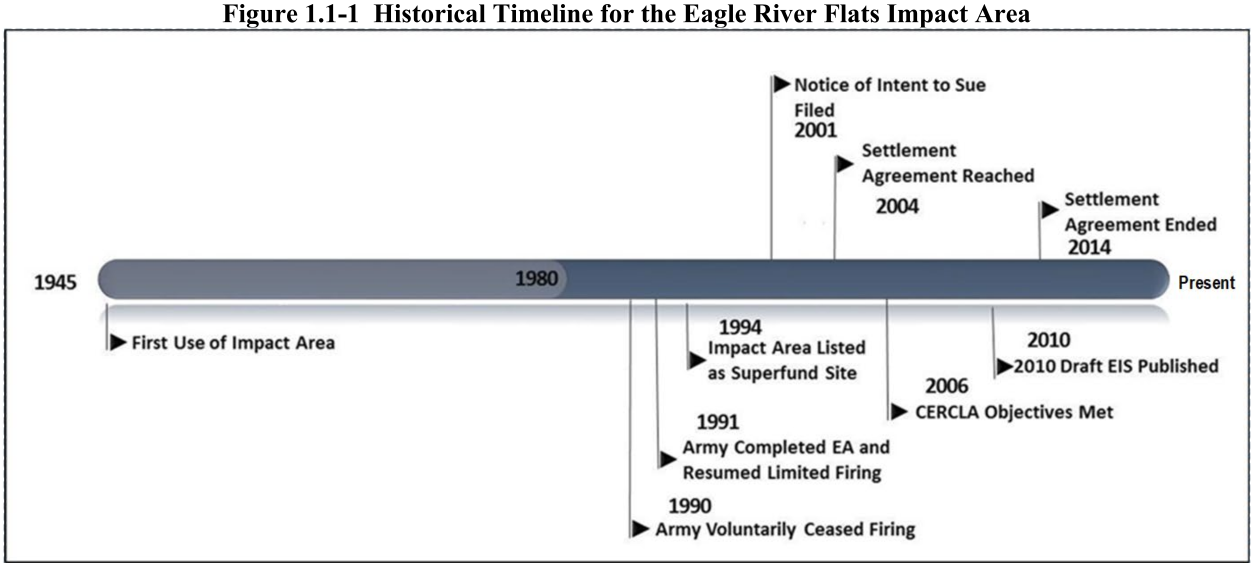
1.1 INTRODUCTION

This Environmental Impact Statement (EIS) addresses the proposed mortar and artillery training (PMART) at the Richardson Training Area (RTA) on Joint Base Elmendorf-Richardson (JBER), Alaska. This EIS is being prepared pursuant to the National Environmental Policy Act of 1969 (NEPA), as amended (42 United States Code [U.S.C.] § 4321 et seq.); United States (U.S.) Air Force (Air Force) Environmental Impact Analysis Process (EIAP; 32 Code of Federal Regulations [CFR] Part 989); and U.S. Army (Army) NEPA implementing regulations (32 CFR Part 651). This EIS has been prepared to ensure that comprehensive and systematic consideration is given to potential environmental impacts that may result from implementing the proposed action or any reasonable alternatives. The detailed NEPA process is presented in Section 2.5 of this EIS.

The Air Force manages JBER and is responsible for ensuring NEPA compliance for actions on the installation, while the Army retains operational responsibility for training areas and ranges and is the project proponent—the agency proposing the PMART action. The Air Force is the lead agency for preparation of this EIS. The Army and the National Marine Fisheries Service (NMFS) are cooperating agencies for the EIS.

A wide range of direct and indirect weapons systems and munitions have been used on JBER, throughout the history of the installation. Eagle River Flats Impact Area (ERF-IA) has been used for weapons training since the 1940s and is currently the only dedicated impact area at JBER. This impact area supported heavy all-season use until February 1990, when the Army implemented a temporary firing suspension due to a suspected correlation between munitions used during training at ERF-IA and a high rate of waterfowl mortality that Army biologists first began to notice in 1980. Figure 1.1-1 presents a timeline of actions pertaining to ERF-IA.

Figure 1.1-1 Historical Timeline for the Eagle River Flats Impact Area



Investigations into waterfowl mortality began around 1982, but white phosphorus (WP) was not determined to be the causative agent until late 1990. WP particles had been dispersed into ERF-IA during detonation of specific smoke munitions. Dabbling waterfowl, such as teal and mallards that feed mainly on seeds and insects in shallow pond bottom sediments, consumed WP particles while grazing for food, which resulted in mortality. The Army has since prohibited WP from being fired into open waterbodies or wetlands, as specified in Department of the Army Pamphlet (DA Pam) 385-63.

In 1991, the Army completed an Environmental Assessment (EA) that allowed for the resumption of use of the impact area under limited conditions that prevented the addition, disturbance, and redistribution of WP. The 1991 EA resulted in a Finding of No Significant Impact (FONSI) for the winter firing alternative, which prevented firing into ERF-IA during the summer. In 1994, the impact area was placed on the National Priorities List (NPL) and designated as a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site. The CERCLA Record of Decision (ROD) in 1998 specified the process for remediating the WP contamination. The remedial action objectives were first met in 2006 and have been maintained since.

In 2001, a Notice of Intent (NOI) was filed by the Alaska Community Action on Toxics, Cook Inlet Keeper, Chickaloon Village Traditional Council, Janet Daniels, Richard Martin and Military Toxics Project (collectively plaintiffs) to sue the Army, U.S. Department of Defense (DoD), and Donald Rumsfeld in his official capacity as U.S. Secretary of Defense, for activities in ERF-IA. This resulted in a settlement agreement in 2004. Under the terms of the agreement, among other things, the Army agreed to (1) continue undertaking monitoring studies to ensure that munition constituents were not moving off of the range into Knik Arm, (2) monitor Cook Inlet beluga whales (*Delphinapterus leucas*) in the vicinity of the range and continue to assist NMFS in research on beluga whales in Upper Cook Inlet, (3) assist the plaintiffs in understanding the data from these studies by funding a technical expert to review the studies and results, and (4) provide information to the plaintiffs on the numbers and types of munitions used at the range. The Army fulfilled the requirements of the settlement agreement, which expired without protest in 2014.

Cook Inlet beluga whales are present in Eagle Bay and Eagle River and may be influenced by the live-fire weapons training in ERF-IA. In 2008, the Cook Inlet beluga whale was designated as an endangered species under the Endangered Species Act (ESA). Critical habitat for the beluga whale was established in a 2011 Final Rule (76 *Federal Register* [FR] 20180). Eagle Bay, adjacent to JBER and ERF-IA, lies in the critical habitat designated area; however, Eagle River (as with all other streams in Cook Inlet except the Susitna, Little Susitna, Kenai, and Chickaloon Rivers) was excluded as critical habitat as defined in the final rule. The designation under the ESA requires consultation for any actions that may affect the species or critical habitat. JBER is operating under a Letter of Concurrence from NMFS for actions currently taken at JBER.

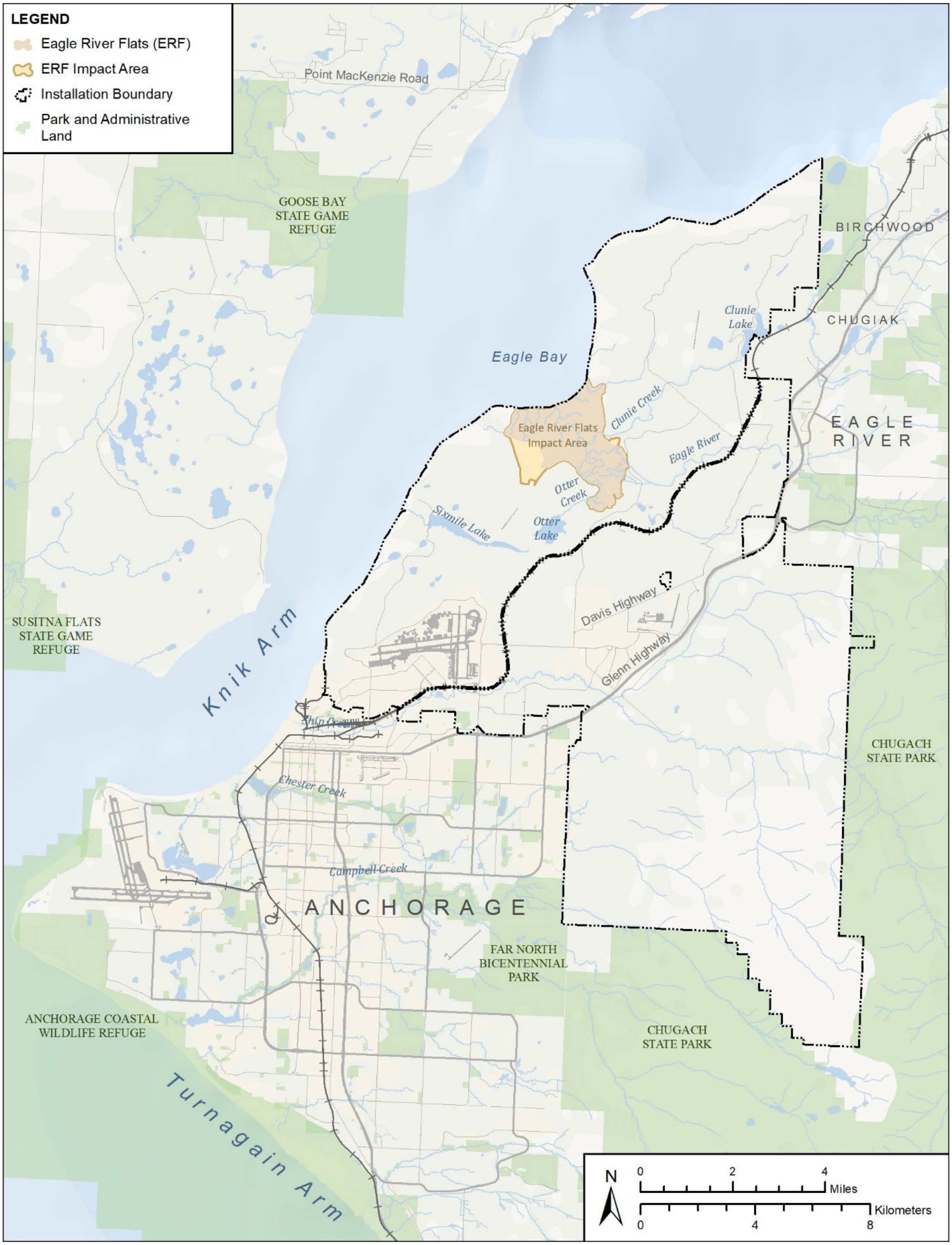
During the time from the seasonal firing suspension to the present, units stationed at JBER have been unable to conduct the full range of training, qualification, and certification tasks at JBER. Based on the completion of CERCLA remediation and attainment of the CERCLA remedial action objectives in the ROD published in the Air Force Administrative Record September 1998 (CH2M Hill 1998), the Army decided to seek expansion of the capability to conduct mortar and artillery training by reinstating all-season firing into ERF-IA and expanding ERF-IA to include an additional upland area suitable for a Combined Arms Live Fire Exercise (CALFEX) range.

In 2010, a draft EIS was developed to resume year-round firing opportunities at the former Fort Richardson. However, a final EIS was never developed due to the transition to a joint base, changes in the proposed action, and the identification of a new potential alternative that was not analyzed in the draft EIS. Based on these factors, a new NOI (85 FR 14928) for the purpose and need as described in this EIS has been issued.

1.2 LOCATION

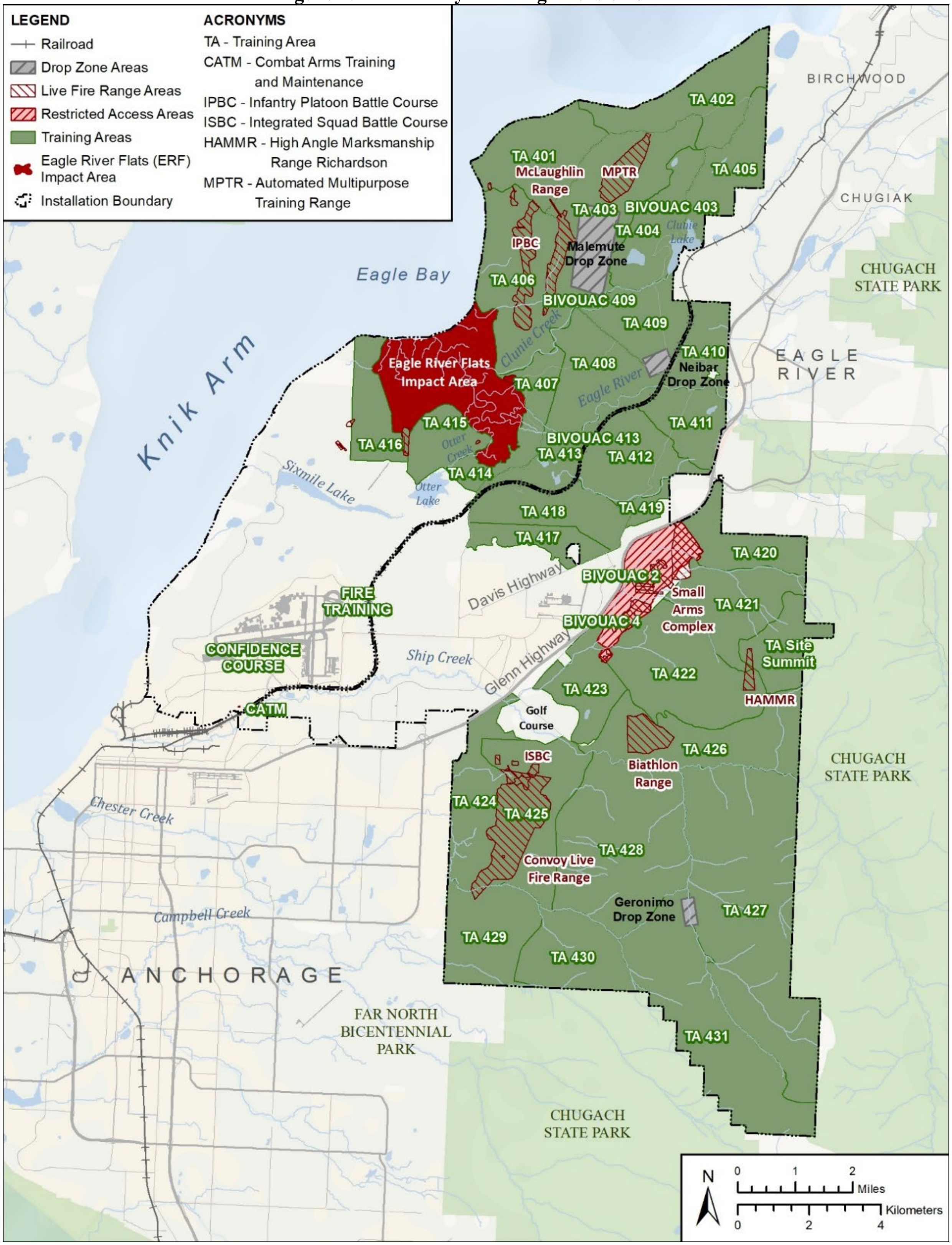
JBER is a 73,041-acre military installation in southcentral Alaska, adjacent to Anchorage and the community of Eagle River (Figure 1.2-1 and Figure 1.2-2). Knik Arm of Cook Inlet borders the northwest boundary of the installation, and Chugach State Park lies to the south and southeast. The community of Eagle River lies along the northeast border, and Anchorage forms the southwestern boundary. Knik Arm borders JBER to the west and north for approximately 20 miles. Knik Arm includes Eagle Bay, which lies outside the installation boundary. Water is generally shallow and murky, and tides in this area are extreme,

Figure 1.2-1 Installation Setting



Sources: JBER 2020a, 2023b

Figure 1.2-2 Military Training Areas on JBER



Sources: JBER 2019a, 2020a, 2023b

Note: BIVOUAC is a temporary encampment usually involving tents or other temporary shelter.

with high and low tide differentials reaching over 36 feet which creates a tidal zone with minimal vegetation, with the exception of the Eagle River Flats (ERF). Within Eagle Bay, the Mean Low Water depth ranges from 0–10 feet (National Oceanic and Atmospheric Administration [NOAA] Hydrographic Survey H-9439), with significant areas exposed as mud flats, particularly along the shoreline and toward the center of Knik Arm.

Eagle Bay is located where Eagle River empties into Knik Arm. Tidal activity in Eagle Bay has created an estuarine salt marsh encompassing ERF. Numerous ponds dot the marsh. Many of these are shallow mudflat ponds, less than 6 inches deep, that often dry up during summer; others are more permanent with depths over 20 inches (JBER 2023a). These deeper ponds often are fed by freshwater streams and springs. The salinity level varies from 1 to 46 parts per thousand; salinity in most ponds is below 10 parts per thousand (JBER 2023a). Tidal flooding of ERF infuses ponds with saltwater and sediments from Eagle Bay. Elevation determines frequency of floods, varying from mean sea level to 18 feet above mean sea level. Flooding may occur daily during high tides in areas less than 12 feet above mean sea level. In areas 12–13 feet above mean sea level, flooding occurs only with the highest tide each month; in areas above 13 feet, flooding occurs only during extremely high tides (JBER 2023a).

ERF consists of estuarine emergent meadows, fringed by estuarine shrub–carr wetlands and palustrine forest. ERF includes more than 95 percent of the total estuarine wetlands on JBER (JBER 2023a). Eagle River is the predominant waterbody flowing through ERF. Otter Creek also flows through ERF until its confluence with Eagle River. Eagle River emerges from a narrow valley along the easternmost point of the impact area then meanders through ERF and discharges into Eagle Bay. Otter Creek stems from Otter Lake and flows through the southern portion of ERF, where two small tributaries connect to the main Otter Creek channel referred to as the Otter Creek complex. Clunie Creek is also hydrologically connected to Eagle River through re-emergence of an underground spring on the eastern edge of ERF (JBER 2023a). Clunie Creek leaves Clunie Lake at the southern tip of the lake and proceeds southwest toward ERF; south of Artillery Road, however, the creek dissipates into the ground and loses all stream bed and bank morphology until it re-emerges at a small pond at the edge of ERF (JBER 2023a). More detailed figures depicting waterbodies in ERF can be found in Chapter 3.

ERF-IA is a 2,483-acre dedicated impact area on JBER (Figure 1.2-1), of which approximately 2,092 acres lies within ERF; the remaining acreage is primarily contained in an upland area near the western boundary and bluffs along its northern and southern boundaries. Throughout this EIS, the term ERF-IA is used to denote the entire 2,483-acre dedicated impact area, while the term ERF is used to denote the 2,092-acre estuarine salt marsh. ERF is surrounded on the north and south sides by steep bluffs vegetated with upland spruce and birch forest. More detailed figures depicting ERF-IA wetland and upland areas can be found in Chapter 3.

The proposed expansion area for CALFEX lies along the northeastern boundary of the current impact area and would comprise approximately 585 acres. The proposed area is mostly forested but also includes wetland designated areas. Four confirmed cultural sites are clustered in the area that would be protected using standing timber, downed tree barricades, berming, or other appropriate means.

1.3 MILITARY HISTORY OF FORT RICHARDSON AND JOINT BASE ELMENDORF-RICHARDSON

1.3.1 Unit Histories 1940s to Today

Fort Richardson was constructed as an Army Air Corps Station during 1940–1941 on the site of what is now JBER (see Section 1.3.3 for more information on joint basing). Fort Richardson encompassed the entirety of what is today JBER and in some areas extended beyond the boundaries of present-day JBER. In 1947, the Army Air Corps Station was re-designated U.S. Army Alaska (denoted as USARAL at that time) and was established as the headquarters of U.S. Army Alaska. Military missions assigned to USARAL included ground and air defense of Alaska, with priority to the Anchorage and Fairbanks areas.

The 172nd Infantry Brigade (Mechanized) was officially designated at Fort Richardson in 1963 as the mechanized force component of USARAL. USARAL was discontinued as a major subordinate command on 31 December 1972, and all Army forces in Alaska reorganized under the command of U.S. Army Alaska (USARAK) at Fort Richardson. The 172nd Infantry Brigade was the principal combat formation, split-stationed at both Forts Richardson and Wainwright. The brigade deactivated in 1986.

The 6th Infantry Division (Light) was activated at Forts Richardson and Wainwright in 1986, using the 172nd Infantry Brigade (Separate) as the nucleus. The division was the Army's primary arctic warfare division. USARAK continued to be the primary headquarters for all Army forces stationed in Alaska. The division was deactivated on 6 July 1994 and re-designated the 172nd Infantry Brigade. In 2002, the Army began the process of transforming its force structure into brigade combat teams (BCTs) to allow standardized military unit design and training, and to provide commonality across the entire Army (Active, Guard, and Reserve components). The Army developed a programmatic EIS to initiate transformation of the force, and the ROD for the programmatic EIS selected USARAK as one of the sites for transformation. Subsequent to that decision, the Army completed an EIS (USARAK 2004) and other supporting NEPA documentation to analyze further the impacts of transforming Army forces in Alaska.

In 2004, as part of USARAK Transformation, the portion of the 172nd Infantry Brigade stationed at Fort Richardson was augmented and re-designated as an Airborne Task Force. In 2005, the Airborne Task Force was transformed into the Airborne Brigade Combat Team. At that point, the major units under USARAK were the 1st Stryker BCT, 25th Infantry Division located at Fort Wainwright; and the 4th BCT (Airborne), 25th Infantry Division (commonly referred to as the Infantry Brigade Combat Team or 4/25 IBCT [ABN]) located at JBER. In 2008, Army growth resulted in an additional 1,773 soldiers stationed at Fort Richardson, and with that growth came an increase in training requirements.

On 6 June 2022, the Army reactivated the 11th Airborne Division as the 11th Airborne Division (Arctic) and transferred the units formerly assigned to the 25th Infantry Division to the new division. USARAK continued as the administrative headquarters for all Army forces in Alaska. Both the 11th Airborne Division and USARAK are commanded by the same Commanding General. The Army established the 11th Airborne Division (Arctic) as part of its Arctic Strategy with a mission to "generate and globally project multi-domain forces that are specifically trained, equipped, and sustained to survive over extended periods, conduct decisive action in support of unified land operations, and win in extreme cold weather and rugged mountainous conditions. On order, execute land component command functions in support of homeland defense and defense support to civil authorities in Alaska."

1.3.2 The Army's Historical Use of Eagle River Flats Impact Area

The military has fired munitions into ERF-IA since the 1940s. These munitions possibly included 107-millimeter (mm), 81-mm, 60-mm, and 120-mm mortar rounds; 155-mm and 105-mm howitzer rounds; 90-mm recoilless rifle rounds; 66-mm light anti tank weapons; 40-mm grenades; 30-mm training rounds; 2.75-inch training rockets; Shillelagh missiles; flares; and small arms rounds (CH2M Hill 1994). Prior to the winter-only firing restrictions, the Army used the impact area for all-season weapons training, and range records show that roughly 12,000 artillery and mortar rounds were fired into ERF-IA each year, including about 9,000 high-explosive (HE) rounds and 440 WP rounds. Additionally, the Alaska Army National Guard has historically used ERF-IA to conduct required proficiency training.

1.3.3 Joint Basing and Creation of Joint Base Elmendorf-Richardson (JBER)

In 2005, the Base Realignment and Closure Commission called for the realignment of Elmendorf Air Force Base (AFB) and Fort Richardson into a single joint installation. The new joint installation became JBER, effective 1 October 2010. The decision listed the Air Force as the supporting agency, implementing and providing the funding vehicle for support to the entire joint base. On 30 July 2010, the 673d Air Base Wing activated as the host wing, combining installation management functions of Elmendorf AFB's 3rd Wing and Army Garrison Fort Richardson. Management of JBER falls under the purview of the Air Force. The

Army retains operational responsibility for training areas and ranges in accordance with governing regulations. JBER reached full operational capability on 1 October 2010, and supports Alaskan Command, 11th Air Force, 11th Airborne Division, and more than 90 supported and tenant organizations. Under the JBER construct, 11th Airborne Division is classified as a "supported Component," and the Air Force is the "supporting Component." The Air Force is responsible for ensuring NEPA compliance for actions occurring at JBER, although 11th Airborne Division retains certain responsibilities as the project proponent.

1.4 ARMY TRAINING, QUALIFICATION, AND CERTIFICATION OBJECTIVES AND STANDARDS

1.4.1 Army Training Objectives

Based on the training doctrine described in Section 1.4.2, the Army has formulated the following objectives to meet the intent of the Army Training Standards:

- Optimize the ability to train, qualify, and certify units to a proficiency level set by Army standards, with the full array of indirect fire (the impacts of rounds are not seen from the firing location [e.g., mortars and artillery]) and direct-fire (the impacts of rounds are observed from the firing location [e.g., small arms/machine guns]) weapons and munitions in an efficient manner at home station.
- Optimize opportunities for live-fire weapons qualification and training at JBER to ensure soldiers achieve and maintain individual and crew proficiency, qualify newly assigned soldiers throughout the year, train prior to deployments, and continually qualify weapon system crews in accordance with the Army training model requiring repetitive training.
- Ensure long-term, realistic training at JBER that will provide soldiers opportunities to practice their skills in combat-like conditions in accordance with the Army Integrated Weapons Training Strategy (IWTS) (Training Circular [TC] 3-20-0), Army Doctrine Publication (ADP) 7-0, and other applicable regulations and doctrine.
- Improve soldier quality of life and family stability by minimizing the need for travel to other installations for small unit training (company/battery/troop and below).
- Minimize overall training costs and lost time as a result of repetitive travel to other installations.
- Avoid land use conflicts.

1.4.2 Army Training Standards

Army training, qualification, and certification requires the use of multiple methods of training including live-fire, virtual, and constructive environments. Live fire is the use of the full range of service munitions for all calibers for all weapon systems. To maintain proficiency and qualification standards, live-fire training is required at all levels (section, platoon, company, and battalion) on a recurring basis. The unit commander is responsible for scheduling this training to meet the needs of the unit. This section describes the Army training doctrine and the need for live-fire artillery/mortar training and qualification as a key component of the Army IWTS and is the focus of this EIS.

The doctrinal publications discussion is included to provide the sources for more in-depth understanding; however, the critical elements of the included publications are in this EIS to facilitate a decision. The applicable Army doctrine relevant to this EIS begins with ADP 3-0, *Operations*, at the capstone level. Keystone doctrinal publications include ADP 7-0, *Training*, and Field Manual 7-0, *Training*. The principal governing documents containing specific training, qualification and certification standards are TCs 3-20.0, 3-20.33, and 3-09.8. Annual ammunition requirements are contained in DA Pam 350-38, *Training, Standards in Weapons Training*. Unit combined arms live-fire certification criteria and evaluation metrics are contained in TC 3-20.0, *Integrated Weapons Training Strategy*. TC 3-20.0 provides a detailed description of the maneuver force's overarching training strategy for all individual and crew-served weapons to achieve fire and maneuver proficiency. It includes the purpose of the IWTS along with its standard structure, training requirements, combined arms asset integration, and resource requirements for BCTs' subordinate maneuver elements. It provides training principles and techniques for units to gain proficiency in engaging and destroying threats ethically, effectively, and efficiently in any operational environment. TC 3-20.0 provides CALFEX certification requirements, evaluation criteria, and condemnation criteria to determine the expiration of qualifications, certifications, and proficiency ratings. Condemnation criteria refer to those events—other than time—that can cause an individual or a unit to lose their proficiency ratings.

Qualification and certification standards for Army artillery weapon systems are contained in TC 3-09.8, *Fire Support and Field Artillery Certification and Qualification*, which provides the standards to certify and qualify Field Artillery individuals, teams, crews, sections, platoons, batteries, and battalions. The programs and requirements detailed in TC 3-09.8 follow the concepts and guidance in ADP 7-0. TC 3-09.9 includes standards for both the 105-mm and 155-mm howitzers involved in this EIS.

Qualification standards for Army mortars are contained in TC 3-20.33, *Training and Qualification of Mortars*, which provides the training framework to assist mortar sections and platoons to train, qualify, and certify to a common standard. This training strategy provides all prerequisite and required events to build, evaluate, and execute the critical tasks, culminating in qualification. The strategy provides the required ammunition resources, training area, firing point, and impact area requirements to ensure units properly generate proficient mortar squads, sections, and platoons that provide effective high angle indirect fire support to maneuver units. TC 3-20.33 is a supporting document to TC 3-20.0 and includes standards for mortars involved in this EIS.

A commander focuses the unit's efforts to optimize available time, ensuring the unit trains the right tasks to meet mission requirements and to support the next higher commander's intent. "Train to Win in a Complex World" means training under an expected operational environment for the mission. Replicating an operational environment is critical to ensuring that training is as realistic and challenging as possible.

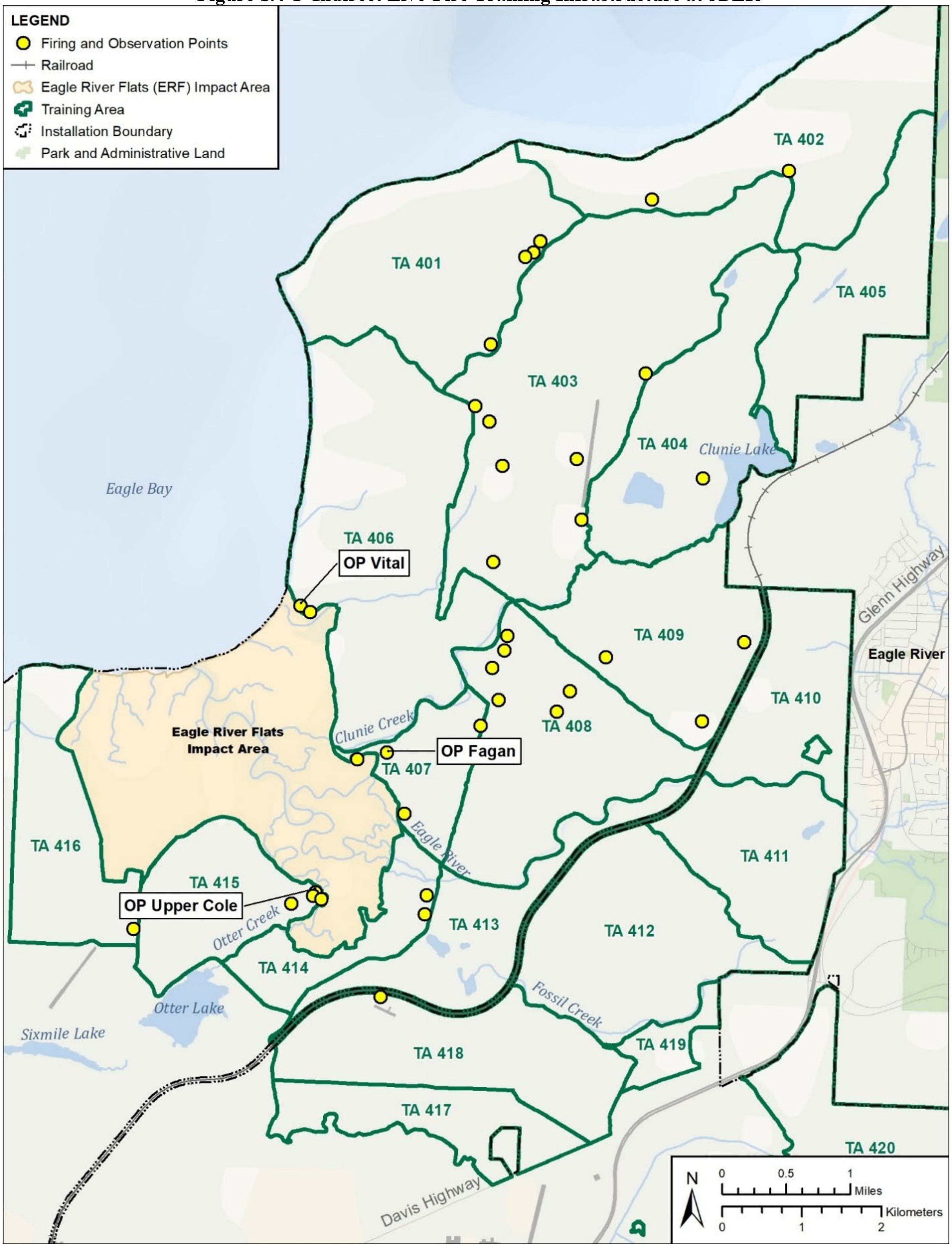
DA Pam 350–38 provides standardized training strategies for weapons training and identifies the amount of ammunition required to execute standardized training. DA Pam 350-38 also specifies the frequency of repetitive training (quarterly, semi-annually, annually, and as required) throughout the year to ensure soldiers maintain their skill proficiency. The required intervals vary by unit based on the last time the unit, as a whole, qualified for the specific requirement. This can occur any time, and if a new soldier joins the unit who has not met the qualifications, then the qualifications cycle starts over. DA Pam 350-38 is the basis for determining ammunition requirements for specific types of training and for providing the means to annually forecast ammunition needs. DA Pam 350-38 is used in programming and resourcing ammunition on an Army-wide basis to ensure that units have the resources to train to standard.

Training standards for an IBCT such as the 2/11 IBCT (ABN) stationed at JBER include proficiency and qualification training using the following major weapon systems:

- 60-mm mortar
- 81-mm mortar
- 120-mm mortar
- 105-mm howitzer
- 155-mm howitzer

Figure 1.4-1 provides a visualization of the established training infrastructure at JBER that supports indirect live fire. Though firing points are identified, it should be noted that depending on the mission objective, a unit may use any open area for indirect live fire.

Figure 1.4-1 Indirect Live-Fire Training Infrastructure at JBER



Sources: JBER 2020a, 2023c

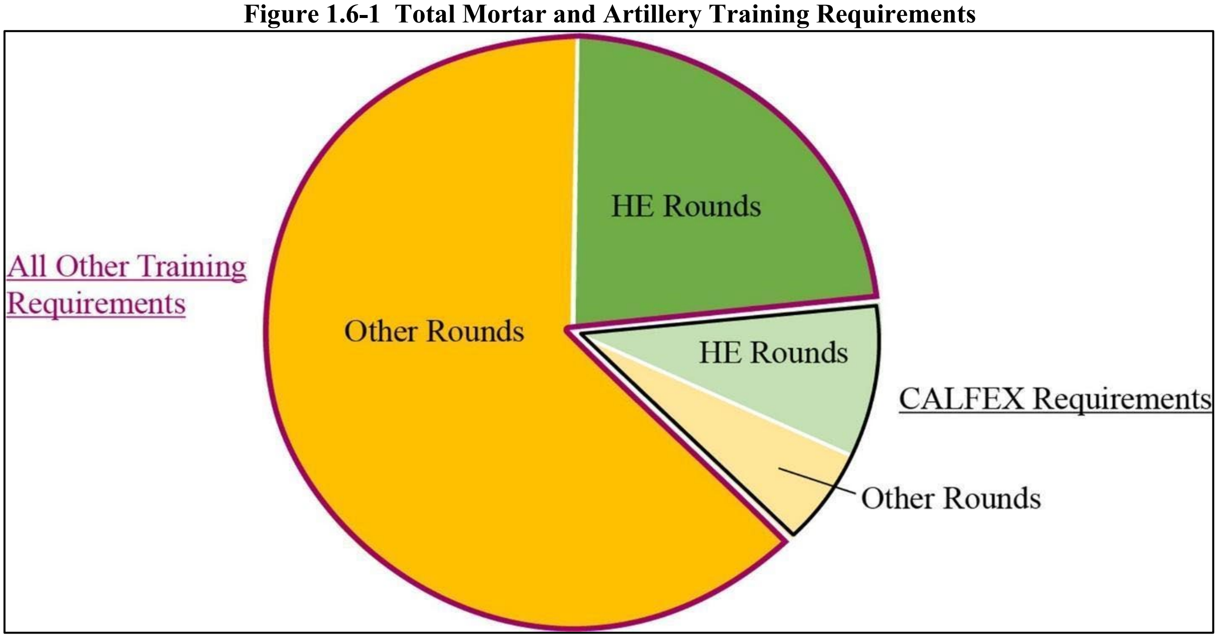
1.5 PURPOSE

The Air Force (lead agency), Army, and NMFS (cooperating agencies under NEPA) have coordinated from the outset and developed this document to meet each agency's separate and distinct NEPA obligations and support the independent decision-making of all agencies. The Army's purpose for the proposed action is to increase military readiness by optimizing recurring indirect live-fire weapons training, qualification, and certification at JBER to meet home station training requirements in accordance with current Army training doctrine.

1.6 NEED

The Army needs to conduct frequent live-fire mortar and artillery training, qualification, and certification exercises under realistic conditions/standards throughout the year, as described in Section 1.4.2, to prepare soldiers for combat operations. Personnel turnover in the Army necessitates that training progression and proficiency is cyclic in nature and results in a continual, repetitive training regimen. With the activation of the 11th Airborne Division (Arctic) and its rapid deployment mission, the importance of fulfilling this Army need has become increasingly urgent. Soldiers deploy to combat with the skills they have upon notification; therefore, the opportunity to conduct frequent realistic small unit training, to include a CALFEX at home station, must exist. Company-level CALFEX capabilities at JBER are limited by seasonal restrictions and because the current facilities do not provide a realistic training environment. Artillery and mortar crew participation in a CALFEX is integral to train echelonment of fires (described in Section 2.4.1.2). All-season training is necessary to ensure that live-fire training occurs at the required frequency and soldiers achieve and maintain critical combat skills. Figure 1.6-1 represents the distribution of rounds to meet the total training requirement.

Figure 1.6-1 Total Mortar and Artillery Training Requirements



Current restrictions limiting the use of ERF–IA to winter months were initiated by the Army to prevent WP in underlying sediments from being released into standing water. Because the temporal onset and duration of these specific ice conditions vary annually, it is difficult to precisely predict when and for how long firing into ERF-IA will be allowed each year. During warm winters, units may not be able to begin indirect-fire weapons training until late November and may be forced to stop training in early March, affording a short window of opportunity to conduct required training and qualification at home station. Even with favorable conditions, the winter season is too short to fulfill quarterly and semi-annual standardized training and qualification requirements or to fulfill newly assigned soldier training and qualification requirements. As a result, soldiers must travel to Fort Wainwright to conduct indirect live-fire mortar and artillery training when ice conditions at ERF-IA are not met, generally April through November. This continual requirement to deploy in order to train reduces readiness, violates the principle and benefit of home station training, places qualification and certification at increased risk, and unnecessarily separates soldiers from families for protracted training exercises.

Traveling more than 700 miles (round trip) to conduct small unit and live-fire training does not meet the intention of ADP 7-0, which directs such training to be conducted at home station. It also adds an additional cost that unit commanders must factor into their already limited budgets. The travel turns what is commonly a small unit action encompassing a 3-day training exercise and a half-day firing event for mortar systems or a 3-day training exercise and 1-day firing event for howitzer systems at home station into a 3-4–week operation requiring augmentation of convoy equipment and a battalion deployment of personnel. While sections, platoons, and batteries can train/qualify independently at home station, they each lack the internal logistical support to deploy independently, and therefore small unit exercises are transformed into battalion-level exercises. In addition to the added time, equipment, and personnel requirements, this movement also requires units to transport hazardous and explosive materials along public roads and highways, which increases risks to both soldiers and members of the public traveling the highways. Once at Fort Wainwright, units still run the risk of lost training time due to frequent high Fire Weather Index conditions in summer during which firing is restricted or prohibited. Artillery units assigned to JBER run a significant risk of not meeting qualification standards due to ERF-IA only being available in the winter combined with potential Fort Wainwright range closures during the summer wildfire season.

Additionally, this frequent travel to Fort Wainwright has high potential to result in a severe loss of readiness as reported to the Army via Unit Status Reports and ultimately into the Defense Readiness Reporting System. This loss of readiness manifests itself via two mechanisms. First, when a unit is already deployed to another installation, it is considered non-deployable for an actual contingency mission; units already deployed to Fort Wainwright would need to cease training, redeploy to JBER to consolidate the entire unit, then begin preparing for the ordered contingency deployment. Second, deploying to Fort Wainwright typically results in stranded equipment due to lack of line-haul transportation or mechanical breakdown. During the delay in returning equipment to JBER, the unit may be non-deployable due to equipment limitations. With the Army's new mission to provide a rapidly deployable force throughout the Pacific Area of Operations, this is an unacceptable risk that can be prevented by training at home station.

Lastly, JBER soldiers are unnecessarily separated from their families for protracted exercises to accomplish training that is typically conducted at home station by other units across the Army. While deployments and field training are part of Army life, leaders strive to remove as much stress and disruption on families as possible. Enabling units to conduct this qualification and certification training at home station would be a net benefit for Army families in addition to increasing unit readiness.

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.1 DESCRIPTION OF THE PROPOSED ACTION

The proposed action consists of modifying the training conditions in which indirect live-fire weapons qualification, certification, and training can be conducted by reinstating all-season indirect live-fire training and adding 155-mm artillery to the authorized weapon systems to meet Army regulatory and doctrinal standards. The proposed action focuses on live-fire mortar and artillery training, which requires a dedicated impact area to contain explosive munitions, fragments, and debris. Current live-fire restrictions limit firing into JBER's only dedicated impact area, so units stationed at JBER must travel more than 700 miles (round trip) to Fort Wainwright to train and qualify individual soldiers and weapon system crews. Reinstating all-season live-fire training at JBER would enhance small-unit and live-fire training opportunities, avoid land use conflicts, and allow units stationed at JBER to attain and maintain mandatory Army qualification, certification, and training standards in an efficient manner (Figures 2.1-1 through 2.1-5). Additionally, it would provide a long-term local training solution, provide soldiers a more stable family environment, and minimize costly and time-consuming movement of equipment and personnel to and from Fort Wainwright.

2.1.1 Weapon Systems and Munitions

Units stationed at JBER must train on direct and indirect-fire weapon systems, as described in Section 1.4.1. The proposed action would not modify current use of direct-fire weapon systems at JBER. The proposed action would reinstate indirect-fire weapon systems use of ERF-IA during all four seasons. Indirect fire weapon systems assigned to units stationed at JBER are listed in Table 2.1-1; the mm measurement of the weapon system refers to the diameter (or caliber) of the gun's barrel. As part of this proposal, the assigned 155-mm howitzers that currently travel to Fort Wainwright to fire would be incorporated into home station training and qualification at JBER. The proposed action specifically excludes the use of WP mortar rounds and all red phosphorus (RP) rounds on JBER.

Table 2.1-1 Assigned Indirect Weapon Systems and Frequency of Training

Weapon System	Number of Weapon Systems Assigned at JBER	Frequency of Qualification and Live-Fire Training
60-mm Mortar	14	Quarterly
81-mm Mortar	8	Quarterly
120-mm Mortar	12	Quarterly
105-mm Howitzer	12	Semi-annually
155-mm Howitzer	6	Semi-annually

Key: JBER = Joint Base Elmendorf-Richardson; mm = millimeter

Mortar and howitzer ammunition consists of a fuze, a projectile body, and propellant charges. Projectile bodies can be filled with varying materials, discussed below, and are commonly referred to as rounds or munitions. Mortars and howitzers use the same basic types of fuzes and munitions. With each of the above indirect-fire weapon systems, several types of fuzes and munitions can be used.

Figure 2.1-1 Soldiers with 4th Brigade, 201st Afghan National Army Corps, compete in a speed drill with a 60-mm mortar system (8 January 2014, at Forward Operating Base Afghanistan).

Source: U.S. Army

Figure 2.1-2 Soldiers from the 1-19 Infantry Battalion, at Fort Benning, Georgia, assemble an 81-mm mortar system.

Source: U.S. Army

Figure 2.1-3 Soldiers with Mortar Platoon, Headquarters and Headquarters Company, 2nd Battalion, 34th Armor Regiment, 1st A Armored Brigade Combat Team, 1st Infantry Division, prepare a 120-mm Full Range Practice Cartridge during a training exercise at Fort Riley, Kansas.

Source: U.S. Army

Figure 2.1-4 A paratrooper assigned to Battery B, 4th Battalion, 319th Airborne Field Artillery Regiment, 173d Airborne Brigade, prepares to load a 105-mm artillery round during a training mission at Vaziani Training Area in Georgia.

Source: U.S. Army

Figure 2.1-5 Soldiers of 2nd Battalion, 11th Field Artillery, at Schofield Barracks, Hawaii, firing a 155-mm howitzer.

Source: U.S. Army

Mortar and howitzer ammunition incorporates one of a variety of fuze types. With the exception of delay fuzes, all of the following could be used at ERF-IA under the proposed action as training requirements dictate:

- Point-detonating, impact, or super quick fuzes, which detonate the cartridge on impact with the ground.
- Near-surface burst fuzes, which explode on or near the ground.
- Proximity (mechanical or variable time) fuzes, which explode above the ground.
  - Mechanical time fuzes explode after a preselected time has elapsed from the round being fired.
  - Variable time fuzes explode at a predetermined height and are not based on time.
- Delay fuzes, which explode 0.05 seconds after impact.
- Multi-option fuzes, which combine two or more of the other modes into one fuze.

The cartridge, or projectile body of the round, may contain HE, illumination (ILLUM), smoke, or inert[3] materials. The function of each is explained below. All of these types of materials could be used under the proposed action.

- HE is used against enemy combatants and light-materiel targets. An explosive, when reacted, produces a sudden expansion of the material usually accompanied by the production of heat and large changes in pressure. This rapid expansion and change in pressure produce noise and fractures the metal casing, resulting in shrapnel.
- ILLUM is used in missions requiring illumination for assistance in observation or as a spotting or marking round. ILLUM rounds are classified as non-explosive pyrotechnic rounds that contain chemical compounds (typically magnesium and sodium nitrate) that produce heat, light, smoke, and/or sound. None of the ILLUM rounds for the mortar systems or artillery used by units stationed at JBER contain phosphorus.
- Smoke is used as a screening, signaling, spotting, marking, casualty-producing, or incendiary agent. Smoke rounds are also pyrotechnic rounds. Three types of smoke-producing agents are used in Army mortar and howitzer munitions: WP, RP, and hexachloroethane (HC). Rounds including WP or RP as the primary constituent are prohibited from use in wetlands or other bodies of water per Army regulation (USARAK Regulation 350-2; DA Pam 385-63). Neither are used currently at ERF-IA, and neither will be used in the future at ERF-IA (including in the upland expansion area as proposed in Alternative 1). Thus, only HC smoke munitions are currently specified for use at ERF-IA.
- Full Range Practice Cartridges (FRPCs; for mortars only) are generally inert. FRPCs are essentially the same as their HE counterparts except that they contain an inert filler material such as gypsum or plaster of Paris. Each round is fitted with a point detonating practice fuze that simulates the multi-option fuze and provides a flash, bang, and smoke that is channeled through exhaust holes in the rear of the round and does not produce shrapnel. The pyrotechnic charge within FRPCs typically contains 12 to 16 grams of an aluminum and potassium perchlorate mixture, a mixture which is commonly used in consumer and commercial fireworks. Approximately 4 to 6 grams of the mixture is explosive.
- The primary training round[4] for the 155-mm howitzer weapon system consists of a metal projectile casing filled mostly with high-density concrete and does not result in shrapnel. A small charge of HE (2.8 pounds; compared to as much as 24 pounds in the full HE round) is positioned in the nose

[3] Note that inert rounds may contain a negligible amount of HE.
[4] The term "training rounds" refers to rounds used during training that are similar to their HE counterparts but with no or much reduced HE. Depending on the caliber of the weapon and the manufacturer of the round, these can also be called "practice rounds." "Training rounds" is used for both in this EIS.

of the round just beneath the fuze. The fuze is made up of metals or metal alloys and contains a pyrotechnic charge used to detonate the HE filler.

The term "munitions constituent" refers to any material originating from unexploded ordnance (UXO), discarded military munitions, or other military munitions; this includes explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions (10 U.S.C. § 2710[e][3]). The primary components (about 97 percent by weight) of mortar and howitzer munitions are explosives, iron (in the form of steel), copper, and aluminum. The projectile body (or fragments thereof in the case of full HE rounds) is the only part of the round that lands in the impact area and is most often made of steel or iron. Many of the rounds have copper alloy rotating bands, and the fuzes and fins are typically made of aluminum. The remaining components (2 to 3 percent) consist of trace amounts of numerous other compounds that can include metals (e.g., zinc, manganese, nickel, chromium, and cadmium), waxes, silicon, and pyrotechnics.

2.1.2 Mortar Munitions

Mortar ammunition is resourced for units in DA Pam 350-38. Table 2.1-2 is derived from DA Pam 350-38 and lists the number of rounds allocated to JBER units for mortar training and qualification. The DA Pam 350-38 allocation represents the maximum number of rounds that could be fired under any of the alternatives presented. Annually, each unit would conduct multiple training/certification events, but the overall number of rounds used during training in each fiscal year would not exceed the DA Pam 350-38 quantities as indicated in the table. Note that the standard Army ammunition allotment includes WP smoke munitions. Because WP smoke would not be used at ERF-IA, it is listed as zero in the table.

Table 2.1-2 Mortar Standard Training Munitions as Allotted Annually (Fiscal Year) by DA Pam 350-38

Mortar Type	HE	SMOKE	ILLUM	FRPC
60-mm Mortar	1,036	0	490	2,800
81-mm Mortar	592	0	280	1,600
120-mm Mortar	744	0	360	2,232
Total Annual Mortar Rounds	2,372	0	1,130	6,632

Key: DA Pam = Department of the Army Pamphlet; FRPC = Full Range Practice Cartridge; HE = high explosive; ILLUM = illumination; mm = millimeter

2.1.3 Artillery Munitions

Howitzer ammunition is resourced for units in DA Pam 350-38, and an extract of the data is presented in Table 2.1-3. The table presents the maximum number of artillery rounds that could be fired under the alternatives presented. Although allocated by DA Pam 350-38, rocket-assisted projectile rounds are not used at JBER and are not included in the table. Blank rounds are training rounds without actual projectiles that are used during non-firing exercises to simulate the noise and effect of live fire and do not require the use of a dedicated impact area. FRPCs have been developed for the 105-mm howitzer; however, they have never been funded for production and thus are not included in the proposed action. Annually, each unit would conduct multiple training/certification events, but the overall number of rounds used during training would not exceed the DA Pam 350-38 quantities as indicated in the table.

Table 2.1-3 Howitzer Standard Training Munitions as Allotted Annually (Fiscal Year) by DA Pam 350-38

Howitzer Type	HE	SMOKE[1]	ILLUM	BLANK	Training[2]
105-mm Howitzer	2,612	144	282	908	0
155-mm Howitzer	144	62	84	0	900
Total Annual Howitzer Rounds	2,756	206	366	908	900

Notes:

[1] Howitzer smoke rounds approved for use on JBER are non-phosphorus rounds that contain HC.

[2] For 155-mm howitzers, these are training rounds that contain a small amount (2.8 pounds) of HE material.

Key: DA Pam = Department of the Army Pamphlet; HC = hexachloroethane; HE = high explosive; ILLUM = illumination; JBER = Joint Base Elmendorf-Richardson; mm = millimeter

2.1.4 Total Live-Fire Ammunition Use for Mortars and Howitzers

Table 2.1-2 and Table 2.1-3 together list the maximum number of mortar and artillery (howitzer) rounds (all indirect-fire weapon systems) that could be fired annually (by fiscal year) at ERF-IA by the IBCT currently stationed at JBER (excluding WP, which could only be fired at other installations). These numbers are based on the allocation specified in the 2018 version of DA Pam 350-38 (U.S. Army 2018). Although the number of rounds allotted varies annually, the number fired at ERF-IA in a given year would not exceed the numbers shown in Tables 2.1-2 and 2.1-3. Larger unit exercises, which are included in these numbers, are likely to be conducted at other installations, which would decrease the total rounds expended at ERF-IA. Similarly, some smaller unit exercises may still be conducted at other installations depending on training objectives and scenarios. The total number of rounds expended would also be reduced when units are called upon to deploy for overseas contingencies.

Although the number of training days varies annually, the total average number of indirect-fire training days scheduled by all units stationed at JBER is 134 days at ranges on either JBER or Fort Wainwright. The number of rounds fired per hour or day is highly variable depending on the unit, the qualification table, the training objectives, and the current conditions. The total number of rounds per training session and length of each training session would also vary, but weapons firing during training would be intermittent, with the number of rounds fired on a given day varying by whether units are qualifying or conducting a company CALFEX. As an example, the number of HE rounds fired in a day could range from 26 rounds fired over a period of 6 to 10 hours to 324 rounds fired over a period of 6 to 12 hours, with the high end of this range only occurring if the artillery battalion were to qualify every howitzer crew on the same day, which is unlikely. Acoustic modeling conducted for the proposed action uses a more realistic number of HE rounds per day of 298 (see Appendix C). Other types of rounds could also be fired during these periods, although training rounds would not be fired for qualification. Numerous representative firing combinations were developed for the detailed acoustic study and can be reviewed in context in the *Noise Technical Report* (Appendix C).

2.1.5 Other Operational Assets

The following sections describe other operational assets required for soldiers to conduct indirect live-fire training and fulfill their training requirements.

2.1.5.1 Firing Points and Observation Points

Firing points are designated areas from which munitions are fired from weapon systems into an impact area. Indirect-fire weapons are fired from points that are not in the line-of-sight of targets in the impact area. Mortar firing points tend to be closer to the impact area than howitzer firing points, as the howitzer is a long-range indirect-fire weapon that can be fired from greater distances. In general, howitzers would be fired from locations at least 4 to 5 kilometers from the target area (which is in the impact area).

As specified in Army Techniques Publication (ATP) 3-09.42, a forward observer is an observer operating with front line troops and trained to adjust ground or naval gunfire and pass back battlefield information. Platoon forward observers are assigned to the fire support team supporting each infantry company or cavalry troop in the BCT and to the battlefield surveillance brigade. During live-fire training, observation points are located in close proximity to impact areas to allow a forward observer to see and direct artillery and mortar fire onto a target (defined in Section 2.1.5.2). At ERF-IA, forward observers are located at one of the observation points that surround ERF (Figure 1.4-1). Primary forward observer locations are Observation Point (OP) Upper Cole, OP Fagan, and OP Vital. Forward observers are not the same as marine mammal observers (MMOs; see Section 3.8.2.4, *Mitigation*)

Forward observers use specialized binoculars, spotting scopes, and laser range finders to observe potential targets and surrounding areas. When units fire at night, forward observers identify and observe targets either through daytime optics in conjunction with visible light illumination rounds or night vision equipment aided by infrared illumination. For visible light, units fire visible light ILLUM rounds just prior to firing HE rounds, which allows the forward observers to observe targets relative to where rounds are impacting. Alternatively, forward observers can also use night vision equipment to see in the dark; infrared ILLUM rounds are often used to enhance night vision capability and target observation. In both scenarios, units would continually intermix ILLUM rounds with the HE until the training is complete. Based on sunrise/sunset and civil twilight, night firing could realistically occur from mid-August through mid-April. For the few nights each month when tide tables predict inundating tides, units will fire only at targets that are outside the areas that are routinely inundated (upland areas on the east or west side of Eagle River). Additionally, advanced target designation systems (see Section 2.4.1.3) allow adjustments to be made after each round fired to improve the accuracy of subsequent rounds fired by the weapon in hitting targets.

2.1.5.2 Impact Areas, Target Areas, Surface Danger Zones

Indirect-fire weapons are fired into a selected impact area. An impact area is simply a designated site used for training with live munitions. A dedicated impact area is a site used for training with live-fire munitions such as mortars or howitzers that could result in UXO. UXO is munitions that do not explode, as designed, when employed and thus pose a risk of future detonation.

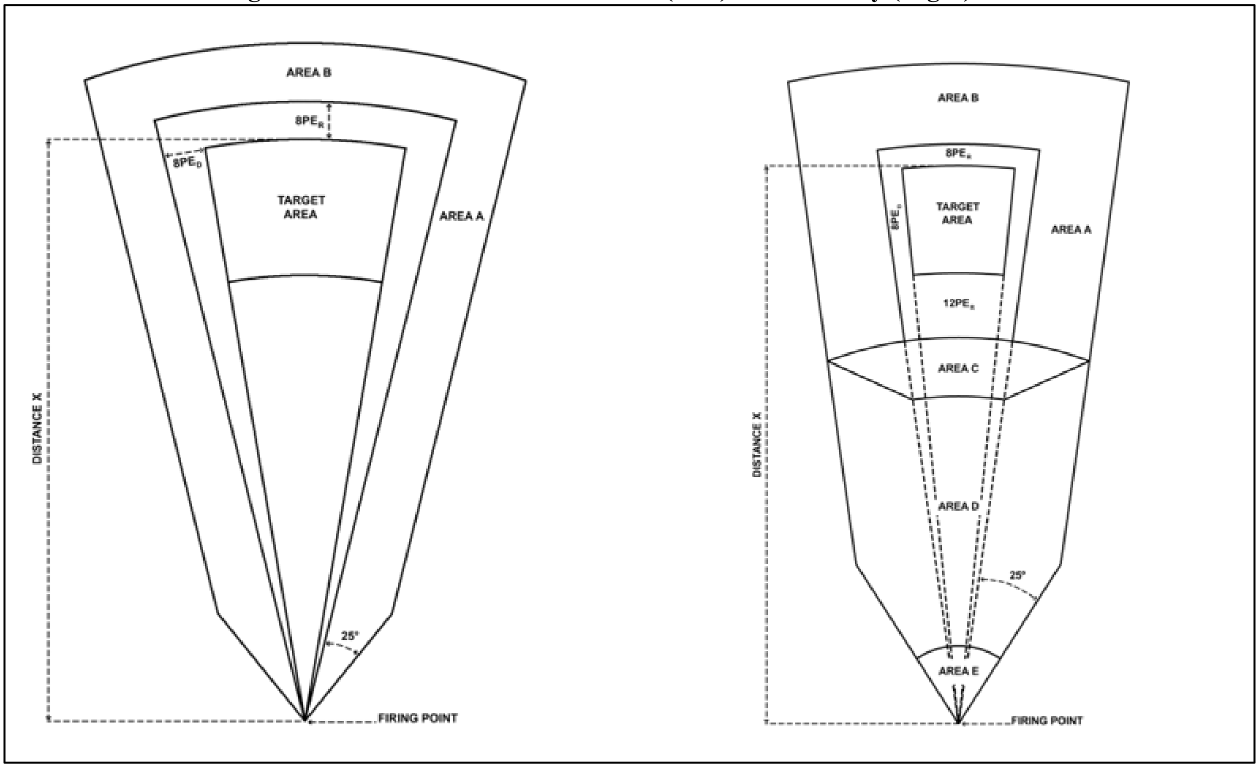
ATP 3-09.42 defines a “target” as an entity or object that performs a function for the adversary considered for possible engagement or other action. Targets may be static or moving and may either occur as a single point/object or as an array. Within ERF-IA, an example of a target array is six vehicles grouped together in a line just west of OP Fagan; any one of those vehicles would represent a point target. Targets are placed in ERF-IA without the use of fill.

A target area is the zone inside an impact area into which a weapon is fired. In DA Pam 385-63, *Range Safety*, a target area is defined as the point or location within a Surface Danger Zone (SDZ, defined later in this section) where targets (static/moving, point/array) are emplaced for weapon system engagement. For demolitions, it is the point or location where explosive charges are emplaced. Target areas in ERF-IA are limited by environmental restrictions set forth in USARAK Regulation 350-2.

Additionally, each installation may designate exclusion zones inside its impact areas, wherein the placement of targets is prohibited, in order to avoid damage to specific areas or to ensure that the impact area adequately contains the effects of live-fire training.

An SDZ is defined as the ground and airspace designated in the training complex (to include associated safety areas) for vertical and lateral containment of projectiles, fragments, debris, and components resulting from the firing of weapons systems. SDZs are munitions and weapons system specific, are developed to ensure personnel safety during training, and are calculated to contain effects of the given munitions. The probability of hazardous fragments leaving the SDZ may not exceed 1 in 1,000,000. The SDZ essentially delineates a safety boundary that surrounds the firing point, the target area, and all points in between. DA Pam 385-63, *Range Safety*, provides a standard methodology to construct SDZs. Figure 2.1-6 illustrates example SDZs for indirect mortar and artillery fire. The boundaries of the SDZ cannot extend past the installation boundaries per Army regulation (DA Pam 385-63). Personnel, including forward observers, are not allowed to enter an SDZ during training exercises except under special circumstances, as described in DA Pam 385-63.

Figure 2.1-6 SDZ for Indirect Mortar (Left) and Artillery (Right) Fire



Source: DA Pam 385-63

Note: PE = probable error in range or deflection

An SDZ consists of several areas, the dimensions of which are specific to each weapons system and munitions type:

- The **target area** is the point or location in the SDZ in which targets are placed for weapon system engagement (U.S. Army 2014). In Figure 2.1-6, the target area is shown as a box.
- The **weapon system impact area** is defined in USARAK Regulation 350-2 (for indirect fire) as including "the probable error for range and deflection" (8PE and 12PE in Figure 2.1-6). It consists of the target area plus an additional containment zone, designed to contain fired or launched ammunition and explosives. The weapon system impact area is constructed such that there is a 1 in 1,000,000 probability that a round would land outside of this containment zone under standard firing procedures. Firing procedures are established in regulations, field manuals, and training circulars; adherence is required. Failure to adhere results in a formal investigation.
- **Areas A and B** are the secondary danger areas (buffer zones) that laterally parallel the impact area or ricochet area (depending on the weapon system) and contain fragments, debris, and components from frangible or explosive projectiles and warheads functioning on the right or left edge of the impact area or ricochet area.
- **Area C** (artillery only) is the secondary danger area (buffer zone) on the up-range side of the impact area and parallel to Area B, which contains fragments, debris, and components from frangible or exploding projectiles and warheads functioning on the near edge of the impact area.

- **Area D** (artillery only) is the safe area in which personnel are allowed, provided that ammunition certified for overhead fire is used during the exercise.
- **Area E** (artillery only) is the danger area directly in front of the weapon system, inside of which there is danger from muzzle debris, overpressure, blast, and hazardous impulse noise. Personnel in service batteries firing from approved tactical configurations may occupy Area E.

While mortar SDZs do not have an Area C or D, they can be authorized for overhead fire, which requires delineation of a more detailed SDZ (similar to an artillery SDZ) to enforce the minimum safety distances published in DA Pam 385-63.

Because firing is directed at individual and grouped targets, the actual area impacted by munitions is generally only a small part of the overall impact area.

2.2 SCREENING CRITERIA

The following screening criteria were designed to evaluate the viability of a wide range of reasonable alternatives proposed to satisfy the purpose and need. For clarification, the screening criteria identified and described in this document serve the purpose of reasonable selection standards, as explained in 32 CFR § 989.8(c). The criteria, organized into four key functional areas, are as follows:

Training and Infrastructure

- Supports training with service ammunition including high-explosive munitions.
- Provides all-season weapons systems training capacity.
- Limits new construction of hardened facilities that may cover hundreds of acres and cost tens of millions of dollars. Hardened facilities include any developed structure required to support mission training requirements, operational needs, installation support, or utilities systems. This includes, but is not limited to, automated ranges, training complexes, administrative buildings, dwellings, improved roads, landing strips, and mission support facilities.
- Target area does not occur on slopes greater than 30 percent (see Appendix A, Section 3.1, for more information).

Soldier Quality of Life

- Keep soldiers and families together at their home station, during small unit training and when not deployed during wartime, to the greatest extent possible. The Army must maintain a long-term sustainable balance between operational requirements and soldier and family quality of life to reduce stresses placed on soldiers and their families, and to support a higher quality of life at home station. Taking care of soldiers and their families is a firm Army commitment and is essential to the maintenance and preservation of today's high-quality, all-volunteer force.

Land Use

- Does not create land use conflicts. Indirect live-fire training cannot take place in installation cantonment areas or over public transportation routes.
- Capable of being accomplished with no land acquisition. This criterion is framed within the bounds of Army Regulation (AR) 350-19, *Army Sustainable Range Program*, which provides parameters and processes for land acquisition.

Public Health and Safety

- Training may not result in SDZs or hazardous noise extending beyond installation boundaries in accordance with applicable regulations or instructions that limit SDZs or hazardous noise from extending beyond installation boundaries.

2.3 ALTERNATIVES CONSIDERED

In compliance with NEPA and the Air Force implementing regulations, the screening criteria listed in Section 2.2 were used to assess the viability of a full range of reasonable alternatives. Determinations made about the specific alternatives considered are discussed in the sections that follow. Detailed descriptions of the alternatives that have been carried forward are provided in Section 2.4.

2.3.1 All-Season Live-Fire Training That Meets Training and Certification Requirements with Expanded Impact Area in Order to Fully Meet CALFEX Live-Fire Proficiency in Accordance with Army Training Strategy (Preferred Alternative)

Under this alternative, all-season live-fire qualification and training would be reinstated at ERF-IA, and ERF-IA would be expanded into the adjacent uplands to fully meet CALFEX live-fire proficiency and certification in accordance with the Army IWTS. Under this alternative, ERF-IA would be modified and expanded with associated service roads, service pads, and fuel breaks. The expanded impact area would provide a functional and realistic CALFEX certification/validation range where units could use all organic and supporting assets to successfully complete training, certification, and qualification requirements to be fully trained for global on-call deployments. Additionally, expanding the impact area into the uplands would reduce, but not eliminate, the need to use portions of the existing ERF-IA, thereby reducing the potential impacts to Cook Inlet beluga whales, other protected marine mammals, and anadromous fish (i.e., fish that spawn in fresh water but live much of their lives in salt water). Army RTA Range Office personnel with extensive experience in siting ranges identified the optimal area for ERF-IA expansion.

Modifying and expanding the existing impact area would support training with service ammunition, including HE munitions, and would provide greater training capacity and capability at JBER. The necessary facilities could be built in the short term, whereupon they would be available indefinitely.

Implementing the proposed modification and expansion of ERF-IA would allow soldiers to carry out the majority of their training at home station and minimize the need for travel to other installations, maximizing the time soldiers and their families are together when not on deployment. This alternative would improve soldier quality of life. Reducing travel would also increase the Army's readiness posture by eliminating unit deployments to Fort Wainwright and reducing the risk of stranded equipment.

This alternative does not create any land use conflicts. The expanded impact area and associated infrastructure (e.g., firing points) would be located on JBER property (within already designated training areas) and would be designed to avoid land use conflicts. Firing would not occur in the cantonment area or over public transportation routes. Also, careful design of the impact area and facilities would preclude SDZs and hazardous noise to human environment from extending beyond installation boundaries. Army RTA Range Office personnel with extensive experience in siting ranges have identified the optimal location for CALFEX operations within the proposed expanded ERF-IA. No new firing points would be required to support the CALFEX operations.

The existing ERF-IA is still integral to this alternative and is still required. The Army considered using only the proposed expansion area; however, the Army would be unable to conduct all required certification and qualification without the existing ERF-IA. Artillery units, in particular, need the larger space afforded by the existing ERF-IA to conduct fire missions. Relying solely on a new upland impact area would reduce the number of surveyed firing points capable of supporting the minimum distance requirements for 105-mm and 155-mm artillery. Lastly, the geography of the existing ERF-IA and the surrounding ridges provides ideal conditions to teach and train soldiers how to call for, observe, and adjust artillery fire.

Utilizing both the existing ERF-IA and expanding it into the adjacent upland provides the Army with the highest degree of flexibility from every perspective. It also provides protection to the Cook Inlet beluga whale by allowing firing in the uplands, thus reducing the number of rounds fired into ERF. Firing into the existing ERF-IA provides the best scenario for routinely qualifying artillery weapon systems when the exercise can be planned well in advance. Conversely, the upland area could support short notice qualification requirements if units needed to rapidly qualify new crew members due to an operational deployment notification.

This is the only alternative that fully meets the Army's purpose and need. This alternative would increase training capability to qualify individual soldiers and weapon system crews, improve mission readiness, improve soldier quality of life, avoid land use conflicts, provide for public health and safety, and satisfy the screening criteria. Thus, this alternative is carried through this EIS as Alternative 1. It has been identified as the Army's Preferred Alternative.

2.3.2 All-Season Live-Fire Training at Existing ERF-IA Only That Meets Training and Certification Requirements and Marginally Meets CALFEX Live-Fire Proficiency in Accordance with Army Training Strategy

Under this alternative, all-season use of ERF-IA would be reinstated to provide live-fire training capabilities at JBER and would marginally fulfill Army CALFEX certification training requirements; however, soldiers would not receive the full benefit of a CALFEX since they would not experience realistic wartime conditions (the impacts of mortar and artillery rounds in close proximity). The key difference between this alternative and the previous alternative is that no additional acreage would be added to the impact area, thus requiring all mortar and artillery rounds to be fired into the existing ERF-IA. Ideally, during a CALFEX, rounds should impact near (but not within) the minimum safe distance for training, which varies from 100–500 meters from the detonation point, depending on the weapon system.

Training would utilize existing facilities that are sufficient to support training with service ammunition including HE munitions. The CALFEX would also incorporate 155-mm howitzers, which are not currently used. The resumption of all-season training at this location would increase capacity and capability at JBER and do so immediately and indefinitely. Use of existing infrastructure would not require construction of hardened facilities or ranges.

This alternative would allow soldiers to conduct the majority of their training at home station and minimize the need for travel, thus maximizing the time soldiers and families are together when not on deployment. This alternative would have similar positive impacts to readiness, as discussed for the previous alternative.

This alternative would not result in land use conflicts. Use of ERF-IA would not entail live-fire training in cantonment areas or over public transportation routes.

Training at ERF-IA and associated firing points would not cause SDZs or hazardous noise to extend beyond the installation boundary, in accordance with Army regulations.

In summary, this alternative would increase training capability, improve soldier quality of life, avoid land use conflicts, provide for public health and safety, and satisfy the screening criteria. Thus, this alternative is carried through this EIS as Alternative 2.

2.3.3 All-Season Live-Fire Training at a New Permanent Explosives Munitions Impact Area on JBER

Under this alternative, a new permanent impact area would be located at JBER to accommodate all-season live fire to support small unit training.

During the development of the JBER Impact Area Siting Analysis (Appendix A), no available space was identified on JBER to accommodate a new impact area due to the size of the associated SDZs and other safety restrictions. A specific alternative that was previously considered was the creation of a new permanent South Post impact area; this site would not have met requirements for safety restrictions. Specifically, there is not enough usable area that is less than 30 percent slope; the areas abut the Municipality of Anchorage, which would incur new noise and wildland fire risks; and the area is not of sufficient size to meet the training and certification requirements.

Because Alternative 1 includes adding land adjacent to ERF-IA to use as an impact area, the Army RTA Range Office conducted a review to determine if all qualification and training objectives could be met using just that new upland portion. After close and careful consideration, the Range staff determined the area is too small to complete all required training and qualification. The location of the proposed upland impact area is too close to most of the surveyed artillery firing points and too small to accomplish the full set of tasks required for artillery weapon system training and qualification. The expanded upland area is only sufficient for portions of 60-mm, 81-mm, and 120-mm mortar training and qualification, CALFEX certification, and single artillery gun crew qualification and training. Therefore, this alternative is not carried forward for full analysis in this EIS.

2.3.4 Acquisition of New Land for Construction of a New Dedicated Impact Area Adjacent to JBER

The acquisition of new land for the construction of a new dedicated impact area adjacent to JBER could potentially satisfy a majority of screening criteria. This alternative does not meet the land use screening criterion stating that the proposed action must be accomplished with no land acquisition. Therefore, this alternative is not carried forward for full analysis in this EIS.

2.3.5 Modification of Training Requirements That Can Be Met at Existing JBER Facilities

Modifying training requirements so they could be met at existing JBER facilities, subject to current firing restrictions, is an alternative that could satisfy several of the screening criteria, such as avoiding land use conflicts, relocating existing hardened facilities or ranges, and minimizing environmental impact.

This alternative is not feasible, however, due to the training requirements themselves, as outlined in ADP 7-0. All training conducted by the unit is assessed against the commander’s intent for the training event and published doctrinal standards. Each individual and collective task has standards of performance. A standard is the accepted proficiency level required to accomplish a task. Mastery, the ability to perform the task instinctively, regardless of the conditions, is the desired level of proficiency.

The mastery of skills requirement is a repetitive process that occurs throughout the year and requires the use of the full range of munitions allocated in DA Pam 350-38 for training. Such training is essential for unit preparedness and is a critical aspect of the Army’s standardized unit design and training requirements. Therefore, this alternative is not carried forward for full analysis in this EIS.

2.3.6 Conduct Training at Other Existing Impact Areas Outside of JBER (No Action Alternative)

This alternative fails the screening criteria; however, it is carried forward for full analysis in this EIS as the No Action Alternative.

Conducting small unit training at other existing impact areas outside of JBER is an alternative that can meet several of the screening criteria. It does not necessitate the construction of hardened facilities or ranges, and it supports all-season training with service ammunition including HE munitions. Although land use conflicts would arise with regard to training capacity at other facilities, this alternative could be accomplished without land acquisition and does not result in land use conflicts at JBER or adjacent properties. This alternative does not allow training with 155-mm rounds at JBER. 155-mm howitzers were assigned to units within the 11th Airborne Division fairly recently. The ROD that established firing into ERF-IA did not include 155-mm rounds and did not provide ice thickness standards for this weapon type, and the 2016 NMFS Letter of Concurrence likewise only includes mortars and 105-mm howitzers.

This alternative does not meet the soldier quality of life screening criterion because soldiers would continue to frequently travel from home station to complete small unit training. This alternative continues to impart a significant risk to readiness and does not support the training and qualification requirements as previously discussed. However, pursuant to 32 CFR § 989.8, NEPA implementing regulations require that a No Action

Alternative be analyzed in this EIS; therefore, this alternative is carried forward for full analysis. Additional details and considerations to the No Action Alternative are described in subsequent sections.

2.3.7 Re-station Army Units Currently at JBER to Another Installation in Alaska

Analysis of where to station the 4/25 IBCT (ABN) (now the 2/11 IBCT) was provided in the 2004 Transformation EIS (USAG 2004). The current stationing serves to meet both National Security objectives for having a force strategically positioned for rapid global response and for having a force trained and ready to operate in an arctic environment. Thus, this alternative is not carried forward for full analysis in this EIS.

2.3.8 Expand ERF-IA (CALFEX) and Continue the Winter Firing Restrictions

During the scoping process, commenters recommended the EIS explore an alternative that would expand the firing range but does not include all-season firing; therefore this was added as a consideration. This alternative would expand ERF-IA into the adjacent upland (as in Alternative 1) to develop a CALFEX area. The current winter firing restrictions would remain in place for ERF-IA and would also be enforced in the added CALFEX area.

Integrating the mortars, artillery, and infantry is a key aspect to qualification and certification of each type of unit; this alternative would allow the Army to fully conduct CALFEX in a realistic environment but only between late November and early March. The remaining mortar and artillery gunnery qualification tasks would continue as they currently do, thus allowing the full scope of artillery and mortar qualification tasks to be conducted while the winter firing window is open.

Although this alternative would increase live-fire training and qualification capabilities on JBER, it still would not meet minimum qualification and certification requirements including quarterly mortar qualification, semi-annual artillery qualification, new soldier qualification, and new weapons system crew qualification. It also would not allow units to periodically conduct qualification training to repair condemnation criteria or prepare for short notice operational deployments. In order to meet all qualification requirements, JBER units would still need to travel to Fort Wainwright during 8 months of the year. Units traveling to Fort Wainwright would continue to face extended training times, experience unnecessary time away from home station, and risk deployment readiness. This alternative does not fully meet the purpose and need of the Army; therefore, it is not carried forward for full analysis.

2.4 ALTERNATIVES CARRIED FORWARD

2.4.1 Alternative 1—All-Season Live-Fire Training That Meets Training and Certification Requirements with Expanded Impact Area in Order to Fully Meet CALFEX Live-Fire Proficiency in Accordance with Army Training Strategy (Preferred Alternative)

Alternative 1 would remove the winter firing restrictions at ERF-IA, which are outlined in Section 1.6, and reinstate all-season indirect live-fire training and qualification as well as expand ERF-IA (into an upland area) by approximately 585 acres. If this alternative is selected in the ROD, the Army intends to allow units to begin all-season firing in the existing ERF-IA as soon as practicable following the decision. The Army anticipates at least one to two construction seasons before the expansion area is ready for use.

Although this alternative indicates all-season live-fire, it does not mean live-fire 365 days per year but rather only sufficient days to meet the quarterly, semi-annual, or condemnation criteria. Over the last 3 years, the average cumulative number of live-fire training days for JBER stationed units has been 134 days per year, distributed between JBER and Fort Wainwright. The training days do not fall evenly across the calendar year but rather are scheduled based on unit training and certification needs as well as training area availability.

Because of the non-persistent presence of Cook Inlet beluga whales, the multiple Pacific salmon runs (four of five salmon species are recognized as key physical or biological features [PBFs] for Cook Inlet beluga whale critical habitat), and large tidal fluctuations, it is important to delineate independent and scientifically determined protective buffers (particularly for HE rounds) as a key measure to protect marine mammals and Pacific salmon. While habitat buffers are viewed as protective, they are also viewed as secondary. Other protective measures to be executed include new target placement, “No Fire Areas” along stream and shorelines, visual clearing of the impact area before firing, “soft start” to firing, and appropriate indirect fire control measures. Each of these protective measures would continue to be secondary to the intent of firing when beluga whales are less likely to be present. The following definitions pertain to the information provided in this section and throughout this EIS:

- “Buffer” refers to a setback (e.g., from a river) identified to protect a sensitive resource/habitat from an activity such as live-fire training.
- For the purposes of training, protective buffers are translated into “fire exclusion zones,” which are delineated by Range Control as areas that may not be fired into.
- “No fire area” is an Army doctrinal term that refers to an indirect fire control measure that can be entered into the Advanced Field Artillery Tactical Data System to alert fire planners of an area that cannot be targeted.

Implementation of recommended protective buffers identified by a detailed acoustic modeling report of munitions effects should provide sufficient protection to fish and marine mammals, but as an added protection, this alternative considers additional protections for areas within ERF immediately along Eagle River, Otter Creek, the Otter Creek complex, and the Eagle Bay shoreline.

The Air Force requested assistance from NMFS in determining a seasonal closure period for HE firing, based on Cook Inlet beluga whale presence in ERF, to help ensure that Cook Inlet beluga whales are protected from potential project impacts during times when they are most prevalent in the area. In a memo dated 9 August 2024 (NMFS 2024a), NMFS recommended a closure period from 9 August through 18 October (70 days) based on an analysis of recent passive acoustic data for Cook Inlet beluga whales at the mouth of Eagle River and within the river. This window includes periods when beluga whales were recorded in greatest numbers at six marine mammal acoustic monitoring stations and would provide the greatest protection for beluga whales present throughout ERF based on the current best available science (NMFS 2024a).

This alternative incorporates the following HE round limited fire periods (mortar FRPC and 155-mm training rounds may still be fired in non-inundated areas during the limited fire period):

- During all inundating tide events as predicted by a 31-foot[5] or higher tide at the Goose Creek, Cook Inlet Tide Station (ID 9455963) or as observed on the ground. Inundated areas would become no-fire areas during predicted and actual flooding events. Inundation period closure was recommended by NMFS in an Essential Fish Habitat (EFH) Coordination Letter dated 26 July 2022. See Section 2.1.5.1 for a discussion of tools used to determine whether targets are in inundated areas at night. This closure period would begin 1 hour before high tide and extend for 2.5 hours after high tide, as determined by the Goose Creek, Cook Inlet Tide Station. The timing of high tide as predicted by this station is consistent with JBER’s field observations, and the tide tables account for tidal amplification. This restriction applies during all periods in the year when HE firing is not otherwise limited by other protective measures (see seasonal closure discussed in the bullet below).
- During the peak Cook Inlet beluga whale upriver visitation period, as determined using statistical analysis of local studies conducted between 2018 and 2021 (JBER unpublished data; NMFS 2024a). The result of that analysis was a recommended closure between 9 August and 18 October. These dates will be periodically reviewed as new data are gathered and in conjunction with the *Integrated Natural Resources Management Plan* (INRMP; JBER 2023a).

[5] While tides exceeding 30 feet result in flooding of ERF, the 31-foot tide level at the Goose Creek, Cook Inlet Tide Station (nearest tide station) is used as a reference for this restriction because there are no tide tables for 30 feet.

Aside from the wildlife protections, four National Register of Historic Places (NRHP)-eligible cultural sites exist within the boundaries of the proposed expansion area that would require appropriate protection or preservation. The sites would be contained inside a vegetative buffer area where trees would be left standing. Additionally, the sites would be protected by either downed tree piles, berms, or both. If other eligible cultural, historic, or archaeological sites are identified during the establishment of the proposed expansion area, those sites would also be protected or preserved, as appropriate.

2.4.1.1 Impact Area Expansion

Establishing an expanded upland impact area serves a dual purpose. It both optimizes training opportunities and provides additional habitat protections to marine mammals, migratory birds, and Pacific salmon by reducing the quantity of mortar and artillery rounds fired into ERF. In effect, the expanded impact area provides a major minimization measure to the overall alternative. Figure 2.4-1 provides a visualization of the proposed expansion of ERF-IA to roughly 3,086 acres to support indirect live-fire training. Construction would occur entirely within the 585-acre site and would entail clear-cutting approximately 359 acres of vegetation and creating approximately 1.8 miles of gravel service roads and five vehicle gravel service pads inside the cleared area. The gravel service roads would be approximately 15 feet wide, and each service pad would be approximately 50 feet by 50 feet. In addition, a 3-mile firebreak, located along the boundary of the cleared area, would be created to contain wildland fires and prescribed burns. The firebreak would be approximately 16 feet wide. An approximately 226-acre vegetation buffer would remain as shown in Figure 2.4-1; this area would not be cleared but would be thinned to increase foot maneuverability and improve line of sight for training (described further in Section 2.4.1.2). To reduce the risk of wind-throw, no more than a third of the basal area of trees would be removed from the buffer.

Construction equipment would have access to the proposed expansion area to execute the design. Construction equipment (masticating hydro-axes, excavators, skidders and feller bunchers) would clear vegetation, and salvageable trees would be disposed of in accordance with the JBER forestry policy, as outlined in the INRMP. Following clearing, the site would be reseeded with a native grass seed mix selected from the list of native seed mix recommendations provided in the INRMP to revegetate and stabilize the cleared area. Given that the area that would be clear-cut in the expansion area is located in uplands, the seed mix selected would ideally consist of predominantly upland grass species with a smaller proportion of dry area grasses, such as the “Wainwright” slender wheatgrass mix (80 percent upland, 20 percent dry).

The footprint of the service roads and pads would be grubbed and contoured to desired design prior to gravel installation. The firebreak would be constructed in accordance with the JBER *Wildland Fire Management Plan* (WFMP; JBER 2023d) using a reciprocating Fecon machine to churn up the surface of the earth, creating a barrier of mineral soil that fire cannot spread through. Construction of the expansion area would take approximately 4 months to complete. The cleared portion of the expansion area would be maintained with controlled burning as required. The firebreak would be maintained by repeating the mechanical treatment with a Fecon machine every 2–3 years. Dud rounds would be cleared after each training event to prevent accumulation of UXO in the expansion area, in order to ensure its trafficability for infantry maneuver. There would also be annual maintenance to replace targets and clear the area around each target.

2.4.1.2 Qualification and Training under Alternative 1

Under Alternative 1, soldiers would regain the ability to conduct quarterly, semi-annual, and periodic live-fire qualification training across all seasons and weather conditions utilizing ERF-IA and the expanded impact area. Additionally, the expanded upland impact area (Figure 2.4-1) would enable units to conduct CALFEX live firing proficiency exercises at JBER using a full array of weapons systems and munitions (excluding WP munitions). Therefore, all training requirements depicted in Figure 2.4-2 could be conducted at JBER to meet the mortar and artillery training, certification, and qualification requirements under Alternative 1. All munitions used for CALFEX training (see Figure 2.4-2) would be targeted into the proposed expansion area, which would partially alleviate the use of ERF-IA.

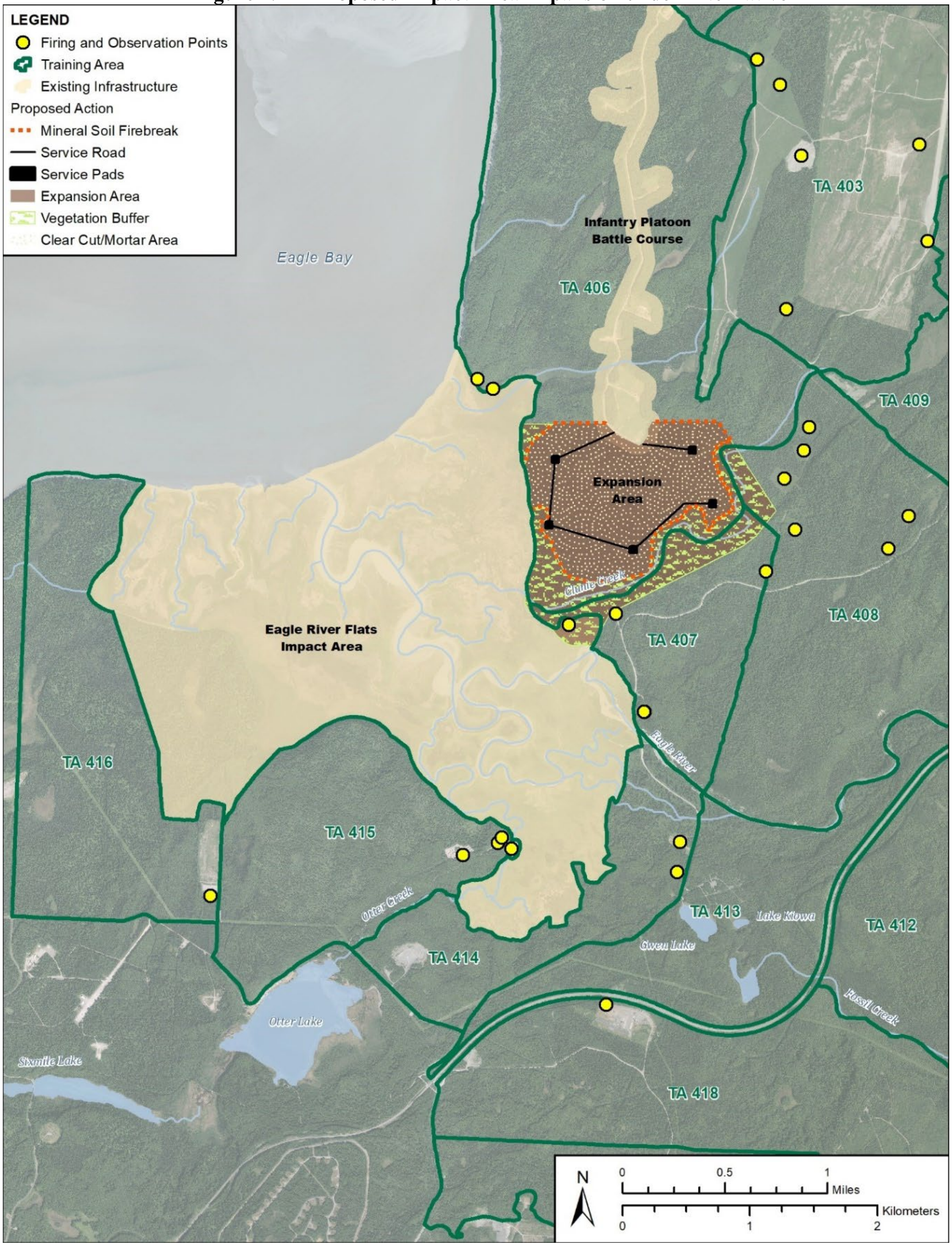
Figure 2.4-2 shows how Alternative 1 would allow the Army to meet the indirect live-fire training requirements at JBER, with the full circle representing the total rounds needed (see also Figure 1.6-1). The hatched areas represent WP smoke rounds that are allocated to JBER units but would not be fired into ERF-IA (in either wetland or upland areas).

The maximum numbers of mortar and howitzer rounds that could be fired into ERF-IA annually under Alternative 1 are shown in Table 2.1-2 and Table 2.1-3. Although the focus of this EIS is on meeting Army training objectives for small unit training, because JBER has some capability to support larger unit exercises, the ammunition resources allocated by DA Pam 350-38 for those larger exercises are included in this analysis. Ultimately, it would be up to unit commanders to determine the specifics of each training exercise, including where to conduct that exercise; however, it is highly unlikely this many rounds would be fired on JBER annually. Over the last 3 years, JBER based units have historically scheduled 134 cumulative days of firing indirect weapons systems into impact areas on JBER or Fort Wainwright.

The maneuver portion of the certification/validation training exercise would be conducted perpendicular to the indirect fire operations in ERF-IA. The purpose of a CALFEX is to train the unit to perform its core competencies in a realistic, live-fire environment combining the various capabilities of multiple weapon platforms into one exercise, preferably on one piece of ground. The concept for the execution of a CALFEX is to link a company tactical exercise with the final phase of the unit's collective gunnery training. At the completion of this exercise, the company/troop Tactical Standard Operating Procedure (SOP) and other SOPs are validated effectively, including the tactics, techniques, and procedures for integrating these external combined arms elements and war fighting functions. The qualifications are valid for 9 months for the active component and through the next training year for the reserve component. CALFEX qualifications will ultimately expire based on the date of the qualification or critical leader changes.

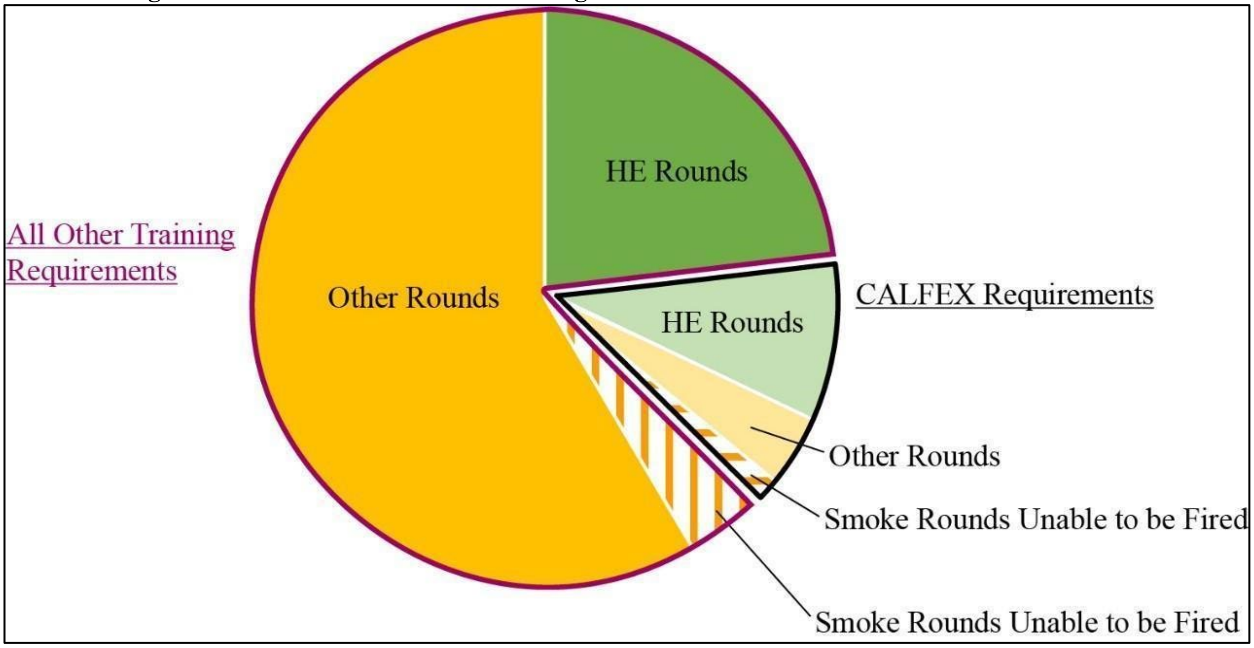
Army TC 3-20 describes a company CALFEX as an externally evaluated maneuver live-fire event that measures a unit's proficiency in executing a series of supporting collective tasks and at least one mission essential task. The CALFEX evaluates the key and subordinate leaders' ability to integrate organic weapons systems, subordinate units, and multiple warfighting functions in combat realistic conditions. The CALFEX incorporates full caliber training ammunition on an authorized live-fire facility or safety certified training area. To meet the intent of the fire control aspect of the CALFEX, field artillery (FA) must participate in all company and battalion CALFEX events. The minimum level of required FA cannon support is one echelon below the unit conducting the live-fire event. For example, a minimum of one FA platoon supports a company CALFEX. The FA participation includes shooting planned targets and responding to calls for fire from the company on the ground. Incorporating a sequence of fires is critical to ground maneuver operations, and the CALFEX enables a company commander to sequence preparatory fires as soldiers move toward an objective while also engaging targets of opportunity. This critical leader task is known as echelonment of fires.

Figure 2.4-1 Proposed Impact Area Expansion under Alternative 1



Sources: JBER 2020a, 2023c

Figure 2.4-2 Indirect Live-Fire Training at JBER under Alternative 1 and Alternative 2



2.4.1.3 Existing Regulations and Definitions Pertinent to Training under Alternative 1

TC 7-9, *Infantry Live-Fire Training*, provides in depth descriptions, standards, concepts, and philosophy for Army live-fire exercises beginning with individual soldier marksmanship and movement techniques then progressing through buddy team, fire team, squad, and platoon levels. The CALFEX is the culminating event for company-level live-fire training and validates the ability of company commanders to plan and conduct a tactically sound, safe, and realistic live-fire event applying the principles of maneuver tactics in a simulated combat environment. The CALFEX is meant to help unit leaders learn to control multiple formations, to control multiple assets within those formations, and to synchronize activities in time and space.

Standard best management practices (BMPs) used at JBER include rigorous training by soldiers to avoid errors when firing munitions, use of SDZs for personnel and protective redundancies in firing protocol, marine mammal observation, and cease-fire protocols. The Army, JBER (Air Force, supported components, and tenant organizations), and contractors are required to comply with applicable laws, regulations, and policies.

Systems for Accuracy of Indirect Fire

Indirect fire accuracy is determined by a variety of factors including known location of the gun, known location of the target, distance to the target, munitions ballistics, and weather data such as temperature, humidity, and wind. To address location data, JBER Range Control updates the map declination data annually and has surveyed each firing point. Artillery units use a survey team to emplace guns with sub-meter accuracy, while mortars typically use GPS coordinates with approximately 1-meter accuracy. All targets are stationary and recorded to 1-meter accuracy, and forward observers also use laser range finders to determine distances and locations. Lastly, the artillery battalion has a Meteorological Team that provides local, real-time weather data.

A Fire Direction Center (FDC) is used as the focal point for controlling artillery and mortars, and all the location data, munitions ballistics data, and weather data are combined in a fire control computer to provide actual firing solutions to each howitzer/mortar. As firing begins, all rounds must be observed, and units use two methods to observe where rounds impact on the ground: forward observers and radar. Forward observers are specially trained and equipped soldiers who observe rounds impacting, determine the distance from the target, and relay the information back to the FDC. Alternatively, units may use radar to track the trajectory of the round, then relay the point of impact back to the FDC. As the FDC receives information from the forward observer or the radar, it will recalculate firing data as necessary to make the next round more precise. In the interest of accuracy, units also conduct a registration fire mission, to confirm the accuracy of the data before proceeding to qualification or CALFEX support. This is the same concept as zeroing a personal weapon.

USARAK Regulation 350-2 requires units to cease fire and initiate an investigation for any round that impacts outside the target area or that is not observed impacting. Of the two methods to determine whether a round impacts outside the target area (forward observer or radar), radar provides the fastest feedback. The SDZ can be entered into the radar's software with warning parameters to alert if a round impacts outside the target, then immediately transmit the information to the FDC. Forward observers overlay the SDZ onto their map, note the distance from the target, and alert the FDC via radio if the round impacts outside the target area. In the event of a round impacting outside the target area, the unit immediately directs a cease fire, removes soldiers from the immediate vicinity of the weapon, notifies the Range Operations Fire Desk Operator, and notifies their battalion/brigade commander. The unit is not allowed to resume firing until the appropriate investigation determines the cause of the incident and the Installation Range Officer authorizes the resumption of firing.

Regulations Pertaining to Open Water

USARAK Regulation 350-2 prohibits firing into or over any open navigable waterbody, unless specific coordination with the U.S. Army Corps of Engineers (USACE) occurs**.** Navigable waterbodies of the U.S. are those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. A determination of navigability, once made, applies laterally over the entire surface of the waterbody and is not extinguished by later actions or events which impede or destroy navigable capacity (33 CFR § 329.4). DA Pam 385-63 defines a Navigable Waterway as any body of water open to the free movement of marine vessels. Eagle River is determined to be a navigable waterway from its mouth upstream to just west of Glenn Highway.

Each Service has procedures in place to fire into and over navigable waterways, such as the Army's action locally at JBER firing across Eagle River, the U.S. Department of the Navy (Navy) Point Magu Sea Range in California's Channel Islands, and the Air Force's Eglin Gulf Test and Training Range in the Gulf of Mexico. In accordance with DA Pam 385-63, the Army requested that Eagle River be restricted where it flows through the impact area so units could fire over the river. USACE established a restricted area on JBER, codified at 33 CFR § 334.1305, for Eagle River from Bravo Bridge to its mouth at Eagle Bay in Knik Arm. The designation was published in the *Federal Register* on 27 September 2022 (87 FR 58453) and made effective on 27 October 2022. The rule indicates that, "Establishment of the restricted area will prevent all vessels, watercraft, and individuals from entering an active military range munitions impact area at all times, except for authorized vessels, watercraft, and individuals engaged in support of military training and management activities." The authority to allow entry lies with the 11th Airborne Division Commander. As a result of the USACE decision to close Lower Eagle River to the public, USARAK Regulation 350-2 will be updated to allow firing over (but not into) Eagle River where it flows through the area closed to the public. Additionally, Range personnel will post large, highly visible signage at the mouth of Eagle River and upstream of Bravo Bridge to inform the public of the closure.

Open water has multiple definitions and must be read in context. Open water generally refers to water not frozen. JBER's training protocols clearly state that there would be no intentional firing into open waterbodies and that targets would not be placed in open waterbodies. In this context, open waterbodies are defined as rivers, streams, intertidal channels, gullies, lakes, ponds, or other areas that contain water. That said, ERF has areas that frequently contain vegetated waters of varying depths. Forward observers will look for observable open water; if no such waters are observed in the intended target area, the live-fire training will proceed. It is possible that the target area will contain areas of flowing or standing water, fully covered by vegetation (typically tall grasses) where small fish, including juvenile salmon, may be present. USARAK Regulation 350-2 requires all rounds to be visually observed impacting or bursting. This restriction leads to not firing into waterbodies that are deep enough that the impacts/effects of rounds cannot be observed. So long as all rounds are visually observed impacting or bursting, which would indicate that they have not landed in water, firing will continue as intended. In this EIS, the word "inundated" is used specifically to refer to the tidal inundation that occurs when higher tides cause flooding outside the banks of Eagle River and into the surrounding floodplain.

Fire Control Measures and Restrictions Associated with the Proposed Action

The following fire control measures and restrictions were built into both action alternatives:

1) Slow Start. When driving pier pilings, the Navy uses a slow start technique whereby strikes to pilings begin with a single strike followed by a wait period then an increased number of strikes followed by another wait period; this pattern continues until the day's full work begins. During the slow start, trained observers monitor for protected marine wildlife, and work typically stops if marine mammals are observed. The slow start provides an opportunity for unseen marine mammals to safely depart prior to the start of work. The Army doctrinal use of indirect fire and the registration process parallels this methodology. All rounds fired during training and qualification are observed by forward observers who ensure the area is clear to fire into and the correct targets are engaged. Artillery and mortar units register their weapon systems by firing individual rounds prior to beginning multiple gun engagements. This registration process, similar to a slow start, provides an opportunity for submerged/unseen marine mammals to safely depart an area or for observers to halt firing.

2) Firing Restriction. No firing HE rounds into areas inundated by high tide events as predicted by a 31-foot[6] or higher tide at the Goose Creek, Cook Inlet Tide Station (ID 9455963) or as observed on the ground. Firing will continue to be allowed in non-inundated areas meeting the No Fire Area limitations. While the tidal level imparts the major influence on inundation in ERF, multiple factors contribute including the current river level, wind speed/direction, and ice volume. Given these additional variables, inundation may occur at lower tide levels; therefore, unit observers will confirm the impact area is not inundated prior to firing HE (see the preceding section *Regulations Pertaining to Open Water* and Section 2.1.5.1 for more information). Survivable flood monitors may also be emplaced to better indicate flooded areas hidden by tall grasses and shrubs. Note that while only restrictions on full HE rounds are built into the action alternatives, mitigation developed as a result of the analysis in Chapter 3 of this EIS would expand this restriction to include 155-mm training rounds. Additionally, because 105-mm howitzer training does not include the use of training rounds, no artillery training rounds would be fired during inundated conditions. While there is no restriction on conditions during which mortar FRPCs (non-HE rounds) could be fired, in practice these rounds must be fired at targets on solid ground (i.e., targets in the impact area that are not experiencing inundation) to be effective for training, and would therefore not be fired intentionally into lakes, ponds, streams, or temporarily inundated/flooded areas.

3) Fire Control Measure. The Installation Range Control Officer will redistribute targets within ERF-IA to support No Fire Areas established along the Knik Arm shoreline, Eagle River, Otter Creek, and the Otter Creek complex. Target redistribution may include siting new targets, moving existing targets, obscuring existing targets, highlighting existing targets, or removing existing targets. CALFEX targets in the proposed expansion area will be placed to complement the method chosen to protect or preserve the cultural sites. The end goal is to establish an array of targets to focus the indirect fire and to preclude inadvertent targeting of rounds inside the protective buffer areas. Clearly identifiable targets, in conjunction with No Fire Areas, are key to precluding inadvertent targeting of rounds inside the protective buffer areas. For the few nights per month where inundating tides are likely, the Army will

[6] While tides exceeding 30 feet result in flooding of ERF, the 31-foot tide level at the Goose Creek, Cook Inlet Tide Station (nearest tide station) is used as a reference for this restriction because there are no tide tables for 30 feet.

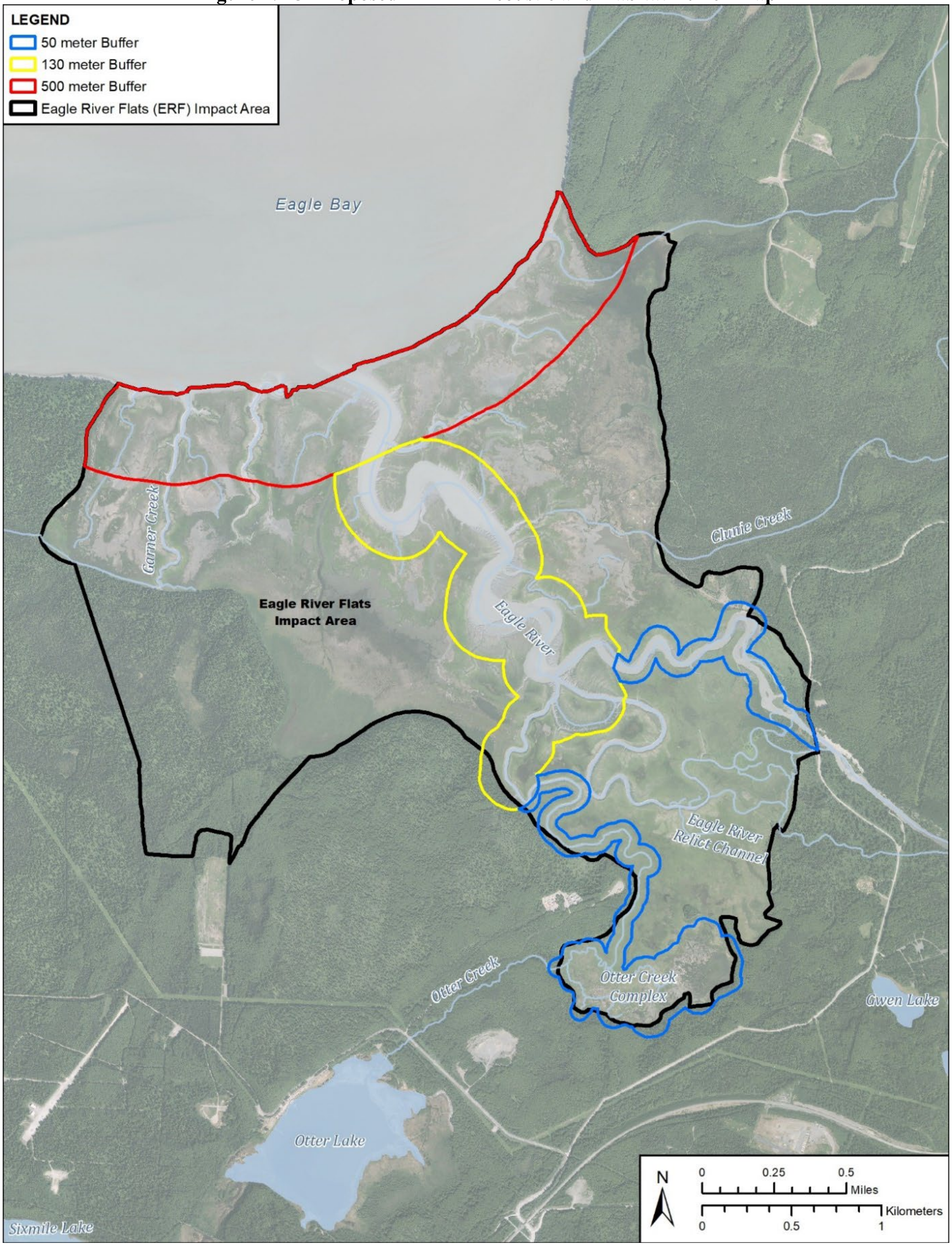
restrict units to targets outside areas that are routinely inundated, which will include upland areas on either the east or west side of Eagle River. See also Section 2.1.5.1 for a discussion of tools used to determine whether targets are in inundated areas at night.

4) Fire Control Measure. Units will continue to only use variable or mechanical time (air burst) or point detonating super quick fuzes in ERF to minimize the risk of artillery and mortar rounds penetrating the ground and potentially exposing and redistributing WP. Delay fuzes, which allow projectiles to penetrate into the ground, will not be used.

5) Firing Restriction. The acoustic modeling reports (JASCO Applied Sciences 2020, 2022) identified protective buffer distances from the Knik Arm shoreline and the banks of Eagle River, Otter Creek, and the Otter Creek complex; each of these identified protective buffer distances were substantially less than current protective buffers. Proposed protective buffers will be finalized in coordination with NMFS and include an analysis of shrapnel and debris. As finally determined, these protective buffers will be translated into No Fire Areas in artillery fire support computers and loaded as Geographic Information System (GIS) layers into the Range Facility Management Support System for planning and tracking. These buffer distances will be periodically reviewed and may be altered during INRMP updates. No targets will be placed within the habitat protective buffers, and no rounds will be intentionally fired into the buffer areas. Targets will be placed far enough outside the buffers to allow for adjustment of rounds without the rounds impacting the buffer areas. The buffer distances are graphically depicted in Figure 2.4-3.

- Keep the current 500-meter shoreline habitat buffer along Eagle Bay for all rounds, which exceeds the 254-meter protective buffer indicated by the acoustic modeling report for the highest Net Explosive Weight (NEW) round (the 155-mm M795 HE).
- Eliminate the current 1,000-meter shoreline habitat buffer along Eagle Bay for 120-mm HE rounds. The acoustic modeling indicates only a 254-meter buffer is required for protection, and the 500-meter buffer will be nearly twice that distance.
- Keep the current 130-meter habitat buffer from each bank of Eagle River, beginning from the mouth at Eagle Bay and extending upstream to a point 100 meters above the confluence with Otter Creek. This buffer is more than triple the 36-meter buffer indicated by the acoustic modeling report.
- Extend the current 130-meter habitat buffer from either bank of Eagle River approximately 0.5 kilometer upstream to encompass the Eagle River/Otter Creek confluence area.
- Keep the current 50-meter habitat buffer from each bank of the main Eagle River channel beginning at the point 100 meters upstream from the Otter Creek confluence and extending further upstream to the Route Bravo Bridge. This protective buffer exceeds the 36-meter buffer indicated by the acoustic modeling report.
- Keep the current 50-meter habitat buffer from either bank of Otter Creek and the associated Otter Creek complex from 900 meters above its confluence with Eagle River to the impact area boundary. This protective buffer exceeds the 20- to 36-meter buffer indicated by the acoustic modeling report.
- Extend the 50-meter Otter Creek habitat buffer approximately 0.25 kilometer south and east to encompass the Otter Creek backwater channel complex.
- Prohibit firing into Eagle Bay, Eagle River, or Otter Creek. (Adherence to USARAK Regulation 350-2, which requires all rounds to be visually observed impacting or bursting, will result in numerous additional waterbodies receiving similar protection.)
- Restrict firing into the Otter Creek complex to the area outside of the established protective buffer areas to include its multiple small tributaries, branches, and connected open water.

Figure 2.4-3 Proposed ERF-IA Acoustic and Habitat Buffer Map



Sources: JBER 2020a, 2023c

Note: The buffers on this figure are non-georectified representations of the written descriptions provided on the preceding page. They may change with stream movement over time.

6) Fire Control Measure: If one or more mammals are observed in Eagle River or Otter Creek before or during a training event, firing will not begin or units will cease fire and report back to Range Control, in accordance with USARAK 350-2. Fire will cease for ERF-IA until the marine mammals are observed traveling into Eagle Bay or until 15 to 30 minutes have passed without resighting (30 minutes for beluga whale, 15 minutes for all other marine mammals).[7] If the animals are not observed again during this time, firing can resume.

7) Training Area and Range maintenance and upgrades to assist with accuracy and precision of rounds fired:

   - Update and mark permanent survey points at all firing points for ensured accuracy.
   - Enforce navigational closure of Eagle River within the impact area.
   - Conduct vegetation maintenance on observation points bordering ERF-IA to include OPs Cole, Fagan, and Vital to improve forward observer visibility. Continue to protect any identified cultural resources near all OPs in accordance with the *Integrated Cultural Resources Management Plan* (ICRMP).
   - Develop a detailed target list to provide units with authorized targets within ERF-IA and all the information needed to ensure they are engaging the correct target within prescribed guidelines. The target list will provide target description, grid coordinate, length, width, height, and restrictions. Restrictions would include weapons systems that may not use the target, types of munitions that may not be used or must be used, and periods of time targets may not be engaged by any system.

8) Unit Training Measures:

   - Expand the current leader-specific training for winter firing to include all-season considerations with an emphasis on Cook Inlet beluga whale. Currently, leader-specific training is conducted in units to ensure the leadership understands the current restrictions, which are unique to JBER. If firing opportunities are expanded, units will update SOPs and institute additional training to fully depict the approved firing procedures, so leaders understand the protection requirements for both wildlife and cultural resources in the vicinity of their training.
   - Routinely verify declination stations to ensure accuracy.
   - Whenever practicable, use assigned radars in the registration process, for redundant observation and to ensure accuracy.
   - Ensure SDZs and fire support graphics account for the habitat buffers as No Fire Areas.

2.4.2 Alternative 2—All-Season Live-Fire Training at Existing ERF-IA Only That Meets Training and Certification Requirements and Marginally Meets CALFEX Live-Fire Proficiency in Accordance with Army Training Strategy

Under this alternative, all-season use of ERF-IA would be reinstated to provide live-fire training capabilities at JBER and would fulfill Army training requirements for CALFEX certification; however, soldiers would not receive the full benefit of a CALFEX because they would not experience realistic wartime conditions (the impacts of mortar and artillery rounds in close proximity). The key difference between this alternative and Alternative 1 is that no additional acreage would be added to the current impact area, thus requiring all mortar and artillery rounds to be fired into ERF-IA. Ideally, during a CALFEX, rounds should impact near (but not within) the minimum safe distance for training, which varies from 100–500 meters depending on the weapon system. ERF-IA specific protective measures meant to protect Cook Inlet beluga whales and other marine mammals discussed in Alternative 1 would be the same under this alternative. If this alternative is selected in the ROD, the Army intends to allow units to begin all-season firing in the existing ERF-IA as soon as practicable following the decision.

[7] NMFS' standard resighting time frames are 30 minutes for beluga whales and 15 minutes for the other marine mammals covered in this EIS.

2.4.2.1 Training under Alternative 2

Under Alternative 2, all-season indirect live-fire proficiency training could be conducted at the existing ERF-IA. Actions under Alternative 2 would involve removal of the current winter firing restrictions as described in Section 1.6 and reinstating all-season firing, allowing the full range of munitions in Tables 2.1-2 and 2.1-3 to be fired into ERF-IA.

The total number of rounds allocated to JBER units that train in ERF-IA would match what is shown in Tables 2.1-2 and 2.1-3, but all munitions fired during CALFEX exercises at JBER would be targeted into the existing ERF-IA because there would be no upland expansion area. Figure 2.4-2 applies to Alternative 2, as the alternative would allow the Army to meet indirect live-fire requirements at JBER. Although Alternative 2 marginally meets CALFEX training objectives, soldiers would not receive the full effect of the munitions fired during exercises due to the distance between ERF-IA and the maneuver portion of the CALFEX. The maneuver portion of the certification/validation exercise would be conducted parallel rather than perpendicular to the indirect fire operations in ERF-IA. Soldiers would not experience realistic wartime conditions of artillery firing over their heads and mortar and artillery rounds impacting in close proximity. Since this alternative only marginally meets training objectives, unit commanders are likely to opt to conduct more of their unit collective training at Fort Wainwright thus continuing to incur substantial amounts of travel.

Units would conduct mortar training events at JBER on an extended basis and would be able to conduct qualification and training at the required intervals, as outlined in Table 2.1-1.

Tables 2.1-2 and 2.1-3 present the maximum potential usage at JBER for Alternative 2. Although this EIS focuses on meeting Army training objectives for small unit training, the ammunition resources allocated by DA Pam 350-38 for larger unit exercises are included in this analysis. Ultimately, it would be up to unit commanders to determine the specifics of each training exercise, including where to conduct it; however, it is highly unlikely this many rounds would be fired on JBER annually.

Fire control measures and restrictions built into this alternative for protecting Cook Inlet beluga whales, other marine mammals, and Cook Inlet beluga whale PBF salmon are the same as in Alternative 1. Impacts to cultural resources are also similar to Alternative 1 in that four identified cultural resources on the bluff above ERF-IA would still need protection or preservation based on using the area for CALFEX operations; the sites would be protected by downed tree barricades, berms, or a combination.

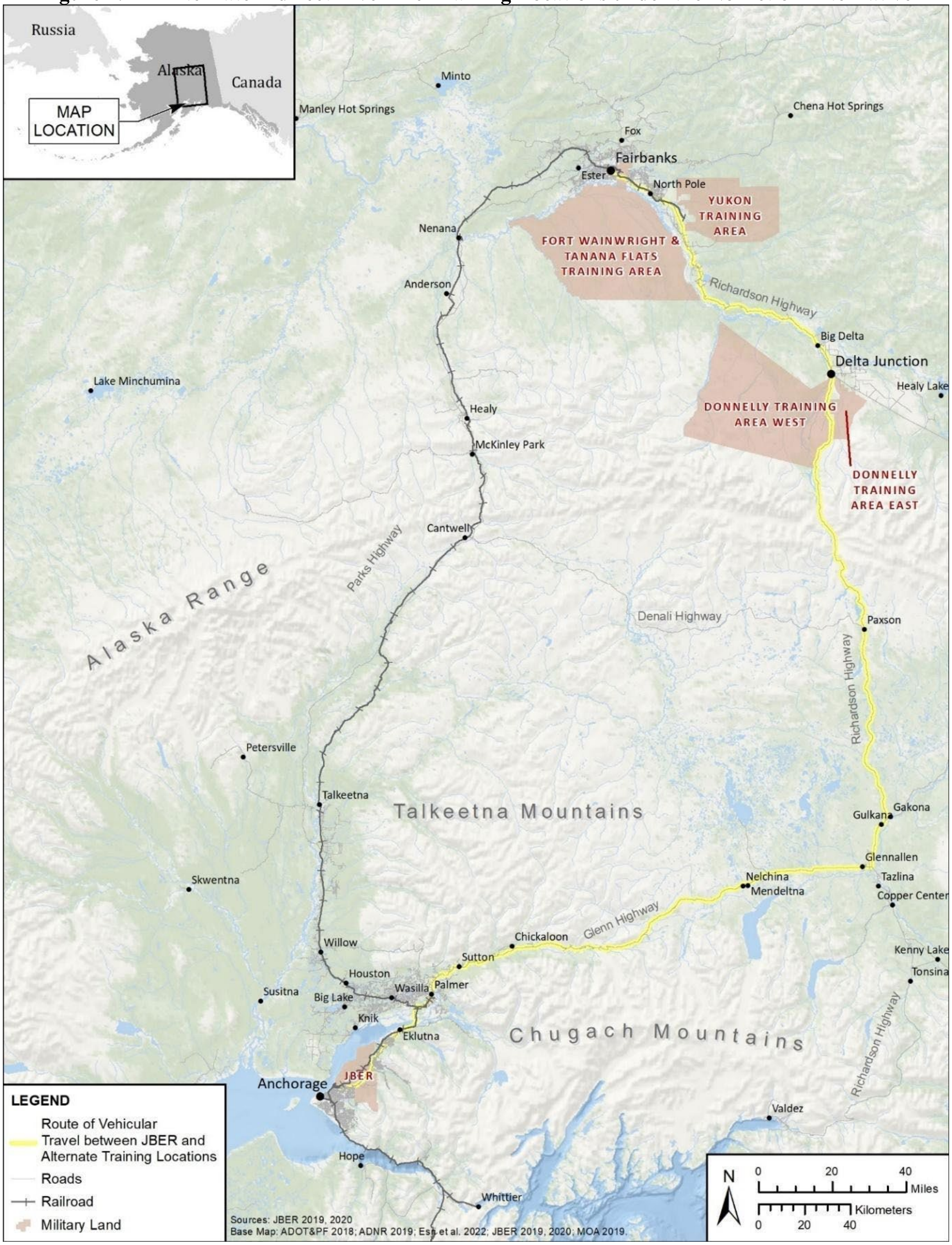
2.4.3 No Action Alternative: Conduct Training at Other Existing Impact Areas Outside JBER

Under the No Action Alternative, ERF-IA would continue to be used at the current operations tempo with the same seasonal restrictions. The No Action Alternative would also result in JBER home station units deploying to other Army-controlled training lands to conduct required small unit training. Current use of ERF-IA is explained in the 1991 *Environmental Assessment for Resumption of Firing in the ERF Impact Area* FONSI and subsequent Records of Environmental Consideration that determined the requisite ice thickness (USARAK 1991; USAG Alaska 2001a, 2001b, 2005). This alternative does not meet the purpose and need for the proposed action because it does not allow units stationed at JBER to conduct the full range of training, certification, and qualification tasks at home station.

2.4.3.1 Training under the No Action Alternative

Units stationed at JBER would continue to travel to Fort Wainwright to conduct indirect live-fire qualification and training whenever ice cover requirements are not met at ERF-IA. The transportation corridor used for these training deployments between JBER and Fort Wainwright includes Glenn Highway and portions of the Richardson Highway (Figure 2.4-4).

Figure 2.4-4 Alternate Indirect Live-Fire Training Locations under the No Action Alternative



Sources: Municipality of Anchorage 2020; AECOM 2020a

Note: Units live-fire at either the Yukon Training Area, Tanana Flats Training Area, or Donnelly Training Area West, all of which are assigned to Fort Wainwright. Units firing at Donnelly Training West may also travel to the Fort Wainwright cantonment area (near Fairbanks) to draw ammunition then transport the ammunition via the Richardson Highway to the Donnelly ranges. Fort Greely, though closer to the Donnelly ranges, does not have an Ammunition Supply Point.

Units stationed at JBER typically need multiple training iterations at Fort Wainwright to meet standard qualification, certification, and training requirements. These training iterations require the transport of both personnel and equipment. Table 2.4-1 identifies an approximation of assets that are transported to Fort Wainwright under present conditions for each of the training iterations. Platoons and batteries are not capable of providing all of the mission command, life support, and logistical needs to deploy individually, so battalion and brigade assets must also accompany them to provide the required support.

The round-trip distance from JBER to Fort Wainwright is approximately 710 miles. A typical convoy consists of dozens of vehicles traveling in groups along narrow two-lane roadways with few pullouts and passing lanes. Convoys transiting to/from Fort Wainwright create additional traffic during the summer months when roadways are already heavily congested by tourists and recreational traffic.

In addition to the broad discussion of Army-wide training requirements in Section 1.4.2, current military training activities in Alaska, including Fort Wainwright, have been analyzed in several NEPA documents.

Table 2.4-1 Military Equipment Transported to Fort Wainwright

Unit Type	Equipment Type	Number	Number of Iterations/Year	Transportation Mode
105-mm Battery (two batteries)	Howitzer	12	1	Line Haul Only
105-mm Battery (two batteries)	HMMWV	24	1	Line Haul or Convoy
105-mm Battery (two batteries)	Soldiers	84	1	Convoy, Air Drop, Bus
105-mm Battery (two batteries)	HEMTT	0	1	Line Haul or Convoy
105-mm Battery (two batteries)	LMTV	0	1	Line Haul or Convoy
155-mm Battery	Howitzer	6	1	Line Haul Only
155-mm Battery	HMMWV	0	1	Line Haul or Convoy
155-mm Battery	Soldiers	54	1	Convoy, Air Drop, Bus
155-mm Battery	HEMTT	0	1	Line Haul or Convoy
155-mm Battery	LMTV	6	1	Line Haul or Convoy
Artillery Battalion/HQ	HMMWV	70	1	Line Haul Only
Artillery Battalion/HQ	Soldiers	313	1	Bus or Convoy
Artillery Battalion/HQ	HEMTT	22	1	Convoy, Air Drop, Line Haul
Artillery Battalion/HQ	LMTV	2	1	Line Haul or Convoy
Infantry Battalion	Mortar (120-mm, 81-mm, 60-mm)	28	2	Transport in organic vehicles
Infantry Battalion	HMMWV	120	2	Line Haul or Convoy
Infantry Battalion	Soldiers	1,290	2	Convoy, Air Drop, Bus
Infantry Battalion	HEMTT	0	2	Line Haul or Convoy

Unit Type	Equipment Type	Number	Number of Iterations/Year	Transportation Mode
Infantry Battalion	LMTV	18	2	Line Haul or Convoy
Cavalry Squadron	Mortar (120-mm, 60-mm)	6	2	Transport in organic vehicles
Cavalry Squadron	HMMWV	40	2	Line Haul or Convoy
Cavalry Squadron	Soldiers	357	2	Convoy, Air Drop, Bus
Cavalry Squadron	HEMTT	4	2	Line Haul or Convoy
Cavalry Squadron	LMTV	5	2	Line Haul or Convoy

Key: HEMTT = Heavy Expanded Mobility Tactical Truck; HMMWV = High Mobility Multipurpose Wheeled Vehicle; LMTV = Light Medium Tactical Vehicle; mm = millimeter

Mortar weapon systems that are currently used at JBER include 60-mm, 81-mm, and 120-mm mortars. Mortar units would not be able to meet all training standards exclusively at JBER. During winter months when conditions permit, JBER units would continue to conduct training exercises as scheduled in their current annual training cycle. As a result, mortar ammunition resources allotted in DA Pam 350-38 being fired into ERF-IA would be reduced under the No Action Alternative, as a portion of mortar live-fire training would occur at training areas away from JBER. Training exercises not conducted at JBER would be conducted at Fort Wainwright. Figure 2.4-5 depicts the proportion of mortar and artillery rounds that could be fired at JBER under the No Action Alternative, relative to the total training requirement depicted in Figure 2.4-2. Rounds unable to be fired at JBER (represented with hatching) would be used during training events at Fort Wainwright.

Figure 2.4-5 Indirect Live-Fire Training at JBER under the No Action Alternative

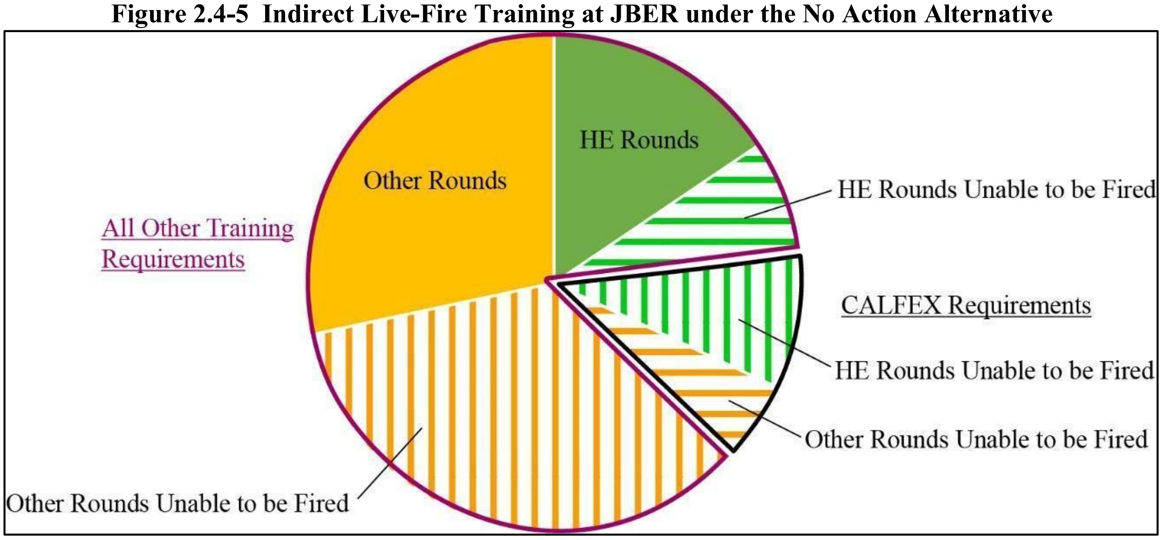


Table 2.4-2 provides a breakdown of the likely number of mortar rounds that could be fired over the course of a fiscal year at ERF-IA under the No Action Alternative (based on the 2018 version of DA Pam 350-38). This table does not include mortar rounds that would be fired during small unit exercises at Fort Wainwright.

Table 2.4-2 Mortar Munitions Resourced Annually (Fiscal Year) for No Action Alternative

Weapon System	HE	SMOKE[1]	ILLUM	FRPC
60-mm Mortar Rounds	518	0	245	1,400
81-mm Mortar Rounds	296	0	140	800

Weapon System	HE	SMOKE[1]	ILLUM	FRPC
120-mm Mortar Rounds	372	0	180	1,116
Total Annual Mortar Rounds	1,186	0	565	3,316

Note: [1]All mortar smoke rounds currently available contain phosphorus and cannot be used at ERF-IA per Army regulation.

Key: FRPC = Full Range Practice Cartridge; HE = high explosive; ILLUM = illumination; mm = millimeter

Note that the numbers in this table do not match Table 2.1-2 due to the reduced time allotted for firing activities.

Although artillery units would not be able to meet training and qualification standards solely at JBER, they would nevertheless attempt to accomplish those training events during winter months, as scheduled in their current annual training cycle and as permitted by the aforementioned restrictions. As with mortars, this would result in a reduction of the ammunition resources allotted in DA Pam 350-38 being fired into ERF-IA. Howitzer weapon systems currently used at JBER are limited to the 105-mm howitzer. The remaining small-unit training events would be conducted at Fort Wainwright. The number of artillery rounds that could be used over the course of a fiscal year at ERF-IA under the No Action Alternative is presented in Table 2.4-3 (based on the 2018 version of DA Pam 350-38). Artillery units currently stationed at JBER have qualification requirements for the 155-mm howitzer but are required to travel to Fort Wainwright to conduct qualification training.

Table 2.4-3 105-mm Howitzer Munitions Resourced Annually (Fiscal Year) for No Action Alternative

Weapon System	HE	SMOKE[1]	ILLUM	BLANK
105-mm Howitzer Rounds (per battery)	653	36	70	251
Total Annual Howitzer Rounds (two batteries)	1,306	72	140	502

Note:[1] Non-phosphorus smoke rounds are available for the 105-mm howitzer.

Key: HE = high explosive; ILLUM = illumination; mm = millimeter

These tables present the maximum number of rounds that could be fired at ERF-IA under the No Action Alternative. As previously noted, larger unit exercises would likely be conducted at other installations but may be conducted at JBER depending on specific training objectives and scenarios. Ultimately, it is up to unit commanders to determine the specifics of each training exercise, including where to conduct that exercise. Because JBER has the capability to support some larger unit exercises (company level and above), the ammunition resources allocated by DA Pam 350-38 for those exercises are included in this analysis.

2.4.3.2 Seasonal Training Constraints under the No Action Alternative

Indirect live-fire weapons training would continue to be conducted at ERF-IA as described in Section 2.4.3.1, using the weapons systems and munitions shown in Tables 2.4-2 and 2.4-3.

Winter-only firing restrictions would apply, meaning firing would be conducted only when the following ice cover conditions are met:

- 60-mm and 81-mm mortar training would be conducted when there are 2 inches or more of ice cover in ERF-IA.
- 120-mm mortar and 105-mm howitzer training would be conducted when there are 5 or more inches of ice cover in ERF-IA.

Only variable or mechanical time (air burst) or point detonating super quick fuzes would be employed.

The following habitat protection buffers would remain in place to ensure that the impact area adequately contains the effects of live-fire training:

- A 500-meter-wide area of land extending along the shore of Eagle Bay.
- A 1,000-meter-wide area of land extending along the shore of Eagle Bay only when 120-mm mortar rounds are used.
- The Eagle River and Otter Creek channels. Firing into the river and creek is always prohibited.
- A 130-meter-wide area extending outward from each bank of Eagle River, beginning at the mouth of Eagle Bay and extending upstream to a point 100 meters above the confluence with Otter Creek.
- A 50-meter-wide area extending outward from each bank along the main Eagle River channel beginning at the point 100 meters upstream from the Otter Creek confluence and extending further upstream to the Route Bravo Bridge.
- A 50-meter-wide area extending outward from each bank of Otter Creek beginning at the confluence with Eagle River and extending upstream to the ERF-IA boundary, to include a tributary.

Units would continue to be subject to the risk of Fort Wainwright impact area closures. Fort Wainwright routinely experiences elevated Fire Weather Index wildfire conditions during summer dry spells that result in the suspension of artillery and mortar firing. Firing suspensions have historically occurred frequently enough that JBER-based units often will not schedule qualification training at Fort Wainwright during the summer months. JBER, with its typically rainier summers, is more conducive to scheduling artillery and mortar firing due to the lessened fire danger.

2.5 THE ENVIRONMENTAL IMPACT ANALYSIS PROCESS

NEPA requires consideration of environmental issues in federal agency planning and decision-making. Under NEPA, federal agencies must analyze and document the impacts of the proposed action. The impacts are documented in an EA or EIS for any major federal action, except those actions that are determined to be “categorically excluded” from further analysis. The review provides a full and fair discussion of potential consequences to the human environment, including the natural environment, resulting from implementing all-season mortar and artillery firing at JBER, Alaska.

2.5.1 Cooperating Agencies

NEPA defines a cooperating agency as “any Federal, State, Tribal, or local agency that has been designated as a cooperating agency under [NEPA] section 107(a)(3).” Under section 107(a)(3), a lead agency may “designate any Federal, State, Tribal, or local agency that has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal to serve as a cooperating agency.” The Army is the proponent and a cooperating agency, and NMFS is a cooperating agency. NMFS has jurisdiction by law and special expertise with respect to marine species potentially affected by the proposed action.

2.5.2 Coordination for Environmental Planning and Scoping

Scoping is an early and open process for developing the breadth of issues to be addressed in the EIS and for identifying agency and/or public concerns related to a proposed action. Scoping initiates the EIS process, informing the public of the Air Force’s intent to prepare an EIS. To the extent possible, public scoping comments are used to shape the proposed action and alternatives, as well as focus the environmental analysis in the EIS.

2.5.2.1 Scoping

The formal scoping comment period started with publication of the NOI to prepare an EIS in the *Federal Register* on 16 March 2020 (85 FR 14928). Consistent with the requirements and objectives of Executive Order (EO) 11990, *Protection of Wetlands*, and EO 11988, *Floodplain Management*, state and federal regulatory agencies with special expertise in wetlands and floodplains were contacted to request comment. Consistent with EO 11988 and EO 11990, the NOI initiated early public review of the proposed action and alternatives, which have the potential to be located in a floodplain and/or wetland. Scoping for the EIS was conducted from 16 March 2020 through 11 May 2020, for a total of 55 days. The Air Force further initiated the scoping and coordination process by sending letters via the U.S. postal service and email to local, state, and federal agencies informing them of the Air Force's intent to prepare the EIS. Stakeholder groups and members of the public were encouraged to provide comments on the proposed action through a variety of methods during the scoping process.

The Air Force was unable to conduct in-person public scoping meetings due to the National Emergency declared by the President on Friday, 13 March 2020, in response to the coronavirus (COVID-19) pandemic in the United States and the Center for Disease Control's recommendations for social distancing and avoiding public gatherings. Instead, information on the proposed action and the ability to submit comments was made available at the project website and by request to the JBER Public Affairs office. An amended NOI announcing the cancellation of previously scheduled public meetings and referring interested parties to the project website was published in the *Federal Register* on 1 April 2020 (85 FR 18217). This amended NOI extended the initial public scoping period by 15 days. Over the 55-day comment period, the Air Force received a total of 11 submissions via the website or email, which included 151 individual substantive comments. Comments were organized into two broad categories: Resource Topics and the NEPA Process and Regulatory Compliance. The main topics addressed in scoping comments were as follows:

Resource Topics:

- Air Quality
- Air Space
- Aquatic Habitat
- CERCLA
- Climate Change
- Environmental Justice
- Fish
- Hazardous Materials
- Human Health
- Noise
- Subsistence
- Threatened and Endangered Species
- Water Quality
- Wetlands
- Wildlife

NEPA Process and Regulatory Compliance:

- Alternatives
- Government-to-Government Consultation
- Mitigation
- Monitoring
- Public Involvement
- Purpose and Need
- Regulatory Framework
- Support

2.5.2.2 Public Outreach

Throughout the scoping period, the Air Force solicited comments through public releases, newspaper ads, flyers, web postings, and similar communications channels. Advertisements announcing the scoping period were published in the *Anchorage Daily News* on 27 March, 29 March, and 5 April 2020. A news release was sent to local media outlets on 31 March and 1 May 2020. The project website (https://jber-pmart-eis.com/) was activated on 13 March 2020, with updates occurring throughout the scoping period. The website includes information about the project, EIS process, and scoping. The Air Force uses the website to disseminate important information to the public, such as the EIS schedule, background information, scoping materials and instructions for providing comments. The website also included a form for the public to submit online scoping comments. In lieu of in-person scoping meetings, information on the proposal was available on the project website and via email by request to the JBER Public Affairs office. Scoping materials available online include a suite of posters describing the NEPA process, the project description, the proposed action and alternatives, and instructions on how to comment.

2.5.3 Interagency and Intergovernmental Coordination and Consultations

The Air Force has consulted with federal, state, and local agencies with jurisdiction in areas that could be affected by the proposed action. These agencies include, but are not limited to, the federal agencies U.S. Environmental Protection Agency (USEPA), U.S. Fish and Wildlife Service (USFWS), NMFS, Bureau of Land Management (BLM), USACE, and Advisory Council on Historic Preservation; the state agencies Alaska Department of Fish and Game (ADF&G), Alaska Department of Environmental Conservation (ADEC), Alaska State Historic Preservation Officer (SHPO), and Alaska Department of Natural Resources (ADNR); and local agencies the Municipality of Anchorage, Anchorage Historic Preservation Commission, and local community council organizations; and Alaska Native entities. Table 2.5-1 lists consultation/coordination specifically required by statute or regulation. A more complete documentation of agency coordination, consultation, and public involvement is provided in Appendix B.

Table 2.5-1 Consultation and Coordination Requirements

Authority	Topics	Statutory and Regulatory Authorities	Status of Consultation and/or Coordination
Federally Recognized Indian Tribes	Government-to-government consultation with federally recognized Indian Tribes	Executive Order 13175, *Consultation and Coordination with Indian Tribal Governments*; DoDI 4710.02, *Interactions with Federally Recognized Tribes*; Executive Order 13007, *Indian Sacred Sites*, and DAFI 90-2002, *Interactions with Federally Recognized Tribes*	See Appendix B, Agency Coordination and Public Involvement. Government-to-government coordination and consultation is ongoing.
State Historic Preservation Officer and Advisory Council on Historic Preservation[1]	Buildings, sites, districts, structures, objects, or traditional cultural properties eligible for or listed in the National Register of Historic Places within the Area of Potential Effect	National Historic Preservation Act (PL 113-287) (54 U.S.C. §§ 300101–320303); 36 CFR Part 800, *Protection of Historic Properties*	See Appendix B, Agency Coordination and Public Involvement. Coordination and consultation with State Historic Preservation Officer is ongoing.
National Marine Fisheries Service	Protected species (threatened or endangered species)	Endangered Species Act (16 U.S.C. § 1531 et seq.); 50 CFR Part 17, *Endangered and Threatened Wildlife and Plants*; Marine Mammal	See Appendix B, Coordination and Public Involvement. Consultation under ESA Section 7 is ongoing.

Authority	Topics	Statutory and Regulatory Authorities	Status of Consultation and/or Coordination
		Protection Act (16 U.S.C. §§ 1361–1383b, 1401–1406, 1411–1421h); Magnuson-Stevens Act of 1972, as amended by the Sustainable Fisheries Act of 1996 (16 U.S.C. § 1801 et seq.)	
U.S. Fish and Wildlife Service	Protected species (bald and golden eagles)	Migratory Bird Treaty Act (16 U.S.C. §§ 703–712); 50 CFR Part 21, *Migratory Bird Permits*; Bald and Golden Eagle Protection Act (16 U.S.C. §§ 668–668c); 50 CFR Part 22, *Eagle Permits*	See Appendix B, Agency Coordination and Public Involvement. Coordination with U.S. Fish and Wildlife Service was part of scoping.

Note: [1] The Advisory Council on Historic Preservation declined participation in consultation.

Key: CFR = Code of Federal Regulations; DAFI = Department of the Air Force Instruction; DoDI = Department of Defense Instruction; ESA = Endangered Species Act; PL = Public Law; U.S.C. = United States Code

2.5.4 Government-to-Government Consultation

The legal driver for government-to-government consultation is EO 13175, *Consultation and Coordination with Indian Tribal Governments*, which directs federal agencies to coordinate and consult with Native American Tribal governments whose interests might be directly and substantially affected by federal actions. EO 13007, *Indian Sacred Sites*, requires that Tribal concerns be addressed regarding cultural and natural resources associated with Tribal traditions, Tribal rights, and activities on Air Force lands. The National Historic Preservation Act (NHPA) and its implementing regulations at 36 CFR Part 800, *Protection of Historic Properties*, are drivers for consultation and require the Air Force to conduct government-to-government consultation with federally recognized Native American Tribes to determine whether any historic properties of Tribal religious or cultural significance would be affected by the action and to resolve adverse effects. Other applicable regulations include DoD Instruction (DoDI) 4710.02, *DoD Interactions with Federally Recognized Tribes*; Department of the Air Force Instruction (DAFI) 90-2002, *Interactions with Federally Recognized Tribes*; and Air Force Manual (AFMAN) 32-7003, *Environmental Conservation*. Appendix B provides a record of Air Force communications for government-to-government consultation with potentially affected federally recognized Alaska Native Tribes and Alaska Native Corporations and consultation under Section 106 of the NHPA. The Air Force invited federally recognized Alaska Native Tribes and Alaska Native Corporations that are historically affiliated with JBER to consult on all proposed undertakings that have a potential to affect properties of cultural, historical, or religious significance to the Alaska Native Tribes and Alaska Native Corporations.

2.5.5 Draft EIS for Public and Agency Review

The Notice of Availability (NOA) for the Draft EIS was published in the *Federal Register* and the public review and comment period will be 60 days. The NOA has been made available through the local newspaper, display advertisements, press releases, public service announcements, and letters accompanying the direct mailing of the Draft EIS document. During the Draft EIS comment period, the Air Force will sponsor public hearings in Palmer and Eagle River on the Draft EIS in accordance with Appendix C in 32 CFR Part 989. These locations have been chosen due to the proximity of the communities with the most potential to be affected by the proposed action. Public hearings will take place no sooner than 15 days after the initial notice in the *Federal Register* and at least 15 days prior to the end of the public comment period. The Air Force will then incorporate into the Final EIS its responses to comments on the Draft EIS.

2.5.6 Scope of Resource Analysis

The following environmental resources are fully analyzed in the EIS:

- Noise
- Air Quality
- Sub-arctic Climate Considerations
- Safety and Occupational Health
- Earth Resources
- Water Resources
- Wetlands
- Biological Resources
- Wildland Fire
- Cultural Resources and Subsistence
- Land Use and Recreation
- Transportation and Circulation
- Socioeconomics
- Infrastructure and Utilities
- Hazardous Materials and Waste
- Forest Resources

Additional information regarding the resource area requirements can be found in Appendix A.

Prior to the implementation of an action alternative, the permits and other requirements listed in Table 2.5-2 are anticipated to be required.

Table 2.5-2 Pertinent Regulatory Requirements

Law or Regulation	Description
Section 404 of the Clean Water Act	Permitting for discharge of dredged or fill material into waters of the United States, including wetlands
Section 402 of the Clean Water Act	Prohibits unpermitted discharge of pollutants from a point source into waters of the U.S. Creates National Pollutant Discharge Elimination System and associated permitting authorities.
Bald and Golden Eagle Protection Act	Unless a permit has been issued, the Bald and Golden Eagle Protection Act sets forth the following prohibited acts "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import…any bald eagle commonly known as the American eagle, or any golden eagle, alive or dead, or any part, nest, or egg thereof of the foregoing eagles…" A permit may be obtained for Bald or Golden Eagle take that is associated with, but not the purpose of, an activity.
National Historic Preservation Act	Section 106 of National Historic Preservation Act requires consultation with the Advisory Council on Historic Preservation, State Historic Preservation Officer, federally recognized Tribes, and interested parties when a proposed action has the potential to affect cultural resources. If there are adverse effects to historic properties listed on or eligible for inclusion on the National Register of Historic Places, a Memorandum of Agreement or Programmatic Agreement may be required to resolve these effects.
Marine Mammal Protection Act	Prohibits the take, including harassment, of marine mammals with exceptions for certain limited activities.
Migratory Bird Treaty Act	The primary federal legislation established to conserve migratory birds, and generally prohibits the unauthorized take of migratory birds.

Law or Regulation	Description
Endangered Species Act	Section 7(a)(2) states that each federal agency shall, in consultation with the Secretary (of either National Marine Fisheries Service or U.S. Fish and Wildlife Service, as appropriate), ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of habitat designated as critical.
Magnuson-Stevens Fishery Conservation and Management Act	The primary law governing marine fisheries management in U.S. federal waters, which requires federal agencies to consult with National Marine Fisheries Service on actions that may adversely affect Essential Fish Habitat.
Coastal Zone Management Act	The State of Alaska withdrew from the voluntary National Coastal Zone Management Program on 1 July 2011. Therefore, within the State of Alaska, the federal consistency requirements under the Coastal Zone Management Act do not apply to federal agencies.
Executive Order 11990, Protection of Wetlands	Includes requirements in order to avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative.
Executive Order 11988, Floodplain Management	Includes requirements in order to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative.

2.6 COMPARISON OF ALTERNATIVES AND ENVIRONMENTAL CONSEQUENCES

The associated impacts to resources differ for each alternative as a result of the different operational strategies and natural settings. Analyses of the environmental issues associated with the proposed action focus on areas of concern identified during the pre-scoping and scoping periods.

Table 2.6-1 provides a summary of the total maximum number of rounds that could be fired under each alternative. The potential number of rounds fired under each alternative is based on the annual (fiscal) ammunition allocations prescribed by DA Pam 350-38. “Other Rounds” refers to ILLUM, smoke, blank rounds, and training rounds that do not contain HE (all training rounds except 155-mm).

Table 2.6-1 Total Number of Rounds Allocated by Alternative Each Fiscal Year

Munitions Type	Alternative 1: All-Season Live-Fire Training with Expanded Impact Area and Fully Meets CALFEX Live-Fire Proficiency	Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only and Marginally Meets CALFEX Live-Fire Proficiency	No Action Alternative
60-mm Mortar HE Rounds	1,036	1,036	518
60-mm Mortar Other Rounds	3,290	3,290	1,645
81-mm Mortar HE Rounds	592	592	296
81-mm Mortar Other Rounds	1,880	1,880	940
120-mm Mortar HE Rounds	744	744	372
120-mm Mortar Other Rounds	2,592	2,592	1,296

Munitions Type	Alternative 1: All-Season Live-Fire Training with Expanded Impact Area and Fully Meets CALFEX Live-Fire Proficiency	Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only and Marginally Meets CALFEX Live-Fire Proficiency	No Action Alternative
105-mm Howitzer HE Rounds	2,612	2,612	1,306
105-mm Howitzer Other Rounds	1,334	1,334	714
155-mm Howitzer HE Rounds	144	144	N/A
155-mm Howitzer Training Rounds	900	900	N/A
155-mm Howitzer Other Rounds	146	146	N/A
Total Rounds	15,270	15,270	7,087

Key: CALFEX = Combined Arms Live Fire Exercise; ERF-IA = Eagle River Flats Impact Area; HE = high explosive; mm = millimeter; N/A = not applicable

Table 2.6-2 summarizes and compares the baseline conditions of environmental resources to the potential environmental consequences of alternatives. The summaries provided document potential impacts assuming adherence to protective measures built into the action alternatives, as well as existing BMPs and SOPs that are required by pertinent policies, guidance documents, and regulations. For some resources, additional mitigation has been identified as a result of the analyses presented in Chapter 3 to further reduce impacts. Table 2.6-2 includes those measures identified during the analysis where mitigation would reduce the impact to less than significant.

Table 2.6-2 Environmental Comparison of Alternatives

Resource Area	Alternative 1: All-Season Live-Fire Training with Expanded Impact Area	Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only	No Action Alternative
Noise (Section 3.1) This section addresses community noise. Noise impacts on specific resource areas are included in the corresponding resource section.	Impacts would not exceed significance thresholds. Increases to noise in sensitive areas would be limited to seasonal impacts in isolated recreation areas and would remain below significance levels. Long-term community noise impacts associated with increased large arms CDNL noise contours (from increased firing) would encompass a larger area on and off the installation, but only one seasonal noise-sensitive land use within the predicted 62 dB CDNL and above noise contours.	Impacts would not exceed significance thresholds. No temporary construction noise. Noise impacts from large arms training would be identical to those under Alternative 1.	No change in noise levels from baseline conditions.
Air Quality (Section 3.2)	With BMPs to control fugitive dust, impacts from construction would not exceed insignificance thresholds.[1] Short-term increase in emissions associated with land clearing, potential burning of slash, and construction. Release of carbon due to conversion of 350 acres of forest to grass, long-term removal of 9 acres of forest, and thinning of 226 additional acres. Annual emissions associated with prescribed fire to maintain open conditions. Long-term reduced vehicle emissions due to less travel to Fort Wainwright annually. Vehicle emissions associated with increased local travel at JBER would be offset by a corresponding decrease in local travel at Fort Wainwright. Localized, negligible increase in emissions of HAPs during live-fire training with increased number of rounds fired at ERF-IA would not present a human health risk. Annual GHG emissions associated with prescribed fire. Long-term reduction in vehicle GHG emissions due to less travel to Fort Wainwright annually. Long-term reduction in carbon sequestration from conversion of forest and maintaining open conditions in the expansion area.	Impacts would not exceed insignificance thresholds.[1] No temporary construction emissions. Short-term release of carbon and increase in annual emissions from potential burning of slash and prescribed burning additional acres (Alternative 1) would not be realized. Long-term reduced vehicle emissions would be less than under Alternative 1, as some travel to Fort Wainwright would likely occur. No increased local vehicle emissions at JBER or corresponding decreases at Fort Wainwright. Localized, negligible increase in emission of HAPs would be less than under Alternative 1, although the rounds would be fired elsewhere. Long-term reduction in GHG emissions from reduced vehicle travel would be less than under Alternative 1. Long-term change in carbon sequestration (Alternative 1) would not be realized. Overall, a beneficial impact to air quality is likely.	No change in annual emissions from baseline conditions. Air quality impacts from vehicle travel would be greater than under Alternatives 1 and 2. No temporary construction emissions or annual emissions associated with prescribed fire. No reductions in GHG emissions from reduced vehicle travel. Overall, impacts to air quality likely would be less than under Alternative 1 and greater than under Alternative 2.

Resource Area	Alternative 1: All-Season Live-Fire Training with Expanded Impact Area	Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only	No Action Alternative
Sub-arctic Climate Considerations (Section 3.3)	Fewer weather impacts than Alternative 2 and the No Action alternative because training would not be limited by ice thickness, training could occur during all seasons, and the upland expansion area would be less susceptible to flooding and erosion than ERF.	Fewer weather impacts than the No Action Alternative due to all-season training, but greater susceptibility to flooding and erosion than Alternative 1 because the impact area would not be expanded into uplands.	Greater weather impacts than the action alternatives due to ice thickness requirements, more frequent training at Fort Wainwright where red flag days from wildfire are more common, and likely increased flooding and erosion at ERF.
Safety and Occupational Health (Section 3.4)	Impacts would not exceed significance thresholds. Short-term safety risks to contractors performing land clearing and construction in the proposed expansion area, which would be reduced by adhering to required BMPs in applicable safety procedures and standards. Long-term increase in UXO at ERF-IA, increased fire risk in the proposed expansion area, and a beneficial impact to soldier safety from reduced vehicle travel and transport of munitions.	Impacts would not exceed significance thresholds. No short-term safety risks associated with construction. Long-term impacts would be similar to those under Alternative 1, except there would be no increased fire risk, and the beneficial impact from reduced travel would be lower than under Alternative 1 because some travel to Fort Wainwright is likely to occur.	No change in safety risks from baseline conditions. No short-term safety risks associated with construction, no increase in UXO at ERF-IA, and no increased fire risk. Risks to soldier safety from vehicle travel and transport of munitions would be greater than under Alternatives 1 and 2.
Earth Resources (Section 3.5)	Impacts from cratering in the expansion area would exceed significance thresholds. Short-term destabilization of soils associated with 359 acres of clearing in the proposed expansion area. Long-term permanent burial of soils in 3.5 acres and long-term periodic disturbance of soils in 5.8 acres of firebreaks. Increased potential for runoff and erosion. Long-term impacts to up to 1,510 acres of soil spread across existing ERF-IA and the proposed expansion area from disturbance associated with detonation of rounds during non-frozen conditions. Total estimated area of soil disturbance in a given training year would not exceed 6 acres for all target areas combined. Potential for deposition of munitions residues throughout target areas and very low risk of striking gravel-capped areas and discharging sequestered WP.	Impacts would not exceed significance thresholds. No impacts to soils outside the existing ERF-IA. Long-term impacts to up to 1,160 acres of soil in existing ERF-IA from detonation of rounds, which is less than under Alternative 1, and no new areas of soil disturbance. Maximum disturbance area of 6 acres annually would be concentrated over a smaller area if all training occurs at JBER, and the degree of impact to soil in ERF could be greater than under Alternative 1. Potential deposition of munitions residues would occur over a smaller area than under Alternative 1, with greater impacts in existing ERF-IA. Very low risk of striking gravel-capped areas and discharging sequestered WP.	No impacts to soils outside the existing ERF-IA. Soil disturbance would be less than under Alternatives 1 and 2 because frozen conditions would protect soils. Lower risk of damaging gravel caps, and less deposition of munitions residues.

Resource Area	Alternative 1: All-Season Live-Fire Training with Expanded Impact Area	Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only	No Action Alternative
Water Resources (Section 3.6)	Impacts are not expected to exceed significance thresholds. No direct impacts from construction of the proposed expansion area, but potential indirect effects from increased sedimentation from destabilized soils and spills from construction equipment, minimized through BMPs specified in SWPPP. Long-term potential for impacts to water resources in ERF-IA through increased deposition of munitions constituents and soil disturbance from detonation of rounds. Water quality criteria exceedances are not anticipated. No or negligible impacts to groundwater or potential drinking water sources.	Impacts are not expected to exceed significance thresholds. No construction-related impacts, and affected area would be limited to the existing ERF-IA. Potential impacts from live-fire training similar to those under Alternative 1, although it is possible that more munitions would be detonated in ERF-IA.	No construction-related impacts. Long-term potential for impacts to water resources in ERF-IA would not increase from baseline levels and would be less than under Alternatives 1 and 2.
Wetlands (Section 3.7)	Impacts would not exceed significance thresholds. Long-term degradation of up to 59 acres of wetlands in the vegetation buffer, and potential indirect impacts from vegetation clearing of the proposed expansion area. Any unanticipated and unavoidable impacts to wetlands would be compensated for through a mitigation bank or in-lieu fee instrument. Long-term impacts to estuarine wetlands from live-fire training during non-frozen conditions and an increased number of rounds detonated in ERF-IA. Total estimated area of wetland disturbance in a given training year would not exceed 4.8 acres for all target areas combined. Potential phytotoxic impacts from an estimated 54 percent increase in annual deposition of energetic residues relative to the No Action Alternative. The social value component of wetlands would be reduced, but no significant reduction in overall function.	Impacts would not exceed significance thresholds. No impacts to wetlands from construction. Greater degree of wetland impact than under Alternative 1 if all training occurs at JBER. Long-term impacts to up to 6 acres of estuarine wetlands annually. Potential phytotoxic impacts from an estimated 54 percent increase in annual deposition of energetic residues relative to the No Action Alternative. The social value component of wetlands would be reduced, but no significant reduction in overall function.	No impacts to wetlands from construction. No change from baseline conditions. Winter firing restrictions would protect wetlands from disturbance and result in lower potential phytotoxic impacts than under Alternatives 1 and 2.

Resource Area	Alternative 1: All-Season Live-Fire Training with Expanded Impact Area	Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only	No Action Alternative
Biological Resources (Section 3.8)	**Vegetation:** Impacts would not exceed significance thresholds. Direct impacts to 585 acres of vegetation, including 359 acres of clear-cutting, 226 acres of alteration through thinning, and increased fire risk in the expansion area. Indirect impacts from increased risk of erosion, sedimentation, and windthrow over 7 acres from construction and maintenance of the proposed expansion area, and increased risk of windthrow in the thinned vegetation buffer. Increased susceptibility to invasive plant species in the proposed expansion area. Mitigation to monitor and treat invasive species would prevent their spread beyond the ROI. Annual disturbance of up to 6 acres from live-fire training during non-frozen conditions would impact vegetated and non-vegetated areas at ERF-IA. Potential phytotoxic impacts from an estimated 54 percent increase in annual deposition of energetic residues relative to the No Action Alternative. The affected area would be spread across the existing ERF-IA and the proposed expansion area.	**Vegetation:** Impacts would not exceed significance thresholds. No impacts to vegetation from construction. Greater degree of vegetation disturbance than under Alternative 1 if all training occurs at JBER. Annual disturbance of up to 6 acres of vegetation from live-fire training (same as Alternative 1). There is a 54 percent increase in annual deposition of energetic residues relative to the No Action Alternative (same as under Alternative 1). The affected area would be limited to existing ERF-IA.	**Vegetation:** No impacts to vegetation from construction. No change from baseline conditions. Winter firing restrictions would help protect vegetation from disturbance. Lower phytotoxic impacts than under Alternatives 1 and 2.
Biological Resources (Section 3.8)	**Fish:** Impacts could potentially exceed significance thresholds, even with mitigation measures. Potential short-term indirect impacts from sedimentation into fish habitats from clearing and construction would be minimized by BMPs. Potential long-term adverse impacts from live-fire training during ice-free conditions through exposure to underwater noise, munitions strikes, alteration of habitat in unbuffered areas, and exposure to munitions constituents. Protective measures would reduce but not avoid or eliminate impacts.	**Fish:** Impacts could potentially exceed significance thresholds, even with mitigation measures. No construction impacts. Potential long-term impacts similar to those under Alternative 1, but the degree of impact could be greater than under Alternative 1 if all training occurs at JBER because more rounds would detonate in the existing ERF-IA.	**Fish:** No change from baseline conditions. With winter-only firing restrictions and less live-fire training at ERF-IA, outside of adult salmon migration periods, impacts would be lower than under Alternatives 1 and 2.

Resource Area	Alternative 1: All-Season Live-Fire Training with Expanded Impact Area	Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only	No Action Alternative
Biological Resources (Section 3.8)	**Terrestrial Wildlife:** Impacts would not exceed significance thresholds. Short-term impacts from noise disturbance during construction of the proposed expansion area. Long-term loss of 359 acres of forest and woodland habitat, degradation of up to 59 acres of wetland habitat, and alteration of various habitats through thinning in the vegetative buffer, but creation of grassland, edge, and successional habitats. Long-term impacts from live-fire training during all seasons through periodic noise disturbance, habitat alteration, and increased risk of exposure to munitions residues. Degree of impact would depend on the species and timing of training, but most species would temporarily leave or habituate. Risks for direct strikes would be reduced by regulations that require cease fire if wildlife is observed. Very low risk of striking gravel-capped areas from live-fire training during ice-free conditions and discharging sequestered WP that could be ingested by birds.	**Terrestrial Wildlife:** Impacts would not exceed significance thresholds. No loss of forested habitat or construction impacts. No or minimal impacts to forest and woodland species from live-fire training, but the degree of impact to waterfowl and other wildlife that use ERF-IA could be greater than under Alternative 1 if all training occurs at JBER. Risks for direct strikes would be reduced by regulations that require cease fire if wildlife is observed. Very low risk of striking gravel-capped areas from live-fire training during ice-free conditions and discharging sequestered WP that could be ingested by birds.	**Terrestrial Wildlife:** No change from baseline conditions. Live-fire training would continue to be restricted during waterfowl migration periods, and migratory birds would not be present in large numbers during firing activities. Gravel caps would continue to be protected from damage and exposure of WP by winter ice conditions. Impacts would be lower than under Alternatives 1 and 2.
Biological Resources (Section 3.8)	**Marine Mammals:** Impacts are unlikely to exceed significance thresholds with implementation of mitigation measures. Potential short-term indirect impacts from sedimentation into marine mammal habitats from clearing and construction would be minimized by BMPs. Potential long-term impacts from live-fire training during all seasons through periodic noise disturbance, hazardous fragment strikes, habitat alteration, reduction in prey species (fish), and bioaccumulation of munitions constituents from live-fire training. Habitat buffers, seasonal firing restrictions, and other built-in protective measures, BMPs/SOPs, and mitigation developed as a result of the analysis would reduce impacts to less than significant.	**Marine Mammals:** Impacts are unlikely to exceed significance thresholds with implementation of mitigation measures. No construction impacts. Potential long-term impacts similar to those under Alternative 1, but the degree of impact could be greater than under Alternative 1 if all training occurs at JBER because more rounds would detonate in the existing ERF-IA. Habitat buffers, seasonal firing restrictions, and other built-in protective measures, BMPs/SOPs, and mitigation developed as a result of the analysis would reduce impacts to less than significant.	**Marine Mammals:** No change from baseline conditions. With live-fire training limited to periods when Eagle River is frozen over, Eagle Bay has high ice concentrations, and marine mammals have a lower likelihood of being present, impacts would be lower than under Alternatives 1 and 2.

Resource Area	Alternative 1: All-Season Live-Fire Training with Expanded Impact Area	Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only	No Action Alternative
Biological Resources (Section 3.8)	**Special Status Species:** Potential impacts to EFH and managed fish species and ESA-listed marine mammals are as described above for fish and marine mammals. Impacts to bald eagles, SGCNs, birds of conservation concern, and other SSCs are as described above for terrestrial wildlife. For rare plants, impacts would not exceed significance thresholds. No rare plants are known to occur in the proposed expansion area, and low risk of impacts to suitable habitat through wetland avoidance. No impacts to rare plants or habitat from live-fire training in the proposed expansion area. No rare plants have been documented in the existing ERF-IA, but suitable habitat is present. Live-fire training during ice-free conditions would have the potential to impact rare plants, if present, through direct disturbance, disturbance of habitat, or phytotoxicity.	**Special Status Species:** Potential impacts to EFH and managed fish species and ESA-listed marine mammals are as described above for fish and marine mammals. Impacts to bald eagles, SGCNs, birds of conservation concern, and other SSCs are as described above for terrestrial wildlife. For rare plants, impacts would not exceed significance thresholds. Impacts to rare plants in ERF-IA would be similar to those under Alternative 1, although there is a potential for more habitat disturbance if all training occurs at JBER.	**Special Status Species:** Impacts to EFH and managed fish species and ESA-listed marine mammals are as described above for fish and marine mammals. Impacts to SSCs are as described above for terrestrial wildlife. No change from baseline conditions. Winter firing restrictions would help protect vegetation from disturbance and would result in lower phytotoxic impacts than under Alternatives 1 and 2.
Wildland Fire (Section 3.9)	Impacts would not exceed significance thresholds. Short-term introduction of new ignition sources during construction. Potential risks from prescribed and wildland fire would be mitigated by following the WFMP. Long-term increase in the annual number of potential ignition sources, introduction of ignition sources into the proposed expansion area, and expansion of live-fire training into the summer fire season.	Impacts would not exceed significance thresholds. No impacts associated with construction or impact area expansion. Long-term increase in the annual number of potential ignition sources and expansion of live-fire training into the summer fire season. While the same number of rounds would be fired as under Alternative 1, ignition risk would be lower, as all potential ignition sources would be targeted into the existing ERF-IA, which has a low fire risk.	No impacts associated with construction or impact area expansion. Winter-only use of ERF-IA would continue to result in low wildland fire risk, and there would be fewer potential ignition sources than under Alternatives 1 and 2.

Resource Area	Alternative 1: All-Season Live-Fire Training with Expanded Impact Area	Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only	No Action Alternative
Cultural Resources and Subsistence (Section 3.10)	**Cultural Resources:** Impacts have the potential to exceed significance thresholds, but with implementation of the PA, direct, indirect, and unanticipated/inadvertent adverse effects would be resolved. Project design of the proposed expansion area avoids direct impacts to documented archaeological sites. Potential for long-term impacts to archaeological sites from live-fire training in the proposed expansion area, and potential for long-term impacts to known or unknown archaeological sites or sites of traditional cultural importance in ERF-IA from training when sediments are unfrozen. **Subsistence:** Impacts would not exceed significance thresholds, and implementation of additional mitigation measures for biological resources would likely help reduce impacts. No direct impacts to subsistence. Potential long-term indirect impacts as a result of impacts to fish and other subsistence resources from live-fire training during periods when these subsistence resources are likely to be present (refer to *Biological Resources* for more information).	**Cultural Resources:** Impacts have the potential to exceed significance thresholds if unidentified cultural resource sites occur in ERF-IA, but with implementation of the PA, unanticipated/inadvertent adverse effects would be resolved. Potential for impacts to cultural resources less than under Alternative 1 because there would be no risks to documented archaeological sites outside of existing ERF-IA. Potential long-term impacts to known or unknown archaeological sites or sites of traditional cultural importance in ERF-IA would be similar to those under Alternative 1. Risks would be slightly higher than under Alternative 1 if all training occurs at JBER. **Subsistence:** Impacts would not exceed significance thresholds, and implementation of additional mitigation measures for biological resources would likely help reduce impacts. Impacts to subsistence similar to and potentially greater than those under Alternative 1, if all training occurs at JBER.	**Cultural Resources:** No increase in risk for impacts to cultural resources from baseline levels, as the impact area would not be expanded and winter firing restrictions would remain in place. **Subsistence:** No increase in risk for impacts to subsistence from baseline levels. Potential impacts would be lower than under Alternatives 1 and 2 because winter firing restrictions would remain in place.
Land Use and Recreation (Section 3.11)	Impacts would not exceed significance thresholds. **Land Use:** No impacts to off-post land uses, and short-term impacts to training uses from construction. Over the long term, expanding the impact area would preclude other types of training over 585 acres, but the changes would meet JBER planning goals. The on- and off-post area subject to noise levels of 57 to >70 dB CDNL during firing activities at ERF-IA would increase, with potential land use incompatibilities over 129 off-post acres. **Recreation:** A total of 30 acres would become off-limits to recreation. Long-term impacts associated with more frequent periodic closures of TAs to recreation and more frequent large arms noise that could be experienced by more recreational users both on and off JBER. Impacts could occur during all seasons.	Impacts would not exceed significance thresholds. **Land Use:** No impacts from construction. Long-term impacts from expanded large arms noise contours would be identical to those under Alternative 1, with potential land use incompatibilities over 129 off-post acres. **Recreation:** No increase in areas off-limits to recreation. Impacts to the recreation experience would be similar to those under Alternative 1 if all training occurs at JBER, but the extent of periodic closures could be less because the impact area would not be expanded.	**Land Use:** No impacts to existing or future land uses on or off JBER. Long-term adverse effect on land use planning goals, as ERF-IA would not be expanded. **Recreation:** No increase in areas off-limits to recreation, and no change in frequency or level of TA closures to recreation and large arms noise experienced by recreational users.

Resource Area	Alternative 1: All-Season Live-Fire Training with Expanded Impact Area	Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only	No Action Alternative
Transportation and Circulation (Section 3.12)	Impacts would not exceed significance thresholds. Short-term localized impacts to transportation and circulation during construction of the proposed expansion area. Long-term beneficial impacts from construction of 1.8 miles of gravel service roads. Long-term beneficial impact on regional off-base transportation network due to reduced travel to Fort Wainwright. More use of on-base roads, as soldiers would deploy less frequently.	Impacts would not exceed significance thresholds. No construction or development of new roads. Long-term beneficial impacts on the off-base transportation would be less than under Alternative 1 because some travel to Fort Wainwright would occur. Use of on-base roads would be greater than under the No Action Alternative, but less than under Alternative 1.	No construction or development of new roads. Travel to Fort Wainwright and associated impacts to off-base transportation would be greater than under Alternatives 1 and 2. Use of on-base roads would be lowest under this alternative.
Socioeconomics (Section 3.13)	Impacts would not exceed significance thresholds. Long-term beneficial impacts to military expenditures and soldier quality of life associated with fewer trips to Fort Wainwright. Estimated annual travel-related cost reduction of up to $618,300. Negligible impacts to economic activity, no impacts to population, no direct impacts on housing, and no indirect impacts on housing values.	Impacts would not exceed significance thresholds. Long-term beneficial impacts would be lower than under Alternative 1 because some travel to Fort Wainwright would likely occur. Estimated annual travel-related cost reduction of up to $262,900, and less time spent at home than under Alternative 1. Negligible impacts on economic activity, no impacts on population, no direct impacts on housing, and no indirect impacts on housing values.	No effect on socioeconomics. Military expenditures would remain unchanged, and soldier quality of life would continue to be adversely impacted by training time spent away from families.
Infrastructure and Utilities (Section 3.14)	Impacts would not exceed significance thresholds. Expansion of ERF-IA would support the military mission. More frequent maintenance of infrastructure assets may be required as a result of increased training at JBER. Long-term increase in annual utility demands at JBER as a result of increased training that would not exceed the available capacity of utility systems.	Impacts would not exceed significance thresholds. No infrastructure improvements would occur. More frequent maintenance of infrastructure assets may be required, but less than under Alternative 1. Long-term increase in annual utility demands would be less than under Alternative 1 and would not exceed the available capacity of utility systems.	No impacts to infrastructure or utility systems. Infrastructure and utility use would remain at current levels.
Hazardous Materials and Waste (Section 3.15)	Impacts would not exceed significance thresholds. Short-term impacts associated with generation of new hazardous materials and waste during construction. Live-fire training would occur when ERF-IA is not frozen and gravel caps are exposed, but the risk of an errant round damaging a gravel cap and redistributing capped or buried WP is very low. Long-term beneficial impacts associated with a reduced risk of spills because of reduced vehicle travel to Fort Wainwright.	Impacts would not exceed significance thresholds. The affected area would be less than under Alternative 1 because ERF-IA would not be expanded. Similar to Alternative 1, very low risk of an errant round damaging a gravel cap and redistributing WP, even with more rounds potentially fired into ERF, if all training occurs at JBER. Long-term beneficial impacts associated with a reduced risk of spills because of reduced vehicle travel, although likely less than under Alternative 1 because some travel to Fort Wainwright would likely occur.	No increase in risk of spills on JBER. Winter firing restrictions would continue to limit the potential for disturbance of gravel caps and associated re-exposure of remediated WP. Risks of spills associated with vehicle travel to Fort Wainwright would be greater than under Alternatives 1 and 2.

Resource Area	Alternative 1: All-Season Live-Fire Training with Expanded Impact Area	Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only	No Action Alternative
Forest Resources (Section 3.16)	Impacts would not exceed significance thresholds. Removal of forest resources in the proposed expansion area equivalent to approximately 1 percent of the total area of the forest types on JBER that would be affected by the clear-cut. Creation of approximately 3 miles of new forest edge, which would increase susceptibility to windthrow and insect pathogens. Increased risk of forest fires associated with increased live-fire training and expanding ERF-IA, which would be minimized by following the WFMP. Increased risk of exacerbating spruce beetle outbreak by cutting and relocating receptive host material, which would be mitigated by following BMPs.	Impacts would not exceed significance thresholds. No removal of forest resources or creation of new forest edge. Potential increase in fire starts with increased live-fire training, but all rounds would be fired in ERF-IA where there are only small stands of trees and risk of wildland fire is low. Risk of fire and outbreak of insect pathogens would be less than under Alternative 1.	No removal of forest resources. Risk of fire and outbreak of insect pathogens would be less than under Alternatives 1 and 2.

Note: [1] In the Air Force Environmental Impact Analysis Process Level II Quantitative Assessment that was completed for this EIS, “Insignificance thresholds” are emission levels for criteria pollutants that are used to identify clearly insignificant impacts and flag potentially significant impacts that warrant additional analysis. The Level II assessment does not use significance thresholds.

Key: BMP = best management practice; CDNL = C-weighted Day-Night Average Noise Level; dB = decibel; EFH = Essential Fish Habitat; EIS = Environmental Impact Statement; ERF = Eagle River Flats; ERF-IA = Eagle River Flats Impact Area; ESA = Endangered Species Act; GHG = greenhouse gas; HAP = hazardous air pollutant; JBER = Joint Base Elmendorf-Richardson; PA = Programmatic Agreement; ROI = Region of Influence; SGCN = Species of Greatest Conservation Needs; SSC = Species of Special Concern; SWPPP = *Storm Water Pollution Prevention Plan*; TA = Training Area; UXO = unexploded ordnances; WFMP = *Wildland Fire Management Plan*; WP = white phosphorus

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the affected environment, potential environmental consequences, and mitigation measures for resource areas that could be affected by the proposed action and alternatives.

The Affected Environment section for each resource includes the following:

- Resource definition:
  - Defines the resource in the context of the NEPA and JBER
  - Defines the Region of Influence (ROI) for the resource for the project, which is the geographic scope of any potential environmental consequences
- Regulatory setting:
  - Provides regulatory information pertinent to the resource and the analysis
- Existing conditions:
  - Describes the baseline conditions of the resource in the ROI that would potentially be affected by the action
  - Provides a meaningful point to compare future environmental, social, and economic effects

The Environmental Consequences section for each resource describes the potential effects or impacts that would occur under the proposed action and alternatives. Impacts are quantified wherever possible, and the analysis considers the timing and duration of the impacts with mitigation measures applied to reduce impacts. Effects or impacts are changes to the human environment that are reasonably foreseeable and include the following:

- Direct Effects – Caused by the action and occur at the same time and place.
- Indirect Effects – Caused by an action and are later in time or farther removed in distance but are still reasonably foreseeable. Indirect impacts may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate and related effects on air and water and other natural systems, including ecosystems.

Cumulative effects that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions are described in Chapter 4.

Effects of the project were evaluated for each resource to assist the decision-maker in understanding the potential significance of each impact analyzed and in comparing the impacts of each action alternative. Impacts and their significance are described in terms of affected area, degree of effect (extent to which the effect would result in an appreciable change to the resource), short-term (generally construction-related) and long-term (operations-related) effects, and beneficial or adverse effects, considering the setting as specified by the ROI for each resource. The effects analysis includes a description of impact assessment methodology and evaluates potential impacts by identifying (1) the project action(s) that could result in notable impacts to the resource, (2) the nature and type of effects expected to result from those project actions, and (3) impact metrics used to quantify those impacts or evaluate impacts qualitatively.

Mitigation measures avoid, minimize, or compensate for environmental impact and include the following:

- Avoiding the impact altogether by not taking a certain action or parts of an action
- Minimizing impacts by limiting the degree or magnitude of the action and its implementation
- Rectifying the impact by repairing, rehabilitating, or restoring the affected environment
- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action

- Compensating for the impact by replacing or providing substitute resources or environments

Mitigation measures identified during the EIAP will be considered during preparation of the Final EIS and ROD. Four types of mitigation measures are considered in this EIS:

- **Protective measures built into the proposed action** are measures that are considered part of the action and will automatically be implemented if Alternative 1 or 2 is selected (although some measures only apply to Alternative 1). They are discussed in detail in Section 2.4.1.3.
- **Best management practices and standard operating procedures** are measures that are already being done and are required by by regulations, policies, manuals, and other guidance documents. They would continue to occur under the proposed action. They are discussed as appropriate in Section 2.4.1.3 and in the Regulatory Setting sections for each resource.
- **Mitigation determined as a result of analysis** refers to measures that have been identified to reduce impacts to resources, sometimes to less than significant levels. Analysis of impacts assumes that these measures would be selected in the ROD.
- **Additional measures being considered** refers to measures that may be implemented to further reduce impacts to resources. They may not be selected in the ROD but would be considered for future implementation based on need, practicability, and other factors.

Mitigation measures that are included as part of the selected alternative or selected in the ROD will be implemented in a mitigation plan. Measures to avoid or mitigate direct and indirect effects to cultural resources were resolved in a Programmatic Agreement (PA) developed through consultation under 36 CFR § 800.6. The PA is included in Appendix I, and stipulations will be included in the ROD. On behalf of the Army, the Air Force is coordinating with NMFS on developing mitigation measures through the consultation and authorization processes. The ROD will document mitigation measures to be implemented in accordance with the mitigation plan. The mitigation plan will identify principal and subordinate organizations responsible for the execution and oversight of specific mitigation measures. The plan will be prepared in accordance with 32 CFR § 989.22.

For the purposes of the ESA Section 7 consultation, the mitigation measures included in this EIS may be considered by NMFS as beneficial actions taken by the federal agency or applicant (50 CFR § 402.14[g][8]). If necessary to satisfy requirements of the ESA, NMFS may develop an additional set of measures contained in reasonable and prudent alternatives, reasonable and prudent measures, or conservation recommendations in the Biological Opinion for the proposed action. It is the Air Force's responsibility to work with the Army to ensure all required actions are executed in the ROD and subsequent mitigation plan.

Throughout this chapter, each resource area describes resource-specific mitigation measures identified to address potential impacts associated with each alternative. Where an alternative would have an unavoidable impact that the Air Force cannot mitigate, such unavoidable impacts are identified in this EIS for decision-makers. Pertinent mitigation measures in the four categories described above to reduce potential impacts of the alternatives are included in the individual resource sections of this EIS.

For ease of reading and to shorten headers, the names of the action alternatives throughout this chapter and Chapter 4 have been shortened from their full titles to the following: Alternative 1 – All-Season Live-Fire Training with Expanded Impact Area; Alternative 2 – All-Season Live-Fire Training at Existing ERF-IA Only; and No Action Alternative. For each resource, the effects analysis for Alternative 1 is broken into subsections that discuss effects associated with construction and maintenance of new infrastructure (Construction and Infrastructure; includes annual prescribed burns and other maintenance) and training operations (Firing and Training Exercises). Because there would be no construction under Alternative 2, there are no corresponding subsections, and effects are generally described in comparison to Alternative 1.

3.1 NOISE

Noise has the potential to affect several resource areas. This section addresses community noise impacts. A summary of noise impacts on specific resource areas is provided in Table 3.1-1.

Table 3.1-1 Summary of Noise Impacts on Specific Resource Areas

Resource Category	EIS Section	Resource Noise Impact Synopsis
Safety and Occupational Health	3.4	Noise exposure (construction and live-fire training) is an occupational hazard that is already addressed and accounted for in safety regulations and procedures.
Biological Resources – Fish	3.8	Juvenile fish in unbuffered areas could be exposed to noise levels from live-fire training that can cause mortality, injury, or behavioral changes. Impacts could potentially exceed significance thresholds.
Biological Resources – Terrestrial Wildlife	3.8	Temporary noise disturbance from construction (Alternative 1 only). Periodic and intermittent noise disturbance from live-fire training could disturb wildlife and impact breeding, but impacts would not be significant with protective and mitigation measures.
Biological Resources – Marine Mammals	3.8	Potential for exposure to underwater noise above NMFS thresholds would be avoided through protective measures and mitigation. Noise effects to prey (see *Fish*) have the potential to exceed significance thresholds.
Biological Resources – Special Status Species	3.8	Potential impacts to EFH and managed fish species and ESA-listed marine mammals are as described above for fish and marine mammals. Impacts to migratory birds and SSCs are as described above (see *Terrestrial Wildlife*).
Subsistence	3.10	Impacts would not exceed significance thresholds, and implementation of additional mitigation measures for biological resources would likely help reduce impacts. No direct impacts to subsistence. Potential long-term indirect impacts as a result of direct impacts to fish and other subsistence resources from live-fire training during periods when these subsistence resources are likely to be present (refer to *Biological Resources* for more information).
Land Use and Recreation	3.11	Noise from large arms training would increase the on- and off-post area subject to noise levels of 57 to >70 dB CDNL. These increases would not result in significant impacts to land use or recreation, even without additional mitigation.

Key: CDNL = C-weighted Day-Night Average Noise Level; dB = decibel; EFH = Essential Fish Habitat; EIS = Environmental Impact Statement; ESA = Endangered Species Act; NMFS = National Marine Fisheries Service; SSC = Species of Special Concern

The ROI for the noise analysis includes JBER and its surrounding communities but is limited to areas that are exposed to noise from on-base activities. For large arms training, this area generally corresponds to areas within the C-weighted Day-Night Average Noise Level (CDNL) 62 C-weighted decibels (dBC) and above noise contours (discussed in Section 3.1.1.1 and Section 3.1.1.3).

3.1.1 Affected Environment

3.1.1.1 Resource Definition

Sound is defined as a fluctuation in the ambient air pressure produced by a given source and resulting in a particular auditory impact. While noise and sound share the same physical aspects, noise is considered a disturbance, and sound is defined as an auditory impact. Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise annoying. Noise can be intermittent or continuous, steady or impulsive, and can involve any number of sources and frequencies. Noise can be readily identifiable or generally nondescript. Human response to increased sound levels varies according to the source type, characteristics of the sound source, distance between the source and receptor, receptor sensitivity, and time of day. Affected receptors are specific (e.g., residential areas, schools, churches, or hospitals) or broad (e.g., nature preserves or designated districts) areas in which occasional or persistent sensitivity or noise above ambient levels exists. These are generally referred to as noise-sensitive receptors. Air Force analysis of community noise impacts considers noise-sensitive land uses (as identified in Air Force Handbook [AFH] 32-7084, *AICUZ Program Manager's Guide*) to determine compatibility/incompatibility with the predicted noise levels of an action.

Sound levels vary with time. For example, the sound increases as a mobile noise source approaches, then falls and blends into the ambient, or background, sound environment as the source recedes into the distance. Because of this variation, it is often convenient to describe a particular noise "event" by its highest or maximum sound level (Lmax). Lmax describes only one dimension of an event; it provides no information on the cumulative noise exposure generated by a sound source. In fact, two events with identical Lmax levels may produce very different total noise exposures. One may be of very short duration, while the other may last much longer. Human response to sound varies, as do the metrics used to quantify it. Generally, sound can be calculated with instruments that record instantaneous sound pressure levels in decibels (dB). Community noise levels are described in terms of in-air dB, which use a reference wave pressure of 20 microPascals (μPa), consistent with thresholds for human hearing. A-weighted decibel (dBA) is the unit used to characterize sound levels that can be sensed by the human ear. "A-weighted" denotes that a frequency-weighted adjustment has been applied to the sound pressure level to account for the frequency response of the average human ear to sense an audible event. The lower threshold of audibility is generally within the range of 10 to 25 dBA for normal adults. The threshold of pain occurs at the upper boundary of audibility, which is normally in the region of 135 dBA (USEPA 1981a). A quiet nighttime bedroom is normally 30 dBA, while an urban expressway 300 feet away is considered an intrusive noise at 60 dBA. Noise levels can become annoying at 80 dBA and very annoying at 90 dBA. To the human ear, each 10-dBA increase seems twice as loud (USEPA 1981b). Appendix C is a *Noise Technical Report* that provides additional background information on community noise.

The day-night average sound level (DNL) metric is a measure of the total community noise environment. DNL (referred to by some agencies as Ldn) is the energy-average equivalent A-weighted sound level over a 24-hour period, with a 10 dBA adjustment added to the nighttime levels (between 2200 and 0700 hours). This adjustment is an effort to account for increased human sensitivity to nighttime noise events, as noise levels occurring at night generally produce greater human annoyance than those of the same levels during the day. This metric applies to assessment of noise from aircraft. In the case of explosives demolition and large arms, which includes the howitzers and mortars that are used during training at ERF-IA, a CDNL noise metric is used to categorize the noise environment. "C-weighted" DNL levels are used to de-emphasize the extremely low frequencies not heard by the human ear while still accounting for the fact that impulse noise generated by large arms may produce intense noise levels that can be heard and felt as vibrations.

For small arms (weapon systems of .50 caliber and smaller) the unweighted peak sound pressure level is used as a measure of the total community noise environment. Peak Sound Pressure Level (Lpk) is the highest instantaneous sound level resulting from an individual firing event. To account for statistical variations in noise levels due to weather, the analysis of small arms noise uses the PK15 metric, which represents calculated peak noise level, unweighted, expected to be exceeded by 15 percent of all firing events. Analysis of large arms noise also considers the PK15 metric, as well as the PK50 metric (the calculated unweighted peak noise level expected to be exceeded by 50 percent of all firing activities). These metrics are commonly used to evaluate the risk of community noise complaints under both extreme and average weather conditions from large arms firing events.

The proposed training does not involve aircraft or small arms, but noise from these sources contributes to baseline noise conditions at JBER. Additional information on metrics for these sources can be found in Appendix C.

3.1.1.2 Regulatory Setting

Federal, state, and local governments have established noise guidelines and regulations to protect citizens from potential hearing damage and from various other adverse physiological, psychological, and social effects associated with noise. The Noise Control Act of 1972, as amended by the Quiet Communities Act of 1978, requires compliance with state and local noise laws and ordinances. U.S. Department of Housing and Urban Development, in coordination with the DoD and the Federal Aviation Administration (FAA), has established criteria for acceptable noise levels for aircraft operations relative to various types of land use.

The Air Force, through AFH 32-7084, consolidates existing guidance related to weapon system noise found in multiple Air Force Instructions (AFIs) into one primary guidance document and provides more detailed direction. This AFH directs the use of noise models and metrics, provides information that can be used to manage and explain noise exposure to off-base populations, and directs analysis of the effects of noise on the natural and human environments when conducting environmental impact analysis. It supports compatible land use analysis, comprehensive planning, management of noise inquiries/complaints, and the Air Force EIAP program. AFI 32-1015, *Integrated Installation Planning*, requires use of the DoD/U.S. Army Blast Noise Model version 2 (BNOISE2) to perform large arms activity noise modeling for use in environmental documents.

The U.S. Army, through AR 200-1, *Environmental Protection and Enhancement*, implements federal laws concerning environmental noise from U.S. Army activities. The Air Force's Air Installation Compatible Use Zone (AICUZ) Program provides guidance to air bases and local communities in planning land uses compatible with airfield operations. The AICUZ program describes existing noise and aircraft flight safety zones on and near Air Force installations.

Table 3.1-2 provides a summary of key noise limit criteria for major noise sources by land use. Detailed criteria for aircraft, small arms, and large arms noise impacts are provided in Appendix C.

Table 3.1-2 Noise Regulation Summary

Noise Zone	Aviation (ADNL, dBA)	Large Arms (CDNL, dBC)	Small Arms (PK15, dB)
Land Use Planning Zone [1]	60–65	57–62	Not Applicable
Zone I – Compatible	< 65	< 62	< 87
Zone II – Compatible with Exceptions	65–75	62–70	87–104
Zone III – Incompatible	> 75	> 70	> 104

Note: [1] Land Use Planning Zone is a subdivision of Noise Zone I that functions as a buffer for Noise Zone II. Land use planning controls may be implemented in this zone to mitigate current noise impacts and create a buffer to prevent the possibility of future noise conflicts.

Key: ADNL = A-weighted Day-Night Levels; CDNL = C-weighted Day-Night Levels; dB = decibel; dBA = A-weighted decibel; dBC = C-weighted decibel; PK15 = Single event peak noise level exceeded by 15 percent of events

EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, is applicable to noise because children (those under the age of 18) are still developing physiologically and are particularly vulnerable to noise and other environmental impacts. Children are considered in Air Force noise planning guidance, as noise-sensitive land uses may include places where children are present, such as residences and schools.

3.1.1.3 Existing Conditions

Figures 3.1-1 through 3.1-3 show aircraft, small arms, and large arms noise contours under existing conditions, superimposed on a JBER aerial map with local land use (where available). The large arms noise contours under existing conditions were produced using the BNOISE2 model based on weapons system and munitions usage currently occurring at ERF-IA (see Tables 2.4-2 and 2.4-3). BNOISE2 contours are typically developed at CDNL levels of 57, 62 and 70 dBC. Aircraft and small arms contours shown in these figures were previously developed for the 2019 JBER *Air Installations Compatible Use Zones (AICUZ) Study* (USAF 2019a).

Aircraft and Small Arms

According to information contained in the AICUZ, there were approximately 39,198 aircraft operations at Elmendorf Airfield and approximately 18,250 aircraft operations at Bryant Army Airfield during 2019. Approximately 8,000 acres on base and 142 acres off-base (including 139 acres of roads) are within the DNL 65 dB and above aircraft noise contour, with approximately 180 acres of noise-sensitive land use on base (103 acres of accompanied housing and 75 acres of unaccompanied housing) (Figure 3.1-1). For small arms, approximately 49,000 acres on base, 6,400 acres off base, and 55,000 total acres are in the PK15 87 dB and above noise contours (Figure 3.1-2). On JBER, approximately 60 acres of noise-sensitive land use are within the PK15 87 dB noise contour (56 acres of residential land use and 4 acres of medical facility land use). Off base, approximately 900 acres of noise-sensitive land use are within the PK15 87 dB noise contour (590 acres of single-family residential, 280 acres of multi-family residential, and 135 acres of mobile homes). Additional information is provided in Appendix C.

Large Arms

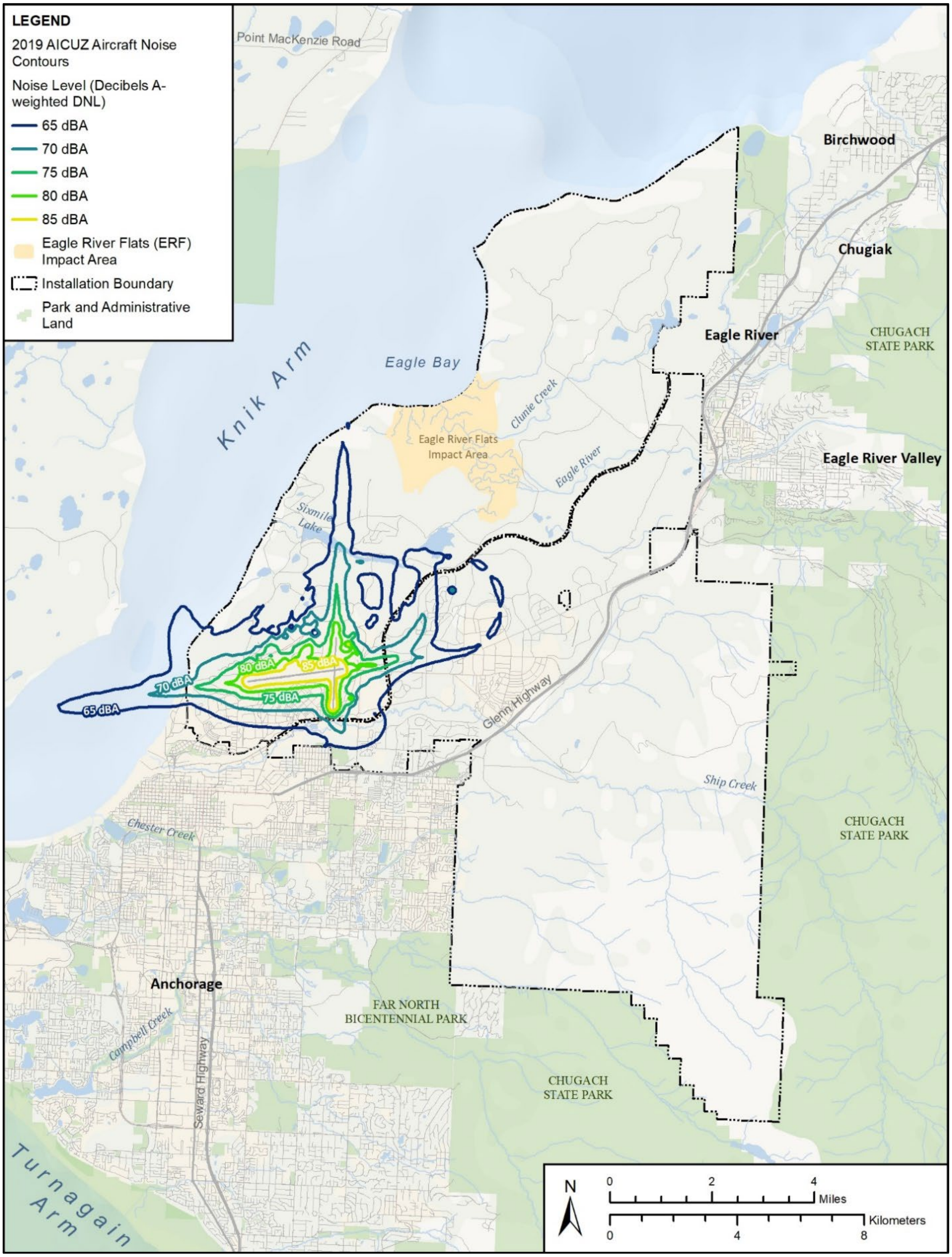
Approximately 23,000 acres on base and 9,400 acres off base are within the CDNL57 dB and above large arms noise contours (Figure 3.1-3). There are no noise-sensitive land uses off base within these noise contours. The vast majority (approximately 9,000 acres) of off-base areas within these noise contours are water (Knik Arm). On-base, there are two areas totaling 109 acres in the Training North planning district that include noise-sensitive land uses (Community Commercial and Community Service). Additional information is provided in Appendix C and Section 3.11.

3.1.2 Environmental Consequences

The Air Force has not defined universally applicable thresholds above which noise impacts are to be considered significant in NEPA analyses. Instead, significance considers location-specific sensitivities, with the degree of effect being measured against accepted criteria where applicable. For analysis of community noise, impacts would be considered significant if any of the following were to occur:

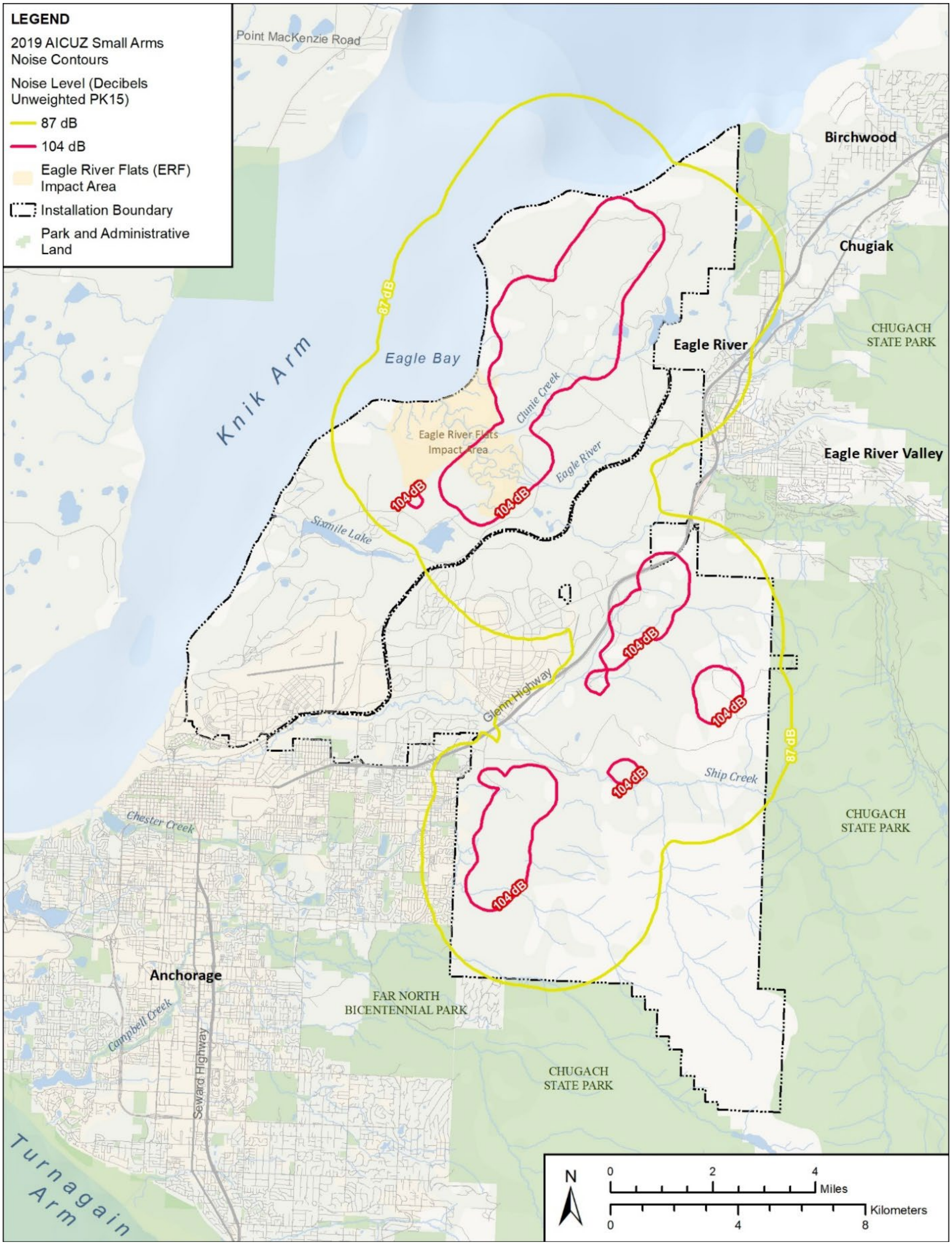
- Noise-sensitive locations were to experience increases in noise levels of 3 dB DNL or greater.
- A large quantity of land were newly exposed to noise levels at which the current land use is considered incompatible (e.g., a large number of residences newly exposed to noise levels exceeding 65 dB DNL).
- Classrooms were newly exposed to noise levels exceeding established criteria.
- There was a notable increase in the risk of sleep disturbance.
- Unprotected populations were exposed to noise levels at which noise-induced hearing loss risk is a concern.
- There were to be a notable increase in noise levels in areas where quiet conditions are a valued attribute (e.g., the Matanuska–Susitna Valley).

Figure 3.1-1 Aircraft Noise Contours



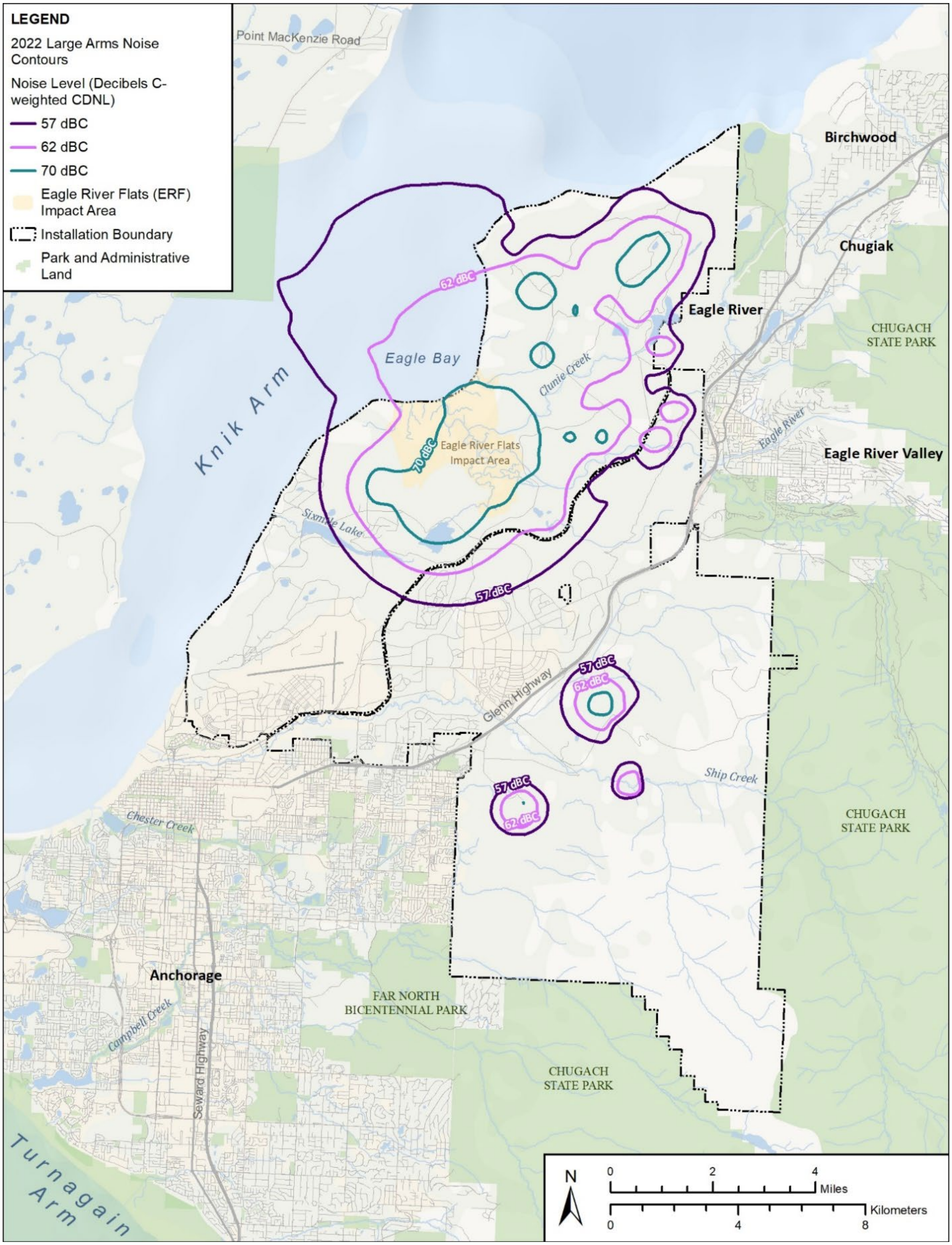
Sources: JBER 2020a, 2020b, 2023b

Figure 3.1-2 Small Arms Noise Contours



Sources: JBER 2018a, 2020a, 2023b

Figure 3.1-3 Large Arms Noise Contours



Sources: JBER 2020a, 2023b; AECOM 2022

3.1.2.1 Methodology

The effects of large arms activity at ERF-IA on the noise environment in the ROI were analyzed for Alternative 1 and Alternative 2. Under all alternatives, aircraft and small arms operations on JBER will remain unchanged from baseline conditions, and associated noise generated will be as described in the JBER 2019 AICUZ Study (USAF 2019a). Furthermore, any mitigation required due to aircraft or small arms noise is already accounted for in the JBER 2019 AICUZ Study.

As required by AFI 32-1015, the DoD BNOISE2 model was used to produce noise contour estimates for CDNL levels of 57, 62, and 70 dB based on inputs of weapons systems used during proposed training and projected activity levels under each alternative. For purposes of community noise modeling, rounds that do not detonate in the impact area (e.g., ILLUM rounds, blanks, HC smoke rounds, and FRPCs) are considered "inert" and are differentiated from HE rounds and 155-mm HE training rounds, which do detonate in the impact area. Large arms noise contours are the same for both action alternatives because the same maximum number of rounds could be fired. Although some rounds are likely to be fired at other installations under Alternative 2, the maximum number is assumed for this analysis. Detailed tables of proposed munitions usage (number of 60-mm, 81-mm, and 120-mm mortars and 105-mm and 155-mm howitzers) during day and night, as well as more detailed discussion of the methodology, are provided in Appendix C.

The large arms contours generated by the BNOISE2 model were overlaid on an aerial map showing the locations of local communities and noise-sensitive receptors, as well as local land use categories. Additional analysis of land use compatibility in relation to noise is provided in Section 3.11.2. Supplemental noise metrics, such as night-time sleep disturbance, daytime speech interference, potential for hearing loss, and school day learning interference were not assessed because noise-sensitive land uses are generally not present within the noise contours under any alternative.

Peak noise contours associated with large arms (Appendix C) were generated for informational purposes but were not part of the quantitative analysis. Peak noise levels are used to estimate the complaint risk but do not account for the number of rounds fired or the types of weapons used and provide only the level of the loudest event. Apart from an area within Beach Lake Park, the potential event peak noise complaint risk under the action alternatives would essentially be the same as under the No Action Alternative (Appendix C).

3.1.2.2 Alternative 1: All-Season Live-Fire Training with Expanded Impact Area

Construction and Infrastructure

Construction work associated with expanding the impact area would generate noise from the use of heavy equipment. There would be a temporary increase in the noise environment in the immediate vicinity of the expansion area, lasting only as long as the construction period (4 months) and occurring only during daytime hours when construction equipment is active. There are no noise-sensitive land uses in the area that would experience an increase in the noise environment.

Based on data provided in the Federal Highway Administration (FHWA) *Construction Noise Handbook*, the loudest equipment that would be used during construction would be two dozers, which produce an Lmax of approximately 85 dBA at a distance of 50 feet from the equipment (FHWA 2006). At 5,000 feet, the Lmax would decay by approximately 40 dBA, to 45 dBA, which would not result in an exceedance of significant impact thresholds for community noise. Construction noise is not expected to affect residents of the closest off-base community (Eagle River), which is approximately 2 miles from the proposed expansion area.

Firing and Training Exercises

Table 3.1-3 provides general land use estimates of on-base and off-base land use acreage (excluding the open water of Knik Arm, which is the vast majority of off-post acreage). Figure 3.1-4 shows the large arms CDNL noise contours for Alternatives 1 and 2 in comparison to baseline conditions. Note that contours are the same for both alternatives. Discussion of land use by specific category is provided in Section 3.11.2.

Table 3.1-3 Alternatives 1 and 2 Large Arms Noise Contours Land Use Impacts (Acres)

Land Use	CDNL 57–62 dBC	CDNL 62–70 dBC	CDNL 70 + dBC	Total
On Base	9,982	11,610	6,611	**28,202**
Off Base	349	287	<1	**637**
Total	**10,331**	**11,897**	**6,611**	**28,839**

Note: Off-base numbers exclude open water (Knik Arm).

Key: CDNL = C-weighted Day-Night Levels; dBC = C-weighted decibel

Source: BNOISE2 modeling results (presented in Appendix C)

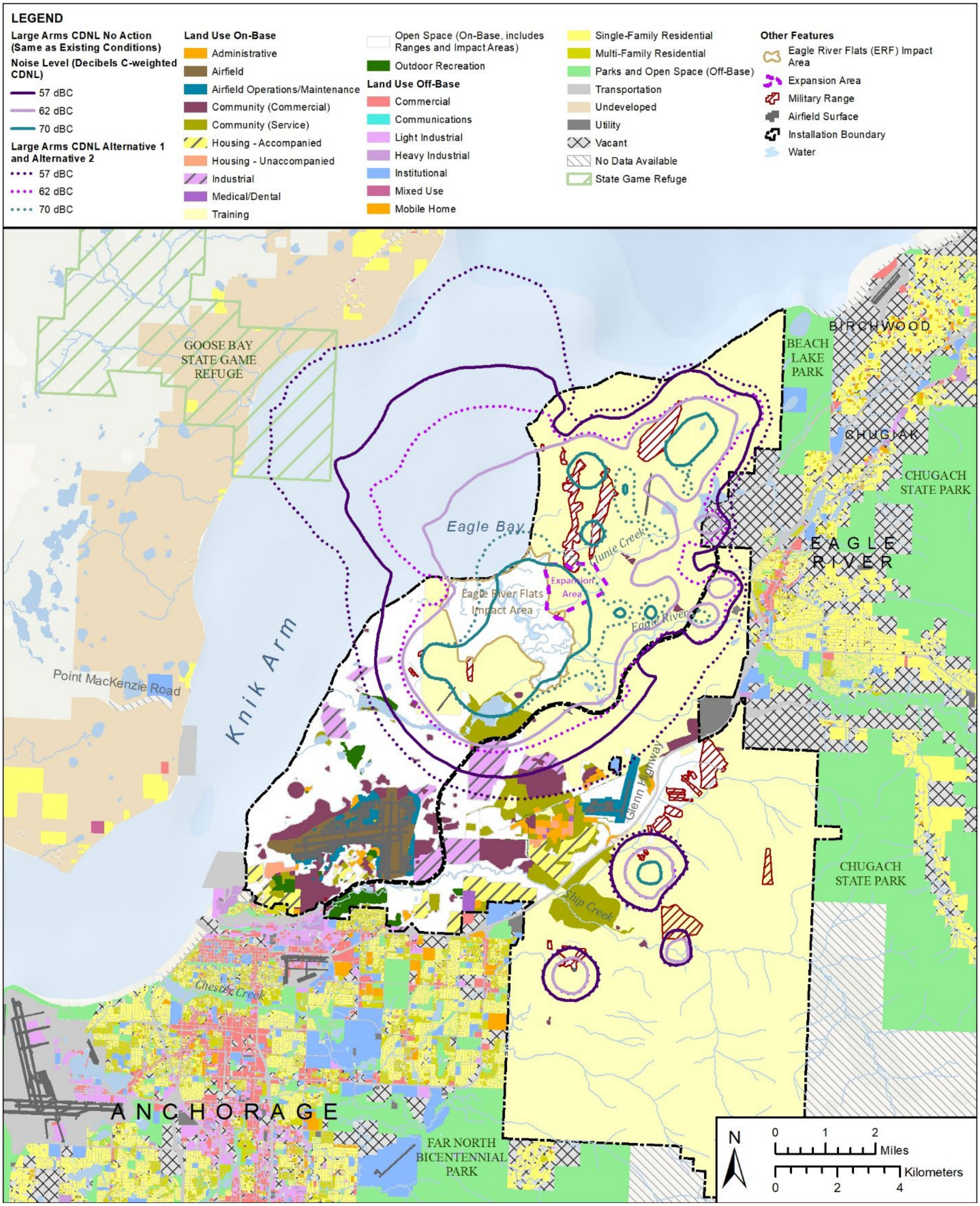
Large arms noise contours would encompass a larger area both on and off post than under the No Action Alternative, but as shown on the figure and discussed further in Section 3.11.2, there would be no new noise-sensitive land uses within the predicted CDNL 62 dBC and above large arms noise contours for Alternative 1, apart from a small increase (7 acres) in overlap with an area identified as Community Service that contains the Otter Lake Recreation Area. The new area within the CDNL >70 dBC large arms noise contours includes slivers of forested land on the west and east sides of the lake that do not overlap fixed recreational features such as cabins or docks (see Section 3.11.1.1), and live-fire training would periodically and temporarily impact low numbers of dispersed recreational users. Recreational areas that are currently in the CDNL >62 dBC noise contours (e.g., Otter Lake cabins) would be newly exposed to noise impacts from live-fire training during the summer months, although there would be 2 weeks advance notice of planned training exercises (see Section 3.1.2.5). Long-term community noise impacts associated with live-fire training at ERF-IA under Alternative 1 would not be significant.

3.1.2.3 Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only

Because the impact area would not be expanded, there would be no short-term community noise impacts associated with construction under Alternative 2.

Community noise impacts from large arms training would be the same as those under Alternative 1 in terms of areas within large arms noise contours and increases in the size of contours relative to baseline conditions (Figure 3.1-4 and Table 3.1-3). However, it is possible that the frequency of large arms training would be less than under Alternative 1 if some training events occur at Fort Wainwright instead of ERF-IA throughout the year. Similar to Alternative 1, there would be a small increase in overlap with noise-sensitive land uses (limited to 7 acres of isolated areas in the Training North planning district) within the predicted CDNL 62 dBC and above large arms noise contours for Alternative 2. Recreational areas that are currently in the CDNL >62 dBC noise contours would be newly exposed to noise impacts from live-fire training during the summer months, although there would be 2 weeks advance notice of planned training events. Long-term community noise impacts associated with live-fire training at ERF-IA under Alternative 2 would not approach significance thresholds.

Figure 3.1-4 Large Arms Noise Contours – Alternatives Comparison



Sources: JBER 2019a, 2020a, 2023b, 2023c; ADNR 2020; AECOM 2022, 2023b

3.1.2.4 No Action Alternative

Under the No Action Alternative, large arms firing at ERF-IA would continue at existing levels. Therefore, there would be no change in community noise levels generated by this activity. Figure 3.1-4 shows the large arms CDNL noise contours for the No Action Alternative. Table 3.1-4 provides general land use estimates of on-base and off base land use acreage. A detailed breakdown of land use by specific category is provided in Section 3.11.2. As shown on the figure and discussed in Section 3.11.2, there are no noise-sensitive land uses within the No Action Alternative large arms noise contours. Therefore, community noise impacts would continue to occur at levels that do not approach significance thresholds.

Table 3.1-4 No Action Alternative Large Arms Noise Contours Land Use Impacts (Acres)

Land Use	CDNL 57–62 dBC	CDNL 62–70 dBC	CDNL 70 + dBC	Total
On Base	8,387	10,270	4,772	23,430
Off Base	259	135	--	394
Total	**8,646**	**10,405**	**4,772**	**23,824**

Note: Off-base numbers exclude open water (Knik Arm).

Key: CDNL = C-weighted Day-Night Levels; dBC = C-weighted decibel

Source: BNOISE2 modeling results (presented in Appendix C)

3.1.2.5 Mitigation

The design of ERF-IA precludes hazardous noise to the human environment from extending beyond installation boundaries. SOPs that would help reduce impacts to community noise include notifying the public in surrounding communities of scheduled training 2 weeks in advance. The notice includes planned late fire events (after 10 p.m.). The Army releases the schedule to the JBER Public Affairs office, which in turn disseminated the information to the public. This notification program would help reduce impacts associated with recreational use in areas within the CDNL 62 dBC under Alternatives 1 and 2.

No mitigation has been determined as a result of the noise analysis for large arms noise exposure associated with the proposed project.

3.2 AIR QUALITY

3.2.1 Affected Environment

3.2.1.1 Resource Definition

The concentration of various pollutants in the local atmosphere determines the air quality at a given location. An increase in emissions may result in increases in local concentrations of pollutants. A region's air quality and local concentrations are influenced by many factors, including the size and topography of the air basin and the prevailing meteorological conditions. The boundaries of air basins are determined based on shared or similar meteorological conditions due to local air patterns influenced by natural terrain and geographic conditions. The local and regional meteorological influences provide for mixing of pollutants in the atmosphere that are emitted from human-made and natural sources in the basin.

The ROI for air quality includes the entire Cook Inlet Intrastate Air Quality Control Region, although some pollutants would influence a much smaller area. For inert pollutants (such as carbon monoxide [CO] and particulates in the form of dust), the ROI is generally limited to close proximities (often less than 1 mile) downwind from a source. The ROI for reactive pollutants such as ozone, which forms in the atmosphere due to photochemical reactions between other releases known as precursors (such as oxides of nitrogen [NOx] and certain volatile organic compounds [VOCs]), may extend many miles downwind from the initial source because photochemical reactions may take several hours after precursors are released. The ROI also includes the approximately 355-mile travel corridor between JBER and Fort Wainwright.

3.2.1.2 Regulatory Setting

Federal regulations define air quality control regions. Based on 40 CFR § 81.54, JBER is in the Cook Inlet Intrastate Air Quality Control Region of Alaska, which includes the Greater Anchorage Area Borough, Kenai Peninsula Borough, and the Matanuska–Susitna Borough (MSB).

Air quality is protected by multiple regulations and, in certain defined areas, air pollutant monitoring requirements. USEPA and ADEC, Division of Air Quality, regulate air quality in the State of Alaska. JBER is also regulated by Air Force requirements. Three categories of pollutants are addressed in these regulations: criteria pollutants, greenhouse gases (GHGs), and hazardous air pollutants (HAPs).

Criteria Pollutants

Under the authority of Clean Air Act Amendments, USEPA establishes primary and secondary National Ambient Air Quality Standards (NAAQS) (40 CFR Part 50) that specify acceptable concentration levels of six criteria pollutants: particulate matter (measured as both particulate matter [PM] less than or equal to 10 micrometers in aerodynamic diameter [PM_{10}] and particulate matter less than or equal to 2.5 micrometers in aerodynamic diameter [$PM_{2.5}$]), sulfur dioxide, CO, nitrogen dioxide, ozone, and lead. Short-term NAAQS (1-, 8-, and 24-hour periods) have been established for pollutants that contribute to acute health effects, while long-term NAAQS (annual averages) have been established for pollutants that contribute to chronic health effects. The State of Alaska has accepted the federal standards (as the Alaska Ambient Air Quality Standards), with a few differences (e.g., inclusion of ammonia), and has codified them into Alaska Administrative Code (AAC), Title 18, Section 50.010. The ambient air quality standards as applicable to the ROI are provided in Table 3.2-1. These standards represent the allowable atmospheric concentrations at which public health and welfare are protected and include a reasonable margin of safety to protect the more sensitive individuals in the population.

Table 3.2-1 Alaska Ambient Air Quality Standards for the ROI

Pollutant	Averaging Period	Value ($\mu g/m^3$)	Form	Attainment Status
CO	8-hour	10,000	Not to be exceeded more than once per year	Parts of Anchorage Municipality and Fairbanks North Star Bureau in maintenance area
CO	1-hour	40,000	Not to be exceeded more than once per year	
NO_2	Annual	100	Annual mean	Attainment
NO_2	1-hour	188	98th percentile of annual distribution of the maximum daily 1-hour concentrations averaged over 3 years	Attainment
$PM_{2.5}$	Annual	12	Annual mean, averaged over 3 years	Part of Fairbanks North Star Borough in nonattainment
$PM_{2.}$	24-hour	35	98th percentile, averaged over 3 years	Part of Fairbanks North Star Borough in nonattainment
PM_{10}	24-hour	150	Not to be exceeded more than once per year on average over 3 years	Parts of Eagle River in maintenance areas
SO_2	Annual	80	Never to be exceeded	Attainment
SO_2	24-hour	365	Not to be exceeded more than once per year	Attainment

Pollutant	Averaging Period	Value (μg/m^3)	Form	Attainment Status
SO_2	3-hour	1,300	Not to be exceeded more than once per year	Attainment
SO_2	1-hour	196	99th percentile of the annual distribution of the maximum daily 1-hour concentrations averaged over 3 years	Attainment
Lead	Rolling 3-month average	0.15	Maximum 3-month average concentration for a 3-year period not to be exceeded	Attainment
Ozone	8-hour	0.070 ppm	3-year average of the fourth-highest daily maximum of 8-hour averages not to exceed 0.070 ppm	Attainment
Ammonia	8-hour	2,100	Not to be exceeded more than once per year	State Standard, not designated by USEPA

Key: μg/m^3 = microgram per cubic meter; CO = carbon monoxide; NO_2 = nitrogen dioxide; $PM_{2.5}$ = particulate matter less than or equal to 2.5 micrometers in aerodynamic diameter; PM_{10} = particulate matter less than or equal to 10 micrometers in aerodynamic diameter; ppm = parts per million; ROI = Region of Influence; SO_2 = sulfur dioxide; USEPA = United States Environmental Protection Agency

Source: 18 AAC 50.010, as amended 7 September 2022, and federal area designations

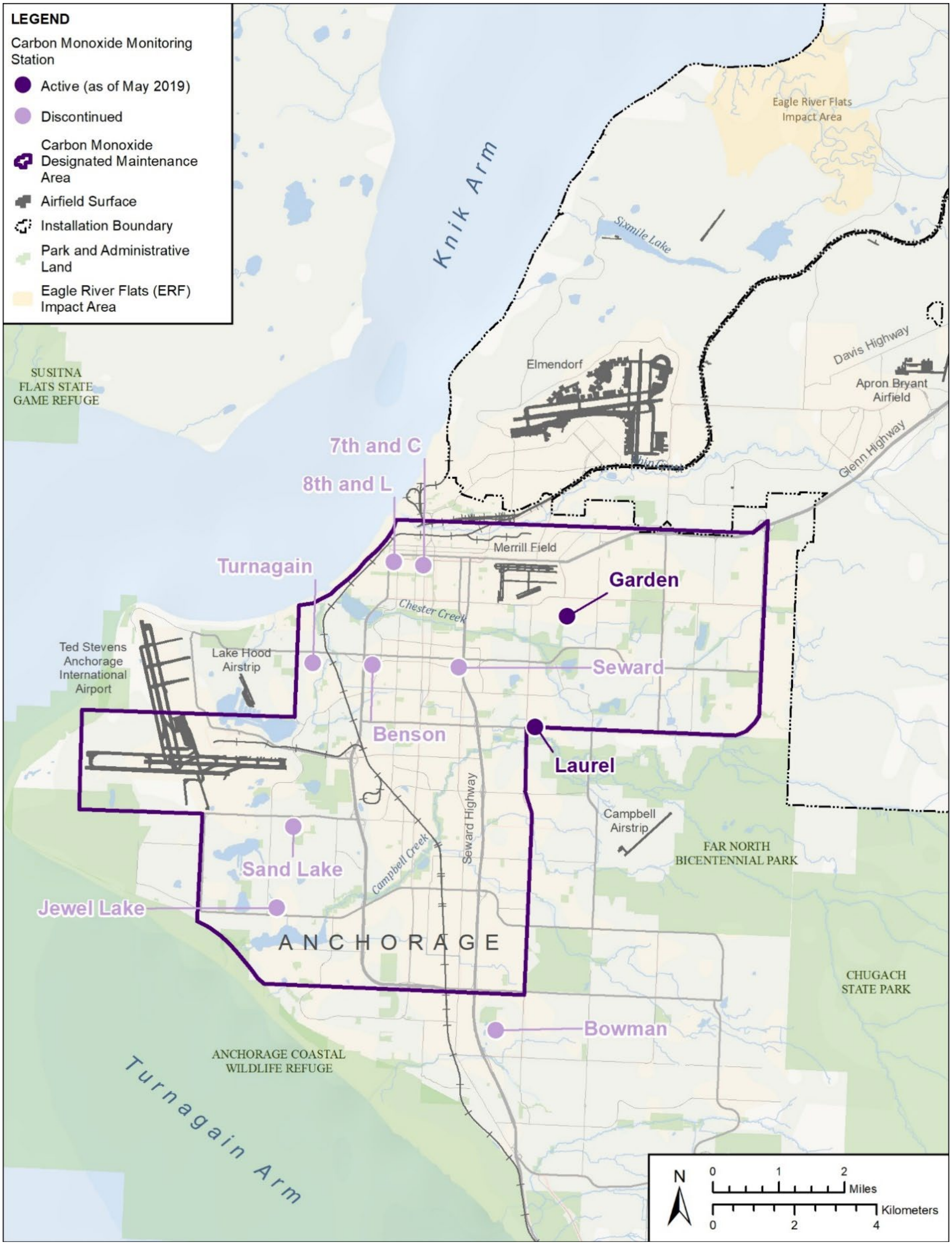
Federal regulations allow USEPA to designate areas in violation of the NAAQS. An area that exceeds the standard for any pollutant is designated as a nonattainment area for that pollutant. Areas with concentrations below the NAAQS are said to be in attainment. Maintenance areas are areas that have previously been designated as a nonattainment area but have come into compliance with the standards and as such are redesignated to attainment, but with a probationary period through implementation of maintenance plans that may include continued ambient air monitoring.

For areas that have exceeded the NAAQS, Section 110 of the Clean Air Act Amendments, 42 U.S.C. § 7410, requires state and local air pollution control agencies to adopt federally approved control strategies to minimize air pollution. The adopted control strategies and regulations are compiled in a *State Implementation Plan* (SIP). Alaska has had SIPs in place since 1972 and continues to revise them as conditions change. The most recent change to the SIP as of November 2023 was to adopt a regulation change in 18 AAC 50 pertaining to a Regional Haze Visibility Area and the Regional Haze SIP (ADEC 2023a).

Anchorage, to the south of JBER, was in nonattainment for CO until 2004, when it was designated as a maintenance area. Section 175A of the Clean Air Act Amendments requires maintenance plans to show compliance with the NAAQS for at least 10 years after re-designation. A *Limited Maintenance Plan* was submitted in April 2012 and adopted for the years 2014 to 2024 (79 FR 11707). Figure 3.2-1 shows the designated area boundaries. Current and past Alaska air quality monitoring locations in the maintenance area are also shown in Figure 3.2-1. According to the most recent final ADEC monitoring plan (ADEC 2023b), only two monitoring stations were active in Anchorage as of May 2023: the Garden Site at 3000 East 16th Street and the Laurel Site at 4335 Laurel Street.

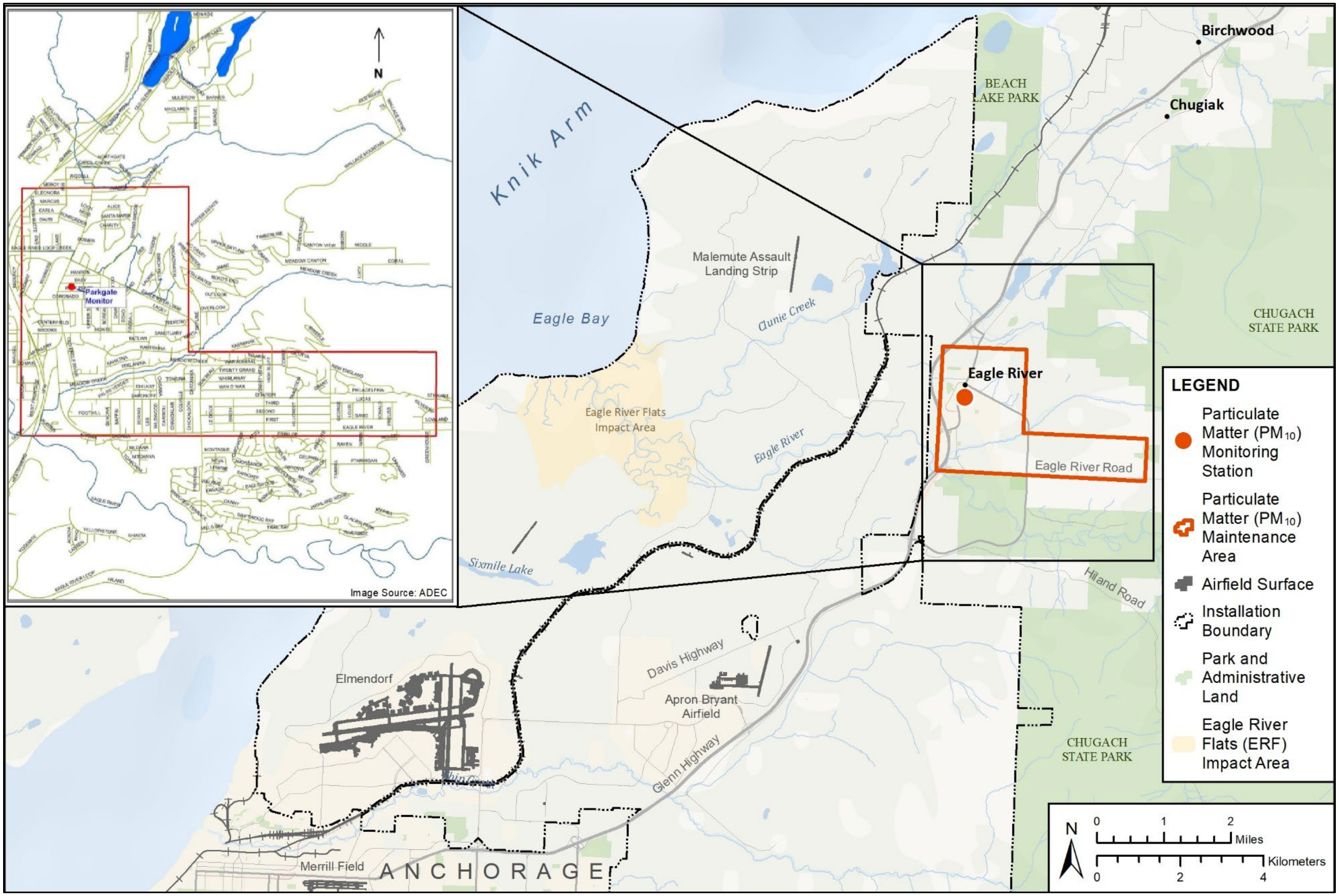
The community of Eagle River, which is east of JBER, violated the PM_{10} NAAQS between 1985 and 1987, resulting in the community becoming designated as a PM_{10} nonattainment area. Paving roads and other changes in Eagle River resulted in re-designation to a limited maintenance area for PM_{10} in 2013. Limited maintenance areas meet certain statistical criteria and have a high probability of continued compliance with the NAAQS. The boundaries of this area, as well as the ambient monitoring station location, are shown in Figure 3.2-2. The most recent PM_{10} *Limited Maintenance Plan* for the Eagle River area was approved by USEPA in 2021 (USEPA 2023a).

Figure 3.2-1 Designated Maintenance Area for Carbon Monoxide



Sources: ADEC n.d.; JBER 2019a, 2020a, 2023b

Figure 3.2-2 Designated Maintenance Area for Particulate Matter (PM10)



Sources: ADEC n.d.; JBER 2019a, 2020a, 2023b

JBER is not in either maintenance area but is close to both the Eagle River PM_{10} maintenance area and the Anchorage CO maintenance area, which are considered in the impact analysis in this EIS.

Pristine areas are protected by Prevention of Significant Deterioration (PSD) federal regulations to prevent significant increases of criteria pollutants. There are no federal PSD Class I areas in the project ROI. The nearest PSD Class I areas to JBER are the Tuxedni Wilderness Area, approximately 115 miles to the southwest, and Denali National Park and Preserve, approximately 150 miles to the north.

Hazardous Air Pollutants and Mobile Source Air Toxics

HAPs, also known as toxic air pollutants or air toxics, are pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects (USEPA 2023b). Section 112 of the Clean Air Act authorizes USEPA to regulate emissions of HAPs. The initial list of HAPs included 190 pollutants, primarily from industry; the list has been modified several times and now includes 188 pollutants (USEPA 2023c). Apart from lead, which is also considered a criteria pollutant, HAPs have no associated NAAQS.

HAPs emissions from vehicle movements are referred to as mobile source air toxics (MSATs). There are no ambient standards for MSATs at this time, but the FHWA in a technical guidance memorandum (FHWA 2023) states that no MSAT analysis is recommended for projects of this type. Therefore, MSATs will not be discussed further in this EIS. Additionally, Air Force guidance on air quality analysis indicates that quantifying HAPs does not provide results that are directly comparable to any regulatory or enforceable ambient air quality standards or emission thresholds (Solutio 2023).

Greenhouse Gases

GHGs are natural or anthropogenic gases that trap heat in the atmosphere. GHGs have effects on our overall environment, from possible sea level rise to inability for regions to grow crops. While GHGs come from many sources, a primary source is combustion of fossil fuels. GHGs include multiple gases or vapors such as carbon dioxide (CO_2), methane, nitrous oxide, water vapor, hydrofluorocarbons, perfluorocarbons, nitrogen trifluoride, and sulfur hexafluoride. Because all plants absorb CO_2 from the air as they grow, they are able to store it in their wood, leaves, and roots in a process called carbon sequestration. Therefore, removal or alteration of vegetation also leads to release of GHGs.

Each GHG has an estimated global warming potential, which is a function of its atmospheric lifetime and its ability to absorb and radiate infrared energy emitted from the Earth's surface. The global warming potential allows GHGs to be compared with each other by converting the GHG quantity into the common unit called the "carbon dioxide equivalent" (CO_2e). There are no ambient standards for GHGs, as the effect is global in nature. However, the USEPA's *Final Mandatory Reporting of Greenhouse Gases Rule* (USEPA 2009a) requires all sectors of the economy that exceed GHG emission thresholds of 25,000 metric tons of CO_2e per year to report their GHG emissions.

Prescribed Burns

JBER's response to wildland fire risks and use of fire as a management tool is mandated by DoD (DODI 6055.06) and detailed in the JBER WFMP. This plan was written as an integral, and supporting, part of the JBER INRMP, and is updated annually. According to the WFMP, prescribed fire will minimize impacts to air quality through compliance with the National Wildfire Coordinating Group *Smoke Management Guide for Prescribed Fires* (NWCG 2020) and ADEC *Enhanced Smoke Management Plan* (ADEC 2021). Under state regulation, all agencies that burn areas larger than 40 acres a year require a controlled burn permit approval application and written approval from ADEC. The *Enhanced Smoke Management Plan* details smoke management techniques to minimize emissions and smoke impacts:

- Use of ventilation factors, up-to-date weather data, and weather forecasts
- Use of appropriate modeling with accurate weather data and emission factors

- Scheduling burns to coincide with periods when fuel moistures are low enough to prevent excessive smoldering, and when weather fronts bringing precipitation are forecast, to assist with minimizing air quality impacts when appropriate (e.g., following a prolonged dry period and just before several days of heavy rain are forecast)
- Referencing historical (e.g., over the last 10 years) emissions from burns in the area
- Use of emission projections based on sound data and science
- Identifying smoke-sensitive features and receptors
- Burning when wind direction and dispersion will mitigate impacts to sensitive features
- Making visual observations
- Monitoring
- Conducting test burns (small piles or representative areas)

3.2.1.3 Existing Conditions

JBER is in the maritime zone of southcentral Alaska. Meteorology of the area is influenced by the mountainous terrain and proximity to the ocean waters of Cook Inlet. The mountains to the north help to shelter the area from arctic air masses. Proximity to the waters of Cook Inlet tend to moderate the seasonal variations. Meteorological data collected at JBER (Elmendorf AFB) show that at this location, the mean annual precipitation total is 12 inches, with an average annual snowfall of about 65 inches (WRCC 2023). July, the warmest month, has temperatures that range from 49 to 70 degrees Fahrenheit (ºF). Temperatures in January, the coolest month, average between 7 and 21ºF. Prevailing winds at JBER are generally from the north or south, with 10 percent calms. South and southeasterly winds passing over the Chugach Mountains during low pressure systems can lead to wind gusts known as "Chinooks" of up to 100 miles per hour (mph; JBER 2015a).

As previously mentioned, JBER is in attainment for all criteria pollutants and is outside of two nearby maintenance areas. Both mobile and stationary emission sources operate within JBER, and the surrounding communities of Anchorage and Eagle River generate air pollutants and contribute to the air quality in the area. Mobile sources such as automobiles were largely responsible for past exceedances of CO, which resulted in Anchorage becoming classified as a nonattainment area for that pollutant. The State of Alaska and Anchorage took action to reduce CO emissions and achieve the standard, and Anchorage is now classified as a maintenance area. As an example of local emissions, emissions from point sources (stationary sources) in tons/year are included in Table 3.2-2. These were extracted from the most recent USEPA National Emission Inventory Data (USEPA 2020). Of note is that emissions from all stationary sources are included for JBER.

Table 3.2-2 Point Source Emissions from JBER as Reported in the 2020 National Emission Inventory Database (Tons per Year)

	VOCs	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
Point	250.16	602.49	543.66	49.43	36.08	34.02	51,981.57

Key: CO = carbon monoxide; CO_2e = carbon dioxide equivalent; JBER = Joint Base Elmendorf-Richardson; NOx = oxides of nitrogen; $PM_{2.5}$ = particulate matter less than or equal to 2.5 micrometers in aerodynamic diameter; PM_{10} = particulate matter less than or equal to 10 micrometers in aerodynamic diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

Source: USEPA 2020

JBER consists of multiple permitted and unpermitted stationary sources organized according to standard industrial classification and ownership. One of the stationary sources managed by JBER is the Flight Line Title V major stationary source, which includes a variety of emission units including boilers, heaters, paint booths, volatile organic storage tanks, and emergency generators. The Defense Health Agency operates the Elmendorf Hospital, including a plant that consists of two large boilers, several heaters, and three emergency generators. Doyon Utilities, LLC, owns and operates a power plant and water utilities, which supply services to the installation. Other sources not included in this example include motor vehicles and short-term emissions, such as construction activities and the use of ranges. The use of munitions at the ranges includes emissions of both criteria pollutants and HAPs. Emissions of stationary and mobile sources from the greater Anchorage area are shown in Table 3.2-3.

Table 3.2-3 Point Source Emissions of the Greater Anchorage Area as Reported in the 2020 National Emission Inventory Database

	VOCs	CO	NOx	SO_2	PM_{10}	$PM_{2.5}$	CO_2e
Point	1,323.29	3,440.95	1,717.51	180.33	141.67	133.92	1,027,161.50
Mobile	3,367.19	31,258.82	2,304.37	4.64	275.78	190.07	2,725,498.06
Total	4,690.48	34,699.77	4,021.88	184.97	417.45	323.99	3,752,659.56

Note: All are in tons except CO_2e in metric tons.

Key: CO = carbon monoxide; CO_2e = carbon dioxide equivalent; NOx = oxides of nitrogen; $PM_{2.5}$ = particulate matter less than or equal to 2.5 micrometers in aerodynamic diameter; PM_{10} = particulate matter less than or equal to 10 micrometers in aerodynamic diameter; SO_2 = sulfur dioxide; VOC = volatile organic compound

Source: USEPA 2020

As previously mentioned, there are two monitoring stations in Anchorage. The Garden Site (see Figure 3.2-1) is the station in the closest proximity to JBER and was therefore selected to review monitoring data. The data show very good air quality for CO. For PM, the maximum hour of the year appears high, but the arithmetic mean indicates good air quality in general, especially since PM values are evaluated over a 3-year period per the NAAQS. These measured concentrations are a direct result of all area emissions, of which a portion are emitted by JBER.

In addition to criteria air pollutants, small amounts of HAPs may be emitted during weapons training, depending on the weapon. For example, during artillery and mortar training, metal particulates, VOCs, and polycyclic aromatic hydrocarbons (PAHs) are emitted (USEPA 2009b). The metals include iron, copper, and aluminum, with trace amounts of zinc, manganese, nickel, chromium, and cadmium. HAPs are emitted at very low levels, in areas far from populated areas, and there are no controls associated with their use.

3.2.2 Environmental Consequences

Impacts to air quality are assessed by calculating the magnitude of emissions that would occur from construction (where applicable) and activities related to live-fire training under the different alternatives. An Air Force EIAP Level II Quantitative Assessment of project emissions was conducted, as described further in Section 3.2.2.1. A Level II assessment uses insignificance thresholds and indicators to identify clearly insignificant impacts and flag potentially significant impacts that warrant additional analysis.[8] Insignificance thresholds considered in this analysis are emission levels for criteria pollutants that take into account the attainment status of the ROI. There are no insignificance thresholds or indicators identified for HAPs (apart from lead, which is also a criteria pollutant) in air quality EIAP assessment (Solutio 2023).

3.2.2.1 Methodology

The following software models, databases, and/or guidance documents were used to determine air quality emissions that would occur under the alternatives:

- *Air Emissions Guide for Air Force Stationary Sources* (USAF 2023a)
- *Air Emissions Guide for Air Force Mobile Sources* (USAF 2023b)

[8] Insignificance thresholds are USEPA-established annual emission rates that, if exceeded, would trigger a regulatory requirement. Insignificance indicators are USEPA-established rate thresholds that are partially applied or applied out of context to their intended use; however, they can provide a direct gauge of potential impact. Although indicators do not trigger a regulatory requirement, they do provide an indication or a warning that the action is potentially approaching a threshold which would trigger a significant regulatory requirement. Insignificance thresholds provide a definitive determination of insignificance, while indicators only provide a clue to the potential impacts to air quality (Solutio 2023).

- *Air Emissions Guide for Air Force Transitory Sources* (USAF 2023c)
- Air Force Air Conformity Applicability Model (ACAM; ACAM01012022) Version 5.0.23a was used for excavation, construction, and worker travel (Solutio 2024)
- USEPA AP-42 Munitions Emission Factors (USEPA 1995)

According to the Air Force EIAP, ACAM is the only quantitative estimating technique and tool approved and validated per AFMAN 32-7002, *Environmental Compliance and Pollution Prevention*, for performing air quality impact assessments under NEPA. Therefore, the initial screening of the net change in emissions from the proposed PMART action must be performed using ACAM. ACAM was used to calculate total combined direct and indirect emissions associated with clearing and construction activities under the proposed action. Emissions were estimated on a yearly basis for “worst-case” scenarios of clearing and construction. For criteria pollutants, Air Quality EIAP insignificance thresholds and indicators (Solutio 2023) were used to evaluate the significance of potential impacts to air quality. These indicators incorporate USEPA General Conformity Rule thresholds (de minimis levels), which are the maximum net change an action can acceptably emit in nonattainment and maintenance areas and include indicators for actions occurring within attainment areas. Emissions expected from the alternatives were also compared to emissions from stationary and mobile sources from the greater Anchorage area (Table 3.2-3). As ACAM does not have capabilities to estimate emissions associated with highway travel by convoys to and from Fort Wainwright, these emissions were evaluated qualitatively. HAPs were also qualitatively evaluated based on expected total emissions from munitions and motor vehicles. USEPA document AP 42 (USEPA 2009b) and Air Force Guidance (USAF 2014) list emission factors for the various HAPs, which allow the most prominent species to be evaluated.

Output from ACAM modeling runs is provided in Appendix G.

Construction and Infrastructure Emissions

ACAM was used to estimate emissions associated with clearing and pad/roadway construction, which would occur only in the first project year (Year 1) and only under Alternative 1. These activities would result in emissions in three major areas: clearing of land, construction (roads and pads), and worker travel. Fugitive dust PM_{10} emissions calculated in ACAM reflect emissions with the dust controls listed in Section 3.2.2.5 implemented, based on reported abatement effectiveness. Appendix G shows the PM emissions calculated by ACAM with and without controls in place.

Emissions from use of heavy equipment to maintain the newly established firebreak are expected to be generated periodically over the long term. These emission effects are expected to be similar to those generated to maintain other, existing firebreaks. Impacts associated with routine maintenance of the firebreaks were calculated for Year 2 and beyond as annual emissions (with dust controls in place), even though maintenance would not occur every year.

Emissions associated with possible open burning following initial land clearing and thinning and annual prescribed burns to maintain open conditions at the proposed expansion area (Alternative 1 only) have been considered qualitatively. While burning of slash and prescribed fire generate emissions of PM_{10}, $PM_{2.5}$, VOCs, and CO, regular prescribed fire is a management tool that can reduce the risk of uncontrolled wildland fire, which would be associated with much higher air quality impacts. The cleared expansion area would be incorporated into the JBER prescribed burn plan, which is updated annually. Once the area is fully incorporated into the prescribed burn plan, it would be included in the annual open burn permit application. Any burning of slash following land clearing and thinning would also be included in the open burn permit for that year. Emissions from burning the expansion area are expected to be similar to those from other sites similar in size, vegetation, and physical features. Impacts would be temporary, lasting for the duration of the prescribed burn.

Firing and Training Exercise Emissions

While ACAM does not have capabilities to estimate emissions from firing munitions, these emissions were estimated by multiplying the emission factors for munitions from AP 42 by the maximum number of munitions of each size and type that would be fired under each alternative. For both criteria pollutants and GHGs, only emissions from munitions fired at ERF-IA were included. Emissions from specific vehicle types and highway speeds cannot be calculated using ACAM. Therefore, the likely number of trips between JBER and Fort Wainwright under each alternative was considered in a qualitative analysis of air quality impacts associated with vehicle convoys between installations. Vehicle travel to and from ranges while training on each base would be similar, with a difference only in where emissions occur.

Greenhouse Gases

GHG emissions from construction activities and during annual firebreak maintenance were estimated using ACAM and compared to EIAP insignificance indicators. As ACAM does not have capabilities to estimate GHG emissions associated with highway travel by convoys to and from Fort Wainwright, these emissions were evaluated qualitatively for each alternative.

3.2.2.2 Alternative 1: All-Season Live-Fire Training with Expanded Impact Area

Alternative 1 would have direct short-term and long-term impacts on air quality associated with expanding the impact area, maintaining the expansion area, and live-fire training that would not exceed significance thresholds. Over the long term, there would be a reduction in vehicle emissions associated with reduced vehicle travel between JBER and Fort Wainwright.

Estimated total emissions of criteria pollutants from construction (Year 1), firebreak maintenance (Year 2+), and munitions use on JBER (all years) under Alternative 1, as compared to the other alternatives and insignificance indicators, are shown in Table 3.2-4. PM_{10} emission estimates from construction and maintenance incorporate standard construction BMPs that would be implemented to control short-term fugitive dust emissions (see Section 3.2.2.5). Not shown in this table are emissions associated with vehicle convoys, burning following land clearing and thinning in the proposed expansion area, and prescribed fire.

Table 3.2-4 Annual Emissions of Criteria Pollutants from Construction, Maintenance, and Munitions Use on JBER for All Alternatives (Tons per Year)

Alternative	Source	VOCs [a]	CO	NOx	SO_2	PM_{10} [b]	$PM_{2.5}$	Pb
Alternative 1	Construction[c] Year 1	0.43	3.61	4.10	0.01	192.9	0.16	0
Alternative 1	Construction Year 2+	0.02	.21	0.20	0.0003	0.44	0.009	0
Alternative 1	Munitions [d]	0	7.05	0.13	0.0002	2.81	2.00	0.02
Alternative 1	Total Year 1	0.43	10.66	4.23	0.0102	195.71	2.16	0.02
Alternative 1	Total Year 2+[e]	0.02	7.26	0.33	0.0005	3.25	2.009	0.02
Alternative 2	Munitions[f]	0	7.05	0.13	0.0002	2.81	2.00	0.02
Alternative 2	Total All Years	0	7.05	0.13	0.0002	2.81	2.00	0.02
No Action Alternative	Munitions[g]	0	0.65	0.04	0	0.55	0.4	0.002
Net Emissions per Alternative	Net Change Total Alt 1 (Yr 1)	0.43	10.01	4.19	0.0102	195.16	1.76	0.018
Net Emissions per Alternative	Net Change Total Alt 1 (Yr 2+)	0.02	6.61	0.29	0.0005	2.70	1.609	0.018
Net Emissions per Alternative	Net Change Total Alt 2	0.00	6.40	0.09	0.0002	2.26	1.60	0.018
Net Emissions per Alternative	Insignificance Indicator	250	250	250	250	250	250	25

Notes: Apart from lead, HAPs have not been included in this table, as there are no specified insignificance indicators, and emissions generated would be negligible.

[a] VOCs are included because they are a precursor for the criteria pollutant ozone, which is not emitted directly.

[b] Table presents emissions of PM_{10} from construction and maintenance with controls for short-term fugitive emissions, which are BMPs that contractors would be required to follow during construction. The primary control would be dampening soil and unpaved areas twice daily during excavation and grading.

[c] Includes worker travel (light-duty vehicles)

[d] Assumes the maximum number of rounds (Table 2.6-1) would be fired on JBER. The total emissions from munitions across all locations where training occurs would not change from baseline levels.

[e] Includes emissions from clearing the 5.8-acre firebreak every 2–3 years.

[f] Assumes the maximum number of rounds (Table 2.6-1) would be fired on JBER, although some are likely to be fired at Fort Wainwright. The total emissions from munitions across all locations where training occurs would not change from baseline levels.

[g] Assumes the maximum number of rounds for the No Action Alternative (Table 2.6-1).

Key: CO = carbon monoxide; HAP = hazardous air pollutant; JBER = Joint Base Elmendorf-Richardson; NOx = oxides of nitrogen; $PM_{2.5}$ = particulate matter less than or equal to 2.5 micrometers in aerodynamic diameter; PM_{10} = particulate matter less than or equal to 10 micrometers in aerodynamic diameter; Pb = lead; SO_2 = sulfur dioxide; VOC = volatile organic compound

Based on a comparison of net emissions to area emissions (Table 3.2-3), emissions of all pollutants from construction, maintenance, and munitions use on JBER under Alternative 1 would be less than 1 percent of the area emissions, except for PM_{10} in Year 1 due to construction. Required BMPs for construction, such as dampening soil and unpaved areas twice daily during excavation and grading (Section 3.2.2.5), would keep these emissions to below significance thresholds.

Construction and Infrastructure

Based on ACAM modeling results, it is estimated that with required construction BMPs implemented, fugitive dust and equipment exhaust generated by clearing 359 acres and constructing the gravel roadway and pads in the proposed expansion would generate approximately 195 tons of PM_{10} during Year 1, which is below the insignificance indicator (250 tons per year). These PM_{10} emissions are associated with the large area of vegetative clearing and are likely overestimated based on the ACAM assumption that grading would occur over this entire area (see Appendix G). In reality, material would remain on-site, and with implementation of controls such as dampening soils and unpaved areas with water twice daily (Section 3.2.2.5). Emissions would occur well away from the installation boundary, allowing considerable dispersion to occur before reaching receptors off JBER, and there would be no exceedances of State or National Ambient Air Quality Standards. No adverse impacts to the PM_{10} maintenance area in Eagle River are expected. For other pollutants generated during construction, emission levels would be just a fraction of the insignificance indicators.

Although not quantified in Table 3.2-4, any open burning following clearing of the expansion area and thinning of the vegetation buffer would result in short-term emissions of PM_{10}, $PM_{2.5}$, VOCs, and CO. Under a worst-case scenario in which all cleared vegetation (apart from marketable timber) is burned, it is anticipated that these emissions would temporarily exceed the insignificance indicators. However, as this burning would only occur during the first year, the steady state estimated annual net emissions would be below the insignificance indicators, showing no significant long-term impact to air quality. Therefore, the action would not cause or contribute to an exceedance on one or more NAAQS and would have an insignificant impact on air quality. Mitigation identified to reduce impacts from open burning (Section 3.2.2.5) includes use of non-burning disposal methods (e.g., hydro-axing and mulching) for some or all of the cleared/thinned vegetation.

Under this alternative, the proposed expansion area would be added to the land area on JBER that receives regular prescribed (controlled) burns, and associated emissions of PM_{10}, $PM_{2.5}$, VOCs, and CO would occur annually. Prescribed burns would be added to the burn acreage for JBER and follow the JBER WFMP as well as all applicable Air Force, DoD, and Alaska guidelines.

Firing and Training Exercises

Long-term impacts would occur from operational emissions associated with live-fire training and vehicle travel to and from ranges. Estimated emissions of criteria pollutants associated with munitions are included in the Year 2+ totals shown in Table 3.2-4. No pollutants would approach or exceed the insignificance indicators. Because the need for travel to Fort Wainwright would be eliminated under Alternative 1, there would be an estimated seven fewer trips made by convoys of 710 miles round trip. Therefore, VOCs, CO, and NOx emissions associated with vehicle travel would be substantially reduced from baseline levels under Alternative 1. These reductions would help offset short- and long-term impacts associated with emissions from construction, maintenance, munitions, and prescribed fire. There would also be reduced vehicle emissions in and near the Fairbanks North Star Borough nonattainment area for $PM_{2.5}$, as well as the maintenance area for CO near North Pole, Alaska, which is 6 miles from Fort Wainwright. On-base travel to and from ranges during training would generate vehicle emissions and PM_{10} from travel on gravel roads at JBER. These emissions would be geographically shifted from Fort Wainwright to JBER.

Increased munitions use at ERF-IA would result in a localized increase in emissions of HAPs during live-fire training. While the units stationed at JBER would fire the same number of rounds annually at all locations combined, the number fired at ERF-IA would increase under Alternative 1, with a commensurate decrease in other locations. HAPs such as acenaphthylene, fluorene, and pyrene would be emitted at a rate 1,000 times less than any criteria pollutant. Both sources would be dispersed over a very large area and away from sensitive receptors. Additionally, only a fraction of this total amount of emissions for HAPs would occur at the same time. The round with the greatest associated HAP emissions, the 155-mm ILLUM round, would release 0.0016 pounds of methyl chloride per round. Expected concentrations of HAPs at any sensitive area would be extremely small and would not present a human health risk. Therefore, it is expected that air quality impacts associated with HAPs would be negligible.

As discussed in Section 3.9.2.2, live-fire training during the summer fire season could increase the risk of wildland fire in ERF-IA, particularly in the forested uplands south of ERF. Should they occur, wildland fires would temporarily impact air quality. Assessment of wildfire risk annually in accordance with the WFMP and implementing appropriate measures based on identified risk factors would help minimize these risks.

Greenhouse Gas Emissions

Table 3.2-5 shows the expected project emissions of GHGs from construction and firebreak maintenance under Alternative 1, as compared to the EIAP insignificance indicator. GHG emissions from these project components are small in comparison to area emissions (see Table 3.2-3) and would be well below the insignificance indicator. Possible open burning following initial land clearing would release carbon (CO_2 and CO), but these impacts would be reduced by mitigation to use non-burning methods (i.e., hydro-axing and mulching) for slash disposal to the degree practicable. Prescribed fires would release carbon but would potentially reduce the risk of uncontrolled wildland fire over the long term. There would also be a release of carbon from clearing of the expansion area (removal of 359 acres of forest and 226 additional acres of thinning) and the subsequent burning of slash, as well as a reduction in carbon sequestration potential. All marketable timber greater than 5 inches diameter at breast height would be removed from the site and either sold as timber or placed in a JBER-designated woodlot for sale as firewood. The increased fire risk associated with live-fire training during the summer fire season could result in release of carbon and GHGs (see Section 3.9.2.2), although the risk would be assessed annually and appropriate risk reduction measures implemented. The reduction in round trips of large-scale convoys to and from Fort Wainwright under this alternative (seven fewer trips) would result in a substantial reduction in GHG emissions from vehicle emissions.

Table 3.2-5 Annual GHG Emissions as CO_2e from Construction and Maintenance under Alternative 1

Alternative and Year	CO_2e Emissions (tons per year)
Alternative 1, Year 1	798.4 (724.2 metric tons)
Alternative 1, Year 2+	33.2 (30.1 metric tons)
Insignificance Indicator	75,000 (68,039 metric tons)

Note: CO_2e emissions are given in short tons, with metric tons shown in parentheses.

Key: CO_2e = carbon dioxide equivalent; GHG = greenhouse gas

3.2.2.3 Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only

Under Alternative 2, there would be no short-term emissions associated with construction or long-term impacts associated with maintenance, and short- and long-term impacts would not exceed significance thresholds. Over the short term, emissions of most criteria pollutants would be less than those under Alternative 1 because the impact area would not be expanded and construction would not occur. Over the long term, prescribed fire is not a component of Alternative 2 because there would be no upland expansion area to maintain in an open condition. However, training during the summer fire season would potentially increase the risk of wildland fires in the existing ERF-IA and associated air quality impacts, as described for Alternative 1. Emissions from vehicle travel would be greater than under Alternative 1 because it is likely that there would be some convoys to Fort Wainwright annually, but vehicle emissions would still be less than under the No Action alternative, with an estimated three fewer trips annually. A portion of the vehicle emissions estimated would occur in nonattainment/maintenance areas for $PM_{2.5}$ and CO under this alternative, although the amount would be less than under the No Action Alternative. Increases in emissions associated with firing munitions would be the same as those under Alternative 1, as it is assumed that the same number of rounds would be fired at ERF-IA under both action alternatives (although some would likely be fired at other locations). No criteria pollutants would exceed insignificance indicators, and net emissions would be less than 1 percent of the greater Anchorage emissions for mobile and stationary sources. Air quality impacts associated with HAPs from munitions would be negligible.

There is no construction under this alternative. However, it is expected that there would be a reduction in annual GHG emissions associated with an estimated three fewer convoys to and from Fort Wainwright. There would be no release of carbon associated with the expansion area under this alternative and no associated loss of carbon sequestration potential.

Overall, it is likely that there would be a beneficial impact on air quality under this alternative because vehicle emissions would likely decrease, and there would be no emissions associated with construction or maintenance of an expanded impact area.

3.2.2.4 No Action Alternative

Under the No Action Alternative, there would be no change in annual emissions from baseline conditions. The decrease in criteria pollutants and CO_2e from the reduction or near elimination of vehicle miles traveled to and from Fort Wainwright under Alternatives 1 and 2 would not occur. A portion of these unrealized emission decreases would occur in maintenance and non-attainment areas each time the convoys traveled to Fort Wainright for training each year. Localized emissions from HAPs would be less than those under Alternatives 1 and 2 because fewer munitions would be fired at ERF-IA, although these emissions would be released during training at other locations. Short-term emissions associated with construction would not occur under this alternative, and there would be no emissions associated with prescribed fire and no release of carbon or loss of carbon sequestration potential associated with clearing and thinning forest vegetation. Emissions of criteria pollutants associated with munitions would not exceed insignificance indicators and would be less than 1 percent of the greater Anchorage emissions for mobile and stationary sources.

An annual increase in GHG emissions from baseline conditions would not occur under the No Action Alternative when compared with Alternatives 1 and 2. The GHG emissions decreases from the reduction in vehicle miles traveled to and from Fort Wainwright associated with Alternatives 1 and 2 would not be realized. Annual short- and long-term increases in GHG emissions from construction and prescribed burning under Alternative 1 would not occur under the No Action Alternative as well.

3.2.2.5 Mitigation

USARAK Regulation 350-2 limits speeds on all roads, trails, and firebreaks to 25 mph unless otherwise posted. These reduced speeds would help reduce fugitive dust emissions during travel on gravel roads during both construction and operations. Required BMPs for prescribed burns can be found in the JBER WFMP, with additional BMPs provided in pertinent prescribed burn plans and open burn permits. Additional BMPs that would reduce fire risk, listed in Section 3.9.2.5, would help reduce the risk of air quality emissions associated with wildland fire.

The following BMPs and SOPs would be implemented under Alternative 1 to reduce PM emissions associated with construction to below significance thresholds (WRAP 2006):

- Dampen soil with water during excavation and grading to maintain a minimum soil moisture. Water a minimum of twice daily on unpaved/untreated roads and on disturbed soil areas with active operations.
- Prohibit excavation and grading during high winds (i.e., greater than 20 mph).
- Use tarps during transport of fine materials.
- Dampen stockpiles of soil or other loose material with water.
- Use wind breaks.
- Reduce speeds of construction vehicles to 15 mph if excessive fugitive dust is observed.
- Maintain construction equipment in good operational condition.
- Track Sustainability Development Indicators as detailed in the *Installation Development Plan* (IDP) (USAF 2015) to demonstrate progress toward Air Force and DoD policies and initiatives and in support of Goal 6 of the IDP: improve JBER as a sustainable installation.

Additionally, the following mitigation has been determined as a result of the air quality analysis for Alternative 1 to reduce potential impacts associated with emissions from open burning:

- Following initial clearing of the proposed expansion area, use non-burning methods of slash disposal to the degree practicable.

No mitigation measures have been determined as a result of the air quality impact analysis for Alternative 2.

The mitigation measures determined as a result of the wildland fire analysis (Section 3.9.2.5) would reduce the risk of fire risk and associated air quality impacts.

3.3 SUB-ARCTIC CLIMATE CONSIDERATIONS

3.3.1 Affected Environment

3.3.1.1 Continental Sub-arctic Climate

In terms of existing climate, JBER is situated in a transitional zone between maritime climate effects to the south and interior or continental climate zone to the north (JBER 2023a). Temperatures are moderated by the Cook Inlet to the northwest and the surrounding mountain ranges (i.e., Chugach, Talkeetna, Alaska Range), which shelter the installation from maritime influences from the Pacific Ocean and cold air masses coming from the interior region to the north. Monthly climate data collected from the Eagle River 5 Southeast weather station, averaged from 1989 to 2023, are provided in Table 3.3-1.

Table 3.3-1 Eagle River 5 Southeast, Alaska Monthly Climate Summary

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (ºF)	20.5	27.9	36.5	49.5	60.8	67.7	70.1	66.6	57.3	42.0	25.0	22.3	45.6
Average Min. Temperature (ºF)	6.6	11.3	14.9	27.2	36.3	44.4	49.4	46.8	38.8	26.8	11.7	8.5	26.9
Average Total Precipitation (in.)	0.58	0.54	0.46	0.3	0.46	0.93	1.48	2.07	1.94	1.39	0.98	1.21	12.42
Average Total Snowfall (in.)	10.0	8.8	8.2	1.7	0	0	0	0	0.2	5.5	11.2	17.8	65.0
Average Snow Depth (in.)	15	15	13	3	0	0	0	0	0	1	6	12	5

Note: Monthly averages based on data from October 1989 through October 2023

Key: ºF = Fahrenheit; in. = inch

Source: WRCC 2023

3.3.1.2 Ice Conditions

Ice conditions vary greatly in ERF-IA. Spring "break-up" for JBER usually starts by early April and lasts into May; break-up is characterized by a rapid rise in temperature (JBER 2023a). Summer conditions last from June to early September. Both Eagle Bay and Eagle River are tidally influenced, which results in a later freeze date and earlier break-up date than the isolated shallow ponds in southern ERF. Eagle Bay typically forms mobile pan ice that can range from inches to feet thick, although no shorefast ice (i.e., ice that is fastened to the coastline) develops. Shorefast ice does develop in Eagle River, although it continues to move vertically with the tide. The ice in Eagle River can reach 2 to 3 feet thick, varying with the year as well as location upriver. Remote camera data collected during 2017 through 2023 show the mean onset of 100 percent shorefast ice cover at six locations along Eagle River, ranging from the earliest onset of 26 November at the furthest location measured upriver to 16 January at the mouth of Eagle River (JBER 2024a) (Figure 3.3-1). On average, shorefast ice may remain along the entire length of Eagle River until mid-April for locations upriver (averaging 143 days of 100 percent ice cover) and up to late January for the mouth of Eagle River (averaging 14 days of ice cover) (JBER 2012a). Between 2017–2023, the mouth of Eagle River did not develop 100 percent ice cover during the winters of 2018–2019, 2020–2021, 2021–2022, and 2022–2023 (JBER 2024a). During the winter of 2018–2019, the remote camera location closest to the mouth of Eagle River also did not develop 100 percent ice cover (JBER 2024a).

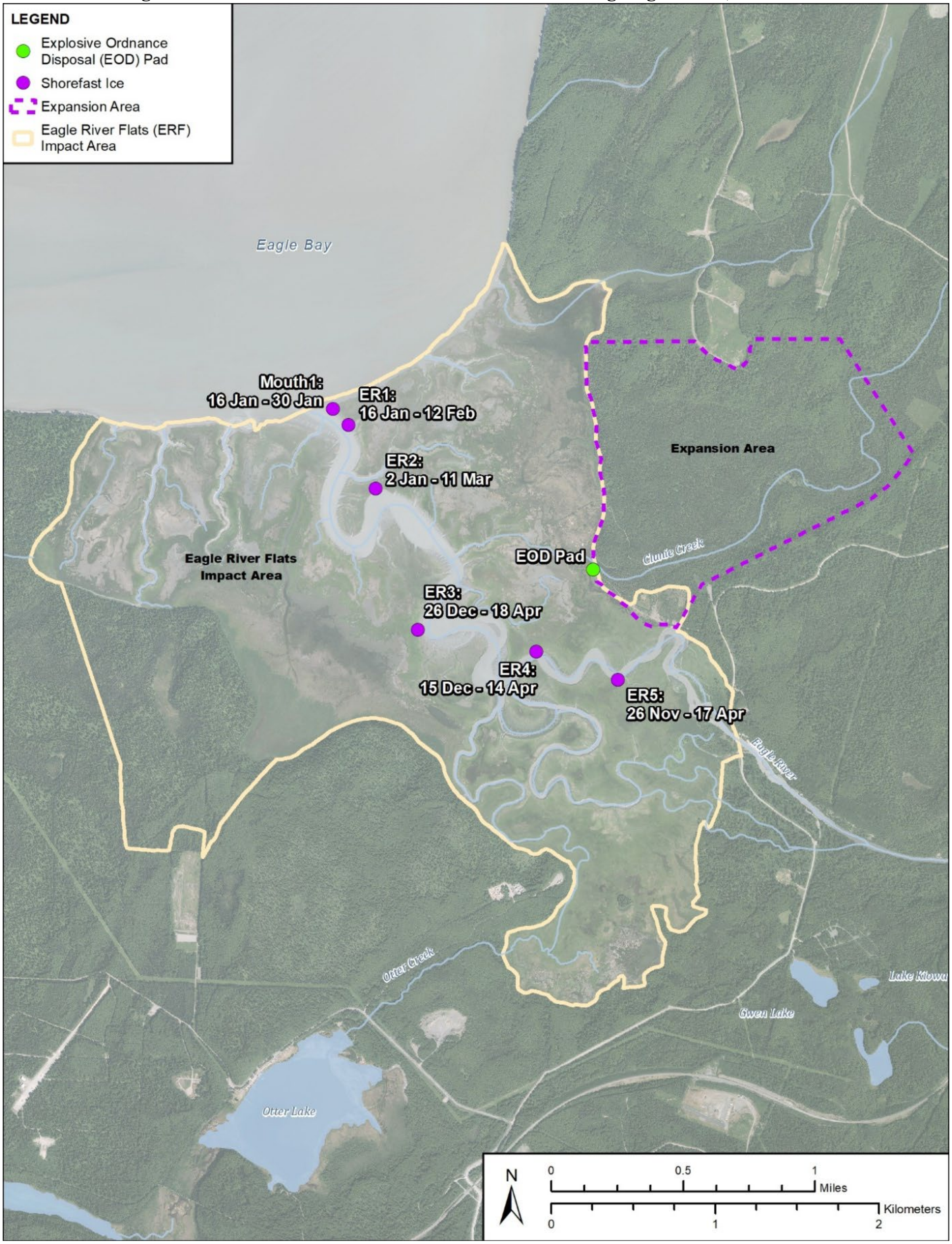
Current restrictions limit live-fire mortar and artillery training at ERF-IA to winter months (1 November to 31 March) when ice thickness is sufficient to protect the underlying sediments from being disturbed. Ice conditions are considered "sufficient" when there are:

- 2 inches or more of ice cover on waterbodies when 60-mm and 81-mm mortar training is conducted, and
- 5 inches or more of ice cover on waterbodies when 120-mm mortar and 105-mm howitzer training is conducted (FRA 2001).

Based on data collected from 2015 to 2022, the shallow ponds in southern ERF develop ice at least 2 inches thick between 31 October and 25 November, varying by year (data collected at "EOD [Explosive Ordnance Disposal] Pad" shown in Figure 3.3-1) (Tucker 2023a).

The variability in ice formation due to geography, tidal influence, and temperature make it difficult to develop training plans. When ice conditions are not met, units are required to travel to Fort Wainwright, located approximately 355 miles away, to complete their training requirements, as discussed in Section 2.4.3.1.

Figure 3.3-1 Dates of First Onset of Shorefast Ice Along Eagle River, 2017–2023



Sources: JBER 2020a, 2023c, 2024a

3.3.1.3 Wildland Fire

Wildland fires are more likely to occur during drought or low-precipitation times and are less likely to occur during high-precipitation times and when snow is on the ground. The observed warming trend may increase the risk of wildfire through dry vegetation, droughts, heat waves, insect infestation, and changes in the timing of snowmelt. Section 3.9 describes wildland fire in more detail.

3.3.1.4 Erosion and Flooding

According to the *Alaska Baseline Erosion Assessment Report* (ACOE 2009), Anchorage is identified as a Minimal Erosion Community, or one that has reported impacts that are not serious and not affecting the viability of the community. A recent study of JBER found that erosion rates range from 0.2 to 0.8 meters per year for coastal areas and around 1.7 meters per year along the banks of the Eagle River (AERC 2022).

Regional warming may increase riverine flooding on Eagle River from increased likelihood of accelerating glacial melt and could impact infrastructure of locations with cultural or environmental significance (AERC 2022).Tidal flooding resulting from changing sea levels is not predicted to increase in the near term (before 2026) due to the land beneath Alaska rising in a process called vertical land movement (Hall et al. 2016). Factors that contribute to vertical land movement include subsidence (e.g., tectonic land movement, water and resource extraction, and changes in glaciers), dynamic sea level (e.g., surface and deep ocean circulation changes), and ice melt effects (e.g., changes in land-based ice mass) (Hall et al. 2016). According to an analysis of sea level rise scenarios for DoD Coastal Sites worldwide (Hall et al. 2016), the vertical land movement will mitigate sea level rise for JBER in the near term (before 2065). The rate of post-glacial isostatic rebound exceeds both documented and predicted sea level rise, so the proposed action will have no effect.

The current depth of flooding during extreme water levels resulting from astronomical tide and storm surge, combined with predictions for sea level rise and a 1 percent annual event (100-year flood) at JBER, ranges from about 3.2 feet in 2035 to about 7 feet in 2100 (Hall et al. 2016).

3.3.2 Potential Environmental Effects

3.3.2.1 Methodology

This analysis of potential impacts from potential regional warming is qualitatively based on ice condition, wildland fire risk, erosion, and flooding.

3.3.2.2 Alternative 1: All-Season Live-Fire Training with Expanded Impact Area

Ice Conditions

Based on observed temperature trends for the ROI, it is expected that the number of days with temperatures below freezing will continue to decrease, and the annual low temperatures will continue to rise. These trends will result in a shortened season of ice cover at ERF-IA. However, because live-fire training would not be limited to the ice thickness conditions discussed in Section 3.3.1.2 under this alternative, a shortened or moderated winter season in itself would not limit training at ERF-IA.

Wildland Fire

Based on observed warming trends, it is expected that increased temperatures, longer fire season, and altered patterns of precipitation will result in elevated wildland fire activity regionally. Local to JBER and ERF-IA, the planned firebreak around the expansion area would help contain prescribed burns and unplanned ignitions due to training that could otherwise escape the impact area, which would limit associated wildland fire risk and protect JBER infrastructure. Firing during all seasons, including the fire season, would increase the risk of wildland fire as a result of training in ERF-IA, particularly in upland areas. Annual prescribed burns in the expansion area would reduce the risk of wildland fires that would impact training and potentially escape into the surrounding environment. Additionally, wildfire risk would be assessed annually in accordance with the WFMP and appropriate risk measures implemented. While regional wildland fires would be unlikely to directly affect ERF-IA, smoke associated with wildland fire could affect visibility and air quality to the point that training would need to be delayed until after conditions improve. These delays are likely to increase in the future. However, the ability to conduct all training on JBER under this alternative would likely result in fewer impacts to training from poor air quality, as Fort Wainwright typically has more red flag warning days than JBER.

Erosion and Flooding

The existing ERF-IA is susceptible to tidal flooding. Under Alternative 1, expanding the impact area into uplands to the east would provide additional land area for training that is unlikely to be affected by flooding events. However, because Alternative 1 includes restrictions on firing HE rounds during inundated conditions, more frequent and longer duration flooding events would be expected to affect training in the future. Additionally, over the long term, it is possible that coastal erosion and inundation could adversely affect training objectives by increasing the amount of open water in ERF-IA and potentially increasing the amount of area within protective buffers, thereby reducing the amount of area where targets could be placed to avoid firing into water. The upland expansion area, however, would be less susceptible to flooding and coastal erosion because of its topographic location.

3.3.2.3 Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only

Ice Conditions

Similar to Alternative 1, a future shortened or moderated winter season would not in itself limit training at ERF-IA, as live-fire training would not be limited based on ice thickness conditions.

Wildland Fire

While ERF-IA would not be expanded under this alternative, training during the summer fire season could increase the fire risk at the existing ERF-IA. As discussed in Section 3.9.2.2, there would be a slight increase in wildland fire risk in areas of non-forested wetland vegetation and a higher risk in the forested uplands south of ERF, with annual assessments of fire risk and implementation of appropriate measures to reduce risk. There would be an increased risk that smoke associated with regional wildland fire could affect live-fire training, as described for Alternative 1. Impacts on training from wildfire would likely be greater under this alternative than under Alternative 1, as some training would likely be planned for Fort Wainwright, which typically has more red flag warning days than JBER. Increased temperatures, longer fire season, and altered patterns of precipitation associated with regional warming will likely increase the number of red flag warning days in the future, making it harder to schedule training and increasing the degree of impact.

Erosion and Flooding

Flooding and erosion at ERF-IA could affect future training, as described for Alternative 1. However, because there would be no upland expansion area under Alternative 2, the degree of potential effect to training would be greater, as there would be much less training land unaffected by flooding events.

3.3.2.4 No Action Alternative

Ice Condition

Current sub-arctic climate conditions already preclude training objectives from being met under the No Action Alternative. Sufficient ice thickness to protect underlying sediments from being disturbed during live-fire mortar and artillery training is not consistently being achieved for adequate duration for training objectives to be met at home station. If warming trends detailed in Section 3.3.1.1 continue, temperatures will continue to rise, and the duration of the season when sufficient ice conditions are met will continue to decrease. This will require additional training to occur away from home station.

Wildland Fire

Potential impacts to ERF-IA from increased frequency and severity of wildland fire would be as described for Alternative 2. However, impacts to training on JBER could be lower, as training would be limited to the winter months when the wildland fire risk is low. Overall impacts on training from wildfire would likely be greater under this alternative than under Alternatives 1 and 2, as more training would occur on Fort Wainwright. The degree of impact would likely increase with the regional warming trend and an associated increase in the number of red flag days relative to current conditions.

Erosion and Flooding

Impacts to training at ERF-IA from erosion and flooding would be similar to those under Alternative 2. However, the degree of impact would be less because live-fire training at ERF-IA would be limited to winter months, and more training would be done at other locations.

3.3.2.5 Mitigation

No mitigation has been determined as a result of the impact analysis for sub-arctic climate considerations.

3.4 SAFETY AND OCCUPATIONAL HEALTH

3.4.1 Affected Environment

3.4.1.1 Resource Definition

Safety refers to those facets of military activities that potentially pose a risk to the health, safety, and well-being of military personnel and the general public. A safe environment is one in which there is no, or an optimally reduced, potential for death, serious bodily injury or illness, or property damage. The elements of an accident-prone environment include the presence of a hazard and an exposed population at risk of encountering the hazard. The degree of exposure depends primarily on the proximity of the hazard to the population or property. Hazardous activities can include construction, demolition, transportation, and noise-generating activities. Certain military activities are inherently hazardous; however, numerous approaches are available to manage the operational environment to improve safety, including reducing the magnitude of a hazard or reducing the probability of encountering the hazard.

Because the proposed project concerns maximizing military live-fire training opportunities, this analysis is primarily focused on military ranges and ground safety. Ground safety considers issues associated with training operations. Other ground safety concerns include operational safety and UXO. Occupational health includes personnel safety related to land clearing and construction activities and motor vehicle safety related to military convoys. The proposed action and alternatives would not change the airfield environment and associated safety zones; therefore, airfield safety is not discussed in this EIS.

The ROI for safety is the entirety of JBER. The ROI also includes the military convoy route used to transport personnel and equipment to Fort Wainwright. Transportation of supplies by rail does occur but is rare; therefore, it is not discussed in detail in this EIS.

See Section 3.9 for wildland fire risk and management and Section 3.15 for safety concerns associated with hazardous substances.

3.4.1.2 Regulatory Setting

Mission safety on JBER is maintained through adherence to DoD, Air Force, and Army safety policies and plans. Safety programs ensure the safety of personnel and the public on the installation by regulating mission activities.

AR 385-10, *The Army Safety Program*, prescribes Army policy, responsibilities, and procedures to safeguard and preserve Army resources worldwide against accidental loss. Safety is of paramount importance in the execution of any operation on ranges or in training areas. DA Pam 385-63, *Range Safety*, provides minimum requirements for the U.S. Army Range Safety Program prescribed in AR 385–63, *Range Safety*. It also establishes standards and procedures for the safe firing of ammunition. DA Pam 385-63 also provides a standard methodology used for the establishment of SDZs. USARAK Regulation 350-2, *Training and Range Safety*, provides policy and procedures for JBER ranges and implements AR 385-63, DA Pam 385-63, and other directives.

DA Pam 385-64, *Ammunition and Explosives Safety Standards*, explains the Army's safety criteria and standards for operations involving ammunition and explosives (also referred to as military munitions) prescribed by AR 385-10; DoD Directive 6055.09E, *Explosives Safety Management*; and Defense Explosives Safety Regulation 6055.09 for the Army and Government-owned, contractor-operated facilities and property. DA Pam 385-65, *Explosive and Chemical Site Plan Development and Submission*, provides guidance and direction on preparing explosives safety site plans, which provide information to demonstrate compliance with safety standards for explosives storage or operations. Per AR 385-10, Army service component commands direct reporting units to develop, implement, and manage a written explosives safety management program as an element of their overall safety and occupational health program. See Section 3.15 for additional regulations pertaining to munitions as regulated waste.

All contractors performing construction and demolition activities on JBER are responsible for following federal Occupational Safety and Health Administration (OSHA) regulations, 29 CFR Part 1910, as well as Air Force Occupational Safety and Health (AFOSH) standards set forth in DAFI 91-202, *The US Air Force Mishap Prevention Program*, which implements Air Force Policy Directive 91-2, *Safety Programs*; Department of the Air Force Manual 91-203, *Air Force Occupational Safety, Fire, and Health Standards*; and AR 385-10, *The Army Safety Program*. Air Force and Army Safety and Occupational Health standards follow OSHA regulations and are necessary to conduct work activities in a manner that does not increase risk to workers or the public. Movement of personnel and equipment must adhere to 11th ABN DIV and USARAK Regulation 55-2, *Transportation Operations and Planning in Alaska (Transportation and Travel)*, which establishes policies and procedures for Army units and agencies using transportation resources in support of Army operations. Transportation of munitions must adhere to DA Pam 385-64 and all Department of Transportation regulations governing shipment of chemical fillers and chemical regulations. Regulations pertaining to transportation and travel are discussed in more detail in Section 3.12.

3.4.1.3 Existing Conditions

JBER is a secure military installation with access limited to military personnel, civilian employees, military dependents, and approved visitors. Activities conducted on the installation are performed in accordance with applicable regulations and standards, as discussed in the previous section. The 673d Civil Engineer Squadron (CES) provides 24-hour crash, structural, and emergency medical first response; technical rescue; hazardous material and weapons-of-mass-destruction incident response; and fire prevention and safety to JBER. Prior to every range training event, a risk assessment of each operation is conducted, and based on the risk assessment, each training and range activity is assigned a level of medical support based on the potential for injury and the severity of injury that may occur during the execution of the training event (USARAK Regulation 350-2). Existing conditions for range safety, munitions, airfield safety, and construction activities are discussed in the following sections.

Range Safety

A large portion of JBER is designated for training purposes. The JBER ranges (JBER-designated land use of Training) span from the eastern portion of JBER, from the southernmost boundary to the northern boundary along Cook Inlet and Knik Arm, and encompass the majority of the land area not associated with airfield activities or installation support services. The ranges are bordered by the Chugach Mountains and Chugach State Park to the southeast, the Municipality of Anchorage to the southwest, and the community of Eagle River and Matanuska–Susitna Valley to the northeast. JBER ranges support a variety of training exercises and activities. All parts of the range are off-limits, day and night, to all units and personnel, military or civilian, without approved scheduling and/or a use permit.

Ground training activities conducted within the JBER ranges consist of munitions delivery from aircraft as well as munitions use on the ground. Training exercises are coordinated and scheduled according to training and mission requirements. The ranges have designated training locations for both firing and maneuvering to accommodate a variety of training requirements. Ground-to-ground operations occur throughout JBER ranges to fulfill training requirements. There are a wide variety of live-fire missions, which are dependent on the nature of the target and operational mission. Live-fire and simulated-fire training include use of designated ranges and targets, convoy courses, live-fire villages and assaults, direct live fire, improvised explosive device detonations, explosives (both above and below ground), and trail courses. These activities are predominately conducted in four main training areas, one being ERF-IA (USAF 2019a).

ERF-IA and the proposed expansion area lay within the SDZ compliance area. A discussion of target areas and SDZs at ERF-IA is provided in Section 2.1.5.2 and illustrated in Figure 2.1-6. Additional discussion of SDZs and debris/shrapnel associated with indirect live-fire training can be found in Appendices D and E.

Range Control is responsible for providing safe, functional ranges and training facilities, scheduling facilities, and issuing range equipment and targets. The JBER Range Manager oversees the operation and maintenance of the ranges and training lands and ensures compliance with USARAK Regulation 350-2, *Training and Range Safety*. The Range Officer In Charge and Range Safety Office are responsible for reporting to Range Control any safety incident, including but not limited to misfires, malfunctions, medical and non-medical injuries, or ammunition impacting out of established safety limits (USARAK Regulation 350-2). Training injuries on ranges and training lands are minimized through the use of appropriate personal protective equipment. All Army units wear full personal protective equipment, including authorized helmets, body armor, eye protection, and hearing protection during all live-fire training.

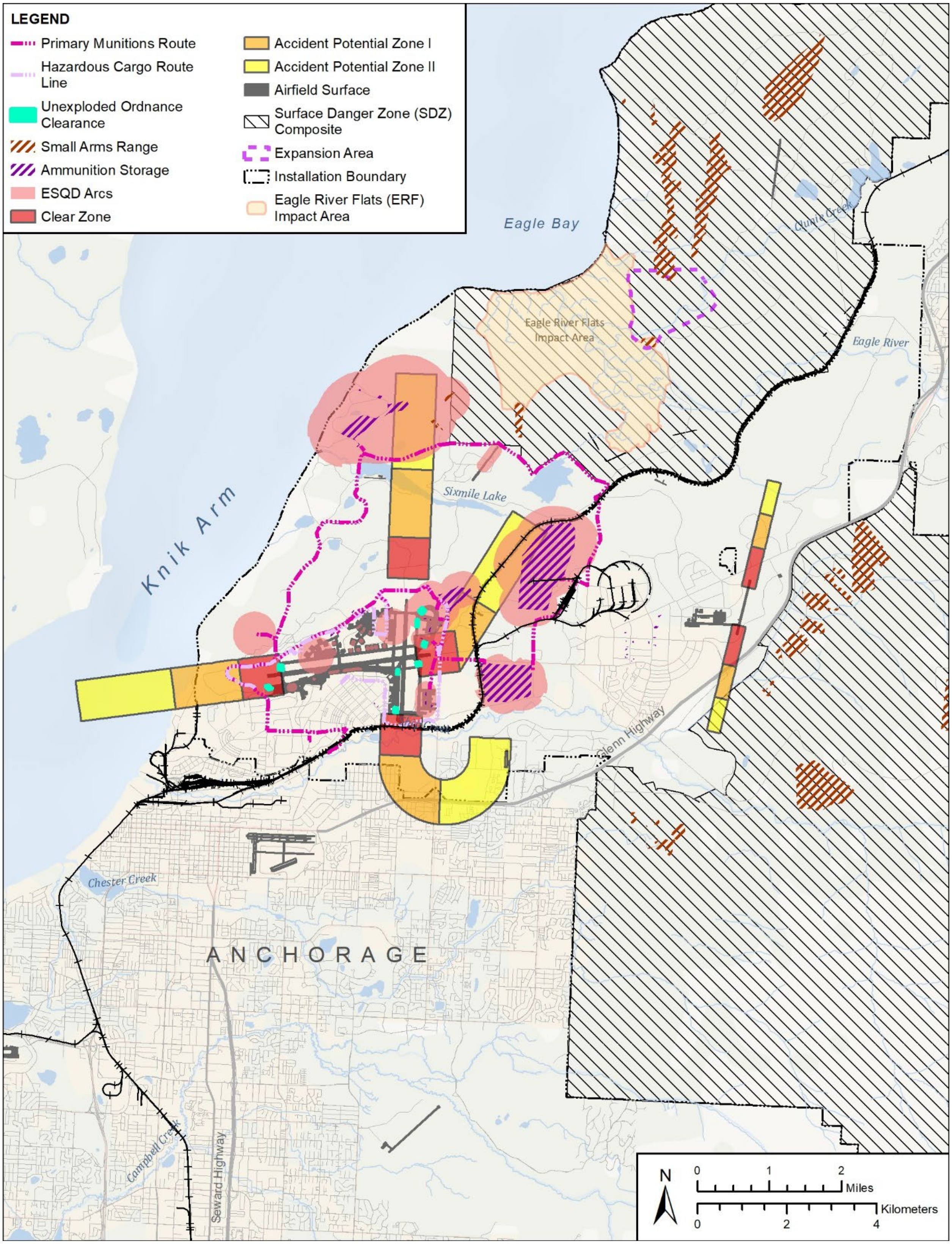
Munitions

Siting requirements for munitions and ammunition storage and handling facilities are based on safety and security criteria. Defined distances, established in AFMAN 91-201, *Explosives Safety Standards*, and DA Pam 385-64, *Ammunition and Explosives Safety Standards*, are maintained between munitions storage areas and a variety of other type of facilities. These distances, called explosive safety quantity-distance (ESQD) arcs, are determined by the type and quantity of explosive material to be stored. Each explosive material storage or handling facility has ESQD arcs extending outward from its sides and corners for a prescribed distance. Within these ESQD arcs, development is either restricted or prohibited to ensure personnel safety and to minimize potential for damage to other facilities in the event of an accident. ESQD arcs have been designed to safeguard the installation population and civilian community from potential accidents. Separation distances are mandated to minimize explosive hazards in these zones (USAF 2015).

ESQD arcs at JBER include the munitions storage areas, hazardous cargo zones, and other small arms storage areas. Figure 3.4-1 depicts the ESQD arcs, authorized facilities for storing explosives, the explosive haul routes, and other associated safety criteria features. While ESQD arcs occur in the vicinity of ERF-IA and the proposed expansion area, none of them directly overlie these areas.

Munitions use at ERF-IA dates back to the 1940s (see Section 1.3.2). The limited training occurring at ERF-IA since 1991 has reduced the total number of munitions fired into the impact area. The proposed expansion area is currently used for maneuver live-fire training. Existing munition expenditures at ERF-IA are discussed in Section 2.4.3.1.

Figure 3.4-1 JBER Safety Zones



Sources: JBER 2019a, 2020, 2023b, 2023c

UXO probability areas (known munitions test/training areas) on JBER are shown in Figure 3.4-1. The Army protects personnel from the risks associated with UXO by controlling access to areas of concern; managing programs to remove UXO; and maintaining records of expenditures, range clearance operations, explosive ordnance disposal incidents, and areas of known or suspected UXO. No range clearance operations are carried out at ERF-IA or the proposed expansion area to remove UXO or low-order (LO) rounds. ERF-IA is in the designated Training North District and is used for military training by authorized personnel. The area is off-limits to the public and recreational users who access JBER, and in 2022 USACE designated Eagle River within ERF-IA as a restricted area. Large orange signs are posted around the area to warn of the potential risks of UXO on ERF-IA. The proposed expansion area is also located in the Training North District and is a maneuver live-fire training area. See Section 3.15 for information about disposition of munitions.

Units that must travel to Fort Wainwright for training currently draw munitions at JBER from an Ammunition Supply Point before departing or arrange to pick up munitions at Fort Wainwright. Most often JBER units will draw their munitions at JBER before departing. The logistics element transports/convoys equipment and personnel to a staging area to issue munitions in a controlled manner. Once the unit has completed firing, the logistics element arranges transport for the accountable residue (and any unexpended rounds) to the same location where munitions were drawn.

3.4.2 Environmental Consequences

The analysis for potential impacts to safety and occupational health is based on the potential for an increase in safety risks to the public, JBER personnel, and/or JBER property. An increased risk for bodily injury, illness, death, or property damage from the proposed action and alternatives would be considered an adverse impact on safety and occupational health.

Adverse impacts associated with safety and occupational health would be considered significant if one or more of the following were to occur:

- Introduction of a new health or safety risk for which the Army and Air Force are not prepared or do not have adequate management and response plans in place
- Substantially increased risks associated with the safety of construction personnel, contractors, military personnel, or the local community and transiting public
- A reduction in the ability to respond to an emergency

3.4.2.1 Methodology

The impact analysis qualitatively assessed the degree to which the alternatives would increase or decrease safety risks to the public, JBER personnel, and property, and the ability of the Army and Air Force to manage potential increased risks by responding to emergencies.

3.4.2.2 Alternative 1: All-Season Live-Fire Training with Expanded Impact Area

Impacts under Alternative 1 would not exceed applicable significance thresholds. This alternative would include short-term occupational hazards associated with construction of the expanded impact area but would have a beneficial effect by eliminating or reducing the need for travel to Fort Wainwright to train.

Construction and Infrastructure

During the construction period, there would be short-term safety risks to contractors performing land clearing and construction in the proposed expansion area. These risks would be present during the normal workday for a period of approximately 4 months. In addition, prior to land clearing and construction activities, the proposed expansion area would be cleared of UXO by qualified/certified personnel. No construction would occur within or near a munitions storage area. Construction workers could encounter soil or groundwater contamination as a result of known contaminated sites in the vicinity or previously unknown soil or groundwater contamination (Section 3.15). All contractors, however, would be required to follow and implement Air Force and Army Safety and Occupational Health safety standards to establish and maintain safety procedures, which would mitigate the short-term risk. Risk from wildland fire to the public, JBER personnel, and property during prescribed burns would be minimized by creation of a firebreak in the proposed expansion area, as discussed in Section 3.9, and by following safety protocols. Risks associated with use of heavy equipment during maintenance of the firebreak every 2–3 years would also be minimized by following safety protocols.

Firing and Training Exercises

Safety risks are inherent with weapons training. Under this alternative, there would be an increase in the amount of indirect live-fire training occurring at JBER and the number of rounds fired into ERF-IA, but the overall amount of annual live-fire training done at all locations by soldiers stationed at JBER would not increase. The Army would continue to follow range safety regulations regardless of where required training is completed. Adherence to safety programs mitigates, to the extent practicable, safety impacts. SDZs associated with training at ERF-IA, including SDZs associated with 155-mm rounds, would not extend into Eagle Bay or beyond the installation boundary, per DA Pam 385-63 (Section 2.1.5.2). Range Control reviews and approves units' SDZs during the range contract process.

While Alternative 1 would increase the number of rounds fired into ERF-IA, there would be no change in the way munitions are stored, the capacity of the existing munitions storage area, or in the size and dimension of existing ESQD arcs. Munitions storage would continue to follow the pertinent explosives safety site plan and safety regulations. No existing munitions storage areas would be modified, and no new ones would be developed. Further, no training would occur within or near a munitions storage area.

Over the long term, the amount of UXO at ERF-IA is likely to increase under Alternative 1. Access to the impact area is controlled to prevent impacts to personnel and the public from UXO hazards, with signs posted around the area that provide warnings about the risks. Clearance of UXO from the proposed expansion after each training exercise would entail safety risks and would be done by appropriate personnel with the requisite technical and safety training.

Risk from wildland fire to the public, JBER personnel, and property as a result of fires ignited during firing and training exercises would be reduced by maintaining low vegetation in the proposed expansion area, conducting periodic controlled burns, creating and maintaining a firebreak, and following safety protocols, as discussed in Section 3.9.

There would be a long-term beneficial impact on safety under this alternative, as there would no longer be a need to travel to Fort Wainwright up to seven times a year for training. While travel could still occur, it would be unlikely under this alternative. Therefore, there would be a reduced risk of traffic accidents, including incidents related to transport of munitions. The Army would continue to adhere to applicable regulations for military convoy traffic on local roadways.

3.4.2.3 Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only

Impacts under Alternative 2 would not exceed applicable significance thresholds. There would be no short-term occupational hazards associated with construction under Alternative 2, as ERF-IA would not be expanded. Similar to Alternative 1, there would be an increase in the amount of indirect live-fire training occurring at JBER and the number of rounds fired into ERF-IA, but the overall amount of annual training (at all locations) would be the same. Army personnel would continue to follow existing regulations pertaining to range safety, munitions storage, and UXO, which would reduce associated safety risk.

Safety risks from wildland fire would be less than under Alternative 1 because all live-fire rounds would target the existing ERF-IA where the vegetation is not easily ignited, as discussed in Section 3.9.

There would be long-term beneficial impacts on safety associated with completing required training at JBER, although it would be less than under Alternative 1 because it is expected that some travel to Fort Wainwright would still occur throughout the year to fulfill training certification. There would be a reduction in risk of traffic and transportation-related incidents (including a reduction in the potential for incidents from transport of munitions) associated with an estimated three or more fewer trips to Fort Wainwright per year than under the No Action Alternative. Under Alternative 2, the Army would continue to adhere to applicable regulations for transportation and military convoy traffic on local roadways to reduce risks. Some travel could occur during periods of hazardous driving conditions and during the summer months, when tourist season traffic on roadways is heaviest.

3.4.2.4 No Action Alternative

Under this alternative, there would be no short-term occupational hazards associated with construction and no long-term change in risks associated with live-fire training. The Army would continue to adhere to all applicable regulations for range safety, munitions storage, UXO, and travel/transportation safety. Some UXO would continue to occur in ERF-IA each year, at a similar rate as at present.

There would be no change to the level of risk associated with travel and transportation of soldiers and equipment. An estimated seven trips to Fort Wainwright would continue to occur by convoy annually, potentially including trips during hazardous road conditions and during the heavy tourist season. The Army would continue to adhere to applicable regulations for transportation and military convoy traffic on local roadways to reduce risks.

3.4.2.5 Mitigation

The Army would adhere to all existing applicable safety regulations and BMPs for range use; munitions storage, use, and transport; construction; prescribed burns; and vehicle travel. Pertinent regulations, standards, and other guidance documents that specify BMPs that would be followed to protect soldier, worker, and public safety are listed in Section 3.4.1.2. The project would not introduce a new health or safety hazard for which adequate management and response plans are not already in place. Therefore, no mitigation measures have been determined as a result of the safety and occupational health impact analysis for the action alternatives.

3.5 EARTH RESOURCES

3.5.1 Affected Environment

3.5.1.1 Resource Definition

Earth resources pertinent to the affected environment include geography, geology, soils, and topography. Geographic and topographic resources refer to the physical features, layout, relief, and landscape within an area and how they relate to human use and other physical resources. The geographic and topographic features of the environment relate to other physical resources as both a control on flow patterns (air, water, and sediment) and the result of associated erosional patterns.

Soils refer to unconsolidated particulates, organic matter, and material overlying the surface topography. Soils are an essential component of the physical environment, and through physical and chemical characteristics relate directly to water quality, vegetation, and habitat.

The ROI for earth resources includes ERF-IA, existing firing points and areas in the immediate vicinity of firing points, and the proposed expansion area (Figure 2.4-1).

3.5.1.2 Regulatory Setting

Earth resources are subject to Section 402(p) of the Clean Water Act (CWA), which regulates municipal and industrial stormwater discharges from non-point source discharges, including soil erosion, under the National Pollutant Discharge Elimination System (NPDES) program. NPDES General Construction Permits require preparation of a *Storm Water Pollution Prevention Plan* (SWPPP) for projects greater than 1 acre.

3.5.1.3 Existing Conditions

Geography and Topography

ERF-IA is in a lowland region north of Anchorage, Alaska, situated adjacent to Eagle Bay of Knik Arm. The area is an estuarine environment that sits within the Anchorage lowlands and was formed as Eagle River eroded older alluvial deposits and filled them with new, fine-grained terrestrial and marine sediments (CH2M Hill 1994). The area primarily consists of tidal flats with approximately 0 to 2 percent slope and some undulating hilly areas with slopes from 0 to 15 percent (USDA NRCS 2022). Within ERF, the highest points of elevation reach about 5.5 meters on levees or ridges (Racine and Brouillette 1995). Ponds within ERF are connected to the Eagle River by distributary channels that cut through the mud flats (CH2M Hill 1998).

The bedrock geology beneath the Anchorage lowlands consists of relatively soft, elastic sedimentary rocks consisting of conglomerate sandstone, mudstone, and coal. Bedrock does not outcrop in the area and is covered with alluvial and glacial surficial deposits (CH2M Hill 1994; JBER 2023a). The proposed expansion area adjacent to the northeastern edge of the existing ERF-IA is similar to the current use area in terms of geology and geography and consists of hilly undulating terrain sloping between 0 and 15 percent (USDA NRCS 2022). Landform features within JBER along Knik Arm include kettles and drumlins oriented to the southwest. These landforms are the result of glacial retreat and are relatively low in relief, typically varying no more than 23 meters in elevation (JBER 2023a).

The landscape in ERF-IA, while flat, contains numerous craters from historical use for training exercises. Prior to 1990, range records show that roughly 12,000 artillery and mortar rounds were fired into ERF-IA each year. Since 1991, all UXOs (approximately 100) found on ERF-IA have been destroyed in place by Fort Richardson EOD personnel (USACE 2005). The most heavily used areas were in the center part of the impact area (along the northeast and southwest sides of Eagle River). Aerial imagery of ERF-IA from prior to 1990 shows distinct impact craters in these heavily used target areas. Since 1991, firing has only occurred during the winter when ice is present and soils are frozen, limiting the creation of new craters. The proposed expansion area lacks any crater coverage.

Soils and Sediments

No soils in ERF-IA or the expansion area would be considered potential farmlands of unique or local importance. Generally, soils on JBER are dominated by three types of unconsolidated deposits: coarse-grained gravel, fine-grained silts and clays, and till (a mixture of coarse- and fine-grained material). Nearly all soils and sediments were deposited as a result of glacial deposition, glacial outwash, and still water deposition from lakes and estuaries (Racine and Brouillette 1995; JBER 2023a). Entisols are pervasive throughout ERF, and eolian deposits over glacial till/outwash are also present within the area (USDA NRCS 2022).

The majority of soils in ERF-IA consist of entisols developed in silty marine deposits in tidal flats, along with histosols developed in organic materials over sediments. Entisols are minimally developed soils, meaning that there has been little weathering of the original sand, silt, and clay particles that constitute the soil. Entisols are common in areas of the landscape that are regularly disturbed, such as floodplains and tidal flats that experience frequent sedimentation and erosion, and in areas where soil materials (sand, silt, clay, rocks) have been recently deposited (e.g., recent [<50 years ago] glacial deposits). Histosols are soils that are continuously wet and consist primarily of organic matter. Upland soils of the proposed expansion area consist of inceptisols and spodosols developed in gravelly glacial till or outwash, sometimes covered with a cap of windblown silt (USDA NRCS 2023; JBER 2023a). Inceptisols are soils with a moderate degree of development, meaning that the sand, silt, and clay particles that constitute the soils are starting to show signs of weathering. Spodosols occur on stable areas of the landscape and are well-developed soils, meaning that the sand, silt, and clay particles have been heavily weathered. In spodosols, minerals such as iron are leached out of upper soil layers by water and deposited lower in the soil profile. ERF-IA comprises three hydric soils types. West and south of Eagle River, the soil is primarily typic cryaquents, east and north of Eagle River the soil is Doroshin mucky peat, and in the southwest portion of the impact area the soil is primarily Salamatof peat (NRCS 2001). Figure 3.5-1 depicts known soil types in ERF-IA and the proposed expansion area. Soils in ERF-IA tend to be poorly drained and deficient in primary plant nutrients. These conditions, along with regular tidal inundation and saline conditions, create steep environmental gradients over short distances, resulting in strongly azonal vegetation communities in the area. Soils in ERF-IA are also deep (extending below 80 inches) (USDA NRCS 2023).

Sediments in ERF-IA consist primarily of silts and clays as well as some coarser sand and gravel sediment. Most of the finer-grained silt and clay sediments are found in ponds and marshes. The coarser sand and gravel sediments comprise the bed of Eagle River and its floodplain. Sand and gravel beaches also occur along the edge of Eagle Bay. Additionally, at some locations (e.g., bogs) sediments consist of organic surface layers extending to a depth of approximately 1 meter overlaying mineral sediments (Racine and Brouillette 1995).

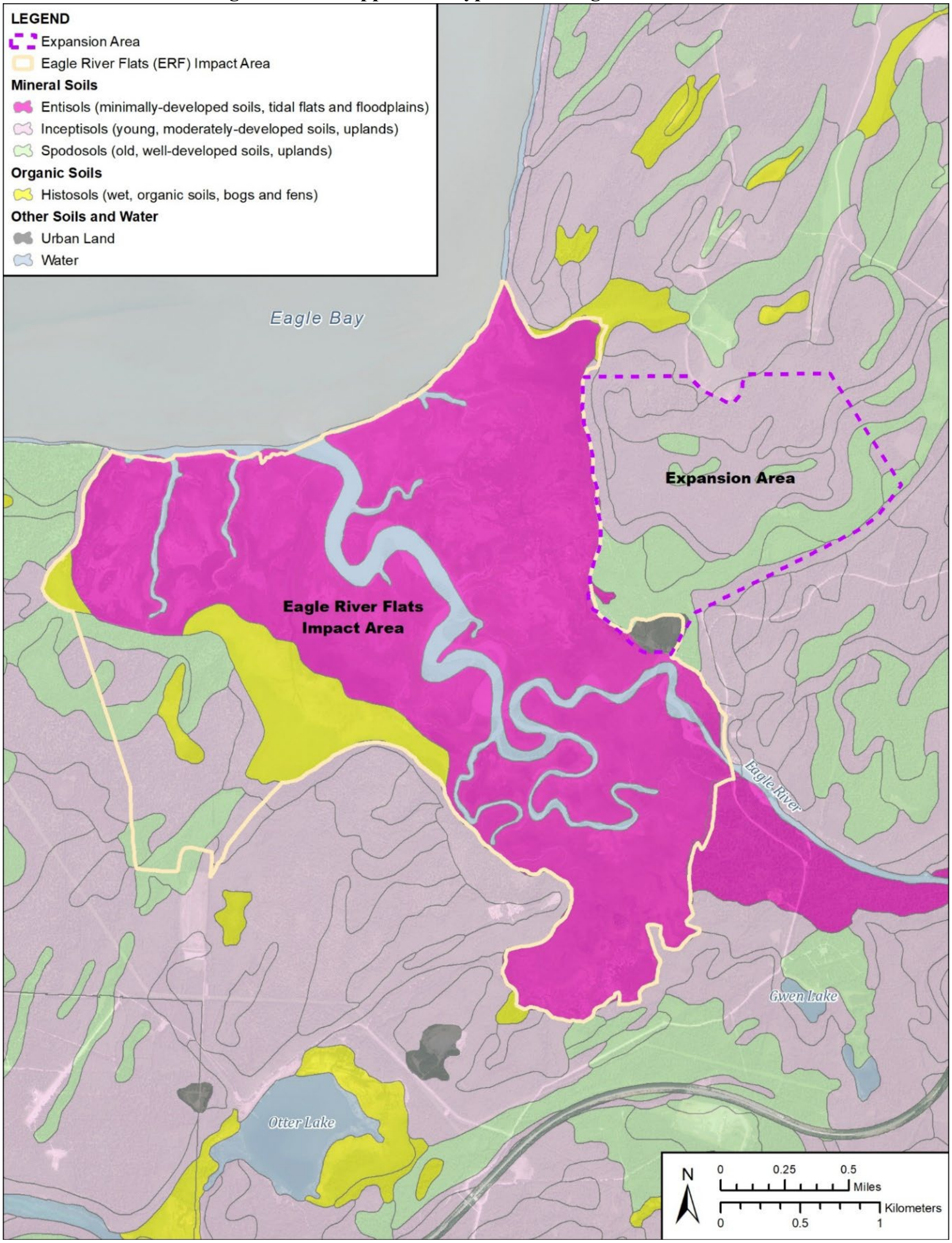
The proposed expansion area is predominantly forested uplands characterized by white spruce (*Picea glauca*)–paper birch (*Betula papyrifera*, which includes both resin birch [*Betula neoalaksana*] and Kenai birch [*Betula papyrifera* var. *kenaica*]), white spruce–quaking aspen (*Populus tremuloides*), and paper birch forests (CEMML 2022). Forested soils in the ROI tend to be acidic (i.e., pH < 5.7). These soils are deep (extending below 80 inches) and well drained, with reduced runoff potential relative to the current use area. The soils typically consist of thin (5–14 centimeter) layers of moderately decomposed plant material over silt and sandy loam (USDA NRCS 2023).

A variety of natural processes, including tidal inundation and currents, control sediment transport and erosion in ERF-IA. The landward third of ERF is controlled primarily by the dynamics of Eagle River and the rest is dominated by tidal fluctuations (Racine et al. 1994). These natural phenomena result in noticeable changes in the landscape over time. During studies of the area in the 1990s, meander scars and abandoned point bars were commonly observed throughout ERF-IA (Racine et al. 1995). The braided channels of Eagle River cut through ERF carrying sediments, altering the existing topography through erosional processes and deposition of sediments. Eroded sediments are in large part transported downstream to the mouth of the river; however, some are deposited into wetlands during flooding events. Drainage gullies resulting from erosion caused by currents during tidal influx and efflux have lengthened and deepened in ERF-IA over time. From 1991 to 1994, it was observed that these gullies progressed headward at a rate of approximately 6.5 to 13 feet per year and expanded laterally approximately 6.5 feet per year (Racine et al. 1995).

Sediment deposit via tidal interactions and flooding is an ongoing process in ERF-IA. Substantial sedimentation can occur during flood events, which can occur 60 or more times throughout the year. Much of the sediment deposited in ERF-IA is sourced from the waters of Knik Arm, which can have levels of total suspended solids (TSS) five times higher than those of Eagle River (Racine et al. 1994). In areas of lower elevations (12–13 feet above mean sea level), flooding can be a daily occurrence during high tides. At elevations greater than 13 feet, flooding only occurs during extreme high tides or flooding events (JBER 2023a).

WP contamination in soils and sediments in ERF-IA occurred in the past as a result of detonation of certain smoke munitions (see Section 1.1). Details about site cleanup and capping of contaminated sediments are provided in Section 3.15.1.3. Explosive residues, including trinitrotoluene (TNT), 2,4-dinitrotoluene (DNT) and 2,6-DNT, were also detected at ERF-IA and the former EOD pad in the 1990s (CH2M Hill 1994). Explosive residues and WP from previous firing and training exercises may have been sequestered in soils and sediments and may therefore still exist in the impact area.

Figure 3.5-1 Mapped Soil Types in the Region of Influence



Sources: JBER 2020a, 2023c, 2023e

3.5.2 Environmental Consequences

The analysis of impacts to earth resources is based on the potential for degradation of the existing earth resources within the ROI.

Impacts to earth resources would be considered significant if any of the following were to occur:

- Long-term loss or degradation of soil quality such that soil productivity is reduced and no longer able to support vegetative growth
- Contamination of soils or the exposure of previously sequestered contaminants, which may render soils non-suitable for human or biological use
- Long-term adverse physical changes to earth resources including topography and geology that would act to limit or reduce the suitability for habitat, vegetation, or sustainability of the current environmental conditions
- Long-term alterations to natural physical processes, including erosional and sedimentary processes, within the ROI

3.5.2.1 Methodology

The impact analysis consisted of a qualitative and quantitative assessment of how the proposed project could affect earth resources through degradation of soil quality, contamination, and disturbance of soils and surface material. Volume of soil that would be disturbed during construction was calculated using the proposed construction footprint and estimated depth of impact. Total volume of soils that would be disturbed by detonation of munitions was calculated by multiplying the total number of annual allotted munitions (HE rounds and 155-mm training rounds) by the likely volume of disturbed soil for that munition type.

3.5.2.2 Alternative 1: All-Season Live-Fire Training with Expanded Impact Area

Alternative 1 would have direct and indirect short-term and long-term impacts on soils and topography associated with construction of the proposed expansion area, detonation of munitions in the impact area, and deposition of new or discharge of previously sequestered contaminants. With implementation of mitigation, short-term impacts would not be significant, but long-term impacts from cratering would be significant. The affected area under Alternative 1 would be greater than under the other alternatives because ERF-IA would be expanded. No impacts to geology are anticipated.

Construction and Infrastructure

Construction activities within the proposed expansion area would result in long-term direct and indirect impacts to earth resources. Expanding the impact area would require land clearing and disturbance, removal, and burial of soils and surface materials. Impacts associated with construction and infrastructure would be localized to the proposed expansion area.

Construction of access roads and pads would entail the disturbance and permanent burial of soils over a footprint of 3.5 acres (approximately 0.6 percent of the proposed expansion area). Construction would include the application of pit gravel to a depth of 18 inches in 6-inch lifts, and a 4-inch cap layer of 3/4-inch minus crushed and compacted gravel, which would permanently compact and bury soils.

During creation of the 3-mile firebreak (approximately 5.8 acres), soils would be disturbed by mechanical equipment, and clearing stumps would likely churn soils at a depth of approximately 6 to 12 inches. Soil disturbance would be mitigated by leaving mulch in place and applying native seed to exposed soil areas. Construction of the firebreak would take approximately 3 to 5 days, and the firebreak would be maintained indefinitely by mechanically churning the soil every 2 to 3 years.

Clearing of vegetation on 359 acres of land could destabilize soils and increase the potential for erosion during construction operations. Adherence to construction BMPs as outlined in a project-specific

Construction General Permit SWPPP would minimize potential construction impacts. Following vegetation clearing, seeding the area with native grasses to stabilize soils would mitigate erosional potential.

Following vegetation removal and construction in the impact area, there would be a potential for indirect impacts associated with increased erosion. Within the cleared area, vegetation removal and potential destabilization of soils would increase their susceptibility to erosion and rutting. Increased runoff may occur at service roads, pads, and firebreaks, which would further increase the potential for erosion and sedimentation in the proposed expansion area. Prescribed burns, which would likely occur once annually (or as needed) to control tree regeneration and maintain target areas, may result in temporary increases in the potential for erosion as portions of vegetative cover is removed. BMPs for minimizing impacts related to prescribed burns and area maintenance, as described in the JBER INRMP and the JBER WFMP, would be employed to minimize impacts associated with area maintenance to the extent possible.

Firing and Training Exercises

The primary contributor to impacts to earth resources during firing and training exercises would be the detonation of HE rounds in ERF-IA during training exercises. While other rounds (smoke, ILLUM, and training rounds) would also be discharged in these areas, associated surface disturbance impacts are expected to be minimal compared to those for HE rounds. Under Alternative 1, the availability for all-season firing would result in associated impacts to soil during a larger portion of the year than at present. Construction of the expansion area would increase the extent of impacts associated with live-fire training and would open 350 additional acres to impacts from detonation of munitions.

In ERF-IA, targets would be placed in locations outside of and away from the proposed protective buffers (Figure 2.4-3), which would serve to protect the most vulnerable areas from disturbance. Surface disturbance impacts from detonations would occur in these target areas, including in approximately 1,160 acres of the existing ERF-IA and in 350 acres of the proposed expansion area. Surface disturbance impacts would generally be localized around targets, with repeated impacts where craters/disturbed soils already occur. If new targets are placed or targets are moved, these localized areas of soil disturbance would shift to other locations.

The detonation of rounds during seasons when soils are not frozen would result in greater surface disturbance in ERF-IA than under existing conditions. Based on field tests of mortar and howitzer rounds in ERF-IA during winter, frozen conditions, snow, and ice provide adequate shielding such that soil/surface disturbance is minimal (Collins and Calkins 1995). Surface disturbance during unfrozen conditions is much greater, with an average crater from a 120-mm HE mortar round of approximately 8.8 feet in diameter and 2.4 feet deep (Walsh et al. 2008a). Crater diameter, depth, and overall volume of surface disturbance would vary depending on munitions size and the number of times a specific area is hit (Table 3.5-1).

Estimates of maximum possible annual soil disturbance volume and acreage resulting from HE munitions detonations under Alternative 1 are provided in Table 3.5-1. These estimates assume that all munitions detonate during summer conditions and that the maximum annual allotted munitions rounds are detonated. It is likely that areas around the targets would be hit repeatedly; however, due to the lack of parameters to assess the degree of overlap between new impacts and existing craters, estimates in Table 3.5-1 assume that munitions do not detonate in an existing crater or an area of previously disturbed surface material (i.e., each detonation results in a new disturbance area). As a result, these estimates represent a maximum for potential soil disturbance and are likely to overestimate impacts.

Table 3.5-1 Total Annual Soil Disturbances from HE Munitions, Alternative 1

	Weapon System	Total Annual Rounds	Crater Diameter (ft)[1]	Crater Depth (ft)	Crater area (sqft)	Total Impact Area (ac)	Total Volume of Soils Disturbed (cy)[2]
ERF	60-mm Mortar	700	4.20	0.8528	13.8	0.22	305.2
ERF	81-mm Mortar	400	5.77	1.148	26.2	0.24	445.6
ERF	120-mm Mortar	552	8.82	2.3616	61.1	0.77	2,949.9
ERF	105-mm Howitzer	1,988	7.68	2.132	46.3	2.11	7,268.1
ERF	155-mm Howitzer[3]	1,044	8.82	2.3616	61.1	1.46	5,579.2
ERF	**ERF Total**	4,684	-	-	-	4.81	16,548
Proposed Expansion Area	60-mm Mortar	336	4.20	0.85	13.8	0.11	146.5
Proposed Expansion Area	81-mm Mortar	192	5.77	1.15	26.2	0.12	213.9
Proposed Expansion Area	120-mm Mortar	192	8.82	2.36	61.1	0.27	1,026.0
Proposed Expansion Area	105-mm Howitzer[3]	624	7.67	2.13	46.3	0.66	2,281.3
Proposed Expansion Area	155-mm Howitzer	0	8.82	2.36	61.14	0	0
Proposed Expansion Area	**Expansion Area Total**	1,152	-	-	-	1.15	3,667.8
Project Totals	**Totals**	**5,836**	**-**	**-**	**-**	**5.96**	**20,215.8**

Notes:

[1] Crater dimensions measured by the U.S. Army during field operations and testing.

[2] Estimate represents a maximum for potential soil disturbance assuming no overlap of detonation locations and is likely to overestimate impacts.

[3] Includes 155-mm HE rounds and training rounds. Crater dimensions for 155-mm howitzer munitions were unavailable; 120-mm mortar crater dimensions were substituted as a proxy.

Key: ac = acre; cy = cubic yard; ERF = Eagle River Flats; ft = foot; HE = high explosive; mm = millimeter; sqft = square foot

Creation of craters and removal of vegetation (where present) at the site of munition detonations would result in localized increased susceptibility to erosion and sedimentation in these areas. Past observations in ERF-IA documented that craters formed in gullies promoted localized erosion and increased gully size (Racine et al. 1994), but also that craters may act as sediment traps. Cratering and soil disturbances could result in the destabilization of soils and surface materials. Further, the destabilization of soils could also result in some slumping or slides within gullies and natural embankments. However, the potential for slumping or mass soil movements would be limited by the relatively flat topography in the impact area.

Soil disturbance associated with munitions detonation would exceed the duration of a long-term impact, given the length of time it would take craters to fill in, but would not be permanent. Even in ERF, where natural processes (erosional and sedimentation) are active, it is estimated that it would take 18–72 years for craters to fill in (based on sedimentation rates in Racine et al. 1995 and an average crater depth of 2.4 feet). Because impacts would likely occur within existing craters, effective crater/surface disturbance depth may be deeper, with a longer recovery period. In the uplands of the expansion area, cratering impacts would last longer, as the area is not susceptible to tidal interactions. The area affected by soil disturbance would generally be limited to target areas, which would cover approximately 1,510 acres of ERF-IA (1,160 in the existing ERF-IA and 350 acres in the expansion area), with the greatest degree of impacts localized around targets. Long-term impacts associated with the burial of topsoil and cratering in the expansion area would be significant because the natural processes of sedimentation and erosion prevalent in ERF-IA are less prevalent in the expansion area thus reducing the likelihood that impacts to earth resources would be naturally ameliorated over time.

Low levels of propellant residues at firing points and munitions residues in ERF-IA could result from firing activities. Based on studies of residues resulting from tests using traditional (or conventional) mortar and howitzer munitions (as opposed to newer insensitive munitions [IMs]) in ERF-IA, live-fire high-order (HO) detonations deposit very little explosive residue. However, malfunctioning rounds, such as LO detonations and UXO/duds, have the potential to deposit greater amounts of explosive residues into soils (Walsh et al. 2005, 2008a, 2008b, 2011). IMs have been developed to replace traditional explosives to prevent unintended detonations associated with shock (e.g., bullets and fragments), heat (from fires or adjacent thermal events), and adjacent detonating munitions. IMs are generally considered more stable than traditional explosives. Due to accidents, and the subsequent loss of human life, cost of repairing and replacing material, and threats to operational readiness and capability, IMs are mandated by law in the U.S. (DeFisher et al. 2010).

IMs, which are less prone to unplanned detonations than older formulations and therefore may be less efficient at detonating, are expected to result in a greater amount of residue from HO detonations (Appendix F). With increased rate of firing under Alternative 1, the potential for accumulation of explosive residues in soils would increase. These residues may be deposited to soils by detonations as well as by dudded rounds (UXOs), which require breaching to mobilize compounds. The potential impact in the proposed expansion area would be reduced by clearing UXO after each training event. In the existing ERF-IA the potential impacts would be long-term (years to centuries) but could be mitigated by clearance of the rounds by blow-in place (BIP) methods. In addition to deposition of residues at target locations, some deposition of propellant residues would likely occur at firing points. The accumulation of propellant and munitions residues in soils could reduce the suitability of soil for biological functions. A discussion of estimated total annual mass of energetic residues from munitions and associated potential impacts to vegetation as a result of uptake from soil is provided in Section 3.8.

Within ERF, natural processes such as tidal inundation, shallow groundwater, and dynamic surface conditions likely harbor naturally reducing conditions, minimizing the potential for munitions residues to persist and accumulate in soils. Based on past observations, sediments can be thrown up to 20 meters away from the crater following LO detonation of a 120-mm round, and this displaced sediment may contain munition residues (Walsh et al. 2008a). Measured concentrations of Royal Demolition Explosive (RDX), TNT, and High Melting Explosive (HMX) in displaced sediment were 105, 64, and 15 micrograms per gram (µg/g), respectively, on the day of detonation, and 13, 5.2 and 2.0 µg/g, respectively, 82 days later, indicating a decrease in concentration over time. In the upland expansion area, the potential for HE residue accumulation may be greater, as this area does not experience tidal inundation.

Surface disturbances associated with firing activities in ERF-IA during periods when soil conditions are not frozen have the potential to expose WP that may have previously been sequestered in soils from historical firing exercises. Re-exposed WP could degrade soil quality and reduce the suitability for biological functions. In dry soil conditions, WP may sublimate, precluding impacts; however, contamination can exist in wet, anoxic conditions and sediments. There would be a very low risk of a gravel cap being struck by an errant round. The locations of gravel caps have been mapped and would not be intentionally targeted during firing outside of winter ice conditions. Most gravel-capped areas are underwater during months when ERF is not frozen, and no targets would be placed on them. If a gravel-capped area were struck during a misfire, it is expected that the risk of releasing sequestered WP would be low, as WP is not generally known to still exist throughout the impact area. In addition to BMPs to avoid disturbing gravel caps, delay fuzes would not be used, which would lessen cratering and prevent deep ground penetration of explosives. With the BMPs and mitigation described in Section 3.5.2.5, it is not anticipated that significant impacts would occur associated with potential re-exposure of WP and accumulation of propellant and munitions residues.

3.5.2.3 Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only

The affected area of impact under Alternative 2 would be less than under Alternative 1 because ERF-IA would not be expanded. However, the degree of impact would be greater because the same number of munitions would be fired into a smaller area. Similar to Alternative 1, it is expected that impacts to earth resources would be to soils and topography, with no anticipated impact to geology.

Impacts in ERF associated with firing and training exercises under Alternative 2 would be as described for Alternative 1. Targets would be placed in locations outside of and away from the proposed protective buffers, but without the proposed expansion area, the maximum total area of localized soil disturbance from detonation of rounds could be 1,160 acres, if each detonation were to result in a new disturbance area, although it is more likely that there would be overlap in areas impacted immediately around targets. The estimated annual potential soil disturbance area given in Table 3.5-1 (approximately 6 acres) would be concentrated within a smaller area than under Alternative 1, and soil impacts in ERF would be greater. The total estimated mass of explosive residues dispersed to soils via LO explosives and UXOs would remain the same. However, explosive residues would be limited to the targetable area of ERF-IA, and natural processes and reducing conditions would likely reduce the potential for buildup of residues in this area.

While all allotted rounds could potentially be fired into ERF under Alternative 2, the risk of disturbing gravel caps and exposing remediated WP would be very low based on the reasons provided for Alternative 1. It is also likely that some rounds would be fired at other training locations. With the BMPs and mitigation measures described in Section 3.5.2.5, it is not anticipated that significant impacts would occur.

3.5.2.4 No Action Alternative

Under the No Action Alternative, there would be no soil disturbance from construction and no change in training use of ERF-IA compared to baseline conditions. Firing activities would continue to take place only during winter months, and the number of munitions expended is not expected to change from past levels. Limiting firing activities to periods of sufficient ice thickness would continue to limit soil disturbance and the potential for re-exposure of sequestered WP. Existing land use for training and firing operations would continue (Section 3.11).

3.5.2.5 Mitigation

Proper resource management would minimize impacts and preserve earth resources. Soil disturbances resulting from firing exercises would occur and would not be mitigatable in the short term.

Protective measures built into the proposed action that would help reduce or avoid impacts to earth resources from deposition of munitions residues include no use of WP in upland areas (its use is prohibited by regulation in wetlands) and clearance of unexploded rounds from the expansion area after each training event (applies to Alternative 1 only). Additionally, habitat protective buffers would protect the most vulnerable areas in ERF from soil disturbance.

BMPs and SOPs that would help avoid or reduce impacts to earth resources would continue to be implemented under all alternatives. The Sustainable Range Awareness (SRA) program would continue to provide education to soldiers operating within the impact area to ensure operations and activities at impact areas are carried out in a sustainable manner to preserve earth resources. Strategic target placement would help minimize the risk of increased erosion during live-fire training, and SOPs for accuracy would help contain the extent of soil impacts to areas around targets. Adherence to spill prevention and cleanup procedures outlined in the most current INRMP and JBER *Spill Prevention Control and Countermeasure/Oil Discharge Prevention and Contingency Plan* (SPCC/C-Plan; JBER 2023f) would help prevent contamination of soil, and construction BMPs and adherence to the Construction General Permit and SWPPP during construction (Alternative 1) would help prevent erosion. BMPs and SOPs to prevent discharge of WP from gravel-capped areas include not placing targets on capped areas and avoiding remediated areas during training exercises to the extent practicable.

Additionally, the following mitigation has been determined as a result of the earth resources analysis to prevent discharge of WP from gravel-capped areas:

- Prohibit use of delay fuzes to minimize ground penetration.
- Make GIS-based tables and a map of remediated areas in ERF-IA available to the units that train at ERF-IA.
- If an errant round strikes a gravel cap, assume damage and place gravel in the affected area when practicable.

3.6 WATER RESOURCES

3.6.1 Affected Environment

3.6.1.1 Resource Definition

Water resources include surface water hydrology and floodplains, groundwater and potential drinking water sources, and water quality. Water resources are defined by the flow and chemical quality of water in relation to biological resources and the human use of water. Surface water includes all rivers, streams, lakes, and ponds, as well as the tidal waters of Eagle Bay. Wetlands are discussed separately in Section 3.7.

The ROI for surface water resources and floodplains includes ERF-IA, the proposed expansion area, and Eagle Bay (Figure 2.4-1). The ROI for groundwater and potential drinking water resources is JBER, based on the geographic location of the proposed action and directional flow patterns of the confined aquifers underlying ERF-IA and the proposed expansion area.

3.6.1.2 Regulatory Setting

Water resources are subject to Section 401 and 404 of the CWA (33 U.S.C. §§ 1341 and 1344), the Safe Drinking Water Act (SDWA), and the USEPA Stormwater General Permit. The CWA and Stormwater General Permit regulate pollutant discharges into waters of the U.S. (WOTUS). Pollutants regulated under the CWA include "priority" pollutants, including various toxic pollutants, such as biochemical oxygen demand, TSS, fecal coliform, oil and grease, and pH. Section 401 of the CWA requires that prior to conducting activities that may result in the discharge of a pollutant into WOTUS, applicants must obtain certification from the state in which the discharge would originate or, if appropriate, from an interstate water pollution control agency with jurisdiction over affected waters at the point where the discharge would originate. Section 404 of the CWA requires a permit from the Department of the Army through USACE for discharges of dredged and/or fill material into WOTUS unless the discharge is associated with an activity exempt from Section 404 permitting requirements under CWA Section 404(f) (e.g., normal farming, silviculture and ranching activities, maintenance activities, construction of farm ponds or temporary sedimentation basins).

Section 402 of the CWA establishes the National Pollutant Discharge Elimination System (NPDES) Program, administered by ADEC and overseen by USEPA. This section requires a permit for sewer discharges and stormwater discharges from developments, construction sites, and other areas of soil disturbance.

DA Pam 385-63, *Range Safety*, prohibits firing into or over a navigable waterway unless specific coordination with USACE occurs. In addition, under 33 CFR Part 334, USACE (1) prescribes procedures for establishing, amending, and disestablishing danger zones and restricted areas; (2) lists the specific danger zones and restricted areas and their boundaries; and (3) prescribes specific requirements, access limitations, and controlled activities within the designated danger zones and restricted areas. These areas are then depicted on NOAA navigation charts. The portion of Eagle River within ERF-IA is a navigable waterway. In 2022, USACE established a restricted area for this portion of Eagle River (between its mouth and Bravo Bridge; 87 FR 58452), which allowed firing over Eagle River to occur. No changes to the boundaries of this restricted area would be needed as a result of the proposed action.

Water resources may be subject to Section 10 of the Rivers and Harbors Act of 1899 (U.S.C. § 403), which prohibits the obstruction or alteration of navigable WOTUS without a permit from USACE. This section provides that the construction of any structure in or over any navigable WOTUS, or the accomplishment of any other work affecting the course, location, condition, or physical capacity of such waters, is unlawful unless the work has been permitted by USACE. Activities requiring Section 10 permits include structures (e.g., piers, wharfs, breakwaters, bulkheads, jetties, weirs, transmission lines) and work such as dredging or disposal of dredged material, or excavation, filling, or other modifications to the navigable WOTUS.

The SDWA is a federal law protecting public water supplies from harmful contaminants. The SDWA was first enacted in 1974 and amended and reauthorized in 1986 and 1996. The act establishes standards and requirements for promoting and protecting drinking water sources. Drinking water sources in the ROI are subject to the SDWA.

EO 11988, *Floodplain Management,* directs federal agencies to consider actions within or near floodplains; to take action to reduce and minimize the risk of flood damage to human safety, health, and welfare; and to preserve the natural and beneficial values of floodplains.

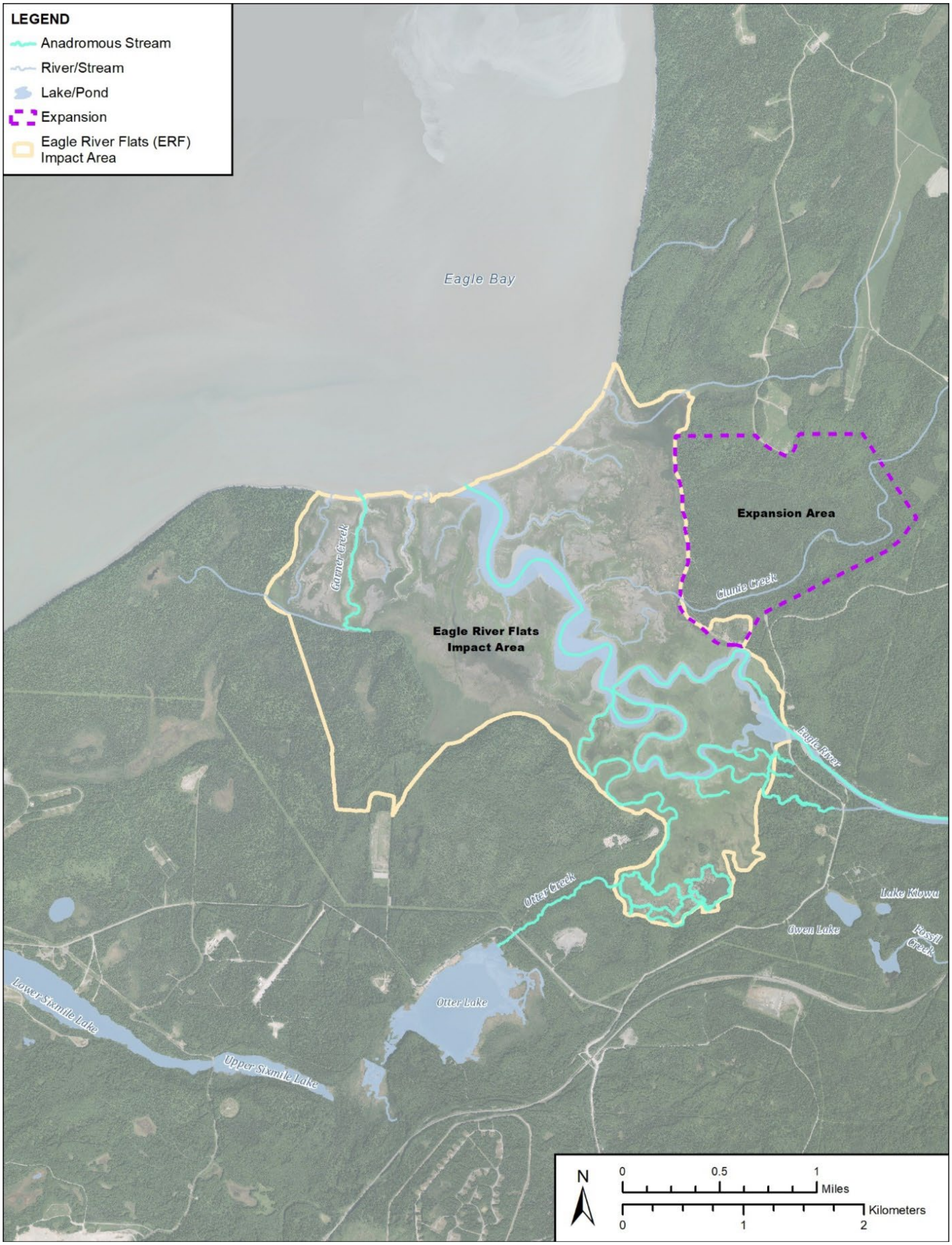
3.6.1.3 Existing Conditions

Surface Water Hydrology

Figure 3.6-1 depicts surface water resources in the ROI. Waterbodies in ERF-IA include Eagle River, Otter Creek, Garner Creek, and Clunie Creek, as well as seasonal and permanent ponds, gullies, wet swales, and other tributaries. Wetland and relict channel complexes are associated with Eagle River and Otter Creek. Water in ponds, gullies, and swales is derived from a variety of sources, including precipitation, river water, and tidal waters. During flooding events, ponds in ERF-IA may be connected to Eagle River. Water composition, depths of waterbodies, and salinity vary seasonally with tides, precipitation, and rates of evaporation (Racine and Brouillette 1995).

Eagle River is a small, shallow river or medium-sized stream that meanders through ERF-IA and has altered its course over the years as a result of natural hydrologic processes (Racine et al. 1995). The waters of Eagle River are sourced from Eagle Glacier to the southeast and terminate in Knik Arm of Upper Cook Inlet, as freshwater channels transition into saltwater tidal channels in a dendritic pattern. The Eagle River drainage area is 232 square miles, and the river discharges into Knik Arm roughly 40 stream miles from its source glacier. The river flows 8.5 river miles through JBER property, with roughly the last 4.1 river miles passing through ERF-IA (Figure 3.6-1). The upper extent of tidal influence extends upstream to about Bravo Bridge. The Eagle River relict channel is a historical channel that connects with Eagle River in the vicinity of Bravo Bridge, extends through the southcentral portion of the impact area, and re-enters Eagle River near the Otter Creek confluence. The lower half of the channel experiences tidally driven, bidirectional flow of brackish water per the semi-diurnal tidal regime of Cook Inlet (i.e., two floods per tidal day [JBER unpublished data]).

Figure 3.6-1 Surface Water Resources in the Region of Influence



Sources: JBER 2020a, 2022b, 2023c, 2023e, 2023g

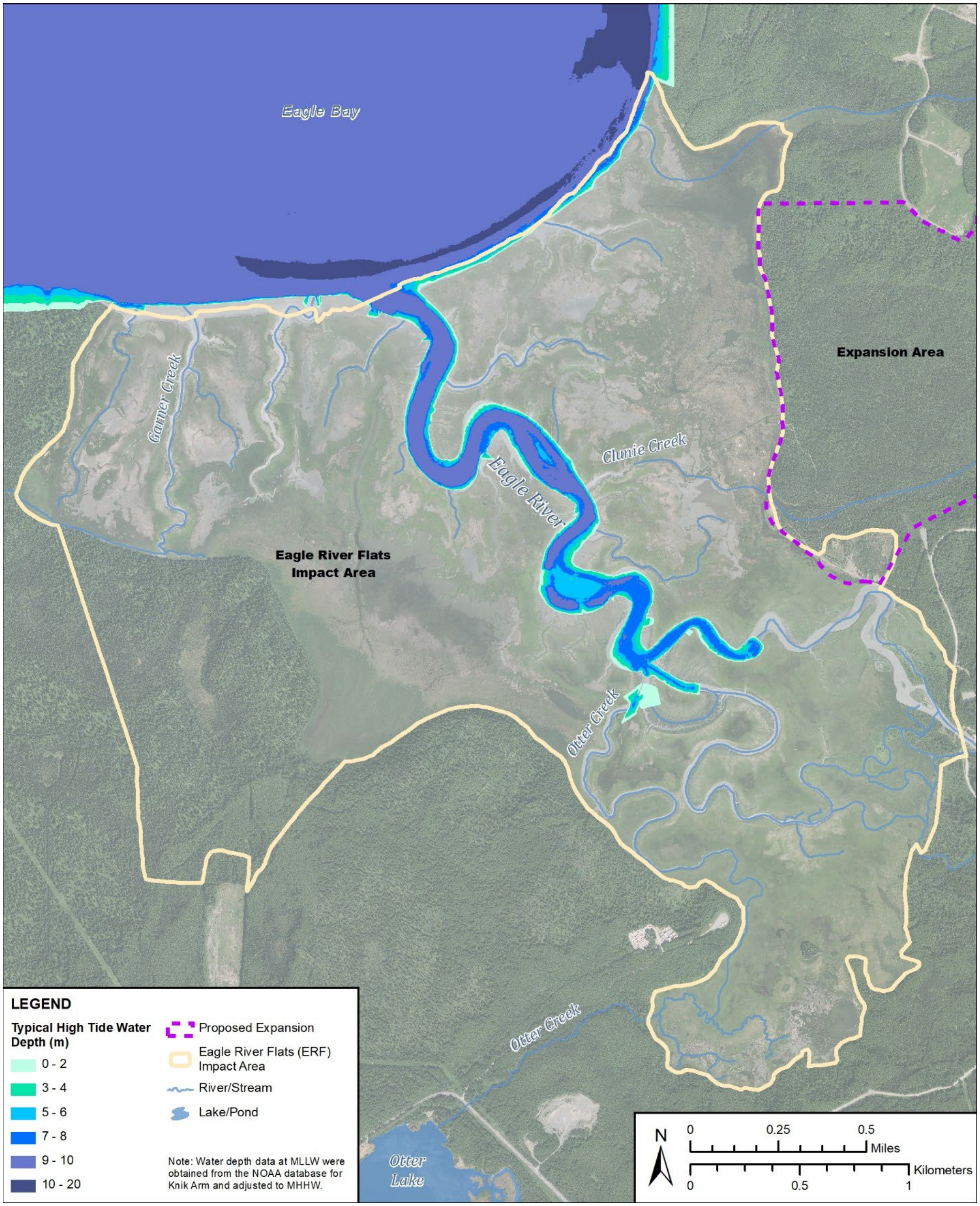
The flow volume of Eagle River varies throughout the year. Stream discharge tends to be high from June through mid-September. The mean flow volume in Eagle River is greatly decreased in the frozen months, from a low of 58 cubic feet per second (cfs) in March to a high of 1,730 cfs in July (USGS 2022). Peak stream discharge of Eagle River (> 2,500 cfs) coincides with the period of maximum melting from Eagle Glacier. Precipitation at JBER increases in the fall (JBER 2023a), which contributes to a second peak in flow. Periods of heavy rainfall or rapid melting from Eagle Glacier can generate water flow in excess of 10,300 cfs (NOAA 2014, cited in JBER 2023a). During the seasonal periods of low flow, Eagle River is primarily fed by groundwater (USARAK 2004). Figure 3.6-2 depicts general bathymetric information for Eagle River throughout ERF-IA. Eagle River becomes shallower upstream of ERF and deepens downstream toward the mouth at Knik Arm.

Otter Creek is a small perennial stream that originates south of the impact area at Otter Lake and flows northeast into Eagle River in ERF-IA. The creek is tidally influenced within ERF-IA and is connected to several small intertidal channels and a wetland complex. Otter Lake is a natural lake that was historically enhanced to increase its size and discharges to Otter Creek (Weber and Seigle 2020a). The lake is an important recreational area serving primarily the military community.

Clunie Creek is an intermittent stream that flows from the southern tip of Clunie Lake southwest toward ERF-IA and into Eagle River. The proposed expansion area includes a portion of Clunie Creek. Prior to reaching ERF, the creek becomes subterranean, re-emerging at a small pond at the edge of ERF. While Clunie Creek does not have a permanent surface water connection to Eagle River, it does effectively drain into the river via groundwater, subsurface flow, and overland sheet flow after the stream channel dissipates approximately 1.3 miles prior to reaching ERF (JBER 2023a). Additionally, during periods of high tide (tide greater than 32 feet) there is a surface water connection between Clunie Creek and ERF (Brandt et al. 2020).

Knik Arm represents the northernmost extension of Upper Cook Inlet, and its waters bound approximately 20 miles of the northwestern portion of JBER. Knik Arm drains approximately 19,723 acres and includes a multitude of drainages including Eagle River (JBER 2023a). The three largest streams contributing to Knik Arm are Eagle River, Knik River, and Matanuska River. Eagle Bay is at the convergence of Knik Arm and Eagle River. For the purposes of this EIS, the landward extent of Eagle Bay is considered to be the Mean High Water mark. Relatively shallow waters (approximately 4 to 12 meters deep) extend approximately 1 mile from the coast of ERF-IA into Eagle Bay and Knik Arm (USARAK 2002). The channel in Eagle Bay reaches depths of -30 feet Mean Lower Low Water (MLLW) and is closely associated with the shoreline of JBER, a nearly contiguous stretch of eroding bluffs reaching elevations of 150 feet. The bathymetry adjacent to Eagle Bay is dominated by mudflats exposed at MLLW and intersected by shifting networks of narrow tidal channels. Tidal activity in Eagle Bay has created an estuarine salt marsh encompassing ERF.

Figure 3.6-2 Water Depth of Nearshore Eagle Bay and Eagle River during Typical High Tide Conditions



Sources: JBER 2020a, 2020d, 2022a, 2023c

Floodplains

ERF is a river delta, which experiences both regular daily tidal inundation and seasonal overbank freshwater riverine flooding; in essence, ERF is both a tidal flat and floodplain. The floodplain of Eagle River extends across the entirety of ERF-IA, which is bounded by upland scarps on the east and west and Eagle Bay to the north. Natural processes, including tidal inundation and currents, riverine flooding, erosion, and sedimentation control the floodplain dynamics in ERF-IA. Upstream of the confluence of Otter Creek and Eagle River, ERF is controlled primarily by the dynamics of Eagle River, while the downstream area is predominantly subject to tidal fluctuations (Racine et al. 1994). In areas of lower elevations (<12–13 feet above mean sea level) tidal flooding occurs twice daily, while at elevations greater than 13 feet, tidal flooding only occurs during extreme high tides or flooding events (JBER 2023a). Substantial amounts of fresh water are flushed through ERF, especially during spring break-up flooding and also during smaller flood events, which can occur 60 or more times throughout the year. The combination of substantial amounts of fresh water from Eagle River and salt water from tidal inundation, deposition of riverine and marine sediments, and the erosive forces of tides and overbank flooding creates a productive and dynamic floodplain environment in ERF.

Groundwater

The groundwater system below JBER is complex, having been influenced by deposits from multiple glacial advances through the region. Most of JBER is underlain by two freshwater aquifers: a deeper aquifer sitting within a sand and gravel bed at depths of 100 to 200 feet, and a shallower sand and gravel aquifer at a depth of 30 to 100 feet (CH2M Hill 1994). Connectivity between the two aquifers beneath JBER appears to be minimal due to a low permeability clay layer below the shallow aquifer (depth of 30 to 175 feet) (Astley et al. 2000). Due to this underlying clay layer, the shallower groundwater aquifer does not impact deeper groundwater (JBER 2023a). The deeper aquifer is utilized by JBER as a standby source of water and by the Municipality of Anchorage for a variety of services including domestic and public supply (JBER 2023a). Wells within the aquifer can produce up to 1,500 gallons of water per minute (CH2M Hill 1994; JBER 2023a).

In general, groundwater flow beneath JBER is to the northwest through unconfined and confined aquifers (Astley et al. 2000). ERF acts as the primary drainage pathway for the regional flow of groundwater (Racine et al. 1995). Regional groundwater is recharged through precipitation events, snowmelt, and local stream interactions. In particular, groundwater recharge and water table elevations appear to be controlled by recharge in the Chugach Mountains (Astley et al. 2000).

Limited groundwater well data are available for ERF-IA and the proposed expansion area. Groundwater tends to be shallow throughout most of the impact area, with a depth of roughly 0 to 4 inches (USDA NRCS 2022). In the intertidal zone of ERF, groundwater is brackish. The composition and quality of intertidal groundwater is dependent on precipitation, snowmelt, and tidal interactions. Depths to groundwater are deeper within forested portions of the impact area and throughout the proposed expansion area, with the water table residing at depths below 80 inches (USDA NRCS 2022).

There are no actively monitored groundwater wells in ERF-IA or the proposed expansion area. However, the U.S. Geological Survey monitors three wells on JBER, the closest of which is approximately 10 miles to the southeast of the impact area. Groundwater occurs at a depth of approximately 110 feet (USGS 2020) at this location.

Water Quality

Limited water quality data are available for ERF-IA and the proposed expansion area. The ADEC has listed Eagle River and Knik Arm as Category 3 waterbodies, as there is insufficient data to assess water quality for various parameters of concern (ADEC 2022a). Quality and chemical composition of water in the impact area vary seasonally based on factors such as snowmelt, precipitation, and tidal fluctuations/inundation. Salinity varies seasonally and spatially throughout ERF waterbodies, with the highest concentrations tending to be in shallow intermittent ponds and during warmer dry summers. Between May and July, salinity in ponds has been measured at 4 to 38 parts per thousand, with higher salinities occurring in shallow mudflat ponds (Racine and Brouillette 1995).

Prior to cleanup in 1996, 60 acres of ERF-IA were placed on the CWA Section 303(d) list for non-attainment of the criteria for toxic and other deleterious organic and inorganic substances. Specifically, ERF-IA was flagged for contamination with WP and was designated as a category 4b waterbody (ADEC 2018a). The site was treated by pumping water out and allowing soils and sediments to dry, which provided an environment for WP to sublimate. Active treatment ceased in 2005, and in 2008 the site was re-designated as a category 2 waterbody.

Other portions of Eagle River are not water quality limited (USARAK 2004). The water quality of Eagle River was monitored by the U.S. Geological Survey until 1981, with a conclusion that Eagle River was, in terms of water quality, similar to other glacier-fed rivers, with no exceedances of water quality standards (USARAK 2004). Between 1970 and 1981, the pH of Eagle River ranged between 6.6 and 8.0. Dissolved oxygen levels measured in 1981 were found to range between 11.8 milligrams per liter (mg/L) to 12.9 mg/L (USGS 2020).

Sediment and surface water samples were collected throughout Eagle River and ERF-IA from 1989 to 1993 to evaluate the potential for environmental contamination (CH2M Hill 1997). The samples were analyzed for metals, explosives, organics, and pesticides. None of the samples detected munitions residues, except WP, at concentrations deemed to be harmful to fish species. The only detectable levels of munitions residues at ERF-IA consisted of TNT and its breakdown products associated with a gravel pad where historical destruction of military ordnance was completed (CERCLA site XU023; see Section 3.15.1.3). Metals concentrations were within background levels for a glacially fed tidal wetland system, and no other contaminants were detected (USAEHA 1994; CH2M Hill 1997). The study found that munitions constituents, while present at low levels in ERF-IA, are not migrating outside the impact area in measurable quantities (CH2M Hill 1997). In ERF-IA, natural processes such as tidal inundation, shallow groundwater, and dynamic surface conditions result in dilution/flushing and naturally reducing conditions, minimizing the potential for munitions residues to persist and accumulate in soils/sediments. Water quality data collected in 2007 at various locations in Eagle River are presented in Table 3.6-1, along with the State of Alaska's most stringent water quality criteria. The upstream sampling location was upstream of the former Fort Richardson boundary, the midstream measurements were taken at a location just upstream of ERF, and the downstream sampling location was at the mouth of Eagle River. No exceedances of the most stringent water quality criteria were found in any samples in Eagle River. Additionally, no explosive residues or compounds (including HMX, RDX, TNT, or polychlorinated biphenyls [PCBs]) were detected in the river. Eagle River data samples indicate a general trend of increasing metals concentrations in water moving downstream, with the largest concentration occurring in ERF-IA.

Table 3.6-1 Baseline Water Quality Data, Eagle River

Analyte	Most Stringent Criteria (µg/L)	Basis	Eagle River Downstream (µg/L)	Eagle River Midstream (µg/L)	Eagle River Upstream (µg/L)
Aluminum	87	ALC	42.5	58.9	35.3
Antimony	6	DW	ND	ND	ND
Arsenic	10	DW	ND	ND	ND
Barium	2,000	HH	7.6	8.6	ND
Beryllium	4	HH	ND	ND	ND
Cadmium	0.08	ALC	ND	ND	ND
Calcium	N/A	N/A	21,983	17,483	17,083

Analyte	Most Stringent Criteria (µg/L)	Basis	Eagle River Downstream (µg/L)	Eagle River Midstream (µg/L)	Eagle River Upstream (µg/L)
Chromium	100	DW	0.7	ND	ND
Cobalt	50	IR	ND	ND	ND
Copper	2	ALC	1.6	0.7	0.4
Iron	1,000	ALC	ND	ND	ND
Lead	0.39	ALC	0.1	0.1	ND
Magnesium	N/A	N/A	16,252	3,205	2,975
Manganese	50	HH	4.8	6.8	6.7
Molybdenum	10	IR	ND	ND	ND
Nickel	12.87	ALC	1.5	0.7	ND
Phosphorus	N/A	N/A	ND	ND	ND
Potassium	N/A	N/A	4,585	459.7	355.3
Selenium	5	ALC	2.1	ND	ND
Silicon	N/A	N/A	1,210	1,047	926
Silver	1.1	ALA	ND	ND	ND
Sodium	N/A	N/A	108,767	3,078	1,743
Thallium	1.7	HH	ND	ND	ND
Tin	N/A	N/A	0.6	0.3	ND
Titanium	N/A	N/A	27.3	19.7	18.6
Vanadium	100	HH	ND	ND	ND
Zinc	29	ALA	9.2	5	4.3

Key: µg/L = micrograms per liter; ALA = Aquatic Life, Acute; ALC = Aquatic Life, Chronic; DW = Drinking Water; HH = Human Health; IR = Irrigation Water; N/A = not applicable; ND = Not Detected

Sources: U.S. Army 2010; ADEC 2018b

Limited groundwater quality data exist for ERF-IA and the proposed expansion area. Throughout JBER, shallow groundwater contamination has occurred. Industrial activities, such as the use of chemical storage facilities, chemical dumpsites, and subterranean storage tanks, have been shown to affect groundwater quality beneath JBER. These impacts have shown to be shallow and localized, with no indication of deep groundwater pollution. However, as a result of this localized pollution, JBER was identified as a CERCLA site in 1994, and continued monitoring has taken place (USARAK 2004; ADEC 2022b).

3.6.2 Environmental Consequences

This section includes a discussion of potential impacts to surface water hydrology, floodplains, groundwater, and water quality. Analysis of project impacts to wetlands is provided in Section 3.7. Consistent with EO 11988, *Floodplain Management*, AFMAN 32-7003, *Environmental Conservation*, requires Air Force installations to:

- Ensure NEPA documentation reflects consideration of alternatives to actions proposed in floodplains, or actions which potentially adversely affect floodplains that would increase the risk of flood loss;
- Include measures necessary to minimize potential harm to the floodplain or reduce the risk of loss; and

- For such actions initially considered within an EIAP, prepare early public notice to encourage early and meaningful public involvement.

Appendix A addresses the first mandate listed above by evaluating the feasibility of siting an expanded ERF-IA on JBER based on options and discusses the rationale for selecting the expansion area carried forward in Alternative 1. Sections 3.6.2.5 and 3.7.2.5 address the second mandate listed above by outlining mitigation that would minimize potential harm to the floodplains or reduce the risk of loss, including adherence to spill prevention and cleanup procedures, protective buffers around waterways and portions of their associated floodplains, management of wetland habitat for no net loss of wetland acreage or functions unless necessary to support mission requirements, and riparian area (i.e., floodplain) setbacks. Section 2.5.1 describes the early public notice and scoping process, which addresses the third mandate listed above.

Impacts to water resources would be considered significant if any of the following were to occur:

- Degradation of water quality to the degree that it is no longer suitable for human, biological, or environmental use
- Restriction or reduction in availability of water resources for human and biological use or environmental sustainability
- Adverse changes to flow patterns or existing natural processes within the impact area, which could result in significant downstream impacts to other resources

3.6.2.1 Methodology

The impact analysis considered factors associated with the proposed project that could affect surface water hydrology, floodplains, groundwater, and water quality. The analysis is largely qualitative in nature and considers pertinent data from previous studies to determine the extent and level of impact. Impacts to floodplains were assessed in relation to EO 11990 by assessing how actions would affect the functions of floodplains (e.g., flood amelioration) resulting from development, including exacerbation of flood effects on downstream developments or natural habitats. The analysis also quantifies the area of floodplains potentially impacted by construction and infrastructure and firing and training exercises.

3.6.2.2 Alternative 1: All-Season Live-Fire Training with Expanded Impact Area

Alternative 1 would have the potential to impact water resources and floodplains through long-term changes to runoff and surface flow patterns, sedimentation and formation of craters from munitions detonations, and increased deposition of munitions constituents from partially or unexploded rounds. These impacts would not exceed applicable significance thresholds. Alternative 1 would have the greatest affected area, although potential impacts would primarily occur in ERF-IA.

Construction and Infrastructure

Under Alternative 1, construction activities in the expansion area are not anticipated to result in any direct impacts to water resources. No stream crossings would be required to construct the service roads, service pads, and firebreak, and the proposed vegetation clearing and construction would not occur on floodplains. The proposed expansion area consists of hilly undulating terrain sloping between 0 and 15 percent (USDA 2020). Clearing of approximately 359 acres of vegetation could temporarily destabilize soils and increase the potential for erosion during construction operations. This could result in short-term indirect impacts to water resources through minor changes to precipitative runoff and surface flow as well as increased particulate transport and sedimentation from destabilized soils (see Section 3.5.2). Further, alterations to runoff and particulate transport may result in periodic temporary alterations to water quality that may recur over time. It is anticipated that impacts would occur primarily during periods of precipitation, and there would be a return to baseline conditions shortly after precipitation ceases.

Service roads and pads would be covered with gravel, while firebreaks would expose mineral soils but would be surrounded by a vegetated buffer to trap sediments. Seeding the cleared area with native grasses to stabilize soils would reduce potential for erosion, although firebreaks would undergo periodic maintenance that would re-disturb soil. Adherence to required BMPs and SOPs during construction activities, as outlined in the JBER INRMP, project-specific Construction General Permit SWPPP, and a SPCC/C-Plan, would minimize potential construction impacts from erosion and sedimentation.

During project construction activities, there would be a potential for small spills of petroleum, oil, or lubricants (POLs) from construction equipment to occur, which could impact local water quality if they reach water resources. In the event of a spill, specific procedures described in the SWPPP would be followed to minimize potential impacts.

While groundwater within portions of the proposed expansion area is shallow, ground disturbance associated with construction is not anticipated to be deep enough to disturb or impact the local groundwater. With measures in place to clean up any spills, construction activities are not anticipated to result in impacts to groundwater or drinking water.

Firing and Training Exercises

Surface Water Hydrology and Floodplains

Increased live-fire training during periods when ERF-IA is not protected by ice would result in detonation of rounds that could impact local hydrology by opening new channels or closing off existing channels within unbuffered areas. Potential impacts to fish resources that may use these channels for rearing habitat are addressed in Section 3.8.2.2. Target areas would be placed outside of protective buffers (Figure 2.4-2), and there would be no intentional firing or placement of targets into open waterbodies, which would prevent impacts to large surface water resources. However, throughout portions of ERF, rounds may land in areas containing perennial standing or flowing water or that have a surface water connection to larger waterbodies. Other built-in protective measures and SOPs, such as use of forward observers and selective firing in higher areas, will help reduce risk of firing into waterbodies. Localized impacts would not adversely affect the larger flow patterns or natural hydrologic processes within ERF and therefore would not be significant.

Many target areas in the existing ERF-IA would be located on the floodplain. Based on the extent of target areas that overlap floodplains in ERF-IA, detonation of HE munitions could result in long-term impacts of up to 4.8 acres of floodplain per year in an active impact area that is already disturbed. However, the degree of impact is likely overestimated, as some targets would be placed in uplands, and areas impacted by detonations would be concentrated near targets. This area of disturbance was calculated using an average impact crater area multiplied by the maximum allowed annual firing of HE munitions that would target wetland habitat in ERF-IA (4,684 rounds for Alternative 1; Table 3.5-1). The project would adversely affect floodplain function only in localized areas affected by detonations and would not affect the function of the floodplain as a whole. Detonation of HE munitions in the floodplain could result in small-scale modification of surface topography that could cause localized alterations to floodplain hydrology and temporarily increase erosion risk in localized areas temporarily denuded of vegetation. The changes in topography from detonation of munitions in ERF-IA floodplains are not likely to obstruct or restrict normal overbank flow, and thus the impacts described above have low potential to cause adverse impacts to the downstream floodplain environment. Additionally, there is no development downstream of ERF-IA and thus no associated impacts. Therefore, impacts to floodplains would not be significant.

Water Quality Impacts from Erosion and Sedimentation

Crater formation in ERF-IA and the proposed expansion area would disturb soils in targetable areas (Section 3.5.2). Changes in topography and the destabilization of soils would likely result in increased sedimentation and particulate transport into waterbodies. It is estimated that individual crater sizes would be relatively small (i.e., 4 to 9 feet wide; see Table 3.5-1), and impacts would be localized to target areas, although repeat detonations in these areas could create larger craters. The potential for slumping or mass soil movements would be limited by the relatively flat topography of ERF-IA. Habitat protective buffers would reduce erosion and sedimentation impacts adjacent to Eagle River, Otter Creek, and the Otter Creek complex. However, some munitions detonations could occur in small waterbodies in unbuffered areas. Within these areas, targets would be placed on higher ground to avoid stream channels and low-lying areas that could be more susceptible to erosion. Although forward observers will monitor firing activities, as discussed in Section 2.4.1.3, it is possible that some detonation of rounds could occur in shallow areas of flowing or standing water that are obscured by vegetation and that are hydrologically connected to other surface water resources.

Tidal flats are naturally dynamic systems in which regular tidal inundation results in nearly continuous sedimentation and erosion as the tide ebbs and flow. Under Alternative 1, during periods of precipitation or tidal inundation, particulate transport and sedimentation would be increased in areas with destabilized or disturbed surface material and would be additive to naturally occurring sedimentation. Craters may effectively act as a sediment trap and collect particulates carried by runoff or transported via tidal inundation. Others could fill with tidal or fresh water. The physical dynamics of ERF-IA are largely dominated by active natural processes. Overall, it is anticipated that increases in sedimentation and particulate mobility would be localized around target areas and not of a magnitude great enough to result in significant impacts to surface water quality.

Other indirect impacts to water resources resulting from live-fire training could include temporary increases in TSS as a result of increased erosion and resulting sediment and soil transport (Section 3.5.2). It is expected that TSS would return to baseline levels shortly after firing activities cease. Based on the site conditions and proposed protection measures, sedimentation and turbidity effects caused by munition detonations in ERF-IA and the proposed expansion area are not expected to be significant, as the system already has a high baseline of suspended sediment/turbidity. Localized sediment increases, particularly within the unbuffered areas, could result in short-term adverse impacts to water quality but because of the dynamic sediment conditions at the site, impacts would not be significant.

Water Quality Impacts from Munitions Constituents

All-season live-fire training would increase the potential for contamination of surface water, particularly through deposition of munitions constituents from LO detonations and UXO. Under Alternative 1, the annual number of munitions expended within the impact area would increase, resulting in an increased potential for accumulation and contamination of surface water resources by residual explosive residues or other leached metals. Additionally, live-fire training would occur during the summer, when the potential for contamination of surface water is greater than under winter firing conditions.

The only waterbody within the proposed expansion area is Clunie Creek, which is subterranean through much of the expansion area and re-emerges at the edge of ERF-IA and drains into Eagle River. With buffers in place to exclude Clunie Creek and its associated wetlands from targetable areas, it is not anticipated that residues from munitions fired in the expansion area would enter surface water resources. Therefore, live-fire training in the expansion area would not result in additional impacts to surface water resources.

In a 2008 study of explosive residues in surface water samples following 120-mm mortar munitions tests in ERF-IA during summer conditions, water draining off mudflats immediately adjacent to areas with explosive residues had detectable levels of RDX (1.19 microgram per liter [µg/L]) and HMX (6.47 µg/L). TNT and two reduction products of TNT (2-Am-DNT and 4-Am-DNT) were also detected at levels bordering the method detection limits (0.04 µg/L) (Walsh et al. 2008a). In water samples from within nearby gullies, RDX was detected only in samples nearest to the source and at levels ranging from <0.04 µg/L to 0.1 µg/L. These concentrations are well below USEPA's lifetime health advisory levels for drinking water of 2 µg/L for RDX and TNT and 400 µg/L for HMX (USEPA 2004). Other studies of Eagle River (discussed in Section 3.6.1.3) provide additional evidence that munitions constituents have historically been present at low levels but are not accumulating in significant quantities in ERF-IA.

Past water quality sampling (Table 3.6-1) did not detect any explosive residues in Eagle River, suggesting that munitions residues from past operations have not persisted in the environment, are not being transported from targetable areas to Eagle River, and/or are quickly diluted below detectable limits and flushed downstream and into Eagle Bay. Additionally, past water quality data from Eagle River indicate consistently low levels of metals associated with components of mortar and howitzer rounds (iron, copper, and aluminum) at locations upstream and downstream of ERF-IA. This suggests that past munitions exercises were not resulting in substantial long-term leaching of metals into Eagle River. It should be noted that past water quality data were collected in 2007, 8 years after firing operations in non-frozen conditions ceased, and the data may not be representative of firing operations in non-frozen conditions. The data also do not consider IMs, which are expected to result in a greater amount of residue than traditional munitions (see Appendix F).

Based on water quality studies conducted during previous firing events, discussed in Section 3.6.1.3 (USAEHA 1994, 1995; CH2M Hill 1997; USARAK 2004; Walsh et al. 2008a; U.S. Army 2010), it is not anticipated that live-fire training under Alternative 1 would result in water quality criteria exceedances for Eagle River, Otter Creek, Eagle Bay, or any other waterbodies within ERF-IA or the proposed expansion area. It should be noted that USEPA has not established a regulatory maximum contaminant level for most explosive compounds, including HMX, RDX, TNT, or IMs.

<u>Groundwater and Potential Drinking Water</u>

Groundwater within ERF and the proposed expansion area tends to be shallow, as ERF-IA acts as a tidal estuary to Knik Arm. Depths to seasonal high water throughout much of the impact area are reported to be roughly 0 to 4 inches (USDA NRCS 2022). Natural processes such as tidal inundation, shallow groundwater, and dynamic surface conditions result in dilution/flushing and naturally reducing conditions, minimizing the potential for munitions residues to persist and accumulate in soils/sediments. As such, should any munitions residues or metals reach the shallow groundwater within ERF-IA, they would either be degraded or transported into Eagle Bay, where they would be rapidly diluted. Additionally, the deeper aquifers on JBER that are used as a standby water source for JBER and as a source for a variety of services by the Municipality of Anchorage are largely hydraulically disconnected from the shallower aquifer (Astley et al. 2000; JBER 2023a). As a result, it is expected that there would be no or negligible impacts to groundwater or potential drinking water sources under Alternative 1.

3.6.2.3 Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only

Under Alternative 2, the affected area of potential water resources impacts would be limited to the existing ERF-IA, as the impact area would not be expanded under this alternative. Potential impacts associated with all-season live-fire training under Alternative 2 would be similar to those described for Alternative 1, although it is possible that more munitions would be detonated in ERF-IA if all allotted rounds are fired at JBER. Additional firing may result in increased impacts to localized floodplain function and an increased frequency of intermittent temporary potential impacts to water quality associated with increased TSS and deposition of explosive residues. Impacts under this alternative are not expected to exceed applicable significance thresholds.

3.6.2.4 No Action Alternative

Under the No Action Alternative, there would be no expansion of ERF-IA, and firing activities would continue to take place only during winter months. Impacts associated with summer firing, such as increased crater formation, sedimentation, particulate transport, and temporary increases in TSS, would not occur, as surface conditions would be frozen, effectively preserving surface material and precluding the aforementioned impacts. Previous observations of munitions residues and metals within waterbodies in ERF-IA suggest that winter live-fire training exercises have not resulted in the degradation of water quality, with no detectable levels of munitions residues or elevated concentrations observed in Eagle River under baseline training conditions.

3.6.2.5 Mitigation

Protective measures built into the proposed action that would help avoid or minimize impacts to water resources in ERF under both action alternatives include habitat protective buffers, redistributing targets away from buffer areas, targeting higher elevation areas, and restricting units to targets outside routinely inundated areas during inundating tides at night. Under Alternative 1, prohibiting use of WP in the expansion area and clearing unexploded rounds from the expansion area after each training events would limit the risk of contaminating nearby water resources.

BMPs and SOPs that would help avoid or reduce adverse impacts to water resources would continue to be implemented under all alternatives. Not placing targets in waterbodies or firing into open water and use of forward observers and systems for accuracy would help prevent rounds from landing in water. The SRA program would continue to educate soldiers operating within the impact area and ensure operations and activities within the impact area are carried out in a sustainable manner to preserve water resources. SOPs for accuracy and to avoid firing into observable open water and near unbuffered channels would help protect water quality. Adherence to spill prevention and cleanup procedures outlined in the most current INRMP, JBER SPCC/C-Plan, and the most current JBER Industrial SWPPP (JBER 2022b) would help prevent contamination of water, and adherence to construction BMPs and the project-specific Construction General Permit SWPPP during construction under Alternative 1 would help minimize potential construction impacts to water resources. Under Alternative 1, adherence to riparian setbacks described in the INRMP would help protect water quality in Clunie Creek.

BMPs and SOPs to prevent discharge of WP from gravel-capped areas include not placing targets on capped areas and avoiding remediated areas during training exercises to the extent practicable. The Army would also continue to follow the most recent guidance and recommendations on using types of munitions that minimize impacts to aquatic receptors to the maximum extent practicable. This involves coordination with other military firing ranges and research institutions (e.g., Strategic Environmental Research and Development Program [SERDP] and Cold Regions Research and Engineering Laboratory [CRREL]) that have been conducting studies on fate, transport, and toxicity of IMs and traditional explosives over the past several decades.

Additionally, the following mitigation has been determined as a result of the water resources analysis to prevent discharge of WP from gravel-capped areas:

- Prohibit use of delay fuzes to minimize ground penetration.
- Make GIS-based tables and a map of remediated areas in ERF-IA available to the units that train at ERF-IA.
- If an errant round strikes a gravel cap, assume damage and place gravel in the affected area when practicable.

The following mitigation determined as a result of the analysis of potential impacts to fish (Section 3.8.2.2) would also help avoid or offset impacts to water resources from the proposed live-fire training:

- Expand the protective measure that specifies limited fire periods for HE rounds to include 155-mm training rounds. This means that 155-mm training rounds, like full HE rounds, would not be fired into inundated areas during inundating tide events and would not be fired into ERF during the seasonal closure period (9 August to 18 October); 155-mm training rounds could still be fired into the proposed expansion area during this time.
- Continue fisheries harvest management, population studies, and habitat protection efforts at Sixmile Lake, Eagle River, and Otter Creek to ensure fish resources are effectively managed on JBER.

Additional measures being considered to further reduce impacts to fish that would also help mitigate impacts to water resources include the following:

- Develop and implement appropriate efforts for comparative sampling and monitoring of hydrologic and biometric conditions in areas within and adjacent to ERF-IA.
- Consider opportunities to protect, enhance, and/or restore salmon habitat in the affected area, including within and outside the JBER installation boundary.
- Maximize use of the expansion area to reduce impacts to areas where juvenile fish may be present and during the height of salmon runs (mid-June through August) (Alternative 1 only).

3.7 WETLANDS

3.7.1 Affected Environment

3.7.1.1 Resource Definition

Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (33 CFR § 328.3[c][1]). Waters such as rivers, streams, lakes, and other aquatic sites that do not meet the definition of wetlands are discussed in Section 3.6.

The ROI for wetlands includes ERF-IA and the proposed expansion area.

3.7.1.2 Regulatory Setting

Section 404 of the CWA (33 U.S.C. § 1344) and Section 10 of the Rivers and Harbors Act (33 U.S.C. § 403) establish programs to regulate dredging and the discharge of dredged or fill material into WOTUS, including wetlands. The premise of these programs is that no discharge of dredged or fill material may be permitted if a practicable alternative exists that is less damaging to the aquatic environment, or if the nation's waters would be significantly degraded. Toward this end, mitigation measures to avoid, minimize, rectify, reduce, or compensate for resource losses are considered throughout the application process. USACE is the authority for regulation of discharge into wetlands and other waters, with oversight by USEPA.

CWA Section 404 permits are needed for actions that propose placement of fill in a jurisdictional wetland and are subject to Section 401 individual water quality certifications. However, water quality certification is generally not required if the proposed action is covered by a nationwide or regional permit, or a Letter of Permission.

USEPA and the Department of the Army have recently redefined the scope of WOTUS and their regulation under the CWA. The most recent final rule, which went into effect on 8 September 2023 (33 CFR Part 328; 40 CFR Part 120), narrows the definition of wetlands included in WOTUS to those areas of the landscape that have a continuous surface connection to streams, rivers, oceans, and lakes. Specific guidance regarding the application of the most recent rule to wetland delineations and permitting is currently in development by USACE.

Wetlands not subject to federal CWA jurisdiction are still subject to environmental review in accordance with EO 11990, *Protection of Wetlands*, which requires federal agencies to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance their natural values. Specific JBER policy is to protect and conserve wetlands in a manner that incurs no net loss of wetland acreage or wetland functions unless necessary to support mission requirements (JBER 2023a).

EO 11990 requires a Finding of No Practical Alternative for all federal activities in wetlands, including both jurisdictional and non-jurisdictional wetlands.

Special aquatic sites are a subset of WOTUS that possess special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values (40 CFR §§ 230.40–

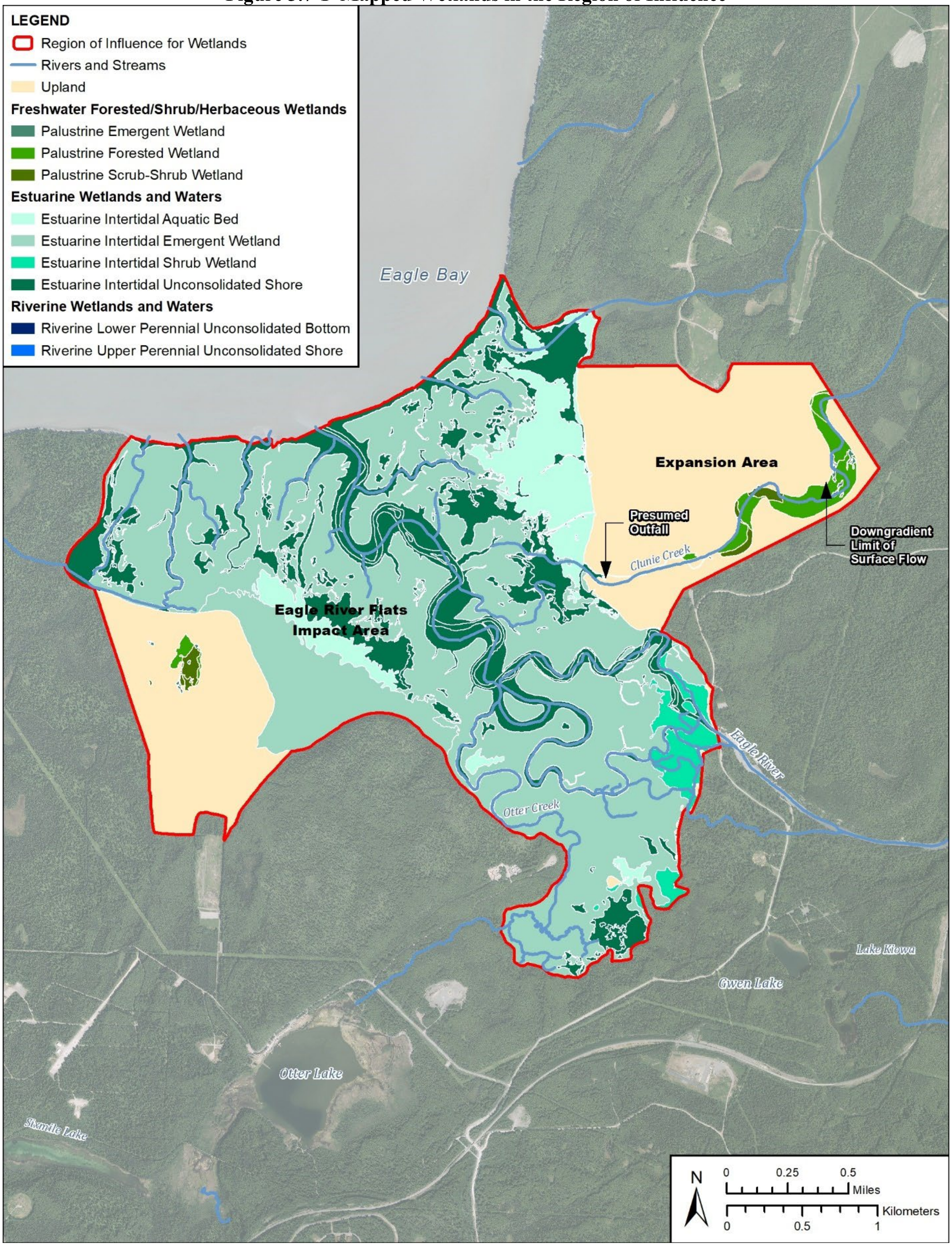
45). They include wetlands, sanctuaries and refuges, mudflats, vegetated shallows, coral reefs, and riffle and pool complexes. Because these sites influence or positively contribute to the health of the entire ecosystem, they receive special attention under USEPA's CWA Section 404(b)(1) guidelines.

JBER wetland management aims to protect and conserve wetland resources so that no net loss of wetland habitat or function occurs. Mission-dependent project planning requires that proponents first avoid wetlands to the maximum extent practicable, then minimize impacts where they must occur. Projects that may permanently or temporarily and either directly or indirectly affect wetlands must be coordinated with the JBER Wetland Program Manager and must use BMPs (JBER 2023a). Furthermore, JBER recommends following wetland and waterbody setbacks adopted by the State of Alaska and Municipality of Anchorage, where appropriate (JBER 2023a). The Municipality of Anchorage requires a setback of 100 feet from waterbodies with anadromous fish, 65 feet from all other waters, 25 feet from high-function wetlands, and 15 feet from wetlands of moderate function (Municipality of Anchorage 2014). If an area of direct impact would avoid wetlands, waters, and their associated setbacks, it is assumed that a jurisdictional wetland determination is not necessary in advance of the proposed action.

3.7.1.3 Existing Conditions

Wetlands in the ROI include the ERF estuarine wetland complex, riparian wetlands associated with Clunie Creek, and unconfirmed areas of black spruce (*Picea mariana*) bog within the proposed expansion area that were identified during a desktop wetland mapping exercise completed for this EIS (Figure 3.7-1). Note that Figure 3.7-1 depicts all wetlands on-site regardless of regulatory status. Wetland delineations were not completed or submitted to USACE for final jurisdictional determination, as avoidance of wetland impacts was intended in the design of the expansion area. All wetlands associated with Eagle River are expected to meet the definition of WOTUS on the basis of their connectivity to a water that directly discharges into tidal waters. Wetlands associated with Clunie Creek above the subterranean reach may be considered isolated per the current definition of WOTUS on the basis of disconnectivity to tidally influenced waters.

Figure 3.7-1 Mapped Wetlands in the Region of Influence



Sources: JBER 2020a, 2022a, 2023b, 2023c

Wetland Types

National Wetlands Inventory types (including uplands) that have been mapped in the ROI are summarized in Table 3.7-1.

Table 3.7-1 Wetland and Other Water Habitat, Summarized by National Wetlands Inventory Class

NWI Type	Area (acres)	Percent Area ROI
Estuarine Wetlands and Waters Subtotal[1]	*2,154*	*71%*
Estuarine Intertidal Aquatic Bed	192	6%
Estuarine Intertidal Emergent Wetland	1,319	43%
Estuarine Intertidal Shrub Wetland	59	2%
Estuarine Intertidal Unconsolidated Shore	584	19%
Freshwater Forested/Shrub/Herbaceous Wetlands Subtotal	*68*	*2%*
Palustrine Emergent Wetland	4	<1%
Palustrine Forested Wetland	52	2%
Palustrine Scrub-Shrub Wetland	12	<1%
Riverine Wetlands and Waters Subtotal	*<1*	*<1%*
Riverine Lower Perennial Unconsolidated Bottom	<1	<1%
Riverine Upper Perennial Unconsolidated Shore	<1	<1%
Total Wetlands and Waters	*2,222*	*73%*
Total Uplands	*822*	*27%*
Total Area ROI	**3,044**	**100%**

Note: [1]The estuarine wetlands and waters encompass the area of ERF. The total acres reported differ from the acres reported in Chapter 2 for ERF due to differences between the mapping scale used to prepare the wetland mapping and the scale used to approximate the acres of ERF for Chapter 2.

Key: ERF = Eagle River Flats; NWI = National Wetlands Inventory; ROI = Region of Influence

Source: JBER Wetland Inventory (ERF-IA), manual digitization (proposed expansion area)

Desktop Wetland Functional Assessments

Desktop wetland functional assessments (Appendix H) were completed to evaluate the functions and values of wetlands in the ROI, using methodology adapted from the Anchorage Wetland Assessment Methodology (Johnson and Schoofs 2020), which evaluates wetlands on the basis of hydrologic, habitat, species, and social function components. The summary score for a wetland is a compilation of these four components. The results of desktop functional assessments (Johnson 2020a, 2020b) are provided in the paragraphs that follow for the ERF Wetland Complex and the Clunie Creek Riparian Wetlands, with more information provided in Appendix H. While a desktop functional assessment was not conducted for the Black Spruce Bog type, summary information is provided below.

Eagle River Flats Wetland Complex: ERF is a distributary delta through which Eagle River drains to the marine waters of Cook Inlet. Distributary channels are fringed by estuarine and palustrine wetlands, transitioning to coastal uplands with gain in elevation. Aside from the entrance of the Eagle River and Otter and Clunie Creek drainages, the estuary is bounded by steep bluffs consisting of glaciofluvial deposits and predominantly vegetated by upland forest. ERF comprises the majority of estuarine wetlands and nearly a quarter of all wetlands on JBER (JBER 2023a). As such, it was given a high summary score (73 percent) derived from its support of species and habitat diversity within the watershed (Johnson 2020a). Pacific tidal marshes such as the ERF estuary are identified as a biophysical setting of conservation concern in Alaska (Flagstad et al. 2018).

Clunie Creek Riparian Wetlands: Clunie Creek riparian wetlands are a mix of forested and shrub wetlands with varying contribution of needleleaf and broadleaf species. Based on a desktop delineation using GIS, these wetlands are estimated to comprise approximately 72 acres (12 percent) of the proposed expansion area and are associated with the Clunie Creek stream channel (AECOM 2020b). Clunie Creek is an influent stream that originates from Clunie Lake and loses its surface water expression approximately 0.5 kilometers into the expansion area. Downgradient of this point, the creek is presumed to maintain subterranean flow along the historical stream channel until its outfall within the tidal reach of ERF (Figure 3.6-1); the surface water connection to the tidal extent of ERF is expected only during extreme high tide events (greater than 32 feet). A defined channel, standing water, and wetland vegetation are present immediately downgradient of Clunie Creek's last point of surface expression; however, these characteristics weaken along the presumed historical stream channel toward ERF (Brandt et al. 2020). Forested and shrub wetlands are presumed to occur within the historical Clunie Creek channel, which is clearly visible on the Digital Elevation Model available for the area. Vegetation mapping classifies these areas as open white spruce–paper birch forests with inclusions of closed tall alder (Jorgenson et al. 2003). With respect to function, the Clunie Creek riparian wetland complex was given a 33 percent summary score, with habitat (52 percent) and hydrology (46 percent) components serving to boost the overall score (Johnson 2020b).

Unconfirmed Black Spruce Bog: This potential wetland area has not been assessed for function. An isolated patch (approximately 0.3 acres) of what is inferred to be black spruce bog is in the north portion of the proposed expansion area. These types of bogs are characterized by an open canopy of black spruce that is often dwarfed (<9 feet) due to saturated soil conditions. Associated understory species commonly include cloudberry (*Rubus chamaemorus*), marsh Labrador tea (*Ledum palustre* ssp. *decumbens*), small cranberry (*Vaccinium oxycoccos*), and sphagnum moss (*Sphagnum* spp.).

Disturbance

The current level of disturbance in the ROI relates to natural ecological processes and human actions. Tidal and storm surge disturbance is a primary disturbance factor that maintains an early successional status for low marsh habitat in ERF-IA. Beyond the reach of tidal influence, fluvial processes associated with Eagle River and, to a lesser degree, Otter Creek become the dominant natural disturbance factors. Forest pathogen disturbance is discussed in Section 3.8, and wildland fire disturbance is discussed in Section 3.9. Human disturbance includes infrastructure associated with firing points and targets, firing activity, and roads and rights of way. The frequency of firing activities in the ROI is discussed in Chapter 2.

Special Aquatic Sites

Apart from wetlands, mudflats are the only other special aquatic site known to occur in the ROI and are assumed to occur only in the ERF portion of the ROI. As defined by regulation (40 CFR § 230.42), mudflats are broad, flat areas that occur along the coast, in coastal rivers to the head of tidal influence, and in inland lakes, ponds, and riverine systems. The substrate of mudflats contains organic material and particles smaller in size than sand. They are either unvegetated or vegetated only by algal mats. Coastal mudflats are exposed at extremely low tides and inundated at high tides, with the water table at or near the substrate surface.

3.7.2 Environmental Consequences

Direct impacts on wetlands could occur as a result of thinning of vegetation and detonation of HE munitions. Indirect impacts to wetlands could include disturbance of wetland soils, altered wetland hydrology, increased erosion and sedimentation, windthrow, establishment and spread of invasive species, and phytotoxicity to wetland vegetation. Windthrow is discussed further in Section 3.16.2. Effects to vegetation from erosion, sedimentation, invasive species, and phytotoxicity are discussed in Section 3.8.2.1. Effects to floodplains are discussed in Section 3.6.2.

Because the project would not result in a reduction in wetland acreage, impacts to wetlands were assessed on the basis of the following significance threshold:

- A reduction in wetland function that would cause a change in wetland resource value designation (i.e., class A, B, or C) for any functional component (i.e., hydrologic, habitat, species occurrence, social function)

3.7.2.1 Methodology

The analysis of potential impacts involved a quantitative assessment of the type of impact and the intrinsic rarity, function, and natural resilience of the affected wetland community to disturbance, using the results of the functional assessment described above that was completed for the estuarine wetlands in ERF and the Clunie Creek riparian wetlands in the proposed expansion area. The functional assessment evaluated baseline and post-project scores for hydrology, habitat, species occurrence, and social value functions (AECOM 2020c; Johnson and Schoofs 2020).

The analysis also involved quantifying the absolute area of wetlands degraded and the percent area of wetlands degraded relative to wetland resources present in the greater sub-basin (Clunie Creek sub-basin: 919 acres, Lower Eagle River sub-basin: 3,123 acres) (Municipality of Anchorage 2022). To assess area of wetlands degraded, the acres of wetlands affected by the construction and related activities in the proposed expansion area were quantified and then compared to the total acres of wetlands in the greater subbasins to determine the proportion of subbasin wetlands affected.

3.7.2.2 Alternative 1: All-Season Live-Fire Training with Expanded Impact Area

Alternative 1 would have direct and indirect long-term impacts on wetlands associated with thinning forest wetlands in the proposed expansion area, vegetation clearing in adjacent upland areas, and detonation of munitions in wetland target areas outside of the period when soils are frozen. Alternative 1 would have the greatest affected area because it is the only alternative that would include expansion of the impact area; however, the degree of impact to ERF wetlands would potentially be less than under Alternative 2 because there would be more upland (non-wetland) area available for live-fire training.

Construction and Infrastructure

While no vegetation clearing would occur in wetlands in the proposed expansion area, thinning of trees in the vegetation buffer would result in long-term degradation of up to 59 acres of wetlands, of which 78 percent (46 acres) would be forested wetlands (Table 3.7-2). The remaining 22 percent of wetlands occurring in the vegetation buffer are non-forested and thus would not be impacted by thinning. Thinning of trees in wetlands would occur when soils are frozen, would avoid the use of mechanized equipment, and would be limited to removal of up to one-third of the basal area per acre without disturbance of the organic duff layer or below the ground surface. These thinning practices would minimize windthrow and ensure that soil compaction, rutting, and displacement are avoided, along with the associated disruption of infiltration and wetland flow paths.

Thinning of forested wetlands could alter wetland hydrology by reducing transpiration. However, due to the limited amount of thinning, and the likelihood of increased growth and transpiration of remaining trees, it is expected that hydrology effects would be short term. Effects on wetland habitat function would vary with susceptibility of understory vegetation to changes in light and weather. Changes in wetland microclimate and nutrient cycling resulting from thinning can have long-term effects on understory composition and habitat suitability for a range of wetland-associated species (Adamus 2014). Forested wetland habitat is common in the project vicinity, thus highly mobile species such as birds and mammals could readily disperse to adjacent wetlands. However, less mobile species, such as invertebrates or wood frogs (*Rana sylvatica*), would be more limited in their ability to disperse to nearby wetlands. Long-term impacts on wetland habitat functions would occur. Although impacts would lessen over time as tree canopy fills in, periodic thinning would likely occur. Section 3.8.2.3 provides a discussion of habitat alteration impacts on wildlife.

While thinning is unlikely to occur for the entirety of the vegetation buffer, impact calculations assume that all forested wetlands in this buffer, or approximately 5 percent of wetland resources in the Clunie Creek sub-basin, would be subject to thinning. The types and areas of wetland subject to direct impacts are provided in Table 3.7-2.

Vegetation clearing over the remainder of the proposed expansion area could result in erosion, sedimentation, and increased susceptibility to windthrow and invasive species (Sections 3.8.2.1 and 3.16.2), which could indirectly impact adjacent wetland habitats by degrading wetland vegetation, eroding wetland soils, over-depositing mineral soil, or causing flooding or drying that could transition wetlands to aquatic or upland habitat, respectively. Based on a 15-foot outer buffer along the cleared area boundary, where [indirect impacts to wetland vegetation, soils, and hydrology are expected to be greatest, approximately <1 acres, representing <0.1 percent of wetland resources in the Clunie Creek sub-basin, could be indirectly impacted over the long term.

The wetland types that would be directly or indirectly impacted by construction and maintenance under Alternative 1 are common within the greater ecosystem and ecoregion and, based on typical rates of succession, are considered moderately resilient to disturbance.

Based on the findings of the functional assessment, the greatest expected reduction in wetland function associated with the proposed expansion area would be for the social value component, which would fall from a score of 26 to 1 resulting from access to the wetlands being permanently closed, recreation uses being excluded, and aesthetic values being diminished. However, as the social value function score for baseline condition was already in the lowest wetland resource value designation (class “C”) (Municipality of Anchorage 2014), further reduction of the score would not prompt a change in category that would indicate a significant reduction in overall function. The second greatest expected reduction in wetland function would be for the hydrologic component, which would fall slightly from a score of 87 to 84 because habitat quality for nesting waterbirds would be slightly degraded due to changes in water quality associated with construction. Change in resource value designation for the other wetland functional components (habitat, species occurrence) is not predicted for the Clunie Creek riparian wetlands under implementation of Alternative 1. The lack of predicted changes to the other wetland functional components is the result of the purposeful avoidance of wetlands to extent possible.

Table 3.7-2 Areas of Direct and Indirect Impacts to Wetlands in the Proposed Expansion Area

NWI Class	Vegetation Buffer (acres)	Area of Indirect Impact (acres)
Estuarine Wetlands and Waters	*3*	*<1*
Estuarine Intertidal Aquatic Bed	0	<1
Estuarine Intertidal Emergent Wetland	1	<1
Estuarine Intertidal Unconsolidated Shore	2	0
Freshwater Forested/Shrub/Herbaceous Wetlands	*56*	*<1*
Palustrine Emergent Wetland	3	0
Palustrine Forested Wetland	46	<1
Palustrine Scrub-Shrub Wetland	7	0
Riverine Wetlands and Waters	*0*	*0*
Riverine Lower Perennial Unconsolidated Bottom	0	0
Grand Total	**59**	**<1**

Key: NWI = National Wetlands Inventory
Source: JBER 2023b

Firing and Training Exercises

Under Alternative 1, targets in the existing ERF-IA would be placed predominantly in wetlands, while targets in the proposed expansion area would be placed exclusively in uplands. Of the maximum 5,836 full HE rounds that could be fired annually, 1,152 would be fired at targets in the proposed expansion area, and the remaining 4,684 rounds would be fired at targets in existing ERF-IA outside of buffered areas (Figure 2.4-3). The largest rounds (155-mm HE) would only be fired into the portion of ERF-IA adjacent to Training Areas (TAs) 415 and 416 (Figure 2.4-1), which includes 286 acres of upland. No discharge of fill into wetlands would occur in association with target placement or live-fire training.

Detonation of HE munitions could result in the damage or mortality of wetland vegetation, mixing of wetland soils, and modification of surface topography that could alter wetland hydrology. Many target areas in the existing ERF-IA would be located in wetlands. Based on the estimates of the maximum area in ERF that could be disturbed by detonation of HE munitions (Table 3.5-1), long-term impacts of up to 4.8 acres of wetlands, an area representing 0.2 percent of the wetland resources in the Lower Eagle River sub-basin, could occur each year. This area of disturbance was calculated using an average impact crater area multiplied by the maximum allowed annual firing of HE munitions that would target wetland habitat in ERF-IA (4,684 rounds for Alternative 1; Table 3.5-1). Because the targets generally would be expected to stay in the same locations, the actual extent of impacts would likely be less, with localized impacts in the same areas around targets year after year. Additionally, because some targets would be placed in uplands, the 4.8 acres likely overestimates wetland impacts, even assuming no overlap of craters. Wetland impacts from firing and training exercises under Alternative 1 would not represent a loss of wetlands. Impacts predominantly would be disturbance to wetland soils and vegetation and the redistribution of sediments, creating shallow depressions that could potentially become deeper over time in repeatedly targeted areas. Most direct impacts due to training events would occur in tidal marsh habitat, which is considered a wetland of statewide conservation concern in Alaska (Flagstad et al. 2018). The area of long-term impacts to wetland habitat related to the detonation of HE munitions is likely overestimated, as the average area of impact craters is calculated from unfrozen soils for which crater volumes are larger, and not all detonations would occur in such conditions. In addition, spatial overlap among impact craters would likely occur.

All-season detonation of HE munitions would allow firing when wetland soils are unarmored by ice, thawed, and/or during the growth period for plants. Physical impact to unfrozen or unarmored soil is presumed to result in a larger impact crater than firing during frozen conditions, thereby increasing the likelihood of alterations to wetland vegetation, soils, and hydrology compared to baseline conditions. Likewise, physical impact to wetland vegetation during the growing season when plants are translating below-ground resources to above-ground foliage, flower, and fruit is more likely to result in the mortality or injury to wetland vegetation. While impact craters subject to daily tidal inundation would continually refill with sediment (Lawson et al. 1995), the recovery of vegetation would be slower in the mid-to-high tidal zone where tidal inundation is less frequent and sedimentation rates are lower. Based on documented rates of succession in herbaceous wetlands, these impacts are considered long term (lasting longer than 10 years).

Live-fire training has the potential to result in phytotoxic impacts to wetland vegetation, largely related to decreased productivity and plant mortality (Pennington and Brannon 2002). Compared to the No Action Alternative, the estimated annual deposition of energetic residues in the existing ERF-IA (based on calculations done for traditional munitions[9]) would increase by 54 percent under Alternative 1 (Table 3.7-3), with a proportional increase in the potential for toxins to accumulate to phytotoxic concentrations in wetland soils. These impacts could range from short term to long term depending on the type and rate of breakdown pathways and duration of exposure. A detailed discussion of the sources of energetic residues, the threshold levels of toxic effect in plants, and the bioremediation of energetic residues is provided in Section 3.8.2.1.

[9] See Appendix F for additional information on assumptions and limitations associated with the residue calculations.

Table 3.7-3 Estimated Total Annual Munitions Use and Energetic Residue Deposited at ERF-IA under Alternatives 1 and 2 and the No Action Alternative

Munitions Information		Munitions Residue Impacts						
		Number of Rounds/Detonations				Munitions Residue Deposition		
HE Munitions Type[1]	Total Energetic Mass (g) per Round[2]	Annual Number of Rounds Fired[3]	Annual Anticipated Number of HO Detonations[4]	Annual Anticipated Number of LO Detonations[5]	Annual Anticipated Number of Dud Detonations[6]	Total Annual Deposition (g) of Energetic Residues[7]	Percent of Total Annual Deposition in Existing ERF-IA[8]	Percent of Total Annual Deposition in Proposed Expansion Area[9]
Alternative 1: Existing ERF-IA & Proposed Expansion Area								
60-mm Mortar	370	1,036	944	3	89	32,930	83%	17%
81-mm Mortar	969	592	564	2	26	25,194	94%	6%
120-mm Mortar	2,960	744	722	2	20	59,202	93%	7%
105-mm Howitzer	2,086	2,612	2574	2	36	75,096	96%	4%
155-mm Howitzer Training Round	808	900	896	1	3	2,424	100%	0%
155-mm Howitzer	6,936	144	140	1	3	20,808	100%	0%
Totals	14,129	6,028	5,840	11	177	215,654	93%	7%
Alternative 2: Existing ERF-IA Only								
60-mm Mortar	370	1,036	944	3	89	32,930	100%	0%
81-mm Mortar	969	592	564	2	26	25,194	100%	0%
120-mm Mortar	2,960	744	722	2	20	59,202	100%	0%
105-mm Howitzer	2,086	2,612	2574	2	36	75,096	100%	0%
155-mm Howitzer Training Round	808	900	896	1	3	2,424	100%	0%
155-mm Howitzer	6,936	144	140	1	3	20,808	100%	0%
Totals	14,129	6,028	5,840	11	177	215,654	100%	0%

Munitions Information		Munitions Residue Impacts						
		Number of Rounds/Detonations				Munitions Residue Deposition		
HE Munitions Type[1]	Total Energetic Mass (g) per Round[2]	Annual Number of Rounds Fired[3]	Annual Anticipated Number of HO Detonations[4]	Annual Anticipated Number of LO Detonations[5]	Annual Anticipated Number of Dud Detonations[6]	Total Annual Deposition (g) of Energetic Residues[7]	Percent of Total Annual Deposition in Existing ERF-IA[8]	Percent of Total Annual Deposition in Proposed Expansion Area[9]
No Action Alternative								
60-mm Mortar	370	518	499	1	18	6,660	100%	0%
81-mm Mortar	969	296	285	1	10	9,693	100%	0%
120-mm Mortar	2,960	372	358	1	13	38,489	100%	0%
105-mm Howitzer	2,086	1,306	1,260	2	44	91,784	100%	0%
155-mm Howitzer Training Round	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
155-mm Howitzer	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Totals	6,385	2,492	2,402	5	85	146,626	100%	0%

Notes:

[1] All munitions in this analysis used Comp B as filler.

[2] Combined energetic mass per round from RDX, HMX, and TNT (from Walsh 2007, Table 1).

[3] Section 2.3 provides estimated annual rounds and munitions that would be fired.

[4] Calculated by multiplying total estimated annual rounds that would be fired (from Section 2.4) by percentage of HO rounds (estimated as all rounds minus LO and UXO rounds).

[5] Calculated by multiplying total estimated annual rounds that would be fired (from Section 2.4) by percentage of LO rounds (estimated to be 0.09% of total rounds fired, based on observations described in Dauphin and Doyle 2000).

[6] Calculated by multiplying total estimated annual rounds that would be fired (from Section 2.4) by percentage of UXO rounds (estimated to be 3.37% of total rounds fired, based on observations described in Dauphin and Doyle 2000).

[7] Total residue is estimated as the sum of residue from HO, LO, and dud rounds.

[8] Percent of total annual deposition of energetic residues estimated to occur in ERF-IA.

[9] Percent of total annual deposition of energetic residues estimated to occur in the proposed expansion area.

Key: Comp B = Composition B; ERF-IA = Eagle River Flats Impact Area; g = grams; HE = high explosive; HO = high-order; LO = low-order; mm = millimeter; N/A = not applicable; UXO = unexploded ordnance

Based on the findings of the functional assessment, the greatest expected reduction in wetland function under Alternative 1 would be for the social value component, which would fall from a score of 21 to 16 as a result of aesthetic values being diminished. However, as the social value function score for baseline condition was already in the lowest wetland resource value designation (class “C”) (Municipality of Anchorage 2014), further reduction of the score would not prompt a change in category that would indicate a significant reduction in overall function. The second greatest expected reduction in wetland function associated with ERF-IA wetlands would be for the hydrologic component, which would fall slightly from a score of 140 to 138. The predicted reduction in hydrologic function is primarily associated with the sensitivity to water quality degradation metric for fish spawning/rearing habitat and waterbird nesting habitat, meaning that habitat quality for spawning/rearing and nesting would be slightly degraded due to changes in water quality associated with construction.

Change in resource value designation for the other wetland functional components (hydrology, habitat, species occurrence) is not predicted for the ERF estuarine wetlands under implementation of Alternative 1. The lack of predicted changes to the other wetland functional components is the result of the baseline functional scores already being reduced due to the history of firing and training exercise in ERF-IA. Alterations to wetland functions in the proposed expansion area due to firing and training exercises are not anticipated, as there would be no firing into wetlands.

3.7.2.3 Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only

Because the impact area would not be expanded under Alternative 2, none of the impacts to wetlands from construction and maintenance described for Alternative 1 would occur. Indirect live-fire training under Alternative 2 would have similar physical and chemical impacts to wetland vegetation, soils, and hydrology as those discussed for Alternative 1. The same number of rounds would be fired under Alternative 2 but would be targeted within the existing ERF-IA. Detonation of HE munitions (and 155-mm HE training rounds) could impact up to 6 acres (Table 3.5-1), which is an overestimate that assumes no overlap of detonations and does not factor in target placement in uplands within ERF-IA. This maximum area represents 0.2 percent of wetland resources in the Lower Eagle River sub-basin.

Compared to baseline conditions, the intensity of firing on wetland habitat in the existing ERF-IA would increase by up to 54 percent under Alternative 2 (Table 3.7-2), with a proportional increase in the potential for toxins to accumulate to phytotoxic concentrations in wetland soils. The larger increase in energetic residues under Alternative 2 relative to Alternative 1 would result from all detonations being concentrated in ERF-IA wetlands under Alternative 2 versus the detonations being spread across ERF-IA (all wetlands) and the proposed expansion area (all uplands). The increase in firing intensity in wetlands would be up to 35 percent more than under Alternative 1 because there would be no upland expansion area.

The degree of change in function of ERF estuarine wetlands would be similar to the change under Alternative 1. There would be a reduction in the social value and hydrologic function components as a result of aesthetic and habitat values being diminished, respectively. However, as the social value function score for baseline condition was already in the lowest wetland resource value designation (class "C") (Municipality of Anchorage 2014) and baseline hydrologic function was already reduced, further reduction of the scores would not prompt a change in categories that would indicate a significant reduction in overall function. It is not expected that change in resource value designation for the other wetland functional components would occur.

3.7.2.4 No Action Alternative

The No Action Alternative would continue to have direct, long-term impacts on wetlands, but these impacts would be less than under either action alternative because only winter firing would occur.

Under the current firing regime, weapons training is only allowed to proceed when the ice or frozen sediment thickness is sufficient to support use of the specific weapon system. Observations since 1999 confirm that this restriction effectively protects the underlying substrate from physical disturbance (USAF 2018) and as such does not directly impact wetlands or special aquatic sites. Toxins associated with the LO detonation of munitions would continue to be introduced to ERF-IA, but under a winter-only firing regime, energetic residues would be more likely to be flushed from the estuary during spring melt and before the active growing season. Toxins would be less likely to be taken up by plants and the potential for accumulation to phytotoxic level would be less than for the action alternatives.

3.7.2.5 Mitigation

BMPs and SOPs that would help avoid or reduce adverse impacts to wetlands would continue to be implemented under all alternatives. The SRA program would continue to educate soldiers operating within the impact area and ensure operations and activities within the impact area are carried out in a sustainable manner to preserve wetlands. BMPs specific to the protection of wetlands include the following:

- Continue to manage wetland habitat in a manner that incurs no net loss of wetland acreage or functions unless necessary to support mission requirement, as prescribed in the INRMP.
- Adhere to riparian setbacks and habitat protection buffers set forth in the INRMP. Pertinent setbacks for development of the proposed expansion area are 65 feet from Clunie Creek and 15 feet from class "B" wetlands associated with Clunie Creek.
- Avoid thinning in wetlands to the extent possible (Alternative 1 only).
- Remove trees in wetlands by hand (Alternative 1 only).
- Limit thinning in wetlands to winter months when soils are frozen (Alternative 1 only).
- Limit tree removal in wetlands to no more than one-third of the basal area per acre (Alternative 1 only).
- During thinning in wetlands, avoid disturbance of the organic duff layer and below the ground surface (Alternative 1 only).
- Adhere to construction BMPs that minimize erosion and sedimentation (Alternative 1 only). For areas in or near wetlands these include measures such as placement of silt fencing, wood chips, and/or wattles as appropriate along the outer boundary of the required riparian or wetland area setback.

Based on a desktop delineation of wetlands in the proposed expansion area, project components were adjusted to avoid vegetation clearing, construction of service roads and pads, and establishment of target areas in wetlands. Wetland boundaries within the proposed expansion area would be verified by USACE prior to implementation of the proposed action, and project components would be further adjusted as needed to avoid wetlands. The analysis of impacts to wetlands assumes that, if needed, appropriate compensation for unavoidable adverse impacts to wetlands would be made through participation in an approved off-site mitigation bank or in-lieu fee instrument (DoDI 4715.03).

3.8 BIOLOGICAL RESOURCES

3.8.1 Affected Environment

3.8.1.1 Resource Definition

This section describes the biological resources of vegetation, fish and wildlife (terrestrial wildlife and marine mammals), and special status species.

Vegetation

Vegetation resources encompass all existing plant communities, including any rare, sensitive, and non-native plant species. Vegetation types are presented as a combination of physiognomy (e.g., forest, shrub, and herbaceous) and characteristic species (e.g., white spruce closed forest), with the plant community name derived from the highest strata (layer) occupied. Wetlands are a type of regulated vegetation community, discussed in Section 3.7.

Non-native species (all taxa) are those present in a given area by accidental or intentional introduction. Invasive species are a subset of non-native species that have the biological capacity to establish, reproduce, and spread throughout natural communities, the introduction of which does or is likely to harm the environment, the economy, or human health (EO 13112). Prohibited and restricted noxious weed species are defined as those considered harmful to agriculture in the State of Alaska (Alaska Statute [AS] 44.37.030; 11 AAC 34.020).

The ROI for vegetation resources includes ERF-IA and the proposed expansion area.

Fish and Wildlife

Fish and wildlife resources include native and introduced aquatic and terrestrial organisms. Fish and wildlife resources relevant to this analysis include vertebrate animal species, such as large and small mammals, birds, amphibians, and fish. Most species indigenous to southcentral Alaska can be found on JBER, as the base contains a variety of habitats and supports a diverse array of wildlife species. JBER is known to support 36 mammal, 1 amphibian, and 144 bird species (JBER 2023a). Many of these species may occupy habitats in the ROI on either a seasonal or year-round basis. Wildlife resources of concern that were identified during scoping include marine mammals, avian species, large mammals, and anadromous fish. For marine and anadromous fishes, particular emphasis is placed on the native and sensitive Pacific salmon species and several groundfish species that are federally managed and/or are subsistence resources. Salmon, several groundfish, and forage fish species are also important prey sources for the ESA-listed endangered Cook Inlet beluga whale; several salmon species constitute essential PBFs of their critical habitat (76 FR 20180). Macroinvertebrates are also addressed as they comprise an important component of the prey base for juvenile fishes. The attributes and quality of available habitat determine the composition, diversity, and abundance of fish and wildlife. Additional context is presented in Section 3.6, Section 3.7, and the *Vegetation* subsection above, which provide information pertinent to aquatic, wetland, and terrestrial habitats found in the ROI.

The ROI for fish is the spatial extent of potential project effects from live-firing noise (based on acoustic modeling), munitions contaminant exposure, direct strikes from munitions and shrapnel, and sediment releases to aquatic habitat, including existing ERF-IA and the proposed expansion area (and associated firing points), the encompassing 6th field hydrologic unit code watersheds, and Eagle Bay. The ROI specifically includes all waterbodies and potentially inundated areas (wetlands and floodplains) that may support native or sensitive fish species. Primary waterbodies in the ROI that are known to support marine and anadromous fishes include Eagle River, Otter Creek, and Eagle Bay.

The ROI for terrestrial wildlife resources includes areas on or adjacent to JBER that could be affected by noise from indirect live-fire training, primarily the existing ERF-IA, the proposed expansion area, Eagle Bay, and adjacent portions of Knik Arm.

The ROI for marine mammals encompasses the waters of ERF-IA that are accessible to one or more species of marine mammal, as well as the remaining portions of ERF-IA that may contribute to the production of prey for marine mammals. The ROI also includes the portion of Eagle Bay where underwater noise from live-fire training may exceed average ambient noise conditions and the area over which airborne noise from live-fire training may exceed noise thresholds NMFS has established for pinnipeds (seals and sea lions). The area where underwater and airborne noise may impact marine mammals was defined using acoustic modeling, as described in Appendix D. The ROI for marine mammals is equal to the action area identified in Figure 1-4 of the Biological Assessment (BA) prepared for ESA consultation (Appendix D).

Special Status Species

Special status plant species include rare or sensitive plant species, which are those with limited abundance, geographic distribution, and/or habitat (Nawrocki et al. 2013; BLM 2019a; ACCS 2023). Rare ecosystems are those supporting unique assemblages of flora and fauna within a small geographic area (Flagstad et al. 2018). Under the ESA, the Aleutian shield fern (*Polystichum aleuticum*) is the only plant species to receive federal status as endangered (USFWS 2012) in Alaska. Due to its limited range and narrow habitat requirements, it is not expected to occur in the ROI and is not discussed further in this document.

Special status wildlife species include species designated as endangered, threatened, or candidate species, or their critical habitat as designated by the USFWS or NMFS under the ESA (16 U.S.C. § 1531 et seq.), migratory birds protected under the Bald and Golden Eagle Protection Act (BGEPA) and the Migratory Bird Treaty Act (MBTA), marine mammals protected under the Marine Mammal Protection Act (MMPA), and Species of Special Concern (SSC) identified in the JBER INRMP (JBER 2023a), which includes many of the Species of Greatest Conservation Need (SGCN) identified in ADF&G's *Alaska Wildlife Action Plan* (ADF&G 2015).

There are no special status fish species present within the ROI. However, several salmon species constitute essential PBFs of the critical habitat for Cook Inlet beluga whale (76 FR 20179). Further detail on these salmon PBFs is provided in the BA (Appendix D). The ROI also supports EFH, which is a special habitat designation for federally managed fish species and established by the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act or MSA). Further detail on EFH and managed species is provided in the EFH Assessment (Appendix E).

The ROIs for special status species are the same as those listed above for vegetation, wildlife, and fish, respectively. Note that marine mammals have a separately defined ROI, as described in the previous section.

3.8.1.2 Regulatory Setting

Federal Laws and Regulations

Marine Mammal Protection Act

The MMPA is a statute enacted in 1972 by the United States to protect marine mammals and their habitat. Take under the MMPA is defined as "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal." For military readiness activities, harassment is defined as "(i) any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild [Level A harassment] or (ii) any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering, to a point where such behavioral patterns are abandoned or significantly altered [Level B harassment]."

The purpose of issuing incidental take authorizations (ITAs) is to provide an exception to the take prohibition in the MMPA and to ensure that an action complies with the MMPA and implementing regulations. ITAs may be issued as either (1) regulations and associated Letters of Authorization under Section 101(a)(5)(A) of the MMPA, or (2) Incidental Harassment Authorizations (IHAs) under Section 101(a)(5)(D) of the MMPA. An IHA can be issued only when there is no potential for serious injury or mortality or where any such potential can be negated through required mitigation measures and is limited to a 1-year authorization period. Letters of Authorization may be issued either when an action has potential to result in serious injury or mortality or is planned for multiple years.

On October 1, 2024 the Air Force submitted a request for an ITA under Section 101(a)(5)(A) of the MMPA of 1972, as amended, for the take of marine mammals incidental to indirect live firing training at JBER.

On January 3, 2025, NMFS notified the Air Force that, based on the proposed mitigation and monitoring measures detailed in the ITA request and NMFS' analysis of potential take, NMFS has determined that the incidental take of marine mammals is not reasonably likely to occur because the specified activities would not harass (as defined for a "military readiness activity" under 16 U.S.C. § 1362[18][B]) or result in the mortality of any marine mammal or marine mammal stock. Therefore, NMFS determined that an ITA under the MMPA is not necessary for the specified activities.

The Sikes Act

The Sikes Act (enacted in 1969, as amended) provides guidance for natural resource management on DoD controlled lands and requires the establishment of an INRMP to conserve natural resources (16 U.S.C. § 670 et seq.). An INRMP has been developed for the JBER installation, with the most recent update occurring in 2023 (JBER 2023a). In addition, the 673d Air Base Wing Instruction 32-7001, *Conservation and Management of Cultural and Natural Resources*, prescribes policies and responsibilities for the management and conservation of water, forest, fish, wildlife, and outdoor recreation resource access; resource enforcement; and historical and archaeological site protection on JBER. AFMAN 32-7003, *Environmental Conservation*, implements Air Force and DoD Policy Directives on how to manage natural resources on Air Force property in the United States for compliance with state, federal, and local laws and standards for natural resources management. DoDI 4715.03, *Natural Resources Management Program*, establishes policy and assigns responsibilities for compliance with applicable federal, state, and local statutory and regulatory requirements, EOs, Presidential memorandums, and DoD policies for the integrated management of natural resources, including lands, waters, airspace, coastal areas, and nearshore areas owned, administered, or controlled by the DoD.

Executive Order 13112

EO 13112 requires federal agencies whose actions may affect the status of invasive species to not authorize, fund, or carry out actions that are likely to promote the introduction or spread of invasive species.

Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Act of 1972 as amended by the Sustainable Fisheries Act of 1996 (16 U.S.C. § 1801 et seq.), established procedures designed to identify, conserve, and enhance EFH for species regulated under a federal fishery management plan. Section 305(b)(2) of the MSA requires federal agencies to consult with NMFS on all actions or proposed actions authorized, funded, or undertaken by the agencies that may adversely affect EFH. EFH has been defined for the purposes of the MSA as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. § 1802 [10]). Eagle Bay, Eagle River, and Otter Creek are identified as EFH for various life stages of salmon and groundfish species. An EFH Assessment to support NMFS consultation is included as Appendix E.

Endangered Species Act

The ESA of 1973 (16 U.S.C. § 1531 et seq.), as amended, established a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat on which they depend. Section 7 of the ESA requires federal agencies to consult with NMFS and USFWS, as appropriate, regarding the effects of their actions on species and critical habitat protected under the ESA. In the case of this proposed action, only species under the jurisdiction of NMFS have potential to be present in the ROI, and consultation with USFWS will not be needed. A BA to support NMFS consultation for ESA-listed marine mammal species is included as Appendix D. The Air Force must coordinate with NMFS on mitigation measures through the Section 7 informal consultation process. The ROD for this EIS will document mitigation measures that will be implemented. If necessary to satisfy the requirements of the ESA, NMFS may develop an additional set of measures contained in reasonable and prudent alternatives, reasonable and prudent measures, or conservation recommendations in the Letter of Concurrence issued for the proposed action.

Migratory Bird Treaty Act

The MBTA of 1918, as amended (16 U.S.C. §§ 703-712), is the domestic law that implements U.S. commitment to four international conventions (with Canada, Japan, Mexico, and Russia) for the protection of a shared migratory bird resource. Each of the conventions protect selected species of birds that are common to these countries (i.e., species occur in these countries at some point during their annual life cycle). The act protects all migratory birds and their parts (including eggs, nests, and feathers). In January 2021, the USFWS published a final rule defining the scope of the MBTA so as to not include any prohibition of incidental take (86 FR 1134). In October 2021, the USFWS revoked this final rule, returning immediately to prohibiting incidental take and applying enforcement discretion under the MBTA (86 FR 54642). However, the Authorization of Take Incidental to Military Readiness Activities (50 CFR § 21.42[a][1]) states "the Armed Forces may take migratory birds incidental to military readiness activities provided that, for those ongoing or proposed activities that the Armed Forces determine may result in a significant adverse effect on a population of a migratory bird species, the Armed Forces must confer and cooperate with the Service to develop and implement appropriate conservation measures to minimize or mitigate such significant adverse effects." Military readiness activities are defined at 50 CFR § 21.3 as all training and operations that relate to combat. Routine operation of support functions, operation of industrial activities, and construction or demolition of support or industrial facilities are not considered military readiness activities.

<u>Bald and Golden Eagle Protection Act</u>

The BGEPA (16 U.S.C. §§ 668-668d) prohibits anyone without a permit issued by the Secretary of the Interior from "taking" bald eagle (*Haliaeetus leucocephalus*) or golden eagle (*Aquila chrysaetos*). Taking involves molesting or disturbing birds, their parts, nests, or eggs. The BGEPA prescribes criminal penalties for persons who without a permit "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle…or any golden eagle…alive or dead, or any part (including feathers), nest, or egg thereof."

State Laws and Regulations

The State of Alaska maintains a list of prohibited and restricted noxious weed species as well as maximum allowable tolerances for seeds of noxious weeds in horticultural products (AS 03.05.010, AS 03.05.030, AS 44.37.030, 11 AAC 34.020). An exterior quarantine to regulate the entry into the state and transportation of select aquatic invasive plants was enacted in 2014 (State of Alaska 2014).

The ADF&G serves as the main coordinator of the *Alaska Wildlife Action Plan* and has a legal mandate (Article 8, Natural Resources) to protect and conserve the state's natural resources, including all wildlife species. The legislature also created the Alaska Board of Fish and Game, which was split into two boards (one for fisheries and one for wildlife) in 1975. The purpose of these boards is to conserve and develop fisheries and wildlife resources (AS 16.05.221 [a] and [b]).

The Anadromous Fish Act (AS 16.05.871-901) requires that an individual government agency provide prior notification and obtain permit approval from ADF&G before altering or affecting "the natural flow or bed" of a specified waterbody or fish stream.

Local Regulations

To implement the INRMP, JBER applies an ecosystem approach to manage a variety of different wildlife species on the installation. Wildlife species fall into several categories including (1) key species that perform a disproportionately large role in ecosystem structure; (2) managed species that are chosen based on human values; (3) species with legal constraints; and (4) indicator species.

3.8.1.3 Existing Conditions

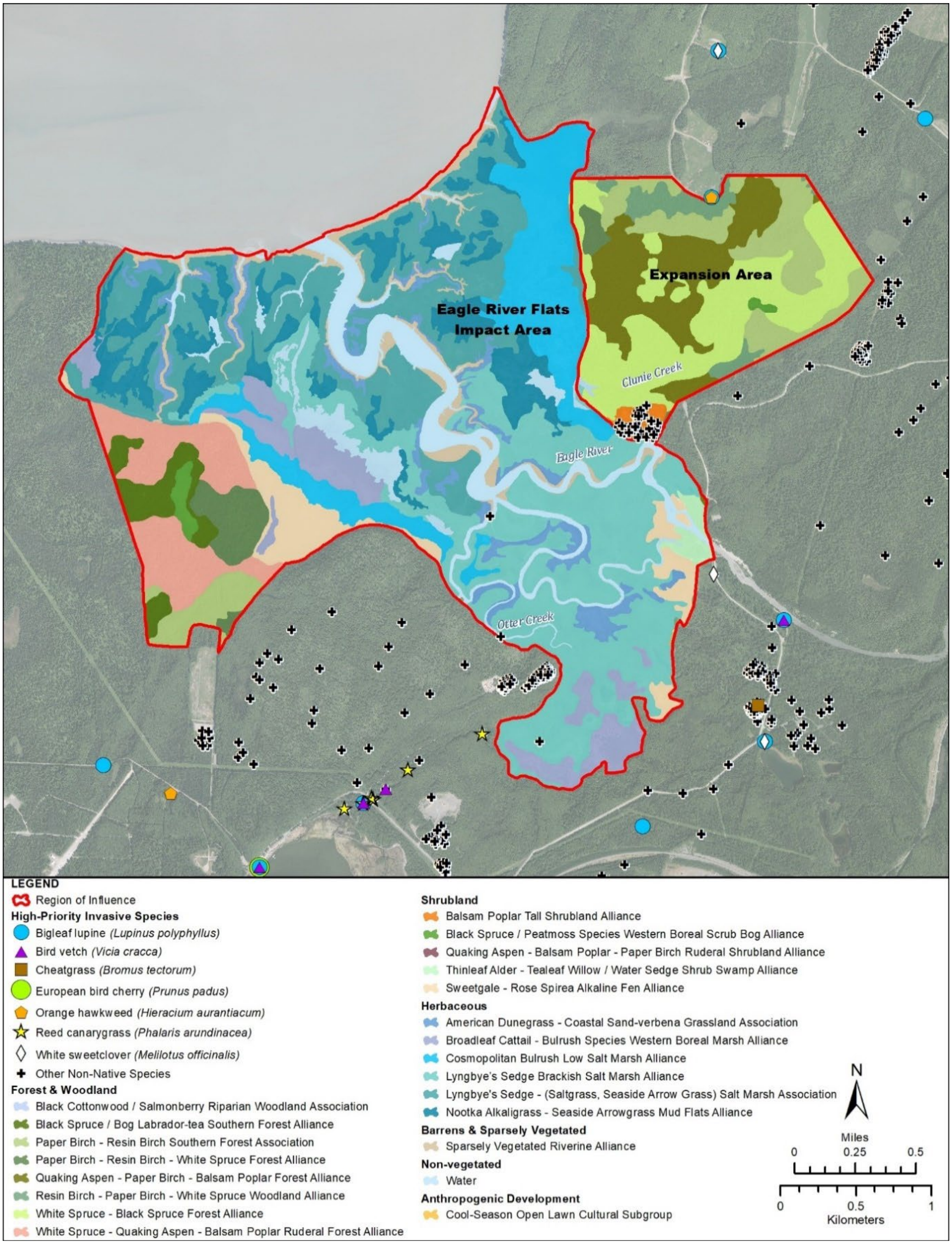
Vegetation

JBER and the vegetation ROI reside in the boreal forest transition, where climate and topography is intermediate between the interior boreal forest ecoregion to the north and the Pacific coastal mountain ecoregion to the southeast (Gallant et al. 1995). The boreal forest transition is characterized by level rolling terrain and proximity to the coast. Although extensively glaciated during the Pleistocene Epoch, the region is now largely permafrost-free (Jorgenson et al. 2008). The maritime climate results in a lower incidence of natural fire compared to interior forest (Gabriel and Tande 1983).

The ROI is composed of two different ecosystems: estuarine wetlands and upland forest. ERF-IA is primarily an estuary with some upland forest inclusions. The wetland complex occupying ERF is an expansive mosaic of unvegetated mudflats, distributary channels, and predominantly herbaceous communities comprising salt-loving (halophytic) to salt-tolerant species adapted to varying extents and periodicity of tidal inundation. Common species include salt-tolerant grasses, primarily Nootka alkaligrass (*Puccinellia nutkaensis*) and creeping alkaligrass (*Puccinellia phryganodes*) as well as a variety of sedges and forbs. Coastal sandy communities are dominated by the American dunegrass (*Leymus mollis*; syn. *Elymus arenarius* ssp. *mollis*).

Upland forests of ERF-IA and the proposed expansion area are characterized by forest communities with open to closed canopy cover dominated by white spruce, paper birch, and black cottonwood (*Populus balsamifera* spp. *trichocarpa*), with subdominant quaking aspen and black spruce (Table 3.8-1). Shrub communities comprising alder species (*Alnus* spp.) are common in mid-successional mesic sites, whereas willow species (*Salix* spp.) develop in wetter sites. Herbaceous communities dominated by the generalist grass bluejoint reedgrass (*Calamagrostis canadensis*) occupy early successional sites with disturbed or mineral soils (Jorgenson et al. 2003). There are also approximately 311 acres of non-vegetated land in the ROI. The forest, shrub, and herbaceous communities present in the ROI are shown in Figure 3.8-1. Detailed descriptions of these vegetation communities can be found in *Vegetation Classification and Mapping Joint Base Elmendorf Richardson, AK* (CEMML 2022). The CEMML (2022) map classes follow the Federal Geographic Data Committee (2008) U.S. National Vegetation Classification (USNVC) Standard. However, the USNVC classification of alliances and associations for Alaska is currently incomplete. Thus, many of the classes mapped by JBER to update the installation's vegetation map are considered provisional, as indicated in Table 3.8-1.

Figure 3.8-1 Forest, Shrub, and Herbaceous Communities and Invasive Plant Species in the ROI



Sources: JBER 2019c, 2020a, 2023c, 2023g

Table 3.8-1 Vegetation Communities and Non-Vegetated Land Cover in the Region of Influence

Vegetation Community/Land Cover Type	Area (acres)	Area of ROI (%)
Forest & Woodland	**856.9**	**28.2%**
Black Cottonwood / Salmonberry Riparian Woodland Association[1]	<0.1	<0.1%
Black Spruce / Bog Labrador-tea Southern Forest Alliance	56.5	1.9%
Paper Birch – Resin Birch – White Spruce Forest Alliance	59.3	1.9%
Paper Birch – Resin Birch Southern Forest Association	170.7	5.6%
Quaking Aspen – Paper Birch – Balsam Poplar Forest Alliance	155.4	5.1%
Resin Birch – Paper Birch – White Spruce Woodland Alliance	40.0	1.3%
White Spruce – Black Spruce Forest Alliance	233.3	7.7%
White Spruce – Quaking Aspen – Balsam Poplar Ruderal Forest Alliance	141.7	4.7%
Shrublands	**153.9**	**5.1%**
Balsam Poplar Tall Shrubland Alliance	17.5	0.6%
Black Spruce / Peatmoss Species Western Boreal Scrub Bog Alliance	14.8	0.5%
Quaking Aspen – Balsam Poplar – Paper Birch Ruderal Shrubland Alliance	<0.1	<0.1%
Sweetgale – Rose Spirea Alkaline Fen Alliance	104.1	3.4%
Thinleaf Alder – Tealeaf Willow / Water Sedge Shrub Swamp Alliance	17.5	0.6%
Herbaceous	**1,721.0**	**56.5%**
American Dunegrass – Coastal Sand-verbena Grassland Association[1]	113.8	3.7%
Broadleaf Cattail – Bulrush Species Western Boreal Marsh Alliance	139.8	4.6%
Cosmopolitan Bulrush Low Salt Marsh Alliance	256.2	8.4%
Lyngbye’s Sedge Brackish Salt Marsh Alliance	555.4	18.2%
Lyngbye's Sedge – (Saltgrass, Seaside Arrow Grass) Salt Marsh Association[1]	437.8	14.4%
Nootka Alkaligrass – Seaside Arrowgrass Mud Flats Alliance	218.1	7.2%
Anthropogenic Development	**<0.1**	**<0.1%**
Cool-Season Open Lawn Cultural Subgroup[1]	<0.1	<0.1%
Barrens & Sparsely Vegetated	**86.7**	**2.8%**
Sparsely Vegetated Riverine Alliance	86.7	2.8%
Non-Vegetated	**224.9**	**7.4%**
Water	224.9	7.4%
Total	3,043.5	100.0%

Note: [1]Vegetation types published in USNVC (2023). All other types are provisional.

Key: ROI = Region of Influence

Invasive Plant Species and Plant Pathogens

Globally, invasive species can have severe impacts on local biodiversity, community structure and function, and natural resources, with consequences for the greater ecosystem, economy, and human health (Duncan et al. 2004; Molnar et al. 2008; Cameron et al. 2016). Several invasive plant species are known to occur in or near JBER and the ROI (Figure 3.8-1), some of which are ranked as highly to extremely invasive in this region of Alaska (Carlson et al. 2008; Nawrocki et al. 2011) or are listed as high priority for management for JBER (Johnson 2019). The invasive species of greatest management concern documented in or adjacent to the ROI are orange hawkweed (*Hieracium aurantiacum*), reed canarygrass (*Phalaris arundinacea*), and white sweetclover (*Melilotus albus*). Orange hawkweed establishes as dense monoculture at the expense of native plants and occurs in the ROI at the southern terminus of the Installation Platoon Battle Course. Reed canarygrass, a known invader of fresh to brackish wetland habitat, is documented from Otter Lake and the headwaters of Otter Creek, which joins Eagle River in ERF-IA. White sweetclover, which thrives in fine-grained mineral soil found along early successional river systems and in road dust corridors, occurs at the mouth of Eagle River at its entrance to ERF-IA. Invasive species may be introduced or spread to disturbed areas during project activities if BMPs are not applied.

Plant pathogens, which can be particularly damaging to vegetation, include a wide variety of insects and diseases that are grouped by the part of the plant they attack (e.g., leaves [defoliators] or bark [bark beetles]). While natural pathogens evolve with their host, introduced plant pathogens can be particularly damaging because host vegetation lacks genetic resistance. Introduced pathogens can cause host plant mortality and are often highly mobile organisms that can spread over large distances quickly (USFS 2008). Spruce beetle (*Dendroctonus rufipennis*), a native plant pathogen that is presumed to occur in the ROI, is discussed in Section 3.16.

Fish

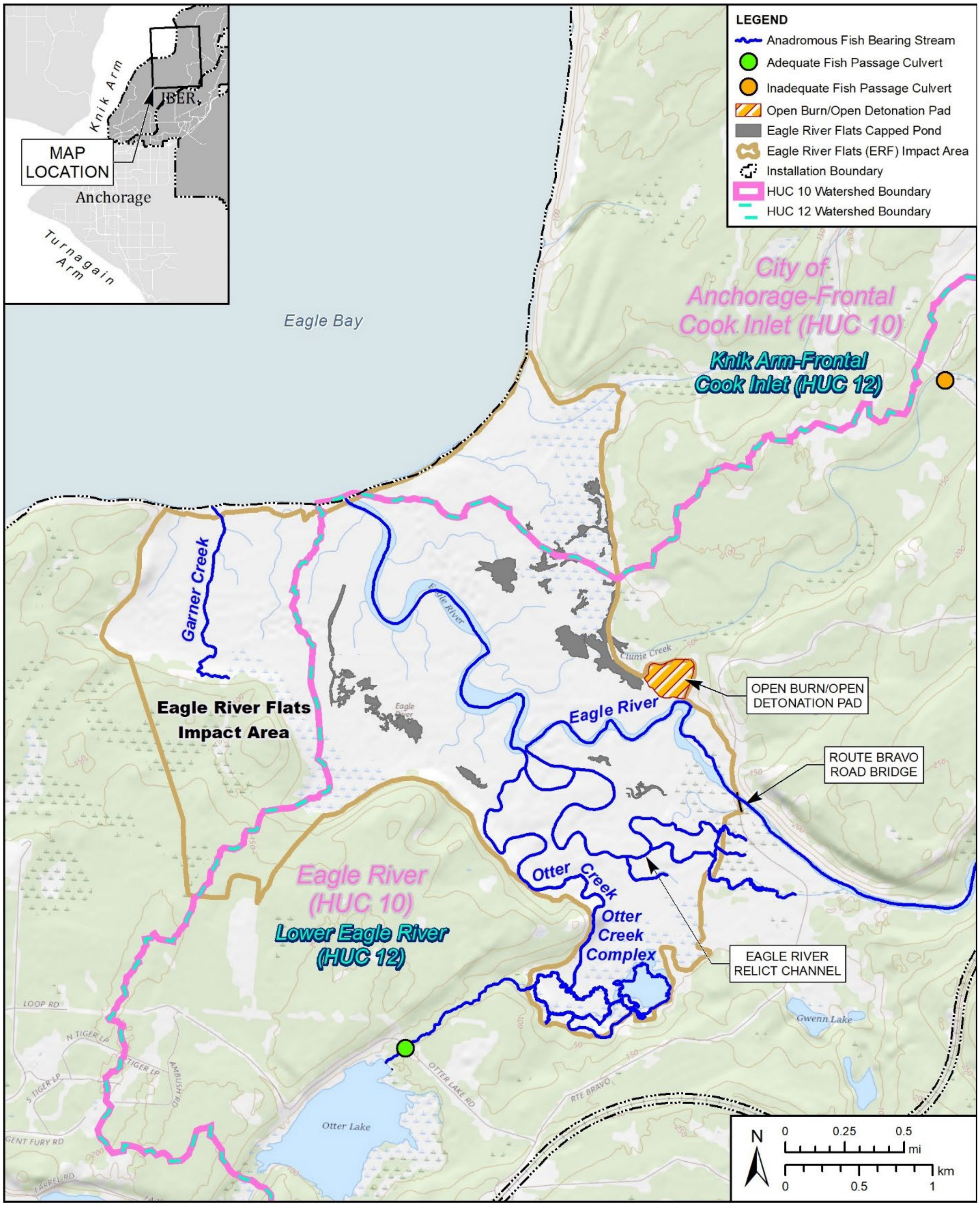
The major waterbodies in the ROI that support fish and their habitats are Eagle River, Otter Creek, and Eagle Bay (in Knik Arm of Upper Cook Inlet) (Figure 3.8-2). More than 20 different fish species have been observed in or adjacent to JBER waterbodies (Table 3.8-2). Eagle River, Otter Creek, and their tributaries within the ROI support rearing and migration of anadromous salmonids.

Fishes are not distributed uniformly throughout the ROI but are closely associated with a variety of aquatic habitats. Freshwater life stages of adult and juvenile salmon and resident trout are distributed according to aquatic habitats such as pools and riffles in the riverine and stream environments (above tidal influence), whereas estuarine and marine fish, such as adult salmon, groundfish, forage fishes, and sticklebacks, are widely distributed in the tidally affected riverine reaches and nearshore environment. Even within species, the distribution and specific habitats in which individuals occur may be influenced by age, developmental stage, size, sex, reproductive condition, health, and other factors.

Fish Habitats

Juvenile salmonids are likely most abundant in the main channels of waterbodies. Eagle River and Otter Creek are fairly channelized and provide a constant source of water with good foraging opportunities. However, juveniles of some species, such as coho and sockeye, may also occur within tidal marsh complexes (e.g., Otter Creek and Eagle River relict channels) on a seasonal or year-round basis when hydrology and water quality conditions are suitable. In addition, flats and wetland areas adjacent to Eagle River may have year-round, seasonal, or diurnal (tidal) ponded areas that may connect to receiving waters and provide rearing for various fish species during flooding events. For example, threespine stickleback (*Gasterosteus aculeatus*) are commonly observed in the shallow mudflat ponds at ERF.

Figure 3.8-2 Fish Habitat in the Region of Influence



Sources: JBER 2019b, 2020a, 2020c, 2023b, 2023g; USGS 2020; AECOM 2020d

Table 3.8-2 Documented Fish Presence and Designated EFH in the Region of Influence

Common Name (*Scientific Name*)	CSU 2017 Eagle Bay Fish Presence[1,a]		Pentec 2004-2005 Eagle Bay Fish Presence[2,b]		D&M 1983 Knik Arm Study[3]	Fish Presence at JBER[4]	Designated EFH[5]	
	No.	%	Beach Seine[c]	Tow Net[d]			Knik Arm	Eagle River/ Otter Creek
Juvenile Salmonids								
Chinook salmon (*Oncorhynchus tshawytscha*)	31	1.2	X	X	X	X	X	X
Chum salmon (*Oncorhynchus keta*)	90	3.5	X	X	X	X	X	X
Coho salmon (*Oncorhynchus kisutch*)	62	2.4	X	X	X	X	X	X
Pink salmon (*Oncorhynchus gorbuscha*)	265	10.4	X	X	X	X	X	X
Sockeye salmon (*Oncorhynchus nerka*)	14	0.6	X	X	X	X	X	X
Unknown salmonid	15	0.6						
Total Juvenile Salmon	477	18.8						
Adult Salmonids								
Chinook salmon (*Oncorhynchus tshawytscha*)	3	0.1				X	X	X
Chum salmon (*Oncorhynchus keta*)	29	1.1				X	X	X
Coho salmon (*Oncorhynchus kisutch*)	2	0.1	X			X	X	X
Pink salmon (*Oncorhynchus gorbuscha*)	8	0.3				X	X	X
Sockeye salmon (*Oncorhynchus nerka*)	30	1.2	X			X	X	X
Rainbow trout (*Oncorhynchus mykiss*)	2	0.1			X	X		
Dolly Varden (*Salvelinus malma*)	21	0.8	X		X	X		
Total Adult Salmon	95	3.7						
Groundfish								
Walleye pollock (*Gadus chalcogrammus*)	3	0.1				X		
Starry flounder (*Platichthys stellatus*)	36	1.4			X	X	X[e]	
Saffron cod (*Eleginus gracilis*)	12	0.5	X		X	X		
Pacific tomcod (*Microgadus proximus*)	-	-				X		
Pacific staghorn sculpin (*Leptocottus armatus*)	4	0.2	X		X	X		
Unknown juvenile gadid	4	0.2						

Common Name (*Scientific Name*)	CSU 2017 Eagle Bay Fish Presence[1,a]		Pentec 2004-2005 Eagle Bay Fish Presence[2,b]		D&M 1983 Knik Arm Study[3]	Fish Presence at JBER[4]	Designated EFH[5]	
	No.	%	Beach Seine[c]	Tow Net[d]			Knik Arm	Eagle River/ Otter Creek
Slimy sculpin (*Cottus cognatus*)	-	-				X		
Alaska plaice (*Pleuronectes quadrituberculatus*)	-	-					X	
Dover sole (*Solea solea*)	-	-					X	X
Flathead sole (*Hippoglossoides elassodon*)	-	-					X	
Northern/Southern rock sole (*Lepidopsetta polyxystra/L. bilineata*)	-	-					X	
Pacific cod (*Gadus macrocephalus*)	-	-					X	
Rex sole (*Glyptocephalus zachirus*)	-	-					X	
Yellowfin sole (*Limanda aspera*)	-	-			X		X	
Forage Fishes								
Eulachon (*Thaleichthys pacificus*)	40	1.6	X		X	X	X	
Longfin smelt (*Spirinchus thaleichthys*)	67	2.6	X		X	X	X	
Pacific herring (*Clupea pallasi*)	2	0.1	X		X	X		
Snake prickleback (*Lumpenus sagitta*)	1	0.0				X	X	
Other Fishes								
Threespine stickleback (*Gasterosteus aculeatus*)	1,125	44.3	X	X	X	X		
Ninespine stickleback (*Pungitius pungitius*)	659	25.9	X		X	X		
Snailfish (*Liparis* spp.)	15	0.6	X		X	X		
Bering cisco (*Coregonus laurettae*)	1	0.0			X	X		
Grand Total	***2,541***	***100***						

Notes:
[a] Beach seine surveys from May–November 2017 at mouth of Eagle River in Eagle Bay.
[b] Fish presence based on sampling sites in or adjacent to Eagle Bay.
[c] Beach seine surveys from July–November 2004 and April–July 2005.
[d] Tow net surveys from April–July 2005.
[e] Starry flounder EFH is part of the shallow water flatfish complex, which has designated EFH in Knik Arm.

Key: CSU = Colorado State University; D&M = Dames & Moore; EFH = Essential Fish Habitat; JBER = Joint Base Elmendorf-Richardson

Sources**:** [1]Schoofs et al. 2018; [2]Pentec Environmental 2005; [3]Dames & Moore 1983; [4]Schoofs et al. 2018; NPFMC 2020; Weber and Seigle 2020a, b; ADF&G 2022a; JBER 2023a; [5]NPFMC et al. 2021; NMFS 2022a, b

Clunie Creek, an intermittent stream in the proposed expansion area, drains Clunie Lake and other small ponds among the moraines northeast of ERF-IA. Clunie Creek lacks a permanent surface water connection to Eagle River, as the stream channel goes subterranean before reaching ERF. The stream reach in the proposed expansion area has been found to support slimy sculpin (*Cottus cognatus*) but no salmonids or other fish species (Schoofs and Zonneville 2016). Garner Creek at the northwestern portion of ERF-IA is known to support salmonids. The creek originates in the lowland gravelly moist needleleaf forest ecotype, northwest of ERF, and empties into Eagle Bay. Fish use of Eagle River, Otter Creek/Otter Lake, and Eagle Bay is summarized in the subsections that follow, with more detailed information provided in the EFH Assessment (Appendix E).

Eagle River

Eagle River is known to support all five Pacific salmon species (Chinook, chum, coho, pink, and sockeye salmon) (ADF&G 2022a, 2022b; JBER 2023a). Adult salmon migrate upriver within Eagle River to spawning areas outside of ERF-IA (e.g., Upper Otter Creek, Upper Eagle River, and tributaries). Adult salmon migration and juvenile rearing has been observed in Eagle River, but spawning has not been documented in ERF-IA (ADF&G 2022a, 2022b; JBER 2023a). The lower portion of Eagle River in ERF-IA consists of silt substrate and does not provide suitable spawning habitat.

Since 2012, JBER has conducted annual salmon enumeration studies on Eagle River to establish a baseline for salmon escapement and run timing (Weber and Seigle 2020a; AERC 2021, 2022b). The studies are conducted from mid-May to mid-October just upstream from ERF and are designed to encompass the majority of the run timing for adult salmonids. Please refer to the EFH Assessment (Appendix E) for methodologies and findings from JBER's ongoing salmon escapement studies in Eagle River. General timing periods of use for adult and juvenile salmon in the ROI have been identified based on annual monitoring efforts and are provided in Tables 3.8-3 and 3.8-4. Chinook salmon (*Oncorhynchus tshawytscha*) are the first and least abundant salmon species to return to Eagle River each year. The Chinook run generally begins in mid-May and is completed by early July. Sockeye salmon (*Oncorhynchus nerka*) are the second salmon species to return, with run timing from late June through August. Adult chum (*Oncorhynchus keta*) and pink salmon (*Oncorhynchus gorbuscha*) tend to return at the end of July, with the pink run complete by the end of August and the chum run ending in the first part of September. Coho salmon (*Oncorhynchus kisutch*) return to Eagle River around the end of July, and the run continues through September.

During a recent (2007 to 2011) study of portions of Eagle Bay and the tidally influenced reaches of Eagle River, Otter Creek, and Garner Creek in the northwestern portion of ERF, the most prevalent species collected included adult salmon species (coho, sockeye, chum, and pink) and juvenile coho. Other fish captured in lesser numbers included Chinook salmon, Dolly Varden (*Salvelinus malma*), threespine stickleback, slimy sculpin, starry flounder (*Platichthys stellatus*), saffron cod (*Eleginus gracilis*), eulachon (*Thaleichthys pacificus*), snailfish (*Liparis* spp.), and sand shrimp (*Crangon* spp.) (unpublished data, cited in Schoofs et al. 2018).

The Eagle River relict channel connects to a large complex of small tributaries and vegetated wetlands that have been recently found to provide off-channel rearing habitat for juvenile salmonids (JBER unpublished data). These findings have been documented as part of an ongoing study to investigate potential year-round residency and overwintering of juvenile salmonids within the eastern portion of ERF where habitat use was previously unknown. During June and August 2023, juvenile coho, Chinook, and sockeye salmon were captured in small tributaries connected to the relict channel and treeline. Portions of ERF are known to provide year-round hydrology (fresh and brackish water) and vegetated cover that provide refugia and foraging opportunities for young juvenile salmon. Because the study is ongoing, it is assumed that rearing salmonids could be present in all connected channels; however, presence and abundance of fish during specific firing activities cannot be determined.

Table 3.8-3 Summary of Adult Salmon Migration Timing in the Region of Influence

Species	Time of Year					
	May	Jun	Jul	Aug	Sep	Oct
Chinook						
Sockeye						
Pink						
Chum						
Coho						

Notes: Dark bars indicate peak migration periods; light bars represent estimated total period of occurrence. Timing is based on Eagle River data.
Sources: Johnson et al. 2015; Johnson and Bottom 2016; Schoofs et al. 2018; Weber and Seigel 2020a, 2020b; JBER 2023a

Table 3.8-4 Summary of Juvenile Salmon Rearing and Migration in the Region of Influence

Species	Time of Year											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Chinook												
Sockeye												
Pink												
Chum												
Coho												

Notes: Dark bars indicate peak presence, which includes emigration and rearing, while lighter-colored bars represent general rearing presence. This table incorporates general and site-specific information and applies to all waterways within the project area.
Sources: Moulton 1997; Schoofs et al. 2017, 2018; Bogan et al. 2018, 2019; JBER 2019c; NPFMC et al. 2021

Otter Creek and Otter Lake

Adult salmon historically used Otter Creek to migrate into Otter Lake, but access was impeded starting in the 1960s by a series of beaver (*Castor canadensis*) dams in Otter Creek, a culvert beneath Otter Lake Road with insufficient flow for fish passage, and a concrete weir that blocked fish passage at the lake outlet. ADF&G stocked Otter Lake with rainbow trout (*Oncorhynchus mykiss*) until 2006 and resumed stocking the lake in 2016 (Schoofs et al. 2017). Northern pike (*Esox lucius*) was illegally introduced into the lake in around 2000 (POA 2011, cited in Weber and Seigle 2020a).

From 2015 to 2017, JBER and ADF&G conducted the Otter Lake/Creek Restoration Project to remove northern pike, remove obstructions to salmon passage, enhance spawning habitat, and reintroduce salmon to the system. Adult coho salmon were observed in Otter Lake in 2017, as well as both coho and sockeye in 2018, suggesting that habitat restoration efforts were successful (Weber and Seigle 2020a).

Adult coho, sockeye, and chum have been observed spawning in the upper reaches of Otter Creek (ADF&G 2022b; JBER 2023a). Rearing juvenile salmonids have been found in Otter Creek, from the lower tidally influenced reaches (in ERF-IA) to as far upstream as Otter Lake (Weber and Seigle 2020a; ADF&G 2022b; JBER 2023a). Other fish species documented in Otter Creek include threespine and ninespine stickleback (*Pungitius pungitius*), slimy sculpin, Dolly Varden, and rainbow trout. These species are presumed to migrate upstream from Eagle River or downstream from Otter Lake (rainbow trout).

Juvenile rearing coho salmon have been documented in freshwater and intertidal areas of Otter Creek and intertidal tributaries to Otter Creek (Bogan et al. 2019), and the intertidal channels and backwater ponds connected to Otter Creek at the southern portion of ERF-IA have been found to provide high-quality rearing and refugia habitat for juvenile coho salmon throughout the year.

The intertidal, backwater areas connected to Otter Creek in ERF support overwintering salmon during a critical developmental period when there is low food availability and reduced dissolved oxygen (JBER 2019c). Further study is necessary to determine other areas in ERF that may provide overwintering habitat for juvenile salmonids.

Eagle Bay

Studies over the past 40 years have shown that Eagle Bay supports all five species of Pacific salmon and a variety of other salmonid, groundfish, and forage fishes, including rainbow trout, Dolly Varden, arctic char (*Salvelinus alpinus*), saffron cod, eulachon, starry flounder, Pacific herring (*Clupea pallasii pallasii*), Pacific staghorn sculpin (*Leptocottus armatus*), slimy sculpin, longfin smelt (*Spirinchus thaleichthys*), snailfish, Pacific tomcod (*Microgadus proxims*), threespine stickleback, ninespine stickleback, polychaete worms, and sand shrimp (Table 3.8-2; Dames & Moore 1983; Pentec Environmental 2005; Schoofs et al. 2018).

Based on fish sampling conducted at the mouth of Eagle River between early May and November 2017, fish presence is greatest during spring and early summer (May through July), with an apparent decline in species diversity and abundance as winter approaches (Schoofs et al. 2018). The most numerous species captured were threespine stickleback and ninespine stickleback, followed distantly by juvenile pink, coho, and chum salmon and longfin smelt. Juvenile salmon were present during all 7 months of the study, while adults were present during most months from June to October (Schoofs et al. 2018).

Although not documented during recent surveys, groundfish in Eagle Bay may also include Alaska plaice (*Pleuronectes quadrituberculatus*), Dover sole (*Microstomus pacificus*), flathead sole (*Hippoglossoides elassodon*), northern rock sole (*Lepidopsetta polyxystra*), southern rock sole (*Lepidopsetta bilineata*), Pacific cod (*Gadus macrocephalus*), rex sole (*Glyptocephalus zachirus*), and yellowfin sole (*Limanda aspera*) (NPFMC 2020; NMFS 2022a).

<u>Fish Prey Base</u>

Abundance and diversity of macroinvertebrates are indicators of stream health, as macroinvertebrates are particularly sensitive to physical, chemical, and biological conditions. The invertebrate orders Ephemeroptera, Plecoptera, and Trichoptera indicate high water quality when present. More than 60 invertebrate species, including midges, mayflies, stoneflies, caddisflies, amphipods, clams, and daphnia have been observed on JBER (JBER 2023a).

Based on a comprehensive survey of benthic macroinvertebrates on JBER during 2015 to 2017, various macroinverbrates are known to inhabit the mouth of Eagle River, including *Crangon* spp*.,* polychaetes, amphipods, and isopods (Schoofs and Zonneville 2016; Schoofs et al. 2017; Schoofs et al. 2018). In general, macroinvertebrate abundance is greatest in July and then gradually decreases throughout the late summer and fall, with a notable increase in October. Invertebrates typical of shorelines in central and lower Cook Inlet are largely absent on the beaches of Knik Arm (Pentec Environmental 2005). Density of invertebrates (mostly amphipods, mysids, and crangonids) on beaches is low in late fall and early spring but increases steadily during the open water season and remains high from August through October (Pentec Environmental 2005).

During a habitat study in Eagle River and Otter Creek, benthic invertebrates in nine families and genera, from the orders Plecoptera, Ephemeroptera, Diptera, and Amphipoda, were documented, with more taxa collected at sites above ERF and tidally influenced stations. The sensitivity of taxa in Eagle River reflected a healthy, unpolluted lotic system, with no highly tolerant taxa collected at any station (Schoofs et al. 2018).

A 2018 juvenile coho dietary study determined that the prey base for coho in the intertidal reaches includes organisms drifting downstream, as well as organisms originating from tidal waters and riparian vegetation (Bogan et al. 2019). Further details on macroinvertebrates in the ROI are provided in the EFH Assessment (Appendix E).

Terrestrial Wildlife

Mammals

Moose (*Alces alces*), an important managed species in southcentral Alaska, are widespread on JBER. The species draws great interest among hunters and wildlife viewers. Moose occurring on JBER are considered part of the larger Game Management Unit 14C population managed by ADF&G. As of 2017, it was estimated that 30 to 250 moose are present on JBER (JBER 2019c), depending on the season, and that higher moose abundance occurs during calving in late spring. Recently, lack of snow during the short sampling window has limited effective aerial surveys for moose. Moose generally favor habitats with willow, aspen, birch, and cottonwood (USAF 2017a). JBER moose management is focused on striking a balance between moose hunting and viewing opportunities, concerns about severe over-browsing in primary wintering areas, moose–vehicle collisions, loss of habitat due to development, and conflicts with people and pets (JBER 2023a). Historically, deep winter snow conditions have resulted in substantial winter moose mortality (Battle and Stantorf 2018). An average of 51 moose were harvested annually between 2001 and 2016 by hunters, and several moose are killed on the installation each year due to vehicle collisions (JBER 2023a). Based on modeling of moose use of JBER (LeBeau et al. 2014), ERF-IA was modeled as "low" for moose use in both summer/winter habitat, and portions of the proposed expansion area were modeled as "high" for moose use.

Both black (*Ursus americanus*) and brown bear (*Ursos arctos*) occur on JBER. Although current abundances are unknown, a nuisance study in the late 1990s estimated that approximately 35 to 42 black bears resided on JBER. A study conducted from 2005–2007 indicated that the minimum number of brown bears using JBER lands was 15, and it is likely more are present (JBER 2023a). Black bear numbers likely fluctuate little throughout the year, as they typically have small home range sizes relative to other larger mammals. Nuisance bears and sightings on the base suggest a stable to abundant population. While the population of bears specifically using JBER land is unknown, an estimated 250 black bears and 55–65 brown bears live in the Anchorage area (between the Knik River and Portage), including Chugach State Park and JBER (JBER 2023a).

Hunting for black bear on JBER began in spring 2017, with one to four black bears harvested annually from 2017 to 2021 (JBER 2023a). Brown bears are typically most abundant on JBER during mid to late summer, when salmon runs are at their peak. While bears typically occupy a variety of habitats, bears on JBER have displayed a strong dependence on salmon streams, maintaining a minimum distance of less than 1 kilometer and often found within 10 meters of streams (Farley et al. 2008). Bears on JBER also show a preference for undeveloped habitats (Farley et al. 2008).

Both bear species regularly use ERF-IA throughout the year and are often associated with Eagle River when salmon are present. Brown bears have been observed using the northeast boundary of ERF-IA and portions of the proposed expansion area as a travel corridor. Numbers of both bear species are likely lowest in the fall, when some bears travel to higher elevations to feed on berries or den. Brown bears have been observed to use ERF-IA but seem to prefer the coastal bluffs and banks of Eagle River for travel and feeding (Farley et al. 2008). While brown bears typically den at higher elevations, at least four bears were documented denning on military lands during a 2005 to 2008 study, including one that denned north of Glenn Highway less than 1,200 meters from the Elmendorf Runway (Farley et al. 2008). Additionally, in fall of 2019, a brown bear was collared and denned within the Clunie Creek drainage south of Route Bravo (C. Brandt, personal communication, 1 February 2024).

Dall sheep (*Ovis dalli*) occur in the alpine and mountainous areas of JBER, and given their preference for alpine environments are unlikely to use ERF-IA or the proposed expansion area.

Based on tracking studies of wolves (*Canis lupis*) near JBER, preliminary home range estimates suggest that there are at least two distinct wolf packs on JBER: the Ship Creek Pack in the southern portion of the installation and the North Post in the northern portion of the installation (JBER 2023a). Wolves use a variety of habitats and are more likely to avoid human disturbances than they are to prefer specific habitat types (Stricker et al. 2019). However, denning habitats tend to be close to water, far from roads, and in undeveloped areas (Stricker et al. 2019). Much of the installation north and east of ERF-IA fits this description, and extensive wolf use in areas east of the impact area has been documented (Saalfeld and Shreve 2020). Wolves are known to have denned and raised pups near the ROI (USAF 2017a), including a wolf den just east of ERF-IA (Saalfeld and Shreve 2020). Management and monitoring of the wolf population on JBER has recently garnered increased interest, both due to wolves' impact on moose populations and general risk to public safety. Aggressive behavior by wolves on JBER resulted in the removal of nine wolves in 2011 (Battle and Stantorf 2018). While it is difficult to determine the total number of wolves on JBER, a minimum count of 11 wolves in the Ship Creek Pack and 4 wolves in the North Post Pack was obtained in 2022 (JBER 2023a). Populations of wolves in the greater Game Management Unit 14C are thought to be at sustainable levels (Battle and Stantorf 2018).

Furbearers found on JBER include species such as beaver, river otter (*Lutra canadensis*), muskrat (*Ondatra zibithica*), ermine or short-tailed weasel (*Mustela erminea*), red fox (*Vulpes vulpes*), coyote (*Canis latrans*), wolf, lynx (*Lynx canadensis*), mink (*Mustela vison*), marten (*Martes americana*), and wolverine (*Gulo gulo*) (JBER 2023a). Red fox are relatively common throughout the installation; coyote are often found near housing areas and the airfield; beavers are common in most waterbodies; and muskrats and river otters are known to use Eagle River and other waterbodies on the installation and are very active in ERF-IA, particularly within the Otter Creek complex. Although marten and wolverine are more common near the Chugach Mountains portion of JBER, both species have been documented throughout the JBER training lands, including the coast along the boundary of base.

Small mammals found on JBER include the snowshoe hare (*Lepus americanus*), porcupine (*Erethizon dorsatum*), arctic ground squirrel (*Spermophilus parryi*), hoary marmot (*Marmota caligata*), collared pika (*Ochotona collaris*), red squirrel (*Tamiasciurus hudsonicus*), northern redback vole (*Myodes rutilus*), meadow vole (*Microtus pennsylvanicus*), tundra vole (*Microtus oeconomus*), meadow jumping mouse (*Zapus hudsonicus*), house mouse (*Mus musculus*; non-native), common shrew (*Sorex cinereus*), tundra shrew (*Sorex tundrensis*), montane shrew (*Sorex monticolus*), pygmy shrew (*Sorex hoyi*), northern water shrew (*Sorex palustris*), and northern flying squirrel (*Glaucomys brinus*) (JBER 2023a). Various small mammals that use forested habitats, such as the northern flying squirrel, red squirrel, and porcupine, are likely to be found in the proposed expansion area. Similarly, small mammals associated with wetland or marshes, such as meadow jumping mouse and meadow vole, are also present in portions of ERF-IA.

Little brown bats (*Myotis lucifugus*), occur throughout southcentral Alaska, including on JBER (JBER 2023a). Maternity roosts of the species are typically documented in association with buildings or other anthropogenic structures, but bats have been documented roosting in a variety of natural features as well (caves, rocks, trees, etc.) (Winters et al. 2014). At least two maternity roosts have been documented on JBER in association with buildings (JBER 2023a). The species likely uses the surrounding forested lands (including portions of ERF-IA and the proposed expansion area) for roosting, and nearby open areas with aquatic habitats (like ERF-IA) are likely used for foraging.

<u>Avian Species</u>

JBER supports a diverse assemblage of birds. More than 140 species of birds have been observed throughout the installation (McDuffie 2018, 2021a, 2021b; McDuffie and Johnson 2019; JBER 2023a). Additionally, nesting has been documented for more than 60 species on JBER, and 18 species are considered rare (JBER 2023a). Birds can be found during all seasons but are likely to be at their highest densities during migration and breeding seasons (USFWS 2021). In general, JBER's bird breeding season occurs from 1 May to mid-July, and migration occurs both before and after this period (USAF 2016b, cited in USAF 2017a).

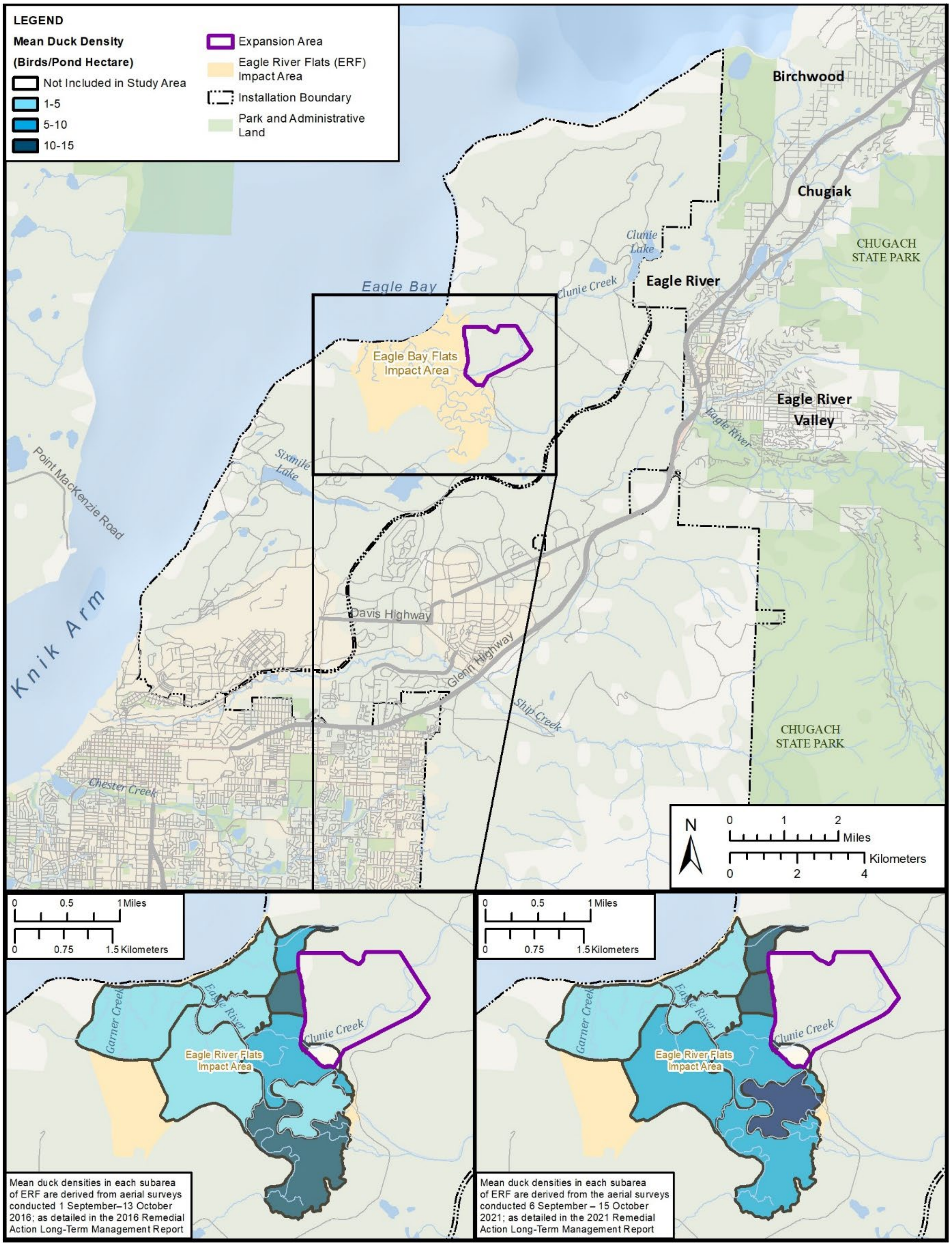
Waterfowl and Geese

A waterfowl concentration area is located immediately adjacent to JBER in the upper reaches of Cook Inlet, where vast numbers of waterfowl stage during spring (late April to early June) and fall (mid-August to mid-October) migrations before moving to nesting or wintering areas (CH2M Hill 1994). An estimated 1 million waterfowl pass over or near the installation during spring migration, and 1.2 million during fall migrations (USARAK 2004). Salt marsh habitat suitable for foraging and staging for migrating waterfowl is limited in Upper Cook Inlet (McDuffie 2018). Consequently, the shallow ponds, bogs, wetlands, and coastal marsh habitat provided by ERF-IA are used extensively by migrating waterfowl.

Aerial surveys of ERF-IA (1997–2012, 2016, and 2021) documented the highest concentrations of ducks in the central portion of the impact area west of Eagle River, followed by the inland portions in the northeast corner of ERF-IA (USAF 2022a). During surveys in 2021, the highest concentration of ducks was observed in the eastern portion of ERF, generally east of Eagle River (USAF 2022a). Therefore, the spatial distribution of migrating waterfowl in the ROI may change from year to year (Figure 3.8-3). While the vast majority of waterfowl use ERF-IA for staging, a small percentage of ducks nest there, and waterfowl nests are common. Lower abundances of dabbling ducks (i.e., ducks that feed by tipping up rather than diving) observed at JBER in recent years may be due to many factors, including flyway/migration route changes, military training activities, survey techniques, or unintentional hazing by the survey crew (USAF 2022a). Figure 3.8-4 shows the estimated population of dabbling ducks in ERF since 1996.

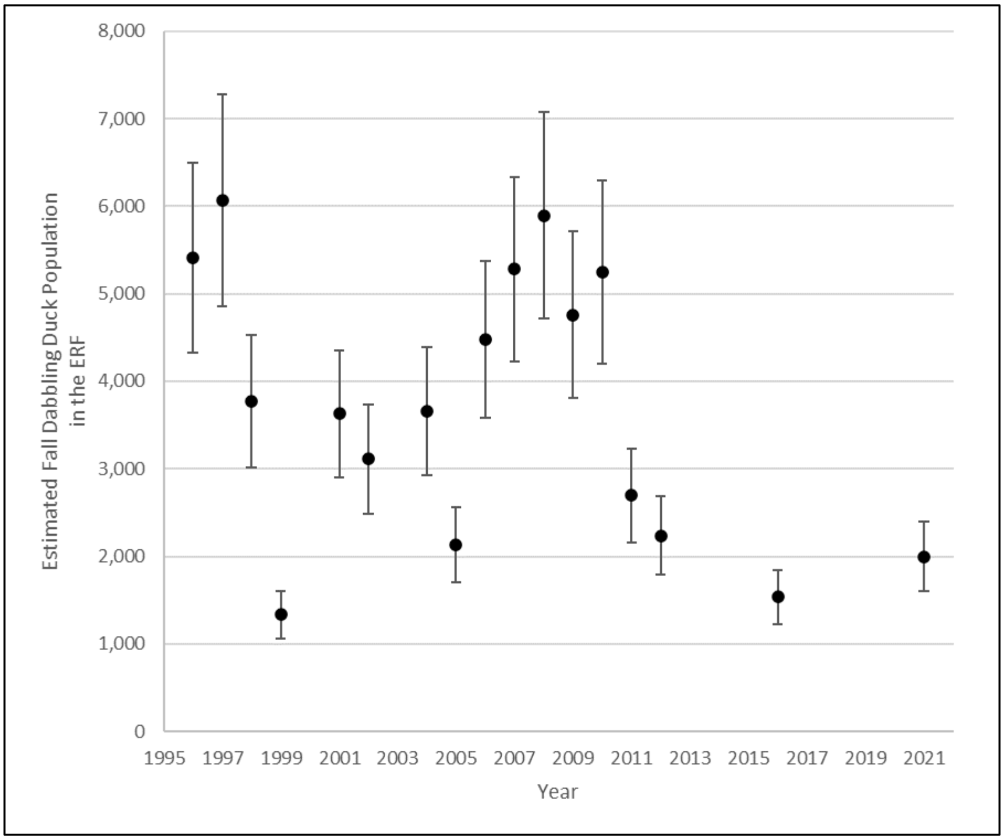
Mallard (*Anas platyrhynchos*) are the most common duck species found on JBER and in ERF. Breeding populations of American widgeon (*Mareca americana*), green-winged teal (*Anas crecca*), Barrow's goldeneye (*Bucephala islandica*), and northern pintail (*Anas acuta*) also occur on JBER (JBER 2023a) and are regularly seen alongside northern shovelers (*Spatula clypeata*) and ring necked ducks (*Aythya collaris*) during aerial surveys in ERF (USAF 2022b). Diving ducks, such as scaup (*Aythya* spp.*)* and white-winged scoters (*Melanitta fusca*) are occasionally observed but prefer deeper water not typically found in ERF. Cackling geese (*Aythya collaris*), greater white-fronted geese (*Anser albifrons*), and snow geese (*Anser caerulescens*) are occasionally seen. Canada geese (*Branta canadensis*) are common on JBER, although they are becoming more uncommon (a result of a Bird/Wildlife Aircraft Strike program designed to reduce the risk birds represent to aircraft). Trumpeter swans (*Cygnus buccinator*) nest at Otter and Sixmile Lakes, and tundra swans (*Cygnus columbianus*) occasionally stage in ERF and on JBER lakes (JBER 2023a). Steller's eiders (*Polysticta stelleri*), which are listed as threatened under the ESA, have been documented in the Cook Inlet region but are incidental and have never been documented in ERF.

Figure 3.8-3 Bird Concentration Areas during Spring/Fall Migration at ERF-IA



Sources: USAF 2017b, 2022a; JBER 2020a, 2023b, 2023c

Figure 3.8-4 Estimated Fall Dabbling Duck Population in ERF From 1997–2021 Aerial Census Surveys



Note: Error bars (+/- 20%) represent the population estimate range (USAF 2022a).

Waterbirds, Shorebirds, and Seabirds

Red-necked grebes (*Podiceps grisegena*) are the most common breeding grebe on JBER, although horned grebes (*Podiceps auritus*) also migrate through the area. Common (*Gavia immer*) and Pacific (*Gavia pacifica*) loons are known to nest on six JBER lakes (the lake nearest to ERF is Otter Lake), and red-throated loons (*Gavia stellate*) migrate through the area. Typically, five pairs of common and one pair of Pacific loons are present on JBER lakes in a given season (JBER 2023a).

Shorebirds are most common near Lower and Upper Sixmile Lakes and in ERF. Greater yellowlegs (*Tringa melanoleuca*), lesser yellowlegs (*Tringa flavipes*), and Wilson's snipe (*Gallinago delicata*) are the most abundant species on JBER. Spotted sandpipers (*Artitus macularia*) and semi-palmated plovers (*Charadrius semipalmatus*) are also common. Sandhill cranes (*Grus canadensis*) nest in ERF and have been observed in JBER bogs and fens. Gulls and terns include common gulls (*Larus canus*) and short-billed gulls (*Larus brachyrhynchus*) (formerly collectively called "mew gulls"), herring gulls (*Larus argentatus*), Bonaparte's gulls (*Larus philidelpia*), and arctic terns (*Larus philidelpia*). Arctic terns, herring gulls, and Bonaparte's gulls commonly nest on JBER. Gulls and terns are commonly found along the JBER shoreline in summer, and throughout ERF.

Craters created by past munition detonations in ERF-IA provide habitat for bloodworms (fly larvae) and mosquitoes. Shorebirds have been observed perching on the edges of the craters, feeding on bloodworms and other insects. Additionally, dowitchers (*Limnodromous* spp.) have been found to nest on the rims of craters (JBER 2019d).

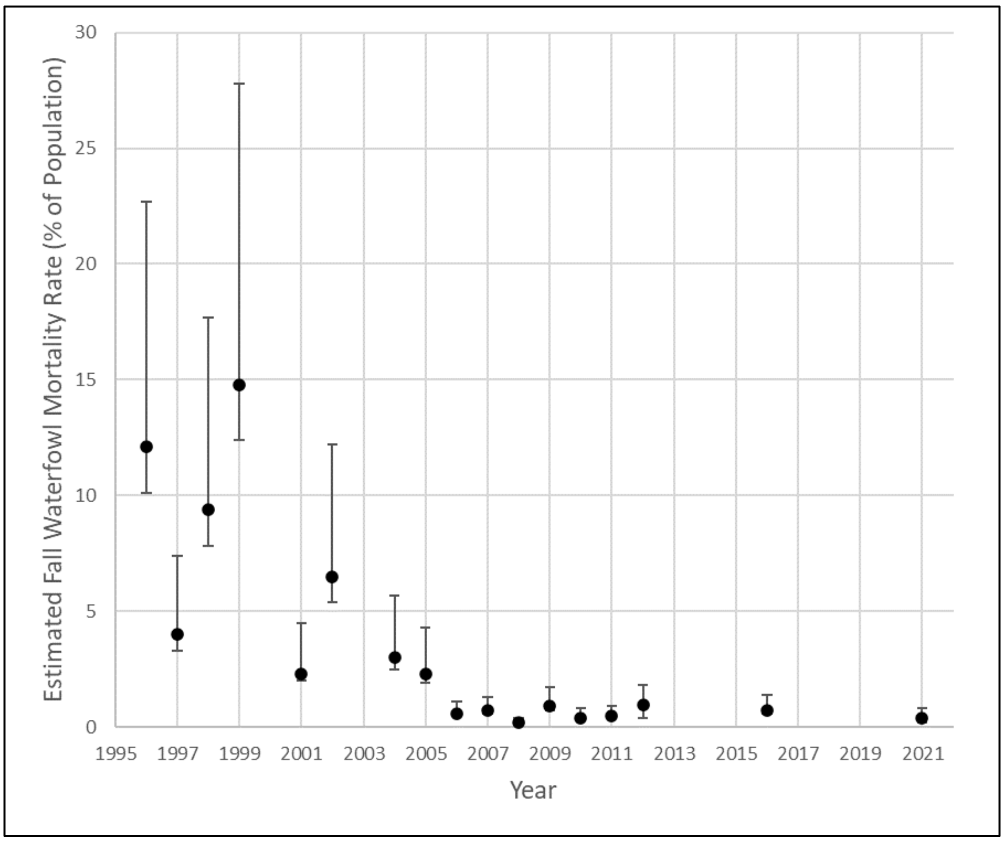
In 1990, ingestion of toxic WP particles was determined as the cause of large-scale mortality of waterfowl in ERF-IA (Racine et al. 1993). Due to their foraging behavior, dabbling ducks (such as mallards, pintails, and teal) were most susceptible to mortality (USAF 2022a). Extensive cleanup operations conducted in accordance with CERCLA have successfully remediated the WP in ERF-IA and have drastically reduced waterfowl deaths.

The following remedial action objectives for WP cleanup have been met (USAF 2022a):

- By 2003, reduce the dabbling duck mortality rate attributable to WP to 50 percent of the 1996 mortality rate (approximately 655 ducks were estimated to have died in 1996). This objective has been achieved every year since 1999.
- By 2018, reduce the mortality attributable to WP to no more than 1 percent of the total annual fall population of dabbling ducks by 2018. This objective has been achieved every monitoring year since 2006.

Figure 3.8-5 shows the estimated waterfowl mortality for each survey year since 1996. Since 2012, dabbling duck mortality monitoring and waterfowl census surveys have been conducted every 5 years to monitor the status of staging waterfowl in ERF-IA. The most recent surveys conducted in 2021 documented eight dabbling duck mortalities, which corresponds to a calculated mortality rate of 0.4 percent (USAF 2022a). Additional details about hazardous materials and the CERCLA cleanup efforts can be found in Section 3.15.

Figure 3.8-5 Estimated Waterfowl Mortality Rate as a Percentage of the Overall Population, Based on Aerial Census Surveys and Ground-Based Mortality Transect Surveys



Note: Error bars represent mortality rate range with uncertainty (USAF 2022a).

Raptors

JBER provides coastal, lake, and upland forest habitat that supports a variety of raptor species. Foraging occurs in ERF-IA, while roosting and nesting habitat likely occurs in the proposed expansion area and surrounding forested lands. The breeding season for raptors generally extends from mid-April to mid-August (USAF 2016b, cited in USAF 2017a). Both bald and golden eagles occur on JBER. In 2019, 17 active bald eagle nests were detected on or adjacent to the installation, three of which were adjacent to ERF-IA, although none were documented in the proposed expansion area (USAF 2019b). A subset of these nests was monitored in 2020, including eight active nests. Three of these active nests were located near or adjacent to ERF-IA, including one that was also active in 2019 (USAF 2020). During a 2021 helicopter survey for nesting eagles, 17 active bald eagle nests were documented on JBER, four of which were located within or immediately adjacent to ERF (USAF 2021). Surveys in 2022 documented three active nests in the vicinity of ERF (USAF 2022b; Figure 3.8-6). A single golden eagle nest has been monitored opportunistically in the Snowhawk Valley (approximately 10 miles to the southeast of ERF-IA in mountainous terrain) (USAF 2019b, 2020b, 2021). No golden eagle nests have been documented in ERF-IA or the proposed expansion area (USAF 2019b, 2020b, 2021, 2022b). Bald eagles are most commonly seen between May and October, although they are year-round residents of the installation.

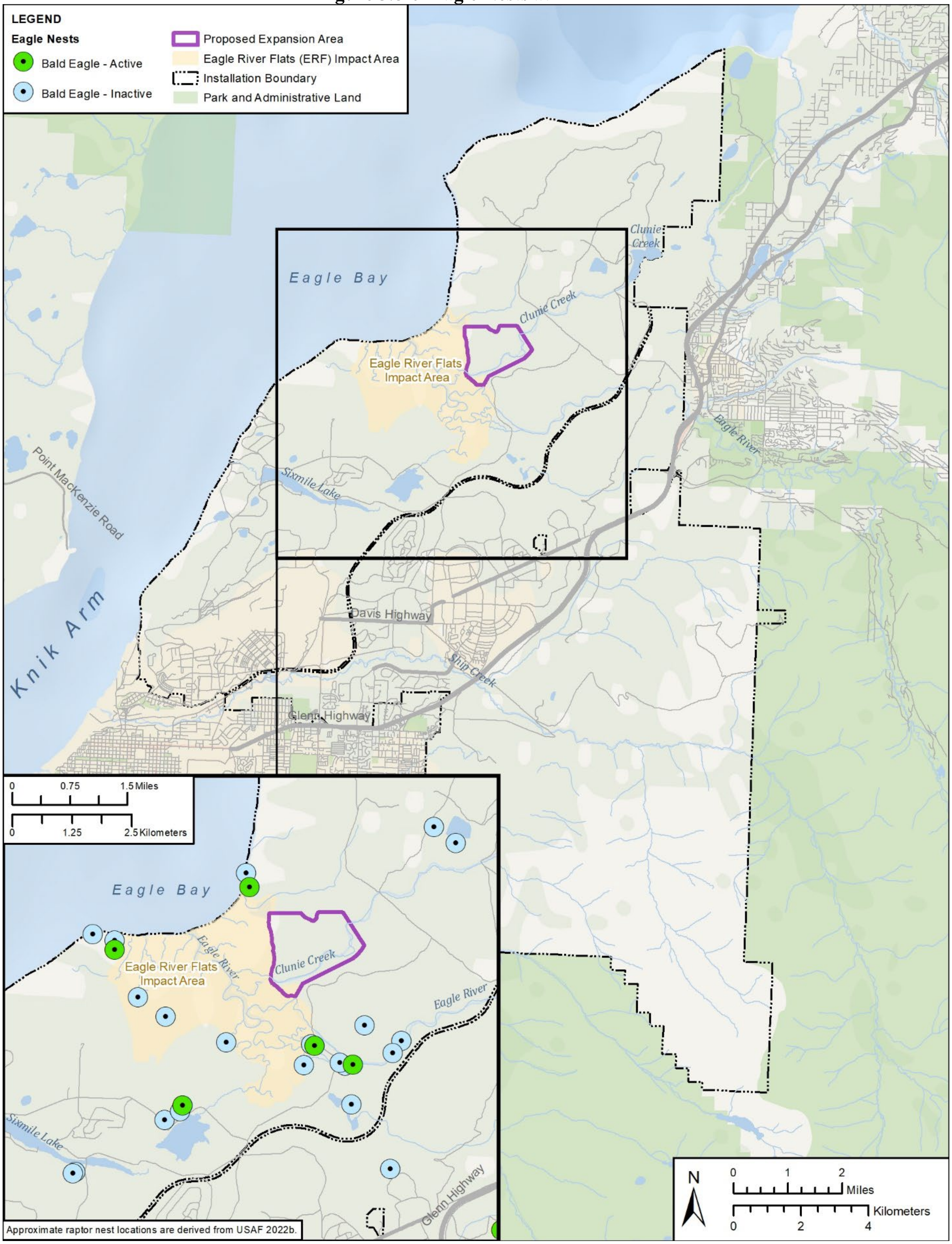
Red-tailed hawk (*Buteo jamaicensis*) nests are generally not associated with ERF (USAF 2019b, 2020b), but a single inactive nest was observed on the southwest side of ERF in both 2016 and 2018 (USAF 2016, 2019b). Other diurnal raptors that occur on JBER include northern harrier (*Circus cynaeus),* red-tailed hawk, sharp-shinned hawk (*Accipiter striatus*), merlin (*Falco columbarius*), northern goshawk (*Accipiter gentilus*). Rough-legged hawks (*Buteo lagopus*) are common during migration. Great horned (*Bubo virginianus*), northern saw-whet (*Aegolius acadicus*), boreal (*Aegolius funereus*), great grey (*Strix nebulosa*), and short-eared owls (*Asio flammeus*) have also been observed on JBER (JBER 2023a). A single osprey (*Pandion haliaetus*) nest has been documented near Green Lake, more than 3 miles southwest of ERF-IA (USAF 2019b, 2020b).

Other Birds

Approximately 40 species of passerine and neotropical migratory birds are found on JBER (Andres et al. 2001; JBER 2023a), at least 37 of which have been observed in ERF (McDuffie and Johnson 2019; McDuffie 2021a). Passerine birds may nest in forested or more open shrub and developed habitats. Species commonly observed in association with ERF include black-capped chickadee (*Poecile atricapillus*), tree swallow (*Tachycineta bicolor*), black billed magpie (*Pica hudsonia*), violet green swallow (*Tachycineta thalassina*), Lincoln's sparrow (*Melospiza lincolnii*), and savannah sparrow (*Passerculus sandwichensis*) (McDuffie 2018, 2021a, 2021b; McDuffie and Johnson 2019; JBER 2023a). The blackpoll warbler (*Dendroica striata*), olive-sided flycatcher (*Contopus cooperi*), and rusty blackbird (*Euphagus carolinus*) are SSCs known to breed on JBER wetlands, although nesting occurrence in ERF-IA and the proposed expansion area has not been confirmed. Sandhill cranes, also an SSC, are known to occur within ERF-IA and have been observed displaying nesting defense behavior in this location. Common passerine birds in forested habitat include Swainson's thrush (*Cathorus ustulatus*), American robin (*Turdus migratorius*), yellow-rumped warbler (*Dendroica coronata*), dark-eyed junco (*Junco hyemalis*), alder flycatcher (*Empidonax alnorum*), and ruby-crowned kinglet (*Regulus calendula*). Cavity nesting birds (such as various owl, swallow, and woodpecker species), birds that preferentially nest in mature trees (such as gulls, jays, ravens, kinglets, and robins), and birds that nest in scrub/shrub communities (such as various warblers, Swainson's thrush [*Catharus ustulatus*], magpie, and various flycatchers) are more likely to be present in the proposed expansion area.

Spruce grouse (*Conachites canadensis*) are common nesters on JBER despite heavy mortality of mature spruce trees, an important winter food source (JBER 2023a). Ruffed grouse (*Bonasa umbellus*) were introduced into southcentral Alaska in the 1990s but are not present on JBER in substantial numbers. Willow ptarmigan (*Logopus lagopus*) are present in the alpine and subalpine areas of JBER and may move into lowland shrub habitat in the winter. From 2015 to 2017, an average of 201 grouse and four ptarmigans were harvested annually by hunters (JBER 2023a).

Figure 3.8-6 Eagle Nests at ERF-IA



Sources: USAF 2020; JBER 2020a, 2023b, 2023c

Amphibians

Wood frogs are common throughout JBER and may use a variety of habitats including mixed forests, open meadows, bogs, freshwater and saltwater marshes, and lake margins. However, wood frogs are largely terrestrial and are generally only found in water during reproduction and early development (JBER 2023a). The breeding period ranges from 1 April to 25 May. Young emerge and disperse from wetlands to nearby woodlands between late-July and mid-August (USAF 2017a). Wood frogs are an important prey species of sandhill cranes and are abundant in sedge marsh areas around the perimeter of ERF. Specific occurrence of frogs in ERF-IA and the proposed expansion area is unknown, but it is likely that suitable habitat exists in the marsh areas and nearby woodlands of these areas.

Marine Mammals

Marine mammal species that may occur in Cook Inlet and in the vicinity of the JBER, based on data from the U.S. Pacific and Alaska Marine Mammal Stock Assessments, JBER monitoring data, and other literature sources, are listed in Table 3.8-5.

Table 3.8-5 Marine Mammal Species of the Cook Inlet Region

Species	Scientific Name	ESA/MMPA Status	MMPA Stock	Stock-wide Population Estimate
Humpback Whale	*Megaptera novaeangliae*	Endangered/Depleted	Western North Pacific Stock (includes Western North Pacific DPS)	1,084[b]
Humpback Whale	*Megaptera novaeangliae*	Threatened/Depleted	Mexico – North Pacific Stock (includes Mexico DPS)	2,352[b]
Humpback Whale	*Megaptera novaeangliae*	Not listed/Not depleted	Hawai'i Stock (Hawai'i DPS[d])	11,278[b]
Gray Whale	*Eschrichtius robustus*	Not listed/Not depleted	Eastern North Pacific Stock	26,960[b]
Beluga Whale	*Delphinapterus leucas*	Endangered/Depleted	Cook Inlet Stock	331[c]
Killer Whale	*Orcinus orca*	Not listed/Not depleted	Eastern North Pacific, Gulf of Alaska, Aleutian Islands, and Bering Sea Transient Stock	587[a]
Killer Whale	*Orcinus orca*	Not listed/Not depleted	Eastern North Pacific Alaska Resident Stock	2,347[a]
Pacific Harbor Porpoise	*Phocoena phocoena*	Not listed/Not depleted	Gulf of Alaska Stock	31,046[a]
Steller Sea Lion	*Eumetopias jubatus*	Endangered/Depleted	Western U.S. Stock (includes Western DPS)	49,837[e]
Pacific Harbor Seal	*Phoca vitulina*	Not listed/Not depleted	Cook Inlet/Shelikof Strait Stock	28,411[a]

Notes: [a] Muto et al. 2021; [b] Carretta et al. 2023; [c] Goetz et al. 2023; [d] This DPS has no status under the ESA, [e] Young et al. 2024.

Key: DPS = Distinct Population Segment; ESA = Endangered Species Act; JBER = Joint Base Elmendorf-Richardson; MMPA = Marine Mammal Protection Act; NMFS = National Marine Fisheries Service

In Cook Inlet, marine mammals use a variety of habitats, from the open waters at the entrance and in the middle of the Inlet, to the nearshore waters and river mouths. Some species utilize the upper reaches of Cook Inlet, with beluga whales, Pacific harbor porpoise (*Phocoena phocoena*), and Pacific harbor seals (*Phoca vitulina*) also entering the freshwater systems (Ford 2014; JBER 2023a). Seasonal variations in the species assemblage occur in relation to the different species' life history patterns. Some, such as humpback whales (*Megaptera novaeangliae*), are migratory and move between the warm tropical waters of the winter breeding season and the cold high latitude waters of the summer feeding season (Ford 2014). Others are more resident in nature (e.g., harbor porpoise), moving in relatively smaller geographical areas (Hall 2011), or non-migratory (e.g., Steller sea lions [*Eumetopias jubatus*]) but with distributional shifts based on reproductive patterns and prey distributions (Ford 2014).

In Eagle River, only Cook Inlet beluga whales and harbor seals are frequently observed visually, with harbor porpoise acoustically detected in Eagle Bay and Eagle River (Table 3.8-6) (U.S. Army 2010; NMFS 2016a; JBER 2023a). Harbor seal and Steller sea lion are also expected to occur within the airborne noise portion of the marine mammal ROI, which includes Knik Arm and nearby portions of Upper Cook Inlet. Humpback whales, gray whales (*Eschrichtius robustus*), and killer whales (*Orcinus orca*) are unlikely to occur in the ROI, as there are few records of these species in this region, and they are considered to be rare or infrequent visitors (see Table 3.8-6). Therefore, these species are not discussed further. In contrast, Cook Inlet beluga whale, Steller sea lion, harbor porpoise, and harbor seal are expected to occur in the ROI, based on the rationale presented in Table 3.8-6.

Table 3.8-6 Marine Mammal Species Frequency of Occurrence in the Region of Influence

Species	Frequency of Occurrence in the ROI	Rationale
Humpback Whale	Rare/Unlikely	In September 2017, a male humpback whale (approximately 25–30 feet) was observed floating dead in Eagle Bay (JBER unpublished data, as cited in JBER 2023a). The cause, time, and place of death are unknown. A necropsy was conducted in September 2017. No other observations of the species in Eagle Bay are known. No humpback whales were observed during monitoring at the POA in 2020, 2021, or 2022 (61 N Environmental 2021, 2022a, 2022b).
Gray Whale	Rare/Unlikely	A live gray whale was observed in Eagle Bay by a team from NMFS in September 2017. The whale was not observed again after that day (Migura, personal communication, 7 September 2017, as cited in JBER 2023a). No other observations of the species in Eagle Bay are known. During monitoring at the POA, one gray whale was observed in both 2021 and 2022 (61 N Environmental 2021, 2022a, 2022b).
Cook Inlet Beluga Whale	Frequent/Certain	Occurs almost exclusively in Cook Inlet. Most likely to be present in Eagle River and Eagle Bay, from August through November but may be present in the ROI year-round (NMFS 2016b; JBER 2023a). Visual and acoustic detections recorded in and near Eagle River Flats; see Appendix C for details.
Killer Whale	Rare/Unlikely	Killer whales are rarely reported from Upper Cook Inlet, with one visual observation of two individuals near the POA during multiple years of monitoring (61N Environmental 2021, 2022a, 2022b). Acoustic monitoring carried out by Castellote et al. (2016) between 2008 and 2013 only detected one transient killer whale at Beluga River, located along the western shore of Cook Inlet.
Pacific Harbor Porpoise	Frequent/Certain	Visual and acoustic detections in Eagle Bay and Eagle River (NMFS 2016a). Similar to beluga whales, harbor porpoises have been recorded making forays upstream in Eagle River year round (JBER 2023a). Small numbers of this species were regularly observed during monitoring at the POA, with 18 individuals observed in 2020 and 27 individuals observed in 2021 (61 N Environmental 2021, 2022a).

Species	Frequency of Occurrence in the ROI	Rationale
Steller Sea Lion	Infrequent/Likely	During intermittent marine mammal monitoring at the POA, Steller sea lions were observed in 2009, 2016, 2020, 2021, and 2022 (NMFS 2021; 61N Environmental 2021, 2022a, 2022b). During the most recent POA monitoring projects (2020–2022), a total of 16 observations of Steller sea lions were recorded (NMFS 2021; 61N Environmental 2021, 2022a, 2022b; Easley-Appleyard and Leonard 2022). Low numbers of this species are expected to occur in the airborne noise ROI.
Pacific Harbor Seal	Frequent/Certain	Present in Upper Cook Inlet and range into Knik Arm. Since 2007, visual monitoring of harbor seals at JBER has been accomplished opportunistically while conducting beluga whale visual surveys (JBER 2023a). Individuals and small groups are sometimes observed in Eagle Bay, at the mouth of Eagle River and upstream as far as Bravo Bridge, and (at high tide) in Otter Creek (JBER 2023a). This species was regularly observed during monitoring at the POA, with 340 individuals observed in 2020 and 220 individuals observed in 2021 (61 N Environmental 2021, 2022a).

Key: NMFS = National Marine Fisheries Service; POA = Port of Alaska; ROI = Region of Influence

ESA-listed marine mammals and designated critical habitat potentially occurring in the ROI were determined based on information from NMFS (2022b), USFWS (2023a), and ADF&G (2015). Table 3.8-7 provides a summary of ESA-listed species and designated critical habitat in the marine mammal ROI. For more details regarding ESA-listed marine mammal species and their potential to be present, see Appendix D.

Table 3.8-7 ESA-Listed Marine Mammals and Critical Habitat in the Region of Influence

Common Name *Scientific Name* DPS	ESA Status & Listing Document	Critical Habitat Occurrence in ROI
Beluga Whale *Delphinapterus leucas* Cook Inlet DPS	Endangered 73 FR 62919	Critical habitat is designated in Eagle Bay, but does not include ERF-IA and other military lands of Joint Base Elmendorf-Richardson between Mean Higher High Water and Mean High Water, two areas for which the military has provided an INRMP that NMFS have determined provides benefits to the Cook Inlet beluga whale (76 FR 20180).
Steller Sea Lion *Eumetopias jubatus* Western DPS	Endangered 62 FR 24345	Critical habitat is not designated in the ROI (59 FR 30715).

Key: DPS = Distinct Population Segment; ERF-IA = Eagle River Flats Impact Area; ESA = Endangered Species Act; FR = Federal Register; INRMP = *Integrated Natural Resources Management Plan*; NMFS = National Marine Fisheries Service; ROI = Region of Influence

Sources: JBER 2023a; NMFS 2023

Humpback whales that may have been from an ESA-listed population have been documented in the marine mammal ROI but are extremely rare and therefore not described further in this EIS. The only ESA-listed species that are likely to occur in the ROI are the Cook Inlet beluga whale and Steller sea lion, details of which are presented below. The other marine mammal species likely to occur in the underwater noise portion of the ROI are harbor porpoise and harbor seal. The airborne portion of the marine mammal ROI is only applicable to the two pinniped species that occur there, which are Steller sea lion and harbor seal.

Cook Inlet Beluga Whale

Population Status

Beluga whales inhabiting Cook Inlet belong to the Cook Inlet Stock, one of five distinct stocks found in Alaska (Muto et al. 2021). This stock is identified as a Distinct Population Segment (DPS) that is considered depleted under the MMPA and endangered under the ESA (73 FR 62919). The most current population estimate for Cook Inlet beluga whale is 331 individuals (Goetz et al. 2023).

The Cook Inlet beluga whale population may be affected by various natural and anthropogenic factors, including strandings, predation, parasitism and disease, environmental change, poaching, fishing (personal use, subsistence, recreational, and commercial), pollution, oil and gas, coastal development, vessel traffic, tourism and whale watching, noise, and research (NMFS 2008, 2016b, 2022c). For further information regarding the population status of Cook Inlet beluga whale, see Appendix D.

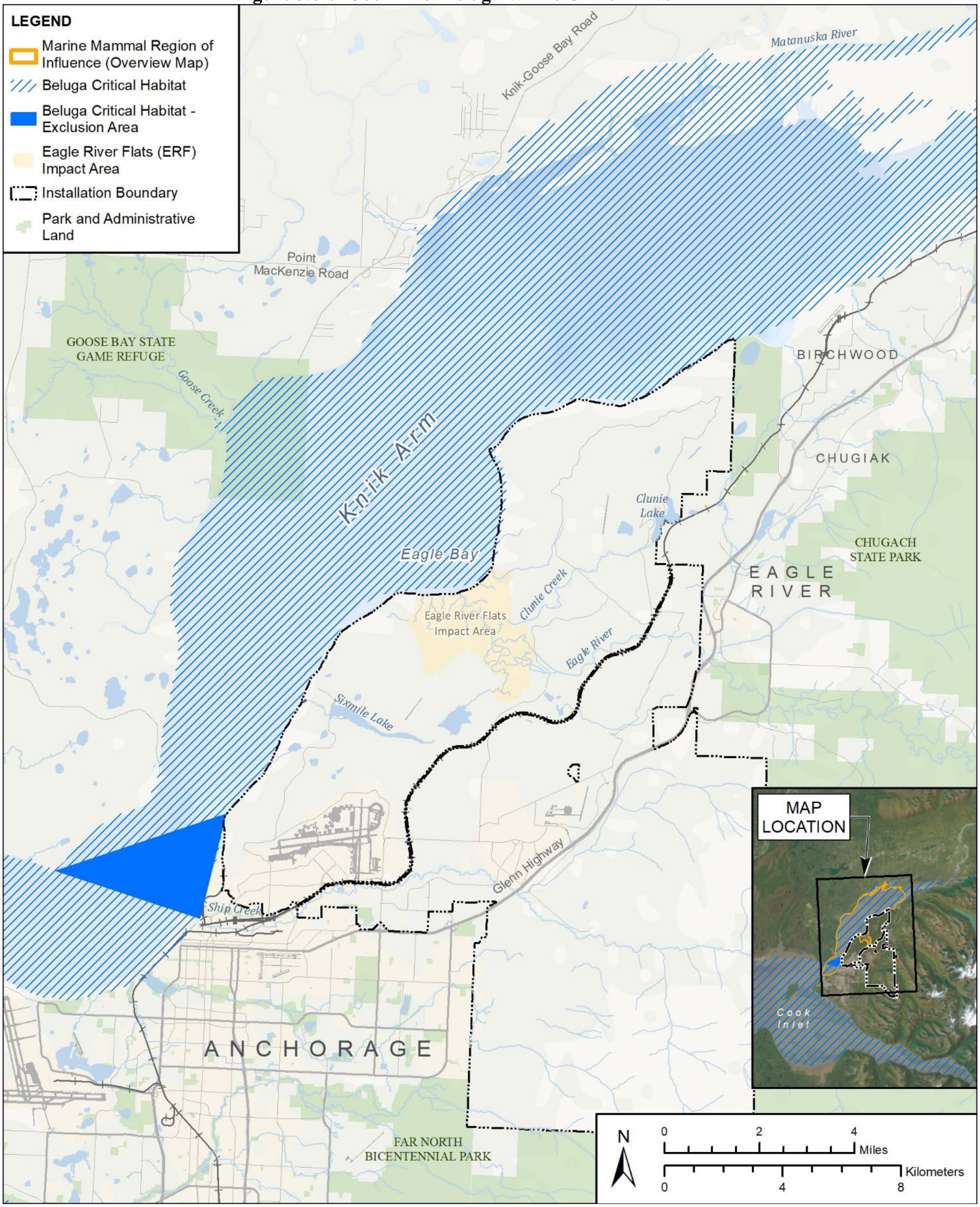
Critical Habitat

Designated critical habitat for Cook Inlet beluga whale includes two areas encompassing 7,800 square kilometers (3,013 square miles) of marine habitat (76 FR 20180) (Figure 3.8-7). The critical habitat includes all waters of Upper Cook Inlet, with an exclusion area that includes the mouth of Knik Arm, the nearshore areas in the southwestern part of the inlet, and Kachemak Bay (76 FR 20180). The critical habitat is spatially separated into two zones. One of these zones encompasses Knik Arm. A critical habitat exclusion zone occurs near JBER that forms a triangle between Ship Creek, Point MacKenzie, and Cairn Point (Figure 3.8-7). In addition, designated critical habitat does not include ERF-IA and military lands of JBER between Mean Higher High Water and Mean High Water (76 FR 20180). However, beluga whale prey species (including migratory fish) that use these areas constitute an important component of their critical habitat.

NMFS considers PBFs essential to the conservation of a given species when designating critical habitat. PBFs for the Cook Inlet beluga whale include the following (50 CFR § 226.220[c]):

- Intertidal and sub-tidal waters of Cook Inlet with depths less than 30 feet (9.1 meters) (MLLW) and within 5 miles (8 kilometers) of high and medium flow of anadromous fish streams
- Primary prey species: four species of Pacific salmon (Chinook, sockeye, chum, and coho salmon), Pacific eulachon, Pacific cod, walleye pollock (*Gadus chalcogrammus*), saffron cod, and yellowfin sole
- Waters free of toxins or other agents of a type and amount harmful to Cook Inlet beluga whales
- Unrestricted passage in or between the critical habitat areas
- Waters with in-water noise below levels resulting in abandonment of critical habitat areas by Cook Inlet beluga whales

Figure 3.8-7 Cook Inlet Beluga Whale Critical Habitat



Sources: NMFS 2011; JBER 2020a, 2023b, 2023c; AECOM 2020d

Presence in the ROI

The Cook Inlet beluga whale stock remains in Cook Inlet throughout the year (Goetz et al. 2012); however, the range of the beluga whale has contracted to the upper reaches of Cook Inlet because of the decline in the population (Rugh et al. 2010). Critical habitat within the marine mammal ROI provides important habitat during ice-free months and is used intensively by Cook Inlet beluga whales between April and November (NMFS 2016b).

The species' range in Cook Inlet has contracted markedly since the 1990s (Shelden et al. 2015b). Since 1993, beluga whales have been consistently found near or in river mouths along the northern shores of Upper Cook Inlet. Since the mid-1990s, most beluga whales in Upper Cook Inlet have been concentrated in shallow areas near river mouths and no longer occur in the central or southern portions of Cook Inlet (Hobbs et al. 2008). Based on aerial surveys, the concentration of beluga whales in the northernmost portion of Cook Inlet appears to be consistent from June to October (Rugh et al. 2000, 2004, 2005a, 2005b, 2006, 2007).

Beluga whales generally occur in shallow, coastal waters, often barely deep enough to cover their bodies (Ridgway and Harrison 1981). While it is difficult to quantify the importance of various habitats in terms of the health, survival, and recovery of the Cook Inlet beluga whale, NMFS believes that certain areas are particularly important. Upper Cook Inlet, including all marine waters in the ROI, is designated Type 1 habitat, which is the most valuable habitat type due to the high concentrations of beluga whales, which use these areas from spring through fall for foraging and nursery habitat. This region is characterized by shallow tidal flats, river mouths, and estuarine areas. The greatest potential for anthropogenic impacts to the Cook Inlet beluga whale population is in Type 1 habitat.

As described in Appendix D, scientific and commercial studies and monitoring data collected in Upper Cook Inlet over the past 20 years were reviewed to evaluate use of the ROI by Cook Inlet beluga whale. These data are particularly useful because they include recent information on presence and timing of beluga whales that are most likely transiting to Upper Knik Arm and Eagle Bay. Overall, the Eagle Bay/Eagle River area appears to be an important area for a substantial portion of the Cook Inlet beluga whale population during the open water (not frozen) months. McGuire et al. (2013) found that 78 percent of the 307 Cook Inlet beluga whales in their photographic catalog, representing most (if not all) of the population, had visited Eagle Bay at least once between 2005 and 2011. Large groups of beluga whales, occasionally exceeding 100 animals at once, move into the area where they travel, mill, feed, and socialize. For more detailed information regarding the use of the ROI by beluga whale, see Appendix D.

<u>Steller Sea Lion</u>

Only the Western Stock of Steller sea lion (listed as endangered under the ESA [62 FR 24345] and depleted under the MMPA [Muto et al. 2021]) is present in the ROI (Muto et al. 2021). The most recent (2024) population estimate for Western Steller sea lion is 49,837 (11,978 pups; 37,333 non-pups; and 517 Western stock non-pups in the Eastern stock area) (Young et al. 2024). For further information regarding the population status of Western Steller sea lion, see Appendix D.

NMFS designated critical habitat for the Steller sea lion in 1993 (58 FR 45269), but critical habitat is not present in the ROI. No Steller sea lion critical habitat is designated within Cook Inlet; the closest critical habitat is Sugarloaf Island in the Central Gulf of Alaska.

Land sites used by Steller sea lions are referred to as rookeries and haul-out sites. Rookeries are used by adult sea lions for pupping, nursing, and mating during the reproductive season (generally from late May to early July). Most adult Steller sea lions occupy rookeries from late May to early July (Gisiner 1985).

There are documented haul-out sites for about 3,600 Steller sea lions in the extreme Lower Cook Inlet (near Kachemak Bay and Cape Douglas) (Sweeney et al. 2018), with additional individuals venturing into portions of Cook Inlet to forage. While Steller sea lions primarily inhabit Lower Cook Inlet, they occasionally venture to Upper Cook Inlet and Knik Arm and may be attracted to salmon runs in the region (NMFS 2021).

Little site-specific information is available for Steller sea lions. In 2009, a single Steller sea lion was observed in transit in Eagle Bay. During intermittent marine mammal monitoring at the Port of Alaska (POA), Steller sea lions were observed in 2009, 2016, and 2020, 2021, and 2022 (NMFS 2021; 61N Environmental 2021, 2022a, 2022b). During the most recent POA monitoring projects (2020–2022), a total of 16 Steller sea lions were observed (although some may have been resightings), with individuals detected intermittently between May and September (NMFS 2021; 61N Environmental 2021, 2022a, 2022b; Easley-Appleyard and Leonard 2022). As detailed in Appendix D, occurrence of Steller sea lions in the airborne noise ROI is considered likely but infrequent and in low numbers.

Harbor Porpoise

In Alaskan waters, harbor porpoise are divided into three stocks via geographic areas (Bering Sea, Gulf of Alaska, and Southeast Alaska), none of which are listed under ESA. Only the Gulf of Alaska stock is present in the waters of Cook Inlet (Muto et al. 2021). This stock was recently estimated to be at 31,046 animals through data collected during aerial surveys (Muto et al. 2021) (Table 3.8-5).

Based on contemporary sighting information, harbor porpoise regularly use the waters of Cook Inlet and are distributed as far as Knik Arm (JBER 2023a). Small numbers of this species were regularly observed during monitoring at the POA (located at the mouth of Knik Arm), with 18 individuals observed in 2020 and 27 individuals observed in 2021 (61 N Environmental 2021, 2022a). In Knik Arm, harbor porpoise generally occur in small group sizes of one to five animals (Shelden et al. 2014). In the JBER area, harbor porpoise are occasionally sighted as single animals (likely due to water turbidity and rough sea conditions) and have also been detected acoustically in both Eagle River and Eagle Bay (NMFS 2016a).

As the harbor porpoise is a cryptic species that typically occurs in small groups, visual detection is difficult at distances greater 200 meters even in calm sea and clear atmospheric conditions (Hall 2004). Based on the limited information, harbor porpoise sightings in the upper inlet appear to peak during ice-free months when there is an abundance of pelagic smelt (Shelden et al. 2014). However, this species is thought to be differentially present in Knik Arm throughout the year (NMFS 2016a). Peak occurrences have been noted in March and August through December, with a potential offset to occurrence with beluga whales (NMFS 2016a), although this latter point remains uncertain. Similar to beluga whales, harbor porpoise also enter Eagle River and have been noted as far as 4.2 kilometers upstream (NMFS 2016a).

Harbor Seal

There are 12 identified stocks of harbor seal in Alaska. Harbor seals in Cook Inlet are managed by NMFS as part of the Cook Inlet/Shelikof stock, estimated at 28,411 based on last available survey data from 2018, with a minimum population estimate of 26,907 (Muto et al. 2021). The current 8-year population trend for the stock is a decrease of 111 seals per year (Muto et al. 2021).

No seal stocks are designated as depleted in Alaska, nor are any stocks listed under the ESA. The Cook Inlet/Shelikof Strait stock is not considered strategic under the MMPA.

Predictive modeling for Cook Inlet harbor seals indicates that seals may predominantly use the waters of Upper Cook Inlet in the summer months (April through June) and the waters of Lower Cook Inlet in the winter months (November through January) (Boveng et al. 2012). This species was regularly observed during monitoring at the POA (located at the mouth of Knik Arm), with 340 individuals observed in 2020 and 220 individuals observed in 2021 (61 N Environmental 2021, 2022a). Since 2007, visual monitoring of harbor seals at JBER has been accomplished opportunistically while conducting beluga whale visual surveys (JBER 2023a). Individuals and groups of up to four harbor seals are sometimes observed in Eagle Bay, at the mouth of Eagle River and upstream as far as Bravo Bridge, and (at high tide) in Otter Creek

(JBER 2023a). Similar to beluga whales, the most consistent sightings are in August and September, which likely correlates to presence of prey species during the salmon run.

Special Status Species

Special status species and habitats potentially occurring in the ROI were determined based on information from NMFS (2023), Alaska Natural Heritage Program (2022), and ADF&G (2015). The USFWS Information, Planning and Conservation (IPaC) database (2023b) identified the short-tailed albatross (*Phoebastria* [=*Diomedea*] *albatrus*) as the only species potentially occurring within the ROI. However, this species spends a vast majority of its time soaring over the ocean, only coming to land to nest (the vast majority of nesting occurs on islands off the coast of Japan), and is not expected to occur within the ROI. Consequently, no federally listed terrestrial plant or wildlife species (or their critical habitat) are expected to occur in the ROI (USFWS 2023a, 2023b). No species listed as endangered by the State of Alaska (ADF&G) occur on JBER.

All marine mammals are protected under the MMPA and thus considered special status species, and the only ESA-listed species with potential to occur in the ROI are also marine mammals. Marine mammals are discussed in the preceding section. Additional information on ESA-listed species is included in the BA (Appendix D).

Although some ESA-listed salmonids that originate in the Columbia–Snake River Basin are known to migrate into the Gulf of Alaska and a few have been captured in the Bering Sea–Aleutian Islands fishery, their occurrence in the ROI would be extremely rare; therefore, these species are not addressed in this EIS.

In addition, EFH for five Pacific salmon species, eight groundfish species, and a forage fish complex has been designated in the ROI (NMFS 2022a, 2022b). Designated EFH waterbodies include (1) the Eagle Bay portion of Knik Arm, (2) Eagle River, and (3) Otter Creek. Managed Pacific salmon and several forage fish species (e.g., eulachon) constitute one of the five PBFs in the survival and recovery of Cook Inlet beluga whales (76 FR 20180). No Habitat Areas of Particular Concern have been designated within the ROI. A detailed description of EFH and managed species within ERF-IA waterbodies is provided in the EFH Assessment (Appendix E).

<u>Rare Plants</u>

The Alaska Natural Heritage Program, under the Alaska Center for Conservation Science (ACCS), maintains a list of rare vascular plant species (Nawrocki et al. 2013; ACCS 2023; CPNHW 2023) for Alaska. The BLM also maintains a sensitive plant species list that includes plants known to occur on agency-managed lands that are either protected under the ESA or are deemed sensitive (per conservation ranking conducted by ACCS; see Nawrocki et al. 2013 for explanation of the ranking system) and watchlist species that are candidates for listing but currently lack sufficient biologic or occurrence information to be included (BLM 2019a). Both lists were consulted to determine if rare or sensitive plant species or habitats occur in the ROI. While neither list connotes regulatory constraint, species with a state rank between 1 and 3 are typically species of conservation concern (JBER 2023a).

Several species on the ACCS and BLM lists occur on JBER. While none of these species have been documented in the ROI, congeners of saltmarsh bulrush (*Bolboschoenus maritimus* ssp. *paludosus*) and horned pondweed (*Zannichellia palustris* ssp. *palustris*) have been documented in ERF, and suitable habitat is present in the ROI for all of the following species:

- Fewflower spikerush (*Eleocharis quinqueflora*) – Member of the sedge family, found in fens, wet meadows, seeps, springs, and hot springs.
- Sessile-leaved scurvy grass (*Cochlearia sessilifolia*) – Succulent forb found in gravel bars, gravel spits in lagoon outlets submerged at high tide; seashores.
- Triangleglobe moonwort (*Botrychium ascendens*) – Species of moonwort, growing scattered in grassy fields such as beach ridges and meadows.

- Hudson Bay sedge (*Carex heleonastes*) – Sedge found in black spruce muskeg, bulrush-sedge wet meadow.
- Saltmarsh bulrush – Member of the sedge family found in brackish to saline coastal and inland shores, marshes.
- Horned pondweed – Aquatic plant found in brackish or fresh waters of streams, lakes, or estuaries.

<u>Species of Special Concern</u>

As of 15 August 2011, the ADF&G no longer maintains an SSC list. ADF&G has completed the *Alaska Wildlife Action Plan* (ADF&G 2015), which identified SGCNs using multiple criteria, including species whose populations are small, declining, or under significant threat ("at-risk" species); species that are culturally, ecologically, or economically important; species that function as sentinel species (indicators of environmental change); and stewardship species (species with a high percentage of their North American or global populations in Alaska). As described in the plan, JBER and the ROI are in the southcentral Alaska biogeographic region (ADF&G 2015).

A former federally listed threatened species, the bald eagle, is common locally, and golden eagles have been sighted in alpine and subalpine zones of JBER. The de-listed species American peregrine falcon (*Falco peregrinus*; 1999) and arctic peregrine falcon (*Falco peregrinus tundrius*; 1994) may pass through the JBER area during migrations. JBER operations and activities are not expected to impact peregrine falcons to any considerable degree.

More than 180 SGCNs are described in the ADF&G *Alaska Wildlife Action Plan* (2015) as potentially occurring in the southcentral Alaska biogeographic region. This list of SGCNs is intentionally large, reflecting the inherent uncertainty surrounding SGCNs in Alaska, where the landscapes are large and data are sparse (ADF&G 2015). JBER works with ADF&G to assess which SGCNs JBER should consider prioritizing as installation SSCs, which include State SGCNs identified in the *Alaska Wildlife Action Plan* (ADF&G 2015) and USFWS-identified "Birds of Conservation Concern" with reasonable likelihood to occur on the installation. Over 100 taxa have been recognized as installation SSCs, including invertebrates, fish, amphibians, small mammals, bats, and birds (JBER 2023a).

3.8.2 Environmental Consequences

3.8.2.1 Vegetation

Potential impacts to vegetation resources include the direct loss or degradation of vegetation due to thinning, clearing, grubbing, prescribed burning, and detonation of HE munitions, as well as indirect impacts related to erosion, sedimentation, invasive species, windthrow, and phytotoxicity.

The determination of significance of potential impacts considered the types of vegetation that would be impacted and their occurrence in the region. Additionally, impacts to vegetation would be considered significant if any of the following were to occur:

- The spread of invasive plant species beyond the ROI that are ranked as highly to extremely invasive within Alaska and/or are listed as a high priority for management on JBER
- A permanent or long-term loss or degradation of plant species or ecosystems that are rare or of other conservation concern in Alaska

Methodology

The estimated area of vegetation that would be lost or degraded by construction and maintenance activities was quantified by overlaying spatial data of project components on vegetation communities. The estimated disturbance area for vegetation was calculated using the same methodology for calculating annual soil disturbance (see Section 3.5.2). An average impact crater diameter was multiplied by the annual number of allotted HE rounds and 155-mm training rounds to determine the affected area. The impact analysis considered the intrinsic rarity, ecological function, and natural resiliency of the affected plant species or community to disturbance as well as the area of impact relative to the area of natural vegetation (i.e., not human-modified; 64,932 acres) present on the JBER installation (CEMML 2022).

Alternative 1: All-Season Live-Fire Training with Expanded Impact Area

Alternative 1 would have long-term impacts on vegetation associated with clearing and thinning vegetation in the proposed expansion area, extending live-fire training into the growing season, disturbance of vegetation by detonating rounds, and potential phytotoxic impacts from munitions constituents. These impacts would not exceed applicable significance thresholds. Alternative 1 would have the greatest affected area and degree of impacts because it is the only alternative under which the impact area would be expanded.

Construction and Infrastructure

Construction and maintenance of the proposed expansion area would directly impact 585 acres of vegetation, of which approximately 563 acres (96 percent of the expansion area) is forest and woodland (Figure 3.8-8; Table 3.8-8). Indirect impacts from erosion, sedimentation, and windthrow would occur over approximately 7 acres (Figure 3.8-8). The affected area represents approximately 2 percent of the natural vegetation present on JBER.

Clearcutting of 359 acres (60 percent of the proposed expansion area) would result in the conversion of forest and shrub community types over 350 acres to an early successional herbaceous community, which would be maintained with prescribed fire. Additionally, 9 acres would be maintained as non-vegetated firebreaks, service roads, and pads. These impacts would persist for as long as the area is maintained as an impact area.

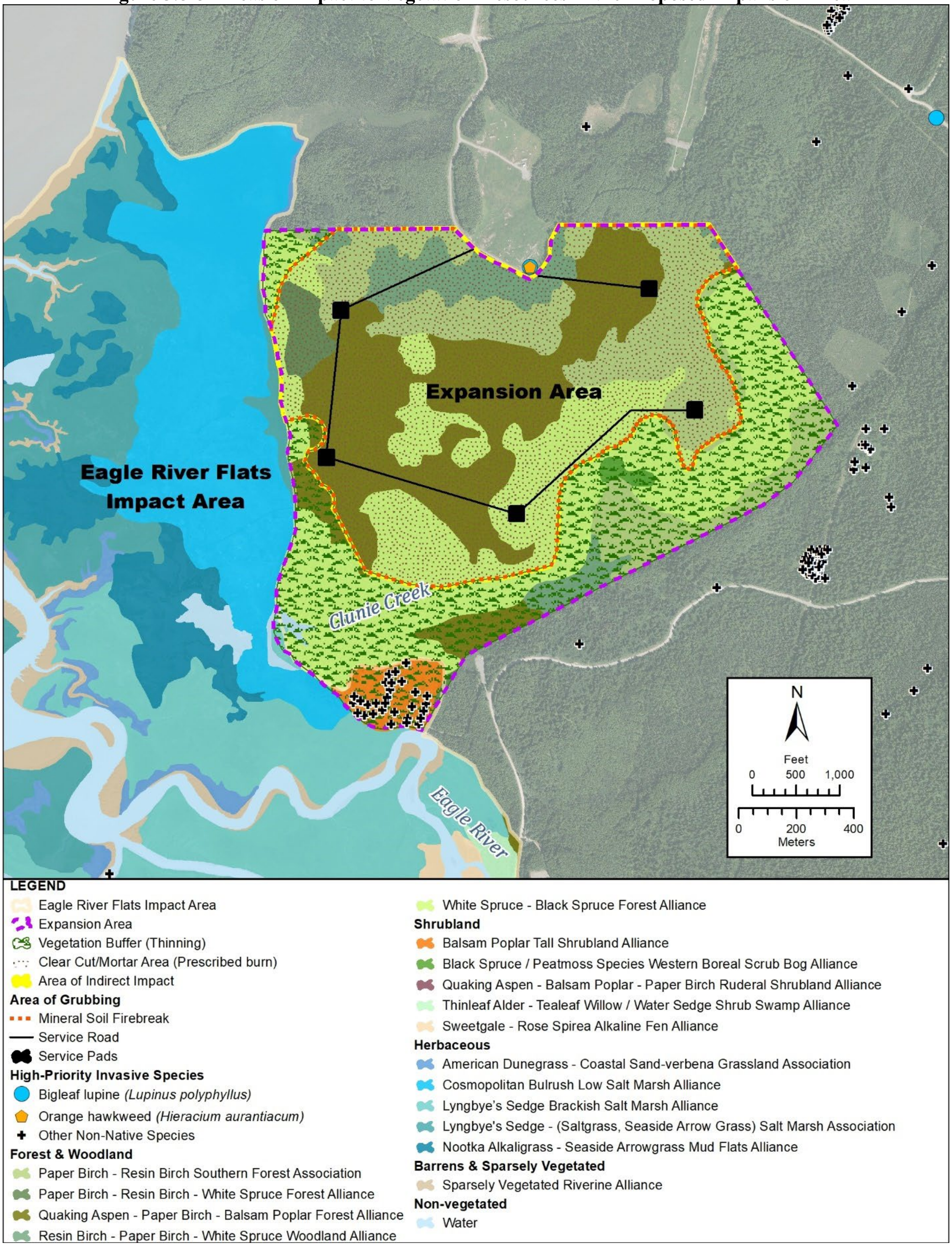
Thinning of trees in the 226-acre vegetation buffer would decrease the density of forest vegetation, increase the risk of windthrow, and increase light penetration to the forest floor, which could initiate a permanent shift in community composition toward shade-intolerant species.

With the change in vegetation, Alternative 1 would result in an increased risk of wildland fire in the proposed expansion area, as the resulting herbaceous species would potentially burn hotter and more frequently than the current vegetation types (see Section 3.9.2.2). Fire could adversely affect vegetation in the adjacent vegetation buffer but could have a beneficial effect by accelerating carbon cycling and stimulating growth of native species. Fire could also lead to spread of non-native species by scarifying seeds and stimulating germination. Annual prescribed burns would help reduce the risk of wildland fire.

Indirect effects from erosion, sedimentation, and windthrow would potentially occur along the approximately 3-mile-long clear-cut boundary. Erosion and sedimentation have the potential to cause long-term degradation of vegetation by physically undermining rooted vegetation or compacting roots through deposition of sediment over root zones. Sedimentation can also reduce vegetation productivity by depositing dust on photosynthetic surfaces or introducing sediment to waters where aquatic vegetation occurs. Where erosion is severe enough to expose mineral soil, it could facilitate colonization of invasive plant species. Lastly, windthrow of trees could increase forest susceptibility to breeding spruce beetles, as discussed in Section 3.16.2.

Construction and maintenance actions would largely impact mixed broadleaf-needleleaf forests, which consist of native plant communities that are common both on JBER and in the greater ecoregion. Forests tend toward late-successional communities characterized by high species richness, structural complexity, and trophic relations. As such, their loss can have greater impact to biodiversity relative to the loss of early-successional plant community types. However, no rare, imperiled, or regionally uncommon plant community types would be impacted by development of the expansion area.

Figure 3.8-8 Areas of Impact to Vegetation Resources in the Proposed Expansion Area



Sources: JBER 2019b, 2020a, 2023c, 2023g

Table 3.8-8 Construction and Infrastructure Impacts to Vegetation in the Proposed Expansion Area

	Vegetation Community/Land Cover Type	Vegetation Buffer		Clearcut Area		Mineral Soil Firebreak		Service Road and Pads		Totals	
		Area (acres)	Percent[1] (%)	Area (acres)	Percent (%)	Area (acres)	Percent (%)	Area (acres)	Percent (%)	Area (acres)	Percent (%)
Forest & Woodland (562.7 acres)	Paper Birch – Resin Birch – White Spruce Forest Alliance	**0.7**	0.1	**10.0**	1.7	**0.1**	<0.1	**0.0**	0.0	**10.8**	1.8
	Paper Birch – Resin Birch Southern Forest Association	**36.6**	6.3	**88.9**	15.2	**1.9**	0.3	**0.4**	0.1	**127.8**	21.8
	Quaking Aspen – Paper Birch – Balsam Poplar Forest Alliance	**18.2**	3.1	**133.4**	22.8	**1.0**	0.2	**1.7**	0.3	**154.4**	26.4
	Resin Birch – Paper Birch – White Spruce Woodland Alliance	**9.0**	1.5	**28.7**	4.9	**0.4**	0.1	**0.5**	0.1	**38.6**	6.6
	White Spruce – Black Spruce Forest Alliance	**139.0**	23.8	**88.9**	15.2	**2.4**	0.4	**0.9**	0.2	**231.2**	39.5
Shrubland (19.9 acres)	Balsam Poplar Tall Shrubland Alliance	**17.0**	2.9	**0.0**	0.0	**0.0**	0.0	**0.0**	0.0	**17.0**	2.9
	Black Spruce / Peatmoss Species Western Boreal Scrub Bog Alliance	**2.9**	0.5	**0.0**	0.0	**0.0**	0.0	**0.0**	0.0	**2.9**	0.5
	Quaking Aspen – Balsam Poplar – Paper Birch Ruderal Shrubland Alliance	**0.0**	0.0	**0.0**	0.0	**0.0**	0.0	**0.0**	0.0	**0.0**	0.0
Herbaceous (1.1 acres)	American Dunegrass – Coastal Sand-verbena Grassland Association	**0.0**	0.0	**0.0**	0.0	**0.0**	0.0	**0.0**	0.0	**0.0**	0.0
	Cosmopolitan Bulrush Low Salt Marsh Alliance	**0.2**	<0.1	**0.0**	0.0	**0.0**	0.0	**0.0**	0.0	**0.2**	<0.1
	Lyngbye’s Sedge Brackish Salt Marsh Alliance	**0.8**	0.1	**0.0**	0.0	**0.0**	0.0	**0.0**	0.0	**0.8**	0.1
	Lyngbye's Sedge – (Saltgrass, Seaside Arrow Grass) Salt Marsh Association	**0.1**	<0.1	**0.0**	0.0	**0.0**	0.0	**0.0**	0.0	**0.1**	<0.1
Non-Veg. (1.6 acres)	Water	**1.6**	0.3	**0.0**	0.0	**0.0**	0.0	**0.0**	0.0	**1.6**	0.3
Totals		**226.1**	38.6	**349.9**	59.8	**5.8**	1.0	**3.5**	0.6	**585.3**	100.0

Note: [1]Percent of proposed expansion area

Development of the proposed expansion area would create an opening with some degree of soil disturbance that would be vulnerable to colonization by invasive plant species. Of particular concern is orange hawkweed, a population of which is documented within the ROI at the southern end of the Installation Platoon Battle Course (Figure 3.8-8). Orange hawkweed is a highly invasive perennial that is competitive in ecotones and establishes as dense monocultures at the expense of native plants (Alaska Natural Heritage Program 2022). Invasive plant propagules could also be introduced via contaminated construction equipment and materials, and germination of seeds could be stimulated by fire. Once established in the cleared area, invasive species could colonize adjacent habitat. In the absence of mitigation, degradation of native plant communities by the establishment and spread of non-native invasive species would have the potential to occur. However, adherence to best construction practices and recommendations in JBER's *Invasive Species Management Plan* (Johnson 2019) would limit the likelihood of introduction and extent of infestation. As mitigation (see Vegetation *Mitigation* section), preliminary treatment for management of existing invasive plant species populations would be conducted in the proposed expansion area, with regular monitoring and treatment as needed. UXO removal following training activities would allow invasive species control to be conducted safely in the expansion area. Therefore, invasive species in the proposed expansion area would be controlled in accordance with the JBER *Invasive Species Management Plan* and the JBER *Integrated Pest Management Plan* to limit their spread in the ROI, and impacts would not exceed significance thresholds.

<u>Firing and Training Exercises</u>

Detonation of HE munitions during ice-free conditions at ERF-IA could result in the annual disturbance of up to 6 acres of vegetated and non-vegetated areas (4.8 acres in the existing ERF-IA and 1.2 acres in the upland expansion area; Table 3.5-1). Assuming an unlikely scenario in which all of the affected area is vegetated, this represents approximately 0.02 percent of the natural vegetation present on the installation. Disturbance caused by exploding munitions can severely injure or kill vegetation within the radius of the impact crater. This degree of impact is likely overestimated, as the approach used to estimate annual disturbance assumes that all munitions detonate during summer conditions, the maximum annual allotted munitions rounds are detonated, and munitions do not detonate in an existing crater or an area of previously disturbed surface material (Section 3.5.2.2). Additionally, impacts to vegetation would not occur on barren land. Detonation of HE munitions would be restricted to target areas located outside of acoustic and habitat buffers (1,160 acres of the existing ERF-IA and the 359-acre cleared area of the proposed expansion area [Figure 2.4-3]).

All-season detonation of HE munitions would allow firing when soils are unarmored by ice or thawed and/or during the growth period for plants. Physical impacts to vegetation during the growing season when plants are translating below-ground resources to above-ground foliage, flower, and fruit would be more likely to result in vegetation mortality than winter-only firing. While direct impacts to special status species are not expected, the ERF estuary has the potential to support rare plants (JBER 2023a) and represents an ecosystem of conservation concern in Alaska (Flagstad et al. 2018). Direct impacts to vegetation from live-fire training would be long term and in some areas could persist beyond 10 years, as it is assumed that targets would be used repeatedly and that vegetation would not recover between training events.

Live-fire training has the potential to result in phytotoxic impacts to vegetation, largely related to decreased productivity and mortality (Pennington and Brannon 2002). Munitions with the potential to impact vegetation include traditional explosives (RDX, HMX, and TNT) as well as IMs (i.e., IMX-101 and IMX-104). The deposition of energetic residues from conventional munitions is largely associated with LO detonation and non-detonation (UXO), which result in incomplete combustion (Walsh et al. 2007). Following a single LO HE detonation in ERF-IA in July 2007, residues of RDX, HMX, and TNT were detected at concentrations of up to 74.4, 14.6, and 64.4 mg/kg soil, respectively (Walsh et al. 2008b). These concentrations are below low effect-based preliminary remedial goals for plants (360 mg RDX/kg soil, 3,500 mg HMX/kg soil, 120 mg TNT/kg soil; LANL 2017).

Samples of the surface sediment 82 days after this same detonation showed RDX, HMX and TNT concentrations of up to 27.6, 3.4, and 7.9, mg/kg, respectively (Walsh et al. 2008b), with observed reductions attributed to biodegradation. Explosive residues have been shown to biodegrade to below levels of detection over a period of months by anaerobic metabolism under conditions of sufficient organic matter content, such as those found in the ERF estuary (Walker and Kaplan 1992; Walsh 2007; Walsh et al. 2007). However, rates of aerobic biodegradation in soil for these same residues are 7 to 11 times slower (Ringelberg et al. 2003). It is therefore expected that HE residues would persist longer in the upland habitats of the proposed expansion area. Regardless of soil condition, impacts to vegetation related to phytotoxicity would be localized to LO and UXO detonation sites, which would encompass a fraction (<0.2 percent) of ERF-IA. However, with the transition to using more IMs in the future, there is likely to be an increase in LO detonations and UXO and associated increase in residues. These impacts could range from short term to long term depending on the type and rate of breakdown pathways and duration of exposure. For example, vegetation in areas that are regularly flooded would be less susceptible to long-term contaminant exposure than vegetation in upland areas because of sediment transport and dilution breakdown processes.

While energetic compounds appear to biodegrade over time, they have the potential to accumulate in soil to potentially phytotoxic levels. To estimate the relative potential for bioaccumulation of phytotoxins among alternatives, the total annual mass of energetic residues deposited was calculated for traditional munitions (Table 3.7-3). Under Alternative 1, the potential deposition of energetic residues would increase by 54 percent relative to the No Action Alternative, although some of this material would be deposited in the expansion area (range between 0 and 17 percent) (Table 3.7-3).

Several factors must be considered when evaluating these deposition rates. First, the residue estimates were developed based on use of traditional munitions. Studies conducted by CRREL have found that the more insensitive the munitions are, the less efficient they become and the more they deposit residues. Thus, IMs are expected to result in a greater amount of residue from HO and LO detonations, and potentially UXOs. In the case where IM constituents are toxic, the live firing of IM rounds into training areas represents an environmental risk (Walsh et al. 2017). Secondly, the analysis incorporates the approximate dud rate for traditional HE rounds (3.37 percent) (Dauphin and Doyle 2000). Although the IM dud rate is not publicly available, it is expected be lower than that of traditional munitions (<1 percent dud rate). The 3.37 percent dud rate is also substantially higher than the dud rate observed at ERF-IA at JBER and other ranges in Alaska over the past 20 years (USACE 2005). Lastly, the total masses in Table 3.7-3 do not account for biodegradation or natural attenuation (i.e., flushing) of residues. Thus, the residue deposition values presented should be used for comparing alternatives rather than predicting deposition quantities that would occur following resumption of all-season live firing in ERF-IA. Please refer to Appendix F for more detailed information on estimated residue deposition rates in ERF-IA.

Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only

Alternative 2 would have long-term impacts on vegetation from live-fire training, but the affected area and degree of effect would be less than under Alternative 1 because the impact area would not be expanded. Impacts would not exceed applicable significance thresholds.

None of the construction and maintenance impacts described for Alternative 1 would occur under Alternative 2. Impacts to vegetation would be limited to those associated with detonation of rounds in vegetated areas of the existing impact area. Similar to Alternative 1, live-fire training during the growth period for plants when soils are unarmored by ice would result in a greater degree of impacts to vegetation than the current winter-only firing. The frequency of live-fire training for HE rounds, and the annual maximum number of rounds fired, would be the same as under Alternative 1; however, because the impact area would not be expanded, all rounds would detonate within target areas in the existing ERF-IA. Under Alternative 2, all 6 estimated maximum acres of annual vegetation disturbance (approximately 0.02 percent of the natural vegetation present on the installation) would occur in the existing impact area if all annual training exercises occur on JBER. Potential phytotoxic impacts to vegetation associated with all-season firing would be similar to those described for Alternative 1, except the affected area would be limited to the existing impact area.

No Action Alternative

Indirect live-fire training would continue to occur only when there is sufficient ice cover or frozen sediment thickness to support use of the specific weapon system. Observations since 1999 confirm that this restriction effectively protects vegetation from physical disturbance (USAF 2017a). Energetic residues associated with the LO detonation of munitions would continue to be introduced to ERF-IA, the general impacts of which are discussed for Alternative 1. Under a winter-only firing regime, energetic residues would be more likely to be flushed from the estuary during spring melt and before the active growing season. In this way, toxins would be less likely to be taken up by plants, and the potential for accumulation to phytotoxic levels would be less than under Alternatives 1 and 2.

Mitigation

BMPs and SOPs that would help avoid or reduce adverse impacts to vegetation would continue to be implemented under all alternatives. The SRA program would continue to educate soldiers and ensure operations and activities within the impact area are carried out in a sustainable manner to preserve vegetation. BMPs that would help protect vegetation from project activities and prevent establishment and spread of invasive species include the following:

- Adhere to construction BMPs that minimize erosion and sedimentation (Alternative 1 only).
- Adhere to riparian setbacks and habitat protection buffers set forth in the INRMP.
- Monitor installation ecosystems through the Long-Term Ecological Monitoring plots per the INRMP.
- Manage vegetation at existing firing points, as prescribed in the INRMP.
- Adhere to BMPs and recommendations of JBER's *Invasive Species Management Plan* to limit the likelihood of introduction and extent of infestation of invasive plant species, which includes implementing equipment cleaning practices for construction equipment.
- Regularly control invasive plant species in the proposed expansion area in accordance with the *Invasive Species Management Plan* and *Integrated Pest Management Plan* (Alternative 1 only).
- Use weed-free soil, seeding mix, and other construction materials to minimize the introduction of invasive plant propagules to the proposed expansion area (Alternative 1 only).

Additionally, the following mitigation has been determined as a result of the vegetation analysis to limit the establishment and spread of invasive species under Alternative 1:

- Conduct preliminary treatment for management of existing invasive plant species populations and continue regular monitoring and treatment as needed.

3.8.2.2 Fish

The analysis of potential project impacts on fish resources considers potential direct and indirect effects from underwater noise, ecotoxicological effects, direct munitions strikes, and habitat alteration. For more detailed analyses of potential project effects to fish and their habitat, refer to the Noise Technical Report (Appendix C) and EFH Assessment (Appendix E). Impacts to fish would be considered significant if any of the following were to occur:

- Mortality or injury of fish species at the watershed scale (Eagle River watershed)
- Long-term obstructions to breeding, feeding, or movement patterns of native resident or migratory fish species
- Long-term loss of rare/valuable fish habitat relative to available similar habitats in Knik Arm of Upper Cook Inlet

- Failure to comply with federal, state, or local regulations protecting fish including the ESA and MSA and its associated fishery management plans
- Failure to meet the provisions of an applicable species conservation plan or habitat management plan, including the JBER INRMP

Methodology

This section provides a general discussion of how noise, munitions strikes, munitions contaminants, and habitat alteration (i.e., erosion and sedimentation) from live-firing activities can affect fish resources and describes the methodologies used to evaluate potential effects on fish and their habitat.

Noise Impacts on Fish Resources

Exposure to high-intensity underwater noise may result in fish mortality, external and internal injury (such as damage to swim bladders), reduced fitness due to physiological/behavioral stress, increased predation, reduced feeding efficiency, and avoidance of preferred habitats (Wright and Hopky 1998; Hastings and Popper 2005; Popper and Hastings 2009; Halvorsen et al. 2012; Buehler et al. 2015; Popper and Hawkins 2019; Popper et al. 2019). Mechanisms for auditory detection of sound (i.e., hearing) vary widely among fish (Ladich and Fay 2013; Popper et al. 2014) and some fish groups (e.g., those with a swim bladder such as salmonids) are more sensitive to underwater noise than others (e.g., those without a swim bladder such as eulachon or flatfishes). Fish hearing capabilities and sensitivities for the fish categories that may occur at ERF-IA are described in Appendix E.

Previous studies have shown that underwater noise can injure and/or kill fish or cause alterations in behavior (Wright and Hopky 1998; Hastings and Popper 2005; Halvorsen et al. 2012). However, there is limited information on impacts to fish from detonation of explosives that travel through air and sediments before entering water. Most of the proposed mortar and artillery training activities are not expected to introduce firing noise directly into the aquatic environment but would be attenuated by air and sediment first before exposure to fish.

In addition to the potential for direct mortality or injury, temporary or permanent hearing loss may result from exposure to intense sounds. Permanent threshold shift (PTS) is a loss of hearing that never recovers. Temporary threshold shift (TTS) is a relatively short-lived reduction in hearing sensitivity due to changes in the sensory cells of the ear. To date, there is no evidence of PTS in fishes, and it is considered unlikely to occur (Smith 2016; Smith and Monroe 2016). However, it is possible that damage to the swim bladder or other organs involved in the detection of sounds might result in permanent changes to the hearing abilities of some fishes. Fish that experience temporary hearing loss may have a reduced ability to detect sounds such as predators, prey, or social vocalizations. Sound detection impairment for fish can result in a decreased ability to forage or avoid predators, thereby reducing overall fitness, although for fish that experience TTS, normal hearing ability eventually returns after the noise exposure ends (Popper et al. 2019). The length of time required for recovery varies as a function of the frequency of the sound and duration of exposure (Scholik and Yan 2001).

In support of the analysis of impacts, acoustic modeling was conducted to evaluate noise propagation pathways for specific munitions and evaluate the potential impacts to fish in ERF waterbodies due to underwater and in-air noise from multiple representative training scenarios during summer and winter. Distance to Effect (DTE) modeling was performed to determine minimum impact distances from the waterbody required to avoid exceeding underwater noise thresholds for fish. The modeling considered typical high tide conditions as well as typical inundating tide events. Additional information about the acoustic modeling scenarios and applicable noise thresholds for fish is provided in Appendix C and Appendix E.

Direct Strikes to Fish Species

Use of explosive munitions during training has potential risk of direct impacts to fish species from an accidental direct strike by a munition and from weapons debris following detonation. A direct hit or shock waves from a munition detonation would likely cause fish mortality or severe injury resulting from damage or rupture of the swim bladder or other internal organs. A qualitative analysis of effects to fish from accidental direct strikes considered areas where fish may be present, the protective measures listed in Section 2.4.1.3, and the timing and frequency of training.

When explosives detonate, fragments of the weapon are thrown at high velocity from the detonation point and have the potential to cause injury or mortality if they enter the water and strike fish. This risk is directly related to the distance of separation between the location of the explosion, presence of obstructions, and the location of fish at the time of detonation. The risk for injury or mortality for fragment strikes is greatest for fish that happen to be present at or near the top of the water column because the friction of the water would be expected to reduce the velocity of these fragments. Only detonation of HE rounds would result in fragmentation or shrapnel.

While there are no standards that document risks to fish from munitions fragments, human-based safety standards can be used as a conservative method for determining risks to fish. The initial analysis of potential effects to fish from fragmentation involved calculation of hazardous fragmentation distances, as presented in Appendix E. This analysis indicated that the estimated maximum distance over which hazardous fragments could extend was greater than the habitat protective buffers described in Section 2.4.1.3. A subsequent mitigation measure developed for marine mammals (Section 3.8.2.4) was to ensure that SDZ areas that are off-limits to personnel (described in Section 2.1.5.2) would not overlap Eagle River and Otter Creek. For this EIS, the analysis of effects to fish from munitions fragments considered areas where fish have the potential to be present in ERF-IA in relation to areas where fragmentation from detonations would have the potential to land.

Habitat Alteration

The analysis of impacts on fish habitat considers cratering, soil compaction, soil erosion, and vegetation removal, which create the potential for increased sediment runoff. Sedimentation and turbidity are primary contributors to the degradation of salmonid habitat (Bash et al. 2001). Excess sediment loading and turbidity levels can clog fish gills, smother eggs, embed spawning gravels, disrupt feeding and growth patterns of juveniles, delay the upstream migration of adults, and scour nutrients from the stream substrate. This may temporarily cause fish to avoid the area, impede or discourage free movement through the proposed project area, prevent individuals from using preferred habitats, and/or expose individuals to less favorable conditions. Excessive sediment deposition over benthic habitats can result in a reduced availability of macroinvertebrate prey for fish.

The analysis of potential impacts to fish from erosion and sedimentation considered the findings of the water resources analysis in Section 3.6.2, the potential for fish to be present in affected areas, and the expected degree of effect to fish based on the timing and frequency of training. Crater generation can erode or modify existing stream channels that provide rearing habitat for juvenile salmonids and thus reduce habitat connectivity. Additionally, the potential for vegetation loss to impact fish terrestrial prey species abundance was considered in the analysis of habitat alteration.

Munitions Contaminants and Bioaccumulation

Fish species and aquatic invertebrate prey items may be exposed to contaminants in munitions residues by direct or incidental ingestion and by dermal contact (USEPA 2021). Exposure to contaminants in the water column could occur via direct uptake from water through gills and accumulation in muscle, fat, and other tissues. Bottom-dwelling species (i.e., groundfish) can be directly exposed to contaminants in sediments, or species may ingest contaminated benthic prey items. If fish consume contaminated prey, there is a potential for contaminants to be transferred up the food chain. The analysis of effects considers information about the chemical constituents found in both traditional munitions and IMs, methods by which these constituents could deposited into the environment, and fate and transport processes. Additionally, information about the relative toxicity and bioaccumulation potential of individual munitions constituents, where available, is considered, along with relevant information from past studies at ERF-IA and various firing ranges. Less information is available on IM constituents because they are relatively new. Due to dynamic hydrologic and sediment transport patterns; daily, seasonal, and interannual variation of fish presence in ERF waterbodies; and protective measures that would be implemented, exposure concentrations of these chemicals in fish species cannot be quantified but are expected to be relatively low. Potential effects are described in this section to the maximum extent practicable without conducting a detailed site-specific ecotoxicological risk assessment. Refer to Appendix E and Appendix F for more detailed information on munitions contaminants and potential effects to fish at ERF-IA.

Alternative 1: All-Season Live-Fire Training with Expanded Impact Area

Alternative 1 would have direct and indirect, long-term, adverse impacts on fish resources. Although mitigation would be implemented to avoid and reduce potential impacts, this alternative would still result in mortality or injury of various fishes depending on type, location, and timing of live-firing activities at ERF-IA. Impacts from Alternative 1 would have the potential to exceed applicable significance thresholds, even with the proposed mitigation, as fish could potentially be impacted at the watershed scale. Although open channels would not be targeted, it is likely that some rounds would land in or near channels that support juvenile rearing salmonids. The mitigation measures identified later in this section include use of ongoing salmon enumeration studies to obtain information on fish populations and potentially identify additional measures to reduce observed effects.

Under Alternative 1, live-fire exercises would be spread out over both existing ERF-IA and the proposed expansion area. Firing into the proposed expansion area, which is further away from fish-bearing waters than existing ERF-IA, would reduce the likelihood of errant rounds reaching fish habitat. Therefore, impacts under Alternative 1 would potentially be less than under Alternative 2, where firing would be concentrated in ERF-IA.

Construction and Infrastructure

Construction activities in the expansion area are not anticipated to result in direct impacts to fish resources, as there would be no direct impacts to surface water resources (see Section 3.6.2). Adherence to BMPs and mitigation measures during construction activities as outlined in the JBER INRMP and a project-specific Construction General Permit SWPPP would minimize potential construction impacts from erosion and sedimentation.

Adherence to habitat buffers and setback requirements would prevent sedimentation into Clunie Creek and associated wetlands. Although Clunie Creek does not have a downstream surface water connection with Eagle River, it may contribute sediments to ERF during infrequent periods of sheet flow flooding. With erosion and sediment control measures in place, any potential sedimentation into Clunie Creek from the proposed grading and construction is not expected to result in measurable effects to Eagle River or ERF. Should sedimentation occur, it is expected that suspended sediments would settle out quickly (or be flushed downstream) and that macroinvertebrates in the affected portions of the channel would recolonize the disturbed areas following construction activities.

Firing and Training Exercises

Noise Impacts

The resumption of all-season mortar and artillery firing at ERF-IA would increase the potential for mortality or injury of fish due to underwater noise and vibrations from live-firing activities, as these activities would occur when some fish species are more likely to be present in ERF-IA or actively migrating to spawning grounds upstream of ERF-IA.

Maximum distances from the edge of waterbodies in ERF-IA where threshold exceedances and associated impacts to fish may occur, based on acoustic modeling results, are provided in Table 3.8-9. Under Alternative 1, proposed buffers along Eagle Bay, Eagle River, and the Otter Creek complex are sufficient to protect fish during conditions when ERF is not inundated. These expanded buffers would increase protections along the Eagle River main channel and the Otter Creek complex (Figure 2.4-3). However, there is a risk that firing at targets in unbuffered areas, particularly the Eagle River relict channel complex, could result in mortality or injury to fish if they are present within a stream channel where a water detonation occurs. Although forward observers would monitor for presence of standing water prior to firing as an SOP, there is a risk that an HE round could potentially land within a wetted channel while fish are present if open water cannot be observed.

Table 3.8-9 Maximum Distances from Edge of Waterbody Where Threshold Exceedances to Fish May Occur (Typical High Tide)

Effect	Species	Threshold (dB re 1 μPa2·s)	Eagle River		Eagle Bay			Otter Creek Complex
			DTE 1	DTE 2	DTE 3	DTE 4	DTE 5	DTE 6
Recoverable injury; SEL	Fish with no swim bladder	216 dB	-	-	-	-	-	-
	Fish with swim bladder	203 dB	-	2 m	-	2 m	-	6 m
Mortality and potential mortal injury; SEL	Fish with no swim bladder	219 dB	-	-	-	-	-	-
	Fish with swim bladder involved in hearing	210 dB	-	-	-	-	-	4 m
	Fish with swim bladder not involved in hearing	207 dB	-	-	-	-	-	4 m
TTS; SEL	All fish	186 dB	18 m	26 m	22 m	26 m	26 m	20 m
Proposed Buffers	**-**	**-**	**50–130 m**		**500 m**			**50 m**

Note: For a discussion of the proposed buffers, see Section 2.4.
Key: dB = decibels; dB re 1 μPa2 = decibels referenced to 1 microPascal squared; DTE = Distance to Effect; m = meter; s = second; SEL = sound exposure level; TTS = temporary threshold shift
Source: JASCO Applied Sciences 2022

When ERF-IA is inundated (typical inundating tide events), there would be a greater risk of noise impacts to fish. Only training rounds would be used during these conditions, the loudest of which is the 155-mm training round. Tables 3.8-10 and 3.8-11 show the predicted maximum distances from detonation points where fish mortality or injury could occur during typical inundating tide events, based on acoustic modeling. Although the 500-meter Eagle Bay buffer would be protective of fish, the proposed buffers at Eagle River and Otter Creek would not be adequately protective when firing 155-mm training rounds. Acoustic impacts (mortality, injury, or behavioral changes) to fish in these areas could occur. Proposed mitigation to not fire 155-mm training rounds during inundated conditions (see Fish *Mitigation* section) would reduce impacts to fish, although some effects may still occur if smaller rounds are fired during inundated conditions. Additionally, because 155-mm rounds would not be fired into the unbuffered portions of the Eagle River relict channel due to space limitations, impacts to fish from these larger rounds in this unbuffered area would be avoided. Due to these mitigation measures, occasional behavioral reactions to intermittent munitions detonations from the proposed firing scenarios are unlikely to cause long-term impacts for individual fish.

Table 3.8-10 Maximum Distances Where Fish Mortality, Potential Mortal Injury, and Impairment SEL Thresholds May Be Exceeded Due to 155-mm Training Round[1] Detonation Noise during Typical Inundating Tide Events

Mortality and Potential Mortal Injury Thresholds (dB re 1 µPa2·s)			Impairment Thresholds (dB re 1 µPa2·s)[2]		
			Recoverable Injury		Temporary Threshold Shift
Fish with no swim bladder: >219	Fish with swim bladder not involved in hearing: 210	Fish with swim bladder involved in hearing: 207	Fish with no swim bladder: >216	Fish with swim bladder: 203	All fish: >186
110 m	260 m	320 m	150 m	410 m	850 m

Notes:
[1] 155-mm training rounds have 1.3 kg NEW.
[2] Thresholds provided are SEL24h values with units of dB re 1 µPa2·s
Key: dB = decibels; dB re 1 µPa2 = decibels referenced to 1 microPascal squared; HE = high explosive; kg = kilogram; m = meter; mm = millimeter; NEW = Net Explosive Weight; s = second; SEL24h = sound exposure level over 24 hours
Sources: Popper et al. 2014; JASCO Applied Sciences 2020

Table 3.8-11 Maximum Distances Where Fish Mortality, Potential Mortal Injury, and Recoverable Injury Peak Thresholds May Be Exceeded Due to 155-mm Training Round[1] Detonation Noise during Typical Inundating Tide Events

Mortality, Potential Mortal Injury, and Recoverable Injury Thresholds[2]	
Fish with no swim bladder: >213 (dB re 1 µPa2·s)	Fish with swim bladder: >207 (dB re 1 µPa2·s)
350 m	490 m

Notes:
[1] 155-mm training rounds modeled have 1.3 kg NEW.
[2] Thresholds provided are unweighted peak thresholds (dB re 1 µPa).
Key: dB re 1 µPa2 = decibels referenced to 1 microPascal squared; HE = high explosive; kg = kilogram; m = meter; mm = millimeter; NEW = Net Explosive Weight; s = second
Sources: Popper et al. 2014; JASCO Applied Sciences 2020

A round unintentionally fired into Eagle River would have the potential to result in injury or mortality of fish, but this accidental scenario has an extremely low risk of occurrence (1 in 1,000,000), provided standard firing procedures are followed (see Appendix C). Underwater noise thresholds could also be exceeded if an errant round were to inadvertently be detonated within a buffered area, but the risk of such an occurrence is low. If a round does land outside the weapon system impact area, all firing would immediately stop, and firing would not resume until a full investigation is completed to determine the cause of the errant round.

With mitigation measures in place, it is unlikely that significance thresholds would be exceeded for adult salmon migrating through Eagle River and Otter Creek to reach spawning grounds upstream. Further, restriction of the use of 155-mm training rounds during typical inundating tide events (i.e., only using training rounds that do not contain HE) would reduce the potential to exceed significance thresholds for fish resources at ERF-IA. Although open channels would not be targeted, it is likely that some rounds would land in or near unbuffered channels that support juvenile rearing salmonids, which could lead to acoustic impacts to fish and potentially exceed significance thresholds for coho, Chinook, and sockeye salmon at the watershed scale. Selective targeting and other protective measures would be conducted when firing into unbuffered areas. Mitigation identified later in this section includes continued salmon enumeration studies to obtain information on fish populations and potentially identify additional measures to reduce observed effects.

Direct Munitions and Fragment Strikes

Under Alternative 1, the increased numbers of munitions fired into ERF-IA when fish species are more likely to be present in ERF waterbodies would increase the risk of direct impacts by munition or fragment strikes. While there would be no intentional firing into open waterbodies, there is a small potential for direct strikes when firing in unbuffered areas, firing of training rounds during typical inundating tide events, or as a result of an accidental deviation from standard firing procedures.

During typical high tide conditions, most fish within ERF are expected to occur in Eagle River, Otter Creek, and the Otter Creek intertidal channels, although as discussed previously, some fish may be present in unbuffered areas where there would be a higher risk that a munition or fragment would result in a direct strike. The greatest risk of direct fragment strikes to fish would be at target areas along Eagle River and Otter Creek that are outside of the protective buffers along these waterways, as well as other unbuffered areas that may support fish. The risk of fragment strikes would be higher for pelagic fish located closer to the water's surface than for benthic groundfish species that are predominantly found along the river bottom. Adult salmon tend to migrate along deeper portions of the water column, whereas juveniles may occur throughout the water column (Carter et al. 2009; Eiler et al. 2022). Underwater, the friction of the water would slow fragments and reduce their potential to harm fish.

Overall, the risk of direct fragment strike of salmonids in these areas is dependent on fish presence, amount and density of vegetation, water levels, topography, and other site-specific factors near target areas at the time of firing. Protective measures will reduce the potential for direct strikes to fish, and the risk of fragments striking adult salmonids is expected to be negligible. High-velocity fragment strikes may occur with low frequency in inundated areas outside the main channels of Eagle River and Otter Creek. The occasional event where a fish is struck by a fragment is expected to occur so rarely that fish species would not experience any population-level effects. The mitigation measures identified later in this section include use of ongoing salmon enumeration studies to obtain information on fish populations that could potentially be used to identify additional measures to reduce observed effects.

Habitat Alteration

There is potential for increased erosion and sedimentation into ERF waterbodies as a result of live-fire training during all seasons under Alternative 1. Considering site conditions and proposed protection measures, most sedimentation and turbidity effects caused by munition detonations in ERF-IA and the proposed expansion area are not expected to appreciably change existing conditions, as the system already has a high baseline of suspended sediment/turbidity.

Live-fire training would occur during periods when ERF-IA is not covered with ice and would generate craters and create localized areas of reduced vegetative cover in the flats. As discussed in Section 3.6.2.2, changes in topography and destabilization of soils associated with increased crater formation in ERF-IA under Alternative 1 would likely result in increased sedimentation and particulate transport into waterbodies. Sediment released into waterbodies and channels could result in loss or degradation of rearing habitat for fish, either by filling in channels or generating suspended sediment. This would indirectly result in some loss or disturbance to the macroinvertebrate prey base. Habitat protective buffers would reduce erosion and sedimentation impacts adjacent to Eagle River, Otter Creek, and the Otter Creek complex. However, some munitions detonations could occur in unbuffered areas where fish are present. Within these areas, targets would be placed on higher ground to avoid stream channels and low-lying areas that could generate erosion.

As discussed in Section 2.4.1.3, it is possible that some detonation of rounds could occur in shallow areas of flowing or standing water that are obscured by vegetation and that are hydrologically connected to other surface water resources during inundated conditions. This could impact local hydrology by opening new channels or closing off existing channels, which could alter fish access to connecting habitats, such as mainstem Otter Creek and Eagle River. Existing vegetation would provide some erosion control, and impacted vegetation would be expected to grow back if the same areas are not continually targeted. However, regrowth could be impeded if firing is concentrated within the unbuffered areas. The built-in protective measure to not fire HE rounds during inundated conditions and mitigation determined as a result of analysis of impacts to fish (see Fish *Mitigation* section) to not fire 155-mm training rounds during inundated conditions would reduce sediment disturbance when the flats are flooded and connected to active channels. The unbuffered area on the west side of ERF-IA would be subject to greater sediment disturbance and erosion because it could accommodate the full range of proposed rounds. However, it is unknown whether this area provides the same high-quality rearing habitat that has been documented within the Eagle River relict channel complex.

The magnitude and scale of effects at the local level cannot be quantified, but it is anticipated that there would be some reduction in coho (and potentially Chinook and sockeye) escapement and productivity in Eagle River and Otter Creek primarily due to loss or modification of habitat in unbuffered areas. Localized sediment increases, particularly within the unbuffered areas, could result in short-term loss or disturbance of some macroinvertebrates that comprise part of the prey base for fish species. Overall, the degree of effects to the unbuffered areas cannot be predicted, but it is expected that existing habitat would be altered, and the degree of effect would depend on detonation locations (buffered versus unbuffered areas). The full extent of impacts may not be realized for years after firing commences through continued monitoring of adult escapement, juvenile outmigration surveys, and habitat evaluations of buffered and unbuffered areas of ERF-IA. The mitigation measures identified later in this section include use of ongoing salmon enumeration studies to obtain information on fish populations and determine whether additional measures could be implemented to reduce observed effects.

Munitions Contaminants and Bioaccumulation

A detailed analysis of potential impacts to fish from deposition of munitions residues under Alternative 1 is presented in the EFH Assessment (Appendix E). The increased quantity of munitions fired into ERF-IA and firing during all seasons would increase the risk to fish species and their prey base from exposure to contaminants. Protective buffers and strategic placement of targets on higher ground within sensitive unbuffered areas would reduce risk of munition detonation in stream channels. However, target areas would still overlap small tributaries, so it is likely that some munitions and contaminants would be deposited into stream channels. Additionally, throughout ERF, rounds may land in areas that contain standing or flowing water during inundated conditions where fish may be found.

Based on the large firing area (existing ERF-IA and the proposed expansion area), the variety of contaminant breakdown pathways that are expected to occur, the low risk of bioaccumulation, and the intermittent flushing of munitions residues from ERF-IA, it is anticipated that even with increased firing under this alternative there would be a low risk of munitions contaminants affecting fish species and habitat. Based on past studies at ERF-IA, it is not anticipated that live-fire training under Alternative 1 would result in significant impacts to fish from contaminant exposure; however, additional site-specific information on water quality and contaminant exposure pathways would provide a better understanding of potential toxicological effects, particularly from newer IMs, as there still remains uncertainty about ecotoxicity risk and bioaccumulation potential from exposure to underwater munitions contaminants. Although acute toxicity (mortality) is highly unlikely, there is a risk of sub-lethal effects resulting in reduced survival, growth, or reproduction that could negatively affect fish resources. Continued salmon enumeration studies (see Fish *Mitigation* section) could allow JBER to obtain a better understanding of impacts to fish from the proposed action, including potential impacts of munitions constituents, and potentially identify additional measures to reduce observed effects.

Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only

Potential impacts to fish from noise, direct strikes, habitat alteration, and munitions contaminants under Alternative 2 would be similar to those discussed for Alternative 1, as the same types of rounds would be fired, the affected area in ERF would be the same, and the same mitigation measures would be implemented to avoid or reduce impacts. However, with no expansion area under this alternative, all rounds would be targeted into the existing ERF-IA. Under a worst-case scenario in which all live-fire training events occur at JBER, the degree of impact would be greater than under Alternative 1, because more rounds would detonate in areas where fish have the potential to be present in a given year. For the reasons given for

Alternative 1, impacts would have the potential to exceed applicable significance thresholds, even with mitigation measures considered. Ongoing salmon enumeration studies (see Fish *Mitigation* section) could allow JBER to obtain a better understanding of impacts to fish and potentially identify additional measures to reduce observed effects.

No Action Alternative

Under the No Action alternative, impacts to fish would be expected to remain similar to baseline conditions. Winter-only firing restrictions would remain in place, and live-fire training would not occur during adult salmon migration periods. Impacts to fish and fish habitat would be lower under this alternative than under Alternatives 1 and 2.

Mitigation

Protective measures built into the proposed action that would help avoid or reduce impacts to fish under both action alternatives include habitat protective buffers based on acoustic modeling, limited fire periods for HE rounds (during inundating tide events and during the seasonal closure period), redistributing targets away from buffer areas, targeting higher elevation areas, and restricting units to targets outside routinely inundated areas during inundating tides at night.

The Army, JBER (Air Force, supported components, and tenant organizations), and contractors are required to comply with applicable laws, regulations, and policies, including but not limited to a prohibition on harassment of fish and wildlife. Any action that disturbs fish and wildlife is considered harassment by federal and Alaska State law. Examples of harassment include pursuit with vehicles or aircraft, feeding, and shooting of fish and wildlife. Vehicles, watercraft, and aircraft (including helicopters) may not be used to herd/chase fish and wildlife off ranges or training areas. Standard BMPs and SOPs for training that would be followed under all alternatives include no target placement in open waterbodies, no intentional firing into open navigable waterways or observable open water, use of an FDC and other systems for accuracy, and cease-fire protocols. JBER's BMPs clearly state that there would be no intentional firing into open waterbodies and that targets would not be placed in open waterbodies. Forward observers would monitor for observable open water and observe rounds impacting or bursting, with cease fire and shifting to different targets if conditions that could potentially harm fish are observed, and night vision equipment or ILLUM rounds would be used to observe targets at night. Additionally, 155-mm rounds would not be fired into unbuffered areas near the Eagle River relict channel due to space limitations.

The SRA program would continue to educate soldiers and ensure operations and activities within the impact area are carried out in a sustainable manner to preserve fish resources and habitats. The most current INRMP contains specific actions to protect, inventory, maintain, and improve fisheries resources and their habitats. This document is continually reviewed and revised to respond to new or increasing impacts on fisheries resources.

Adherence to spill prevention and cleanup procedures outlined in the most current INRMP, JBER SPCC/C-Plan, and the most current JBER Industrial SWPPP would help prevent contamination of water, and adherence to construction BMPs and the project-specific Construction General Permit SWPPP during construction under Alternative 1 would help minimize the risk for impacts to potential fish habitats from construction. Under Alternative 1, adherence to riparian setbacks and habitat protection buffers in the INRMP would reduce the risk of impacts to fish by protecting water quality in Clunie Creek.

BMPs and SOPs to prevent discharge of WP from gravel-capped areas in ERF include not placing targets on capped areas and avoiding remediated areas during training exercises to the extent practicable. The Army would also continue to follow the most recent guidance and recommendations on using types of munitions that minimize impacts to aquatic receptors to the maximum extent practicable. This involves coordination with other military firing ranges and research institutions (e.g., SERDP and CRREL) that have been conducting studies on fate, transport, and toxicity of IMs and traditional explosives over the past several decades.

Additionally, mitigation determined as a result of the water resources analysis to prevent discharge of WP from gravel-capped areas (Section 3.6.2.5) would also prevent associated impacts to fish habitat.

The following mitigation measures have been determined as a result of the fish resources analysis to provide additional protections to fish. These mitigation measures were developed in coordination with NMFS for EFH and managed species (see Appendix E) but would help avoid or reduce impacts to all fish species and their habitats.

- Expand the protective measure that specifies limited fire periods for HE rounds (Section 2.4.1.3) to include 155-mm training rounds. This means that 155-mm training rounds, like full HE rounds, would not be fired into inundated areas during inundating tide events and would not be fired into ERF during the seasonal closure period (9 August to 18 October); 155-mm training rounds could still be fired into the proposed expansion area during this time.
- Continue to evaluate rearing and residency of juvenile salmon and/or other fish species using trap surveys and/or eDNA (or other methods as appropriate) to monitor productivity in and adjacent to the ROI.
- Continue fisheries harvest management, population studies (annual salmon enumeration studies), and habitat protection efforts at Sixmile Lake, Eagle River, and Otter Creek to ensure fish resources are effectively managed on JBER. Data will be used to monitor changes in habitat conditions with appropriate consideration to all other potential confounding factors. Additional measures may be considered where metrics indicate action-related degradation to fish habitat.

Mitigation measures developed for marine mammals to reduce the risk of hazardous fragment strikes under Alternatives 1 and 2 (Section 3.8.2.4, *Mitigation*) would also reduce the risk of fragment strikes to fish while they are in Eagle River, Otter Creek and the Otter Creek complex.

Additional measures that are being considered include the following:

- Develop and implement appropriate efforts for comparative sampling and monitoring of hydrologic and biometric conditions in areas within and adjacent to ERF-IA. The practicability of these efforts is dependent on safe access to relevant areas because much of ERF-IA is a dedicated impact area. Hydrologic monitoring may include water quality sampling as well as biometric sampling of fish tissue and characterization of invertebrate communities in relevant areas.
- Consider opportunities to protect, enhance, and/or restore salmon habitat in the affected area, including within and outside the JBER installation boundary.
- Maximize use of the expansion area to reduce impacts to areas where juvenile fish may be present and during the height of salmon runs (mid-June through August) (Alternative 1 only). The practicality of trajectory adjustments depends on the type of round necessary to train and the location of appropriate firing points relative to the expansion area.
- Consider the practicability of acoustic testing on the effects of managed fish species within the proposed project area. While there are several potential confounding factors that may influence the acoustic measurements in the proposed project area, pilot studies may be developed to evaluate the range of noise inputs within ERF-IA and within various channel morphologies (e.g., primary, tributary, relict). These sound verification experiments and studies may use live species to validate acoustic modeling used in the development of the fish analysis. Data may be used to monitor changes in the condition of fish habitat, with appropriate consideration to all other potential confounding factors in the environment. Additional measures may be considered where metrics indicate action-related degradation to fish habitat. The practicability of these efforts is dependent on safe access to relevant areas, because much of ERF-IA is a dedicated impact area.

3.8.2.3 Terrestrial Wildlife

The analysis of potential project impacts to terrestrial wildlife resources considers noise and other disturbances, ecotoxicological effects, and habitat alteration. Impacts to wildlife species that are rare or locally unique are discussed in Section 3.8.2.5.

Impacts to wildlife would be considered significant if any of the following were to occur:

- Permanent or long-term loss of rare/valuable wildlife habitat relative to available similar habitats in Upper Cook Inlet
- Permanent or long-term changes to the distribution of wildlife species in Upper Cook Inlet
- Permanent or long-term reductions in wildlife populations that threaten the continued existence of the population(s) within JBER installation boundaries

Methodology

The impact analysis quantitatively and qualitatively assessed the degree to which the proposed action would directly or indirectly harm or reduce the reproductive success of individuals, and whether there would be associated population-level or species-level effects. Species and habitats that potentially overlap the ROI, as indicated by local, state, and federal resources and agencies, were identified, and available scientific literature was reviewed to determine potential impacts to these species and habitats from proposed project actions. For wildlife resources, degree of impact is based on the social and scientific importance of wildlife resources, rarity of wildlife resources, sensitivity of wildlife to project elements, and duration of exposure to project elements. Generally, effects to priority species and habitats are considered to be greater than effects to common species.

The following subsections present a general discussion of how noise, contamination/bioaccumulation, and habitat alteration affect wildlife. This information was considered when analyzing impacts under each alternative.

<u>Noise Impacts on Terrestrial Wildlife</u>

Noise impacts to wildlife include primary effects (resulting in damage to hearing organs, and temporary or permanent hearing loss), secondary effects (startle response, movement away from the noise), and tertiary effects (population-level changes, including increased mortality, reduced reproductive rate, or habitat abandonment/changes in local distribution) (Jansen 1980). Noise impacts of live-fire training on human receptors, fish, and marine mammals have been analyzed through noise modeling methods (Section 3.1, Section 3.8.2.2, Section 3.8.2.4, and Appendix C). However, because each animal species has unique auditory sensitivities, extrapolating the conclusions of these models to other wildlife species present on JBER would likely be inaccurate. Instead, this analysis relies on observational data of wildlife responses acquired during live-fire training activities on JBER and a review of published literature on wildlife responses to military training activities.

Wildlife Behavior Observations at ERF-IA

Tables 3.8-12 and 3.8-13 summarize the results of two studies conducted at or near ERF-IA to observe wildlife responses to weapons noise. During a 2007 study, wildlife behavioral reactions to artillery noise at ERF-IA were observed during a period when birds and other wildlife species are known to be present in the area (Table 3.8-12). Munitions fired included 61-mm, 81-mm, and 120-mm mortar training rounds (Walsh et al. 2008b), which do not contain HE and therefore do not produce the level of noise associated with the loudest rounds that would be used during live-fire training.

During a 2018 study, responses of nesting bald eagles to the detonation of mortar (60-mm HE rounds) and howitzer rounds (105-mm HE and C-4 equivalent rounds, and a single 155-mm HE round) were observed at two locations near ERF-IA, located roughly 1.3 and 1.7 miles from an active bald eagle nest (Table 3.8-13).

Table 3.8-12 Wildlife Behavioral Reactions to Mortar Training Rounds Fired into ERF-IA (5–8 June 2007)

Species	Reaction
Sandhill Crane	Nearly 200 individual responses were recorded. Most cranes did not appear to react, even if the round impacted near their location. Those that did react (approximately 35 individuals) appeared annoyed and moved away from the area, or were temporarily startled but shortly returned to the area. Six nesting cranes were observed as being annoyed (calling in response to training rounds) but remained near the nesting sites.
Ducks	Roughly 60 individual responses were recorded. 50% of ducks moved into other areas of ERF, away from detonation sites. 30% of the ducks seemed unaffected, with some remaining within 200 meters of the impact site. About 20% of the ducks left ERF entirely, presumably flying out to Goose Bay.
Gulls and Shorebirds	Several hundred gull and shorebird responses were recorded. Gulls and shorebirds typically dispersed when rounds detonated but returned to the area almost immediately. Birds often returned to the edges of the craters; shorebirds may have been looking for food in the disturbed soils.
Moose	Three moose responses were observed during firing of training rounds. All three moose were startled and left ERF. No moose were observed in the area on 6 June 2007 during firing, so no responses were recorded during the firing of HE rounds.

Key: ERF = Eagle River Flats; ERF-IA = Eagle River Flats Impact Area

Source: USAG 2007

Table 3.8-13 Bald Eagle Behavioral Reactions to Mortar and Howitzer Rounds Fired into ERF-IA (18 July 2018)

Location	Eagle Reactions
Detonation Site 1 – Center of detonation area roughly 1.7 miles from nest	Eagle behavior was observed during detonation of six rounds in ERF (three each of 60-mm HE and 105-mm C-4 equivalent rounds). Eagles did not react to two detonations, one of each round type. Reactions to the other detonations ranged from briefly looking in the direction of the detonation to adult eagles appearing startled and vocalizing/flapping wings. Vocalizations continued for 2 minutes after a 105-mm detonation.
Detonation Site 2 – Center of detonation area roughly 1.3 miles from nest	Eagle behavior was observed during detonation of seven rounds in ERF (three 105-mm HE, two 105-mm C-4 equivalent, and two 155-mm HE rounds). No reactions were observed for the 105-mm rounds, although the adult eagle left the nest 1 minute after the first detonation. Only fledglings were present in the nest after the first round, and no significant reactions were recorded in response to any round fired. One fledgling looked up slightly after detonation of a 105-mm C-4 equivalent round.

Key: ERF = Eagle River Flats; ERF-IA = Eagle River Flats Impact Area; HE = high explosive; mm = millimeter

Source: USAG 2018

Weapons Training Noise Impacts on Wildlife – Other Studies

Supplemental studies are summarized below to further evaluate potential wildlife responses to noise. Table 3.8-14 summarizes the results of studies focusing specifically on the impacts of military training and other loud anthropogenic noises on wildlife resources at various locations. The results of these studies were considered when evaluating potential effects on wildlife resources from weapons training at ERF-IA.

Table 3.8-14 Effects to Wildlife Resources from Military Training and Other Anthropogenic Noise

Wildlife Resource	Training Activity	Reaction	Source
Bald Eagles	Weapons testing at sites ranging from 0.5–4 km (0.3–2.5 miles) from nest/roost sites	72.7 and 92.7% of eagles did not respond within 2 seconds of weapons test. Activity levels prior to weapons noise >110 dBP were similar to levels after noise <110 dBP. Nest success and productivity levels did not differ from reference sites in other counties (without weapons training).	Brown et al. 1999
Bald Eagles	Artillery and mortar noise ranging from 0.5–1 km (0.31–0.62 miles) from eagle location	8.3% of 204 eagles (17 eagles) flushed in response to artillery and mortar noise. Eagles were more likely to be disturbed by ordnance disposal, helicopter fly-overs, and boats.	Stalmaster and Kaiser 1997
Raptor Species	Military live-fire training	Raptor counts did not generally differ between firing days and non-firing days (counts were lower during one particularly intense period of training). When prey populations were low, fewer prey capture attempts were made during training. Fewest prey counts were made during firing of artillery, small arms, and main turret guns/machine guns on tanks.	Schuek et al. 2001
Waterfowl	Overhead sonic booms (approximately 137.2 dB) from military jet flights	Waterfowl significantly and immediately changed their behavior from resting or feeding to locomotion and/or flushing from the area. Behavior returned to normal within 5 minutes.	IEMR 2005
Small Mammals	Overhead military jet flights	No observed differences in small mammal density or reproduction were detected between control plots and jet exposed plots (up to 167 overhead flights/day).	Bowles et al. 1995
Wolves	Military firing including HE 155-mm howitzers and various small arms.	Wolves moved toward howitzer and small arms firing locations (rather than away).	Merrill and Erickson 2003
Wolves	HE and rocket fire	Breeding wolves were regularly found within 1 km of HE and rocket fire target locations, and adults/pups were observed within 100 meters of active tank firing. Wolf "rendezvous" sites were found inside four different impact sites over 2 years.	Thiel et al. 1998
Moose	Pedestrian, mechanical (e.g., helicopter, motorcycle), and cannon-fire disturbances.	Startle responses recorded for pedestrian and mechanical disturbances. Cannon fire did not elicit a startle response or raise the heart rate of a male moose.	Anderson et al. 1996
Black Bear	Weapons firing resulting in noise levels >70 dBC in some areas.	Black bear habitat use was primarily associated with available habitat/vegetation types and not firing activity (except for small areas immediately surrounding firing positions – likely due to human presence).	Telesco and Van Manen 2006
Bats	Blasting to remove sand in mines	When exposed to blasting activity to remove sand in mines in Wisconsin, bat activity was not significantly influenced for 52,000 hibernating bats of four species in nearby inactive mine tunnels	Summers et al. 2022

Wildlife Resource	Training Activity	Reaction	Source
Bats	Exposure to broadband noise	Big brown bat (*Eptesicus fuscus*) hearing sensitivities were found to remain unchanged after being exposed to broadband noise (152 dB SEL), indicating that the species is less susceptible to noise-induced hearing loss when compared to other mammals	Simmon et al. 2016

Key: dB = decibel; dBC = C-weighted decibel; dBP = decibel peak pressure; HE = high explosive; km = kilometer; mm = millimeter; SEL = sound exposure level

A review of available literature (Table 3.8-12 through Table 3.8-14) indicates that wildlife species can generally become accustomed to loud military training noise. Population-specific conclusions include the following:

- Waterfowl, cranes, gulls, and shorebirds are likely to be periodically disturbed by live-fire training activities. Many individuals will return to their original location following detonations, while some will move to other parts of ERF or leave the area entirely. However, it is unlikely that birds would chronically avoid ERF due to the intermittent nature of weapons training and the seasonal presence of many species.
- Bald eagles and other raptor species can become habituated to weapons-testing noise, especially if noise impacts are greater than 1 mile from their nests and/or roost sites.
- Wolves can become accustomed to loud artillery noise and may breed in close proximity to or within military training areas.
- Small mammal abundance is generally not affected by loud noises.
- Large mammals like moose may be disturbed by military activity and noise.
- Individual bears are unlikely to be affected by military training noise, as habitat use is mostly a function of available habitat/vegetation types and not firing activity. Denning bears may be more susceptible to military activities that occur within 1 kilometer of a den (Linnell et al. 2000).
- Bats are generally less susceptible to noise-induced hearing loss than other mammals and do not appear to be disturbed during hibernation in response to nearby loud noises. However, the reviewed literature did not include studies of little brown bats, which are currently the only species of bat expected to be present on JBER.

Contamination and Bioaccumulation Impacts on Wildlife

White Phosphorous

Of the sediments originally identified as contaminated with WP in ERF, approximately 98 percent have been successfully remediated. The remaining areas have been capped with gravel and sealed to prevent exposure and transport of WP sediments (USAF 2022a). Approximately 0.5 acres of sediment was capped to, in part, prevent dabbling ducks from accessing contaminated sediment. While WP is no longer used in munitions fired into ERF-IA, it is still present beneath gravel caps and potentially in old UXO, so the potential for re-exposure of sequestered WP or discharge of WP by a sympathetic detonation of UXO by a nearby explosion is possible. However, sympathetic detonations are rare, and based on the findings of two studies at ERF-IA, there is likely a very low risk of exposing WP by this method (Walsh et al. 2007, 2008a). Considering that fewer UXOs than expected were revealed during remediation activities (U.S. Army 2005), the actual number of UXOs present in ERF-IA is likely much lower than previously estimated.

Should WP exposure occur on the surface or in a relatively dry area such as the high mudflats, the WP would dry out and sublimate, thereby eliminating the risk to waterfowl (USAF 2022a). The primary risk to waterfowl would be from exposing WP in wet environments where WP cannot dry out and sublimate.

Table 3.8-15 summarizes the potential impacts of WP on wildlife, should exposure occur.

Table 3.8-15 Documented White Phosphorus Impacts on Wildlife Receptors in the ROI

Wildlife Receptor	Effects
Water birds – ducks, swans, and shorebirds	Mortality has been related to exposure while feeding on contaminated sediments. Acute exposure has resulted in enlarged spleens, kidney effects, and hepatic effects, including necrosis, fat deposition, and the appearance of hepatic foci. Remediation in ERF-IA has reduced bioavailability of WP to water birds.
Scavengers and predators – coyotes, fox, mink, and bald eagles	Direct exposure to WP (ingestion of WP particulates themselves) by scavengers or predators was not observed in the field. Studies conclude that it is unlikely that mammal scavengers or predators were affected. Scavengers and predators can bioaccumulate WP from feeding on contaminated waterfowl. However, the effects of feeding on contaminated ducks, an indirect effect, should be minimal if few water birds are contaminated by WP (due to successful remediation efforts).
Other mammals, birds, and amphibians – moose, beaver, muskrat, cranes, grouse, wood frogs, and others	Direct observations of WP ingestion were not obtained in the field.
Wildlife in Knik Arm	Adverse effects in Knik Arm are considered to be insignificant because only minimal transport of WP particles from ERF-IA has been identified.
Invertebrates and fish	No significant accumulations of WP were found during sampling. No evidence of adverse effects on invertebrates in ERF-IA was identified. Additionally, ERF macroinvertebrates and fish were not anticipated to pose a risk to birds or mammals (e.g., bats) who eat them.
Aquatic vegetation in ERF-IA and Knik Arm	Aquatic plants growing in contaminated sediments contained only low levels of WP, indicating that they do not create a risk through food-chain contamination.

Key: ERF = Eagle River Flats: ERF-IA = Eagle River Flats Impact Area; ROI = Region of Influence; WP = white phosphorus
Source: CH2M Hill 1998

Other Munitions Constituents

While other constituents associated with munitions used in indirect live-fire training may not be as acutely toxic to various wildlife species as WP, high concentrations of these substances could potentially impact wildlife resources (e.g., waterfowl and mammals). Effects of munitions constituents to wildlife species can be varied but may include reduced reproductive success, reduced fitness, lethargy, and in some cases organ damage/failure and death. A complete list of the chemical constituents of munitions that would be used for indirect live-fire training is provided in Appendix F, along with toxicity information including bioaccumulation potential and threshold exposure values. As trials testing each munition component for its effects on multiple groups of organisms (receptors) are rare, thresholds were derived from a review and synthesis of available scientific literature for each constituent and its effects.

In addition to the chemical components of munitions constituents, various metals may be introduced to the impact areas through training activities. All heavy weapons munitions contain metals, which can be deposited in fragments and fine metallic debris (dust and particulates). Wet environments can facilitate the transport of metals to surface water and groundwater. Some metals are extremely toxic to wildlife when inhaled or ingested (Hourula et al. 2019). Bioaccumulation potential and threshold exposure values for the various metals that could be introduced to impact areas from munitions debris are included in Appendix F.

Based on past studies at ERF-IA, very few munitions constituents (other than WP) remain in the soil and water after conventional munitions detonate. Three studies of soil and water concentrations of munitions constituents, organics, pesticides, and metals at ERF-IA were unable to detect high levels of these compounds (Table 3.8-16). One study, conducted immediately after explosion of 120-mm HE rounds, failed to detect explosive residues in all but one of the craters sampled, and the remaining crater had only trace amounts of explosive residues (Walsh et al. 2008a). Less information is known about the newer IMs, which have a less efficient detonation than traditional munitions and are more likely to result in deposition of residues with the potential to be toxic to wildlife than traditional munitions (Walsh et al. 2013, 2014, 2017).

Table 3.8-16 Summary of Soil and Water Sampling Studies at ERF-IA

Date of Sampling	Type of Sampling	Conclusions/Detections	Source
1990	93 surface sediment and water samples from craters and other features in ERF	None of the samples had detectable concentrations of RDX or TNT. Three samples had high concentrations of 2,4-DNT but were located near the old open burn/open detonation pad.	CH2M Hill 1997
1993	Water and sediment sampling conducted over 21 sites at ERF-IA to screen for metals, explosives, organics, and pesticides	Nonmetal inorganic compounds were consistent with expected levels for a tidal salt marsh with freshwater input. Metals were within freshwater criteria. No volatile base/acid analytes, pesticides/polychlorinated biphenyls, or explosives (including breakdown products) were detected in any sample.	CH2M Hill 1997
2007	Analysis of energetic residues from 14, 120-mm HE rounds fired into ERF-IA	No explosive residues were detected in or around craters from 13 of the 14 impact sites. Only trace concentrations (tens of parts per million) were detected around an impact site where ordinance only partially exploded. Water draining off the flats adjacent to craters had very low concentrations of RDX (<0.06 micrograms/liter).	Walsh et al. 2008a

Key: 2,4-DNT = 2,4-dinitrotoluene; ERF = Eagle River Flats; ERF-IA = Eagle River Flats Impact Area; HE = high explosive; mm = millimeter; RDX = Royal Detonation Explosive; TNT = trinitrotoluene

Recent ecotoxicological assessments have identified that many of the chemical constituents of IM formulations exhibit toxic effects in soil microorganisms, aquatic organisms, and mammals (Stein et al. 2023). Based on potentially higher residue deposition for IM constituents versus those of traditional HE munitions, IM residues could present a contaminant concern to wildlife if they are exposed to these residues at toxic levels.

Despite the potential for increased deposition of residues from IM rounds, studies described in Table 3.8-15 and others conducted in Alaska suggest that most explosive compounds biodegrade within days to months in anaerobic environments with sufficient organic matter content, such as those found at ERF (U.S. Army 1984; McCormick et al. 1984; Walker and Kaplan 1992). Similarly, transformation rates of IM constituents have been observed to be higher under anaerobic conditions than aerobic conditions (Indest et al. 2017), indicating that they may readily biodegrade in conditions similar to those present at ERF-IA. As discussed in Appendix F, the breakdown of IM munitions has been shown to be relatively fast and comparable to conventional munitions. Additionally, saline waters from inundating tides may increase the degradation process of both IM and conventional munition residues deposited on the flats.

Metals and munitions constituents may be taken up by plants. Although concentrations in plants at ERF-IA have not been studied, soil concentrations have been evaluated and are generally very low. It is not anticipated that plants at ERF-IA would bioaccumulate munitions constituents at high levels (Section 3.8.2.1). Consequently, wildlife exposure to munitions constituents through ingestion of contaminated plants is unlikely.

Some munitions constituents and metals have been shown to persist in aerobic environments (McCormick et al. 1984; Ringelberg et al. 2003); therefore, their accumulation in upland areas, particularly in the proposed expansion area, and associated wildlife exposure is possible. While the majority of the existing ERF-IA consists of wetland habitats, scattered upland areas are present in this area as well.

Habitat Alteration Impacts on Wildlife

Habitat alteration can affect wildlife in many ways, including by reducing foraging opportunities and the ability to avoid predators and by potentially eliminating structures necessary for reproduction. Construction activities can alter wildlife habitat through vegetation removal, soil compaction, and soil erosion. Physical impacts from weapons training are more substantial in soft substrates/soils (such as unfrozen wetlands) in comparison to rocky upland areas or frozen wetland substrates. Detonation of munitions can cause cratering and ponding in wetland areas, thereby removing vegetation. Upland vegetation can also be impacted by direct hits during training, compaction, erosion, or wildland fire.

Additionally, habitat alteration can impact or remove wildlife corridors and reduce wildlife movement through an area. Creation of barriers or linear features can fragment habitat, separating suitable habitat into patches separated by barriers and potentially rendering them inaccessible. For instance, major highways and associated infrastructure have been found to correspond to the genetic subdivision of moose in southcentral Alaska (Wilson et al. 2015). The highway may represent a barrier that reduces or prevents moose from crossing and accessing suitable habitat on either side of the highway, thereby fragmenting habitat in the area and eliminating or reducing the connectivity of suitable habitat areas and wildlife populations.

Alternative 1: All-Season Live-Fire Training with Expanded Impact Area

Alternative 1 would have short-term and long-term impacts on wildlife resources associated with noise disturbance and habitat loss and alteration from construction, and long-term impacts from noise disturbance during all seasons, habitat alteration, and potential exposure and bioaccumulation of munitions constituents from live-fire training. With mitigation measures in place, these impacts would not exceed applicable significance thresholds. Impacts under Alternative 1 would be greater than those under the other alternatives, as Alternative 1 would involve wildlife habitat removal in previously undeveloped habitat, and the area affected by live-fire training would increase.

Construction and Infrastructure

During activities associated with expansion of ERF-IA, disturbance from construction noise and human presence could cause wildlife to leave the area, which could in turn result in reduced reproductive success (e.g., abandonment of young/nests/dens), reduced foraging opportunities (e.g., time spent leaving the area instead of foraging), and/or increased exposure to predators (e.g., startled animals fleeing into areas of high predator activity). Disturbance impacts from construction would be short term, lasting only for the duration of the construction period and would not exceed significance thresholds.

Clearcutting 359 acres of forest and woodland habitat would result in long-term direct impacts through the direct loss of wildlife habitat and potential impacts to wildlife corridors and habitat connectivity. Tree thinning would result in an additional long-term alteration of up to 226 acres of habitat. Loss of these common habitat types would not exceed significance thresholds. Large mammals could be affected by loss of forage, denning, and/or refuge opportunities and by potential reductions in their ability to move through these areas. Although wolves have shown an ability to adapt to disturbed military ranges, the wolf den in the proposed expansion area would likely be abandoned during construction due to its proximity to planned roads/pads. Moose are frequently observed in areas with high levels of human disturbance, although loss of winter moose browse could force them into other areas with less suitable habitat and where there is a higher risk of human–wildlife conflict. Coyotes and red fox are also present in developed portions of the installation (likely due to wolf predation outside these areas). These species may be able to utilize the expansion area, as they appear able to tolerate some human disturbance. Bears may avoid the proposed expansion area, as they tend to avoid human disturbances and prefer forested areas on JBER (Farley et al. 2008). However, the amount of forested land being removed within installation boundaries is less than 1 percent of the forested lands on JBER (Section 3.16.2), and it is unlikely that the intermittent use of roads and developed areas would represent barriers to wildlife movement through the area.

Some species that inhabit forested wetlands in the vegetation buffer (e.g., wood frogs) may not be able to disperse to nearby habitats as readily. For these species, thinning could impact microclimate and vegetation composition. However, as stated in Section 3.7.2.2, forested wetlands where thinning may occur represent only 5 percent of wetland resources in the Clunie Creek sub-basin, and a change in resource value designation for habitat and/or species occurrence is not predicted for riparian wetlands under Alternative 1.

Replacement of forest and woodland habitat with grassland habitat and thinning additional forested areas would reduce the suitability of these areas for some bird species. Clearing activities would result in a loss of nesting habitat for cavity-nesting birds (such as various owl, swallow, and woodpecker species) and birds that preferentially nest in mature trees (such as gulls, jays, ravens, kinglets, and robins). While the majority of bird species currently occupying the proposed expansion area would lose habitat under this alternative, some ground-nesting species (such as certain sparrow species and dark-eyed juncos) may gain nesting habitat (Andres 2005), although nests in the expansion area may be at risk for impacts from annual prescribed burns and live-fire training (discussed in the following section). Prescribed burns would typically take place between loss of snow cover and green up (JBER 2023a) and could overlap the migratory bird breeding season that typically begins in early spring (McDuffie and Johnson 2019; USFWS 2021). This could result in loss of ground nests or eggs in the burn area or mortality of young birds that have not yet fledged. As described in Section 3.8.2.5, JBER would confer and cooperate with the USFWS to develop appropriate conservation measures for migratory birds.

Loss of habitat may cause birds to seek adjacent suitable habitats. Adjacent habitats that are suitable may be at carrying capacity and unable to support additional birds or they may lack the specific attributes necessary for certain bird species (e.g., snags/cavities for nesting, roosting habitat). Much of the proposed expansion area is forested, and similar habitats are widely distributed throughout Upper Cook Inlet, including on JBER and in adjacent areas, and the species it supports are common in Upper Cook Inlet.

Clear cutting, site preparation, prescribed burns, tree thinning, and construction activities would comply with the MBTA. While intentional take would not occur as a part of construction activities, construction associated with this alternative may result in the unintentional take of migratory birds. As authorized by Congress and implemented by the USFWS, incidental take of migratory birds resulting from military readiness activities is allowed. Construction BMPs and other procedures, as outlined in the INRMP, would be implemented to minimize the potential for unintentional take of migratory birds.

Bats and other species that rely on forested areas for reproduction and roosting may be impacted by clearing activities. Clearing could result in direct mortality of bats if a roost tree is cut, and available forested bat habitat would be eliminated through the creation of the proposed expansion area. However, the species may gain additional foraging opportunities through the creation of open grassland habitats, as bats are known to forage in open areas with few physical and acoustical obstacles (Winters 2014).

Firing and Training Exercises

Under Alternative 1, the frequency of live-fire training would increase, louder 155-mm rounds would be fired, and live-fire training would occur outside the winter ice season and would expand into the proposed expansion area, resulting in exposure of more wildlife to noise disturbance from weapons training than under current conditions. It is expected that large land mammals would be able to somewhat habituate to the increased noise disturbances. Increases in firing activity during spring may influence the continued use of active wolf denning sites. Additionally, summer firing activities may cause brown bear feeding and travel patterns to avoid the impact area during training activities. While small mammals may temporarily react to military training noises, their relative abundance and density do not appear to be impacted by loud noises. Amphibians can be adversely affected by chronic anthropogenic noise (e.g., Kaiser et al. 2015). Acute noises (such as training noise) have not been investigated as thoroughly but are not anticipated to have large effects.

Birds in noisy environments may compensate for decreased auditory cues by increasing vigilance behavior, such as visual scans from the nest entrance or flushing from the nest, leading to changes in energy allocation or extended periods away from the nest during incubation. This behavior is often followed by nest abandonment (Strasser and Health 2013). Based on past observations, most waterfowl would either not respond or would temporarily move to areas away from detonation sites during training events. However, some waterfowl may leave ERF. Use of ERF-IA during summer months when breeding waterfowl are present may cause them to favor other wetland areas or to avoid ERF. Generally, fall migration of waterfowl occurs from August to October in the area (Racine et al. 1992; ABR INC 2021), partially overlapping with the proposed seasonal closure period for HE rounds (9 August to 18 October). These restrictions on firing HE rounds may alleviate some impacts to migrating waterfowl that use ERF-IA for staging in the fall.

Birds leaving ERF in response to increased noise disturbances may interfere with aircraft, particularly in the case of waterfowl and other large birds. However, the majority (90+ percent) of aircraft strikes occur below 3,000 feet above ground level, with takeoff and landing being the phase of flight where strikes occur the most often. Because restricted airspace is at 11,000 feet over the eastern two-thirds of ERF-IA and 5,000 feet over the western third, the risk of aircraft strikes is low.

Military training during summer months would introduce noise disturbances during critical reproductive windows for bats in the area. As presented in Table 3.8-14, blasting noise has not been found to disturb hibernating bats, and broadband sound levels do not appear to impact the hearing sensitivity of big brown bats. It is unclear how bats in or near impact areas would be impacted by the increase in noise disturbances associated with live-fire training. However, based on the reviewed studies, bats may be less sensitive to loud noise disturbances than other groups of animals.

Summertime firing may impact eagles (including active nests), which may flush or temporarily leave the area in response to live-fire activities. As bald eagle nests are near (and are often present in) ERF-IA and the proposed expansion area, such impacts are likely unavoidable under this alternative. Noise from live-fire training may "disturb" eagles, as defined by the USFWS (50 CFR § 22.6). However, based on past studies showing limited reactions and habituation by bald eagles to munitions noise, it is anticipated that live-fire activities under this alternative would not result in take of eagles, including disturbing eagles as defined by the USFWS and as prohibited by the BGEPA.

While wildlife would not be intentionally targeted or killed and training activities would immediately cease should wildlife be observed in training areas, rounds fired could potentially result in direct strikes or strikes by shrapnel if wildlife is not detected prior to initiating training activities. Only rounds that contain HE would produce shrapnel, which in extreme cases could travel more than 1,000 feet from the detonating round. However, given the height of most detonations, birds in flight would have a low risk of being impacted. Additionally, slow start fire control measures for marine mammals (Section 2.4.1.3) would warn other wildlife species to leave the area prior to beginning multiple gun engagements, which could reduce the likelihood of direct impacts.

Creation of craters during detonations could reduce or alter foraging habitats used by migrating/staging waterfowl. Soil disturbance likely would be localized to areas surrounding targets, and many HE rounds would impact existing craters and disturb previously disturbed soils. Remnant patches of habitat surrounding target areas that have been protected from disturbance by winter firing restrictions may become cratered and disturbed as a result of summer firing. Foraging habitat quality could be reduced through loss of salt marsh vegetation, or birds may avoid the affected areas because of more frequent disturbance. Anecdotal evidence from wildlife monitoring during live-fire operations at ERF-IA indicates that shorebirds may forage in freshly disturbed craters. Birds have been observed scattering when rounds detonate, then returning to the rim of the crater to inspect the ground. Regionally, salt marsh habitat for waterfowl is of limited extent in Upper Cook Inlet and the Anchorage Bowl, and these habitats represent important feeding and staging areas for migrating waterfowl (McDuffie 2018).

Expanding the impact area would increase the area potentially affected by munitions constituents, and an increase in the number of rounds fired would increase the amount of residues deposited annually. Residues deposited into the proposed expansion area may be more persistent than those deposited in the existing ERF-IA and may have an increased potential to persist and enter the food chain. Organisms can potentially bioaccumulate certain constituents above levels present in the environment if they are incorporated into the tissue of prey species or are accumulated by plants from the soil and/or water. Plants have been found to uptake some munition constituents (e.g., TNT and its reduction products), and these compounds can be present in their roots and stems. Predators such as wolves or eagles may be indirectly exposed to these constituents through their prey species, even if they do not directly consume plants that uptake those constituents. However, the potential for wildlife bioaccumulation of munition constituents is generally considered to be low (see Appendix F for additional details). As discussed in the Terrestrial Wildlife *Methodology* section, residues from both conventional munitions and IMs are unlikely to be present in ERF in levels that would be toxic to wildlife, and this area would be flushed into Eagle Bay in runoff and diluted.

Live-fire training would occur during seasons when gravel caps covering WP-contaminated sediment would not be protected by a layer of ice. If damage of a gravel cap were to occur, waterfowl could potentially be exposed to WP that has not naturally attenuated. However, no targets would be placed on the gravel caps and these areas would not be intentionally targeted during training. Additionally, mitigation to prohibit use of delay fuzes (which allow a projectile to penetrate surfaces prior to detonation) would minimize the potential for penetration of a gravel cap by an errant HE round. In the event a gravel cap is inadvertently struck during a misfire, there would be a cease fire and a follow-up investigation. It would be assumed that damage has occurred, and gravel would be placed in the affected area when practicable to prevent exposure of any WP that may be present.

Overall, with mitigation measures in place, the proposed live-fire training is not expected to result in permanent or long-term changes in the distribution of wildlife species in the region or threaten the continued existence of populations on the installation. Therefore, impacts would not exceed significance thresholds. Additionally, as described in Section 3.8.2.5, JBER would confer and cooperate with the USFWS to develop appropriate conservation measures for migratory birds.

Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only

Under Alternative 2, there would be no long-term loss or alteration of forested and woodland habitat, as the impact area would not be expanded. No associated impacts to large mammals and other upland species would occur. Impacts from live-fire training would be similar to those discussed for Alternative 1, except all rounds would detonate in the existing ERF-IA. As a result, potential impacts to waterfowl and other wildlife in this area from noise disturbance, habitat alteration, and exposure to munitions constituents has the potential to be greater than under Alternative 1 if all training occurs at JBER. As discussed for Alternative 1, gravel caps are very unlikely to be disturbed by training activities, and the prohibition of delay fuzes would also reduce the risks of discharge of WP in ERF and subsequent ingestion by waterfowl. With planned protective measures in place, impacts would not exceed significance thresholds.

No Action Alternative

Under the No Action alternative, live-fire training would continue to be restricted during waterfowl migration periods (generally mid-April to mid-May for spring migration, and August to October for fall migration). Migratory birds, including waterfowl, would not be present in large numbers during firing activities. Conditions at ERF-IA for waterfowl would remain largely unchanged, as WP cleanup efforts have been successful, and annual waterfowl mortality has consistently been below target goals. Gravel caps would continue to be protected from damage by winter ice conditions, and there would be a low risk of impact craters forming. No construction and associated loss or alteration of habitat would occur under this alternative. Impacts to terrestrial wildlife would be lowest under the No Action Alternative.

Mitigation

Protective measures built into the proposed action that would help avoid or reduce impacts to terrestrial wildlife under both action alternatives include the use of visual clearing and slow start prior to firing into ERF-IA, limited fire periods for HE rounds (during inundating tide events and during the seasonal closure period), targeting higher elevation areas, and restricting units to targets outside routinely inundated areas during inundating tides at night. Under Alternative 1, prohibiting use of WP in the expansion area and clearing unexploded rounds from the expansion area after each training event would limit the risk of deposition of contaminants with the potential to impact terrestrial wildlife.

The Army, JBER (Air Force, supported components, and tenant organizations), and contractors are required to comply with applicable laws, regulations, and policies, including but not limited to a prohibition on harassment of fish and wildlife. Any action that disturbs fish and wildlife is considered harassment by federal and Alaska State law. Examples of harassment include pursuit with vehicles or aircraft, feeding, and shooting of fish and wildlife. Vehicles, watercraft, and aircraft (including helicopters) may not be used to herd/chase fish and wildlife off ranges or training areas.

Standard BMPs and SOPs for training that would be followed under all alternatives include measures to improve accuracy and avoid firing in open water and inundated areas, and cease fire protocols. The SRA program would continue to educate soldiers and ensure operations and activities within the impact area are carried out in a sustainable manner to preserve wildlife resources and habitats. The most current INRMP contains specific actions to protect, inventory, maintain, and improve wildlife resources and their habitats. This document is continually reviewed and revised to respond to new or increasing impacts on wildlife resources. BMPs and SOPs to prevent discharge of WP from gravel-capped areas in ERF include not placing targets on capped areas and avoiding remediated areas during training exercises to the extent practicable. The Army would also continue to follow the most recent guidance and recommendations on using types of munitions that minimize impacts to aquatic receptors to the maximum extent practicable.

Compliance with the following BMPs and SOPs, in particular, would help reduce the potential for impacts to terrestrial wildlife:

- Adhere to federal guidelines for clearing vegetation that detail provisions to minimize take of migratory birds, including avoiding construction activities during the nesting season.
- Adhere to USFWS bald eagle management guidance.
- Adhere to regulations that require units that discover wildlife on training ranges or in training areas while conducting live-fire activities to immediately cease firing and report the location/number of animals. Prior to firing, areas around targets are visually cleared for all observable wildlife, such as waterfowl, shorebirds, and moose. Wildlife is not purposefully targeted, harassed, or killed.
- Confer and cooperate with the USFWS to ensure compliance with the MBTA and BGEPA, which may require additional conservation measures for migratory birds.
- Monitor responses and productivity of bald eagles nesting on/using ERF-IA.

Many of the BMPs and SOPs that are identified to help avoid or reduce impacts to water resources (Section 3.6.2.5), wetlands (Section 3.7.2.5), vegetation (Section 3.8.2.1), fish (Section 3.8.2.2), wildland fire (Section 3.9.2.5), and forest resources (Section 3.16.2.5) could also help avoid or reduce impacts to terrestrial wildlife habitats. Additionally, the following mitigation determined as a result of the analysis of impacts to several resource areas would prevent discharge of WP from gravel-capped areas under Alternatives 1 and 2:

- Prohibit use of delay fuzes to minimize ground penetration.
- Make GIS-based tables and a map of remediated areas in ERF-IA available to the units that train at ERF-IA.

- If an errant round strikes a gravel cap, assume damage and place gravel in the affected area when practicable.

Mitigation determined as a result of the analysis of potential impacts to fish (Section 3.8.2.2) and marine mammals (Section 3.8.2.4) would provide some protection to wildlife that use ERF, particularly limited fire periods for 155-mm training rounds.

The following mitigation determined as a result of the analysis of potential impacts to terrestrial wildlife would help avoid or reduce impacts from live-fire training under both action alternatives:

- Monitor responses of birds using ERF to noise disturbance to inform future bird aircraft strike management decisions.

3.8.2.4 Marine Mammals

The analysis of project impacts on marine mammals considers the following direct and indirect potential environmental consequences:

- Mortality, injury, or disturbance of marine mammals through a direct strike by munitions fragments/shrapnel
- Mortality, injury, or disturbance through exposure to in-air or underwater acoustic levels above accepted threshold metrics (includes barotrauma) during weapons training
- Potential health impacts from exposure to munitions constituents in prey items
- Habitat loss or alteration within the ROI as a result of increased noise
- Reduction in the availability of prey species from noise, habitat alteration, and exposure to munitions constituents

Impacts to marine mammals would be considered significant if any of the following were to occur:

- Loss or degradation of high-value habitat (including prey species at the watershed scale)
- The potential for noise or hazardous fragments to result in mortality, injury or substantial behavioral changes of marine mammals
- Negative health effects from exposure to munition constituents due to ingestion of contaminated prey items.

This section analyzes the environmental impacts associated with the proposed training activities (and corresponding mitigation measures) for which the Air Force is seeking a determination on the need for authorization for the take of marine mammals. The analysis of mitigation measures considers protections for and benefits to species or stocks and their habitat and analyzes the practicability and efficacy of each measure. This analysis of mitigation measures was used to support requirements pertaining to mitigation, monitoring, and reporting that would be specified through ESA consultation.

Methodology

In support of the analysis of impacts, acoustic modeling was conducted to determine potential noise exposures to marine mammals and prey (fish) at representative detonation sites, as well as sites at various distances from waterbodies, under water levels associated with typical high tides as well as flooding of ERF-IA. A description of the acoustic modeling scenarios and applicable noise thresholds established by NMFS is provided in Appendix C. Results of the modeling, which predicted underwater and in-air noise from various scenarios of mortar and artillery firing at ERF-IA, were used to evaluate potential impacts to marine mammals and their prey and to guide the development of mitigation measures. Potential impacts to marine mammals from hazardous fragments that may be produced from exploding munitions was also evaluated, using standard Army metrics such as DA Pam 385-64 and SDZ definitions.

The evaluation of impacts considers potential for marine mammal species to occur in Cook Inlet and in the vicinity of the JBER. A summary of the material presented in Section 3.8.1.3 and summarized in Table 3.8-6 is as follows:

- Gray, killer, and humpback whales are rare and unlikely to occur in Eagle Bay, highly unlikely to occur in Eagle River, and are not considered further.
- Steller sea lions are unlikely to occur in Eagle Bay and Eagle River but are likely to infrequently occur in the airborne noise ROI.
- Harbor porpoise, harbor seals, and Cook Inlet beluga whales are frequent and are either likely or certain to occur in Eagle Bay and Eagle River.

The evaluation of impacts to marine mammals considered whether each species has a particular sensitivity to stressors associated with the project alternatives and/or if a substantial or important component of the species' habitat would be impacted as a result of the project alternatives. The species-specific impact assessments considered the severity of the interaction and the proportion of the marine mammal resource that would be affected.

Noise Analysis for Marine Mammals

The analysis of potential effects to marine mammals from noise exposure considered which marine mammals species have the potential to be present in the ROI and evaluated whether noise levels would exceed acoustic thresholds established by NMFS and the Navy for those species. These thresholds, which are further discussed in Appendix C, are summarized in Tables 3.8-17 and 3.8-18.

Table 3.8-17 Summary of Underwater Noise Thresholds for Marine Mammals

Marine Mammals	Level A (Injury) Threshold		Level B (Disturbance) Threshold		
	PTS Threshold[1]		TTS Threshold		Behavioral
	Lpk	SEL24h	Lpk	SEL24h	SEL24h
Beluga whale (Mid-frequency cetacean)	230	185	224	170	165
Harbor porpoise (High frequency cetacean)	202	155	196	140	135
Steller sea lion (Otariid pinniped)	232	203	226	188	183
Harbor seal (Phocid pinniped)	218	185	212	170	165

Notes:
[1]The source for this table is the 2018 NMFS technical guidance, which provides thresholds for PTS. The 2024 update to the technical guidance provides thresholds for auditory injury (AUD INJ), which may or may not result in a PTS.
Level A thresholds: Lpk reported as dB re 1 µPa; SEL reported as dB re 1 µPa2·s.
Level B threshold: reported as dB re 1 µPa rms
Key: dB re 1 µPa = decibels referenced to 1 microPascal; Lpk = peak sound pressure level; NMFS = National Marine Fisheries Service; PTS = permanent threshold shift; rms = root mean square; s = second; SEL24h = sound exposure level over 24 hours; TTS = temporary threshold shift
Sources: Finneran et al. 2017; NMFS 2018

Table 3.8-18 Summary of Airborne Noise Thresholds for Marine Mammals

Functional Hearing Group or Species	Level A (Injury) Threshold		Level B (Disturbance) Threshold		
	PTS Threshold[1]		TTS Threshold		Behavioral
	Lpk	SEL24h	Lpk	SEL24h	rms
Steller sea lion (Otariid pinniped)	176	161	170	146	100
Harbor seal (Phocid pinniped)	161	138	155	123	90

Notes:
[1]1The source for this table is the 2018 NMFS technical guidance, which provides thresholds for PTS. The 2024 update to the technical guidance provides thresholds for auditory injury (AUD INJ), which may or may not result in a PTS.
Level A thresholds: Lpk reported as dB re 20 µPa; SEL24h reported as dB re 20 µPa2·s.
Level B threshold: reported as dB re 20 µPa rms.
Key: dB re 20 µPa = decibels referenced to 20 microPascal; Lpk = peak sound pressure level; NMFS = National Marine Fisheries Service; PTS = permanent threshold shift; rms = root mean square; s = second; SEL24h = sound exposure level over 24 hours; TTS = temporary threshold shift
Source: Southall et al. 2019

Guidance documents used to develop the thresholds presented in Table 3.8-17 include NMFS (2018) and Southall et al. (2019), as well as criteria and thresholds developed by the Navy for acoustic and explosive effects on marine mammals (Finneran et al. 2017). The relevant portion of the latter guidance is as follows:

- If more than one explosive or explosive cluster is detonated within any given 24-hour period during a training or testing activity, criteria are applied to predict the number of animals that may have a behavioral reaction. For events with multiple explosions, the behavioral threshold used in this analysis is 5 dB less than the TTS onset threshold.

The thresholds in Table 3.8-17 were used in the analysis presented in Appendix C. Subsequently, in October 2024, NMFS released updated guidance for assessing the effects of anthropogenic sound on marine mammal hearing, which includes updated underwater and in-air criteria for auditory injury[10] and TTS (NMFS 2024b). This new guidance provides minor updates to auditory weighting and exposure function parameters for marine mammal hearing groups and revises TTS and auditory injury criteria for both impulsive and non-impulsive noise, compared to what is presented in Appendix C. After considering these new thresholds, the Air Force and NMFS determined that while some of the new thresholds are slightly more protective and others are slightly less protective, they would not change the results of noise impact analysis for marine mammals. Using the updated thresholds, the estimated underwater ensonified areas for beluga whales and harbor porpoises would be the same or smaller based on higher underwater thresholds for these species. Estimated underwater ensonified areas for pinnipeds would be larger but are still expected to be smaller than the proposed habitat buffers. Lastly, estimated airborne ensonified areas exceeding thresholds would be smaller for pinnipeds.

Noise can affect marine mammals in several ways, including eliciting behavioral response or causing temporary or permanent hearing threshold shifts. The effects of underwater noise on marine mammals depends on several factors, including the species, size of the animal, and proximity to the source; the depth, intensity, and duration of the sound; the depth of the water column; the substrate; the distance between the source and the animal; and the sound propagation properties of the environment. Therefore, the degree of effect is intrinsically related to the received level and duration of the sound exposure, which are in turn influenced by the distance between the animal and the source. In general, sound exposure is less intense farther away from the source. The substrate and depth of the habitat affect the sound propagation properties of the environment. Shallow environments are typically more structurally complex, which leads to more

[10] In the updated technical guidance (NMFS 2024b), thresholds for auditory injury (AUD INJ) replace thresholds for PTS. Auditory injury is defined as "damage to the inner ear that can result in destruction of tissue, such as the loss of cochlear neuron synapses or auditory neuropathy. Auditory injury may or may not result in a PTS." While the thresholds and terminology from the 2018 technical guidance were used in the acoustic modeling reports and Noise Technical Report (Appendix C), changes resulting from the 2024 technical guidance have been reviewed and are considered in the analysis of impacts in this EIS.

rapid sound attenuation. In addition, substrates that are soft (e.g., sand) absorb sound more readily than hard substrates (rock), which may reflect the acoustic wave.

To evaluate potential exposure of marine mammals to noise, numerical acoustic propagation modeling was used to determine in-air and underwater sound that would be generated by live-fire training at ERF-IA. The modeling methods and results are described further in Appendix D. The noise analysis considers two sets of criteria that address the two levels of harassment under the MMPA, as described in Appendix D. Level A thresholds are used for onset of noise-induced hearing damage (PTS), and Level B thresholds are used for temporary changes to hearing capacity (TTS) and behavioral disturbance. Noise modeling was conducted for typical high tide conditions, when wetted areas of the marsh plain at ERF-IA are limited to isolated ponding, as well as for inundating tide events, when water levels rise above the limits of astronomical high tide and the marsh plain at ERF-IA experiences widespread inundation.

Not all responses to sound rise to the level of take as defined for a military readiness activity under 16 U.S.C. § 1362(18)(B) or the ESA. Factors that may influence an animal's response to noise include its previous experience, auditory sensitivity, biological and social status (including age and sex), and behavioral state and activity at the time of exposure (Southall et al. 2021). If an action may cause a slight and very brief startle response in a small number of animals such that there are no implications on survival or fitness, then the action would not be expected to result in take.

In-air noise is a potential issue for pinnipeds that are swimming with their heads above water or hauled out within the range of effect as defined by the acoustic criteria shown in Tables 3.8-19 and 3.8-20. Table 3.8-19 provides the maximum distances to acoustic harassment criteria for Steller sea lion and harbor seal during summer, which were developed using the methods described in Appendix D. For the summer scenario, the greatest distance modeled was more than 50 kilometers from a detonation point (behavioral disturbance to harbor seals). Distances to acoustic harassment criteria for Steller sea lion and harbor seal during winter are provided in Table 3.8-20. For the winter period, the greatest distance modeled was 42.3 kilometers from a detonation point (behavioral disturbance to harbor seals). Figure 3.8-9 provides a visual representation of the maximum area over which pinnipeds may be exposed to airborne noise above the acoustic harassment criteria. For harbor seal, the maximum distances over which PTS and TTS may occur is greater than the habitat protective buffers described in Section 2.4.1.3. Because TTS and PTS thresholds are based on cumulative noise exposure, individual seals would need to remain within the PTS or TTS zone for an extended period during active live-fire training with HE rounds to potentially experience that effect. It is unlikely that any pinnipeds would remain in the area long enough to experience PTS or TTS (NMFS 2025).

Table 3.8-19 Maximum Distances Over Which Acoustic Harassment Criteria for In-Air Noise May Be Exceeded (Summer)

Functional Hearing Group	Species	Level A Criteria		Level B Criteria		
		PTS SEL	PTS Peak	TTS SEL	TTS Peak	Behavioral rms*
Otariid pinniped	Steller sea lion	23 m	13 m	48 m	22 m	39,100 m**
Phocid pinniped	Harbor seal	168 m	57 m	641 m	107 m	>50,000 m**

Notes: * NMFS-established threshold of 90 dB rms for phocids and 100 dB rms for other pinnipeds, referenced to 20 µPa. **SPL threshold reached beyond the 25 x 25 km modeled area. Reported distance corresponds to the radii along an azimuth of 242 degrees, which was modeled as far as 50 km.

Key: µPa = microPascal; dB = decibel; km = kilometer; m = meter; NMFS = National Marine Fisheries Service; PTS = permanent threshold shift; rms = root mean square; SEL = sound exposure level; TTS = temporary threshold shift

Source: JASCO Applied Sciences 2022

Table 3.8-20 Maximum Distances Over Which Acoustic Harassment Criteria for In-Air Noise May Be Exceeded (Winter)

Functional Hearing Group	Species	Level A Criteria		Level B Criteria		
		PTS SEL	PTS Peak	TTS SEL	TTS Peak	Behavioral rms*
Otariid pinniped (Steller sea lion)	Steller sea lion	23 m	13 m	38 m	22 m	20,900 m**
Phocid pinniped (harbor seal)	Harbor seal	115 m	57 m	396 m	107 m	42,300 m**

Notes: * NMFS-established threshold of 90 dB rms for phocids and 100 dB rms for other pinnipeds, referenced to 20 µPa. **SPL threshold reached beyond the 25 x 25 km modeled area. Reported distance corresponds to the radii along an azimuth of 242 degrees, which was modeled as far as 50 km.

Key: µPa = microPascal; dB = decibel; km = kilometer; m = meter; NMFS = National Marine Fisheries Service; PTS = permanent threshold shift; rms = root mean square; SEL = sound exposure level; SPL = sound pressure level; TTS = temporary threshold shift

Source: JASCO Applied Sciences 2022

While in-air noise thresholds for pinnipeds may be exceeded, NMFS has determined that it is not reasonably likely that impacts from the proposed live-fire training would rise to the level of harassment for purposes of a military readiness activity (NMFS 2025). Disturbances of pinnipeds resulting from exposure to in-air noise from the proposed training activities are anticipated to be temporary, behavioral patterns are not anticipated to be abandoned or significantly altered, and data from Upper Cook Inlet suggest that pinnipeds are habituated to multiple forms of anthropogenic disturbance (NMFS 2025). Additionally, the area where exposures may occur is already subject to in-air noise from commercial, private, and military aircraft; port operations; construction activities; commercial and sport fishing, and recreational boating. Because NMFS has determined that while pinnipeds may be exposed to in-air noise above their thresholds, incidental take is not reasonably likely occur; therefore, it is not expected that impacts to marine mammals from in-air noise would be significant.

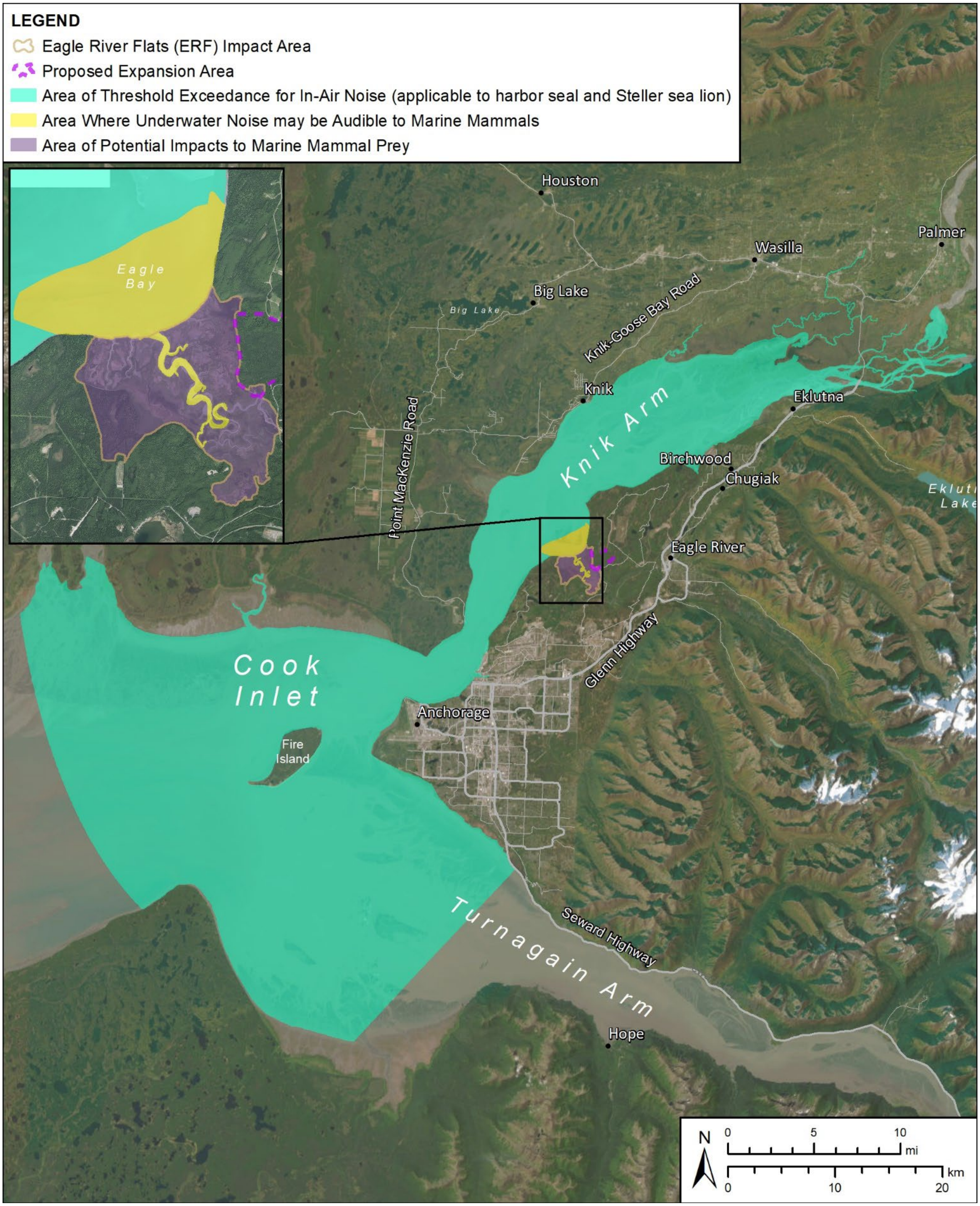
<u>Direct Strikes to Marine Mammals</u>

Fragments from detonation of HE munitions can injure or kill marine mammals if they are struck. Risk of fragment injury reduces exponentially with distance as the fragment density is reduced and the fragment velocity decreases due to air resistance. Hazardous fragments would present the greatest risk for injury to animals at or near the surface of the water; once fragments enter the water, the friction of the water would be expected to slow their velocity. Only detonation of regular HE rounds would result in fragmentation or shrapnel. The 155-mm training round is filled with non-fragmentation-producing concrete to provide the same weight as an actual HE round in order to create similar ballistics (Tucker 2023b). No other training rounds would cause fragmentation that could be dangerous to marine mammals.

Hazardous fragments could result in direct injury to marine mammals. The type of injury that a hazardous fragment may cause is dependent on many variables, including species, size of the animal, and proximity to the source; the trajectory, shape, size, and velocity of fragment; and the distance the fragment travels in water prior to striking the animal. The injuries resulting from a hazardous fragment strike could range from minor contusions to severe, life-threatening wounds. Resulting wounds could become infected or result in permanent physical impairment due to muscular or skeletal damage. Any animal that is struck would likely exhibit behavioral changes, such as fleeing and the cessation of other activities.

Background information on the methodology for assessing impact from hazardous fragmentation is presented in the Fish *Methodology* section, with more information specific to marine mammals provided in Appendix D. Given that there are no standards documenting risks to marine mammals from munitions fragments, human-based safety standards were used. The analysis considered the location of waterbodies in ERF-IA where marine mammals occur in relation to areas where fragmentation from detonations would have the potential to land, with mitigation developed to ensure that SDZ areas that are off-limits to personnel (described in Section 2.1.5.2) would not overlap Eagle River and Otter Creek.

Figure 3.8-9 Modeled Maximum Footprint of In-Air and Underwater Noise from the Proposed Action



Alternative 1: All-Season Live-Fire Training with Expanded Impact Area

Alternative 1 would have long-term impacts from noise disturbance, the potential for hazardous fragment strikes, habitat alteration, and potential exposure and bioaccumulation of munitions constituents from live-fire training. Impacts would have the potential to exceed applicable significance thresholds, even with mitigation measures, as prey items could potentially be impacted at the watershed scale from rounds landing in or near relict or remnant channels that support some juvenile rearing salmonids. Impacts under Alternative 1 would potentially be less than those under Alternative 2, as some live-fire rounds would be fired into the proposed expansion area, where marine mammals are not present. Impacts under Alternative 1 would be greater than those under the No Action Alternative because all-season firing would allow rounds to be fired into ERF-IA during periods when marine mammals have a high likelihood of being present.

Construction and Infrastructure

Ground disturbance associated with construction of the proposed expansion area would generate localized short-term increases in erosion and sedimentation, as described in Section 3.6.2.2 and Section 3.8.2.2. Adherence to BMPs during construction activities, as outlined in the JBER INRMP and a project-specific Construction General Permit SWPPP, would minimize potential construction impacts from erosion and sedimentation.

Setbacks for vegetation clearing would prevent sedimentation into Clunie Creek and associated wetlands. Clunie Creek does not have a downstream surface water connection with Eagle River (the stream goes subterranean upstream from the confluence), although it may contribute sediments to ERF during infrequent periods of sheet flow flooding. Based on the erosion and sediment control measures that would be implemented, potential sedimentation into Clunie Creek from expansion of the impact area is not expected to result in any measurable impacts to habitat for marine mammals in Eagle River, Otter Creek, or Eagle Bay.

Firing and Training Exercises

Noise Impacts

As previously described in the *Noise Analysis for Marine Mammals* section above, an analysis of potential noise impacts, including DTE modeling that establishes the minimum buffers needed to prevent the exceedance of marine mammal thresholds (Tables 3.8-17 and 3.8-18), was conducted, as described in Appendix D and further discussed in Appendix C.

Typical high tide conditions reflect the vast majority of time when ERF is not inundated. Under typical high tide conditions, the largest spatial extent for marine mammal PTS in hearing, TTS in hearing, and behavioral disturbance for underwater noise is presented in Table 3.8-21. This largest spatial extent is based on a modeled scenario where 298 155-mm artillery rounds, of which 36 have a NEW of 10.93 kilograms and 262 have a NEW of 2.84 kilograms, are fired in 1 day. Under all alternatives, the distance over which noise thresholds may be exceeded during typical high tide conditions is smaller than the applicable habitat buffers described in Section 2.4.1.3.

Table 3.8-21 Maximum Distances (from Edge of Waterbody) Where Underwater Noise Threshold Exceedances for Marine Mammals May Occur during Typical High Tide Conditions

Threshold	Eagle River		Eagle Bay			Otter Creek
	DTE 1	DTE 2	DTE 3	DTE 4	DTE 5	DTE 6
All PTS Thresholds	6 m or less	10 m or less	20 m or less	24 m or less	24 m or less	12 m or less
MF Cetacean (beluga whale) TTS	2 m	6 m	6 m	4 m	4 m	8 m
HF Cetacean (harbor porpoise) TTS	14 m	18 m	18 m	18 m	20 m	20 m

Threshold	Eagle River		Eagle Bay			Otter Creek
	DTE 1	DTE 2	DTE 3	DTE 4	DTE 5	DTE 6
Phocid (harbor seal) TTS	16 m	26 m	22 m	24 m	26 m	26 m
MF Cetacean (beluga whale) Behavioral	4 m	8 m	8 m	6 m	6 m	10 m
HF Cetacean (harbor porpoise) Behavioral	18 m	24 m	22 m	22 m	26 m	26 m
Phocid (harbor seal) Behavioral	28 m	36 m	32 m	38 m	36 m	35 m
No Action Buffers	**130 m**		**1,000 m**			**50 m**
Alternative 1 and 2 Buffers	**130 m**		**500 m**			**50 m**

Key: DTE = Distance to Effect; m = meter; HF = high frequency; MF = mid-frequency; PTS = permanent threshold shift; TTS = temporary threshold shift
Source: JASCO Applied Sciences 2022

During an inundating tide event, water partially floods ERF-IA around Eagle River, and shallow water may be present at target areas above the typical high tide level. When ammunition detonation takes place under these circumstances, sound can propagate directly through the water column to include Eagle River and Eagle Bay more easily than during typical high tide conditions. Implementation of the protective measures described in Section 2.4.1.3 would limit the type of rounds used at ERF-IA during typical inundating tide events to only training rounds. To assess impacts during inundated conditions, the 155-mm training round (i.e., the training round with the largest NEW) was considered, based on modeling results for a round with a similar NEW. Under a typical inundating tide event, the largest spatial extent for marine mammal PTS, TTS, and behavioral disturbance for underwater noise from the detonation of training rounds is presented in Table 3.8-22. During inundating tide events, the areas where cumulative noise thresholds may be exceeded extends further than the habitat buffers described in Section 2.4.1.3, meaning that marine mammals may be exposed to noise above NMFS thresholds, experience impacts to hearing capacity, and exhibit adverse behavioral responses. Without the proposed mitigation to expand limited fire periods to include 155-mm training rounds, this would constitute a potentially significant impact. 155-mm training rounds, like full HE rounds, would not be fired into inundated areas during inundating tide events, so even though these harassment distances are large, they would not be reached with the proposed mitigation.

Table 3.8-22 Maximum Distances Where Acoustic Harassment Criteria from Underwater Noise May Be Exceeded Due to 155-mm Training Round[1] Detonation during a Typical Inundating Tide Event

Functional Hearing Group	Species That May Be Present	Level A Criteria		Level B Criteria		
		PTS SEL[2]	PTS Peak[2]	TTS SEL[2]	TTS Peak[2]	Behavioral
Mid-frequency cetaceans	Beluga whale	550 m	70 m	1,240 m	120 m	1,620 m
High-frequency cetaceans	Harbor porpoise	2,820 m	550 m	9,900 m	700 m	10,860 m
Otariid pinnipeds	Steller sea lion	380 m	60 m	760 m	100 m	1,140 m
Phocid pinnipeds	Harbor seal	850 m	220 m	3,630 m	320 m	5,360 m

Notes: [1]155-mm training rounds modeled have 1.3 kg NEW. [2]Cumulative threshold, assuming an individual is exposed to all detonations (179 rounds) during one training day.
Key: kg = kilogram; m = meter; mm = millimeter; NEW = Net Explosive Weight; PTS = permanent threshold shift; SEL = sound exposure level; TTS = temporary threshold shift
Source: JASCO Applied Sciences 2020

In Cook Inlet, marine mammals must compete acoustically with natural (ambient) and anthropogenic (background) sounds. Human-induced noises include large and small vessels, aircraft, pile driving, shore-based activities, dredging, filling, and other events. The effects of human-caused noise on beluga whales and associated increased background noises may be similar to humans' reduced visibility when confronted with heavy fog or darkness.

Potential noise impacts are of particular concern at ERF-IA due to the frequent use of Eagle Bay and portions of Eagle River by Cook Inlet beluga whales, harbor seals, and harbor porpoise (Section 3.8.1.3). Previous studies have been conducted to characterize the human-made underwater noise in the ERF vicinity (Blackwell and Greene 2002; Anderson et al. 2007). These studies identified underwater noise levels (broadband) from ships and tugboats at the POA as high as 149 dB referenced to 20 microPascals (µPa) (Blackwell and Greene 2002). Measurements of underwater noise in Eagle Bay in August and September 2010 determined that mean ambient noise levels (devoid of anthropogenic and recording self-noise) were 97.9 +/-5.8 dB (Castellote et al. 2019). Ship and tugboat noise has been present at the POA for several decades and is expected to continue. The lowest underwater broadband average sampled was 95 dB referenced to 1 µPa, obtained at Birchwood, located approximately 10 kilometers up Knik Arm from Eagle Bay, at a location that is frequented by beluga whales (Blackwell and Greene 2002). The highest underwater broadband levels were obtained north of Point Possession during the incoming tide and reached 124 dB referenced to 1 µPa (Blackwell and Greene 2002). Background underwater noise levels at the mouth of Eagle River were measured to be between the two, with a mean value at 118 dB. Using this background value, JBER has estimated the area over which underwater noise from live fire may exceed background levels with the mitigation measures implemented, as shown in Figure 3.8-9. It is within this area that marine mammals may exhibit startle responses to underwater noise due to live-fire training, as further described in Appendix C. These responses would not rise to levels exceeding significance thresholds under MMPA.

JBER has undertaken prior consultation with NMFS regarding the impacts of noise on Cook Inlet beluga whale. Under informal consultation with JBER, NMFS concurred that overflights by F-22s may affect, but are not likely to adversely affect, the Cook Inlet beluga whale or designated Cook Inlet beluga whale critical habitat (Department of the Air Force 2022). Similarly, NMFS concurred that intermittent explosive ordnance activities at JBER may affect, but are not likely to adversely affect, the Cook Inlet beluga whale or designated Cook Inlet beluga whale critical habitat (JBER 2023a). More information is available in Appendix D.

Based on this past coordination and analysis, JBER concludes that with implementation of mitigation measures, noise from all-season live-fire training would not preclude the continued use of Eagle Bay, Eagle River, and Otter Creek by marine mammals. Marine mammals may occasionally avoid these areas during firing exercises but are expected to resume using those habitat areas once the most intense noise subsides. Alternatively, marine mammals may become habituated to underwater noise produced during live-fire training.

In the absence of mitigation, Alternative 1 would have the potential to expose marine mammals to underwater noise above NMFS thresholds if live-fire training with 155-mm training rounds is conducted when ERF-IA is inundated. This impact would be long term, with the potential exposure of marine mammals to noise above NMFS thresholds potentially occurring several times a year. Mitigation to restrict firing of 155-mm training rounds during inundating tide events (see Section 3.8.2.4, *Mitigation*) would reduce the impact to less than significant. After reviewing the Air Force's ITA request, NMFS determined that the incidental take of marine mammals is not reasonably likely to occur because the specified activities, including mitigation, would not harass or result in the mortality of any marine mammals or marine mammal stocks (NMFS 2025).

Hazardous Fragment Strikes

Under Alternative 1, the increased numbers of munitions fired into ERF-IA, including during periods when marine mammals may be present in Eagle River and Otter Creek, would increase the risk of direct impacts from strikes by munitions or fragments. With the protective measures listed in Section 2.4.1.3 in place, the risk of a direct munition strike would be negligible. However, fragmentation into waterbodies is possible from detonation of HE munitions outside of habitat protective buffers. Based on an initial analysis that involved calculation of hazardous fragmentation distances for all explosive rounds that would be used at ERF-IA, the estimated maximum distance over which hazardous fragments could travel for various weapon systems exceeds these buffers, and there would be a possibility of striking and injuring marine mammals during training when they are present in ERF waterways. While the chance of hazardous fragment strike is low, the impact would be significant if it resulted in serious injury or death, particularly for an endangered species such as Cook Inlet beluga whale.

Based on these findings, the Army has developed mitigation to avoid hazardous fragmentation into waterways on ERF, based on use of SDZs (see Section 3.8.2.4, *Mitigation*). As described in Section 2.1.5.2, the probability of hazardous fragments striking a human-sized target becomes 1 in 1,000,000 at the boundary of the SDZ under standard firing procedures. Army safety standards do not allow personnel to stand inside of this SDZ boundary during live-fire events. The identified mitigation is to apply the same safety standards to marine mammals in waterbodies where marine mammals are most likely to occur. The risk to marine mammals would be even less than 1 in 1,000,000 because the reduced velocity of fragments upon entering the water would quickly reduce their potential to be hazardous. During ice-free periods, live-fire training at ERF-IA would occur such that SDZ areas that are off-limits to personnel would not overlap with the portions of Eagle River and Otter Creek where marine mammals may be present. The boundaries of an SDZ can never extend past the installation boundary, and thus would never overlap Eagle Bay. For further discussion of application of SDZs to protect marine mammals, see Appendix D.

During iced-in conditions, SDZs may overlap Eagle River, provided the weapon system impact area (see Section 2.1.5.2) does not overlap the habitat protective buffers. Marine mammals have a minimal presence at ERF during iced-in conditions, so the risk of hazardous fragments strikes to marine mammals during that time would be negligible. A method for determining iced-in conditions is being developed in coordination with NMFS.

By implementing mitigation that provides Eagle River and Eagle Bay with the same protective measures as personnel, the potential risk of hazardous fragment strikes to marine mammals is less than 1 in 1,000,000 and thus reduced to a less than significant level.

Impacts to Marine Mammal Prey

As described in Section 3.8.2.2, underwater noise associated with live-fire training would increase the potential for mortality, injury, or behavioral effects of/to fish due to underwater noise and vibrations from live-fire training activities. Munitions residues also have the potential to affect prey species and potentially bioaccumulate and cause adverse health effects to marine mammals if consumed (see Appendices E and F for more details). However, exposure risk to prey species would be minimized through various breakdown pathways and natural attenuation (i.e., flushing) of residues from ERF-IA. Further, the potential for bioaccumulation or biomagnification up the food chain is expected to be low, as described in Appendix F, although some uncertainty remains about ecotoxicity risks to aquatic receptors from munitions contaminants. Although acute toxicity (mortality) is highly unlikely, there is a risk of sub-lethal effects resulting in reduced survival, growth, or reproduction that could negatively affect populations.

Marine mammal prey species may be affected by live-fire training under Alternative 1, with the risk of mortality, injury, and behavioral effects greatest to rearing salmonids in unbuffered areas, such as the Eagle River relict channel complex. The magnitude and scale of effects at the local level cannot be quantified, but there would be some reduction in coho (and potentially Chinook and sockeye) escapement and productivity in Eagle River and Otter Creek primarily due to loss or modification of habitat in unbuffered areas. Figure 3.8-9 displays the maximum area over which there may be such impacts to marine mammal prey. Because is not expected that there would be a measurable reduction in marine mammal prey items at the species or population level, impacts to marine mammals are unlikely to be significant. Continued salmon enumeration studies (see Fish *Mitigation* section) could allow JBER to obtain a better understanding of impacts to fish from all-season live-fire training and potentially identify additional measures to reduce observed effects.

Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only

Under Alternative 2, there would be no potential for erosion or sedimentation from land clearing or construction to impact habitat for marine mammals, as the impact area would not be expanded.

Potential impacts to marine mammals from underwater and airborne noise, hazardous fragment strikes, and impacts to prey would be similar to those discussed for Alternative 1, except all rounds would be detonated in ERF-IA. If all training occurs at JBER under Alternative 2, there would be a slightly greater potential for impacts to marine mammals and their prey from live-fire training, although similar to Alternative 1, it is not expected that there would be a measurable reduction in prey at the species or population level. Ongoing salmon enumeration studies identified as mitigation could allow JBER to obtain a better understanding of impacts to fish and potentially identify additional measures to reduce observed effects.

No Action Alternative

Under the No Action Alternative, live-fire training at ERF-IA would continue to be limited to winter months when sufficient ice thickness is present in ERF-IA, Eagle Bay has high ice concentrations, and marine mammals have a lower likelihood of being in the marine mammal ROI. Because marine mammals would not be in Eagle River, there would be no risk of strikes from fragmentation. Based on modeling results and considering existing habitat buffers, noise thresholds to underwater criteria for marine mammals would not be reached during typical high tide conditions under this alternative (see Appendix D). Additionally, the likelihood of marine mammals being present in Eagle River and Otter Creek during the winter months, when weapons firing would occur, is so low that the risk of exposure is negligible.

During winter, flooding over ice is possible, and there is a potential for detonations when targets are inundated, resulting in increased transmission of noise into Eagle River and Eagle Bay. While marine mammals are not expected to be present in Eagle River during the firing period, marine mammals may be present in Eagle Bay during this period. Based on modeling results (Appendix D), there is a potential for behavioral effects to harbor seal, harbor porpoise, and Cook Inlet beluga whale under the No Action Alternative if they are present in Eagle Bay during live-fire training. These species may also experience TTS in hearing, but only if they remain in Eagle Bay for an extended period when live-fire training is being conducted during inundating tide events.

In-air noise from winter-only weapons firing has the potential to affect pinnipeds (i.e., harbor seal and Steller sea lion) in Knik Arm, Eagle Bay, and Eagle River, including Steller sea lions and harbor seals that are hauled out in the marine mammal ROI or have their heads above water during live-fire training; however, injury is not expected. The risk of behavioral disturbance from in-air noise would be further reduced based on low sighting rates of harbor seals during winter months when there is ice cover in Eagle River and Eagle Bay.

Under the No Action Alternative, there are not expected to be reductions in marine mammal prey relative to baseline conditions. Winter-only firing restrictions would remain in place, and live-fire training would not occur during run timing of adult salmon.

Mitigation

Mitigation to avoid and reduce impacts to marine mammals have been developed in coordination with NMFS as a cooperating agency and as part of consultation under the ESA and MMPA. Mitigation presented in this section reflects measures included in the project BA and draft Letter of Authorization application submitted to NMFS and subsequently evaluated and responded to in a memo dated 3 January 2025 (NMFS 2025).

Protective measures built into the proposed action (described in Section 2.4.1.3) that would help avoid or reduce impacts to marine mammals under both action alternatives include habitat protective buffers based on acoustic modeling, limited fire periods for HE rounds (during inundating tide events and during the seasonal closure period), redistributing targets away from buffer areas, targeting higher elevation areas, restricting units to targets outside routinely inundated areas during inundating tides at night, and fire control measures when Cook Inlet beluga whale are observed in Eagle River.

The Army, JBER (Air Force, supported components, and tenant organizations), and contractors are required to comply with applicable laws, regulations, and policies, including but not limited to a prohibition on harassment of fish and wildlife. Any action that disturbs fish and wildlife is considered harassment by federal and Alaska State law. Examples of harassment include pursuit with vehicles or aircraft, feeding, and shooting of fish and wildlife. Vehicles, watercraft, and aircraft (including helicopters) may not be used to herd/chase fish and wildlife off ranges or training areas.

Standard BMPs and SOPs for training that would be followed under all alternatives include no target placement in open waterbodies, no intentional firing into open navigable waterways or observable open water, use of an FDC and other systems for accuracy, and cease-fire protocols. JBER's BMPs clearly state that there would be no intentional firing into open waterbodies and that targets would not be placed in open waterbodies. Forward observers would monitor for observable open water and observe rounds impacting or bursting, with cease fire and shifting to different targets if needed, and night vision equipment or ILLUM rounds would be used to observe targets at night. Additionally, 155-mm rounds would not be fired into unbuffered areas near the Eagle River relict channel due to space limitations.

The SRA program would continue to educate soldiers and ensure operations and activities within the impact area are carried out in a sustainable manner to preserve marine mammals habitats. Additionally, all BMPs and SOPs identified to avoid or reduce impacts to fish resources (see Section 3.8.2.2) would also help avoid or reduce impacts to marine mammals through reduction in prey.

Under Alternative 1, adherence to construction BMPs, the project-specific Construction General Permit SWPPP, and riparian setbacks and habitat protection buffers in the INRMP would help minimize the risk of sedimentation into aquatic areas that could potentially affect marine mammal prey species.

Based on an analysis of potential impacts to marine mammals from hazardous fragment strikes and from acoustic impacts from 155-mm training rounds during inundated conditions, the following mitigation has been determined to reduce impacts under Alternatives 1 and 2 to less than significant levels. Refer to Figure 2.1-6 for a visual representation of SDZ areas and Figure 2.4-3 for protective buffers:

- During ice-off conditions (ice proxy to be developed) the following measures would effectively afford marine mammals the same protections as personnel and would prohibit the firing of rounds into areas where hazardous fragments would have a 1 in 1,000,000 or greater chance of striking marine mammals:
  - Ensure that for each weapon fired (mortar and artillery), the weapon system impact area (target area, 8PE, and 12PE portions of SDZ) does not overlap habitat protective buffers, Eagle Bay, or Eagle River.
  - Ensure that for each weapon fired (mortar and artillery), Areas A, B, and C of the SDZ do not overlap portions of Eagle Bay, Eagle River, or Otter Creek that have 130- or 500-meter buffers.
  - For portions of Upper Eagle River, Otter Creek, and the Otter Creek complex that have a 50-meter buffer, ensure that for artillery, Areas A, B, and C of the SDZ do not overlap the river/creek.
- During ice-off conditions the following measure would apply to waterbodies with habitat protective buffers where marine mammals are less likely to occur:
  - For portions of Upper Eagle River, Otter Creek, and the Otter Creek complex that have a 50-meter buffer, ensure that for mortars, Area B of the SDZ does not overlap the river/creek. For mortars that overfly the river/creek, ensure the minimum safety distances in DA Pam 385-63 are applied to areas that overlap the river/creek. In other words, while there is a greater than 1:1,000,000 chance for fragmentation to land in portions of the river/creek/complex where

infrequent marine mammal visitation is expected, minimum human safety distances would still be applied to protect marine mammals in these areas.

- Expand the protective measure that specifies limited fire periods for HE rounds (Section 2.4.1) to include 155-mm training rounds. This means that 155-mm training rounds, like full HE rounds, would not be fired into inundated areas during inundating tide events and would not be fired into ERF during the seasonal closure period (9 August to 18 October); 155-mm training rounds could still be fired into the proposed expansion area during this time.

The effectiveness of the proposed measures would be monitored through implementation of a mitigation and monitoring plan, which will be developed after the Draft EIS and will include any additional measures identified as a result of ongoing consultation and coordination. This plan will include a year-round marine mammal monitoring and mitigation program that includes the synthesis of visual and acoustic data collection techniques, as well as many of the measures previously listed in this section. This plan will be coordinated with NMFS prior to the implementation of the proposed action.

The specific objectives of the monitoring and mitigation program are as follows:

- Collect data on underwater and airborne noise levels during live-fire training.
- Collect data on the occurrence, distribution, and behaviors of marine mammals observed in the affected area.
- Evaluate the distances, distributions, behaviors, and movements of marine mammals relative to project activities.

The mitigation and monitoring plan will also provide the qualifications and training required for the MMOs; the required equipment, including guidance and reference materials; and required data collection protocols to ensure that clear and concise data records are kept and that data interpretation, post-season data quality assurance, analyses, and reporting are accurate. Marine mammal monitoring and underwater acoustic detection locations will be described in detail in the mitigation and monitoring plan.

Additional measures that are being considered for fish, as discussed at the end of Section 3.8.2.2, would also benefit marine mammals by providing more information about impacts to marine mammal prey in ERF-IA and helping to protect, enhance, and/or restore salmon habitat in the area.

3.8.2.5 Special Status Species

The general impacts described previously in Section 3.8 apply to potential impacts on special status species. Potential impacts on special status species from weapons training may include noise, direct injury or mortality, contamination and bioaccumulation, and habitat alteration or loss.

As mentioned in Section 3.8.1.3, the short-tailed albatross was identified as potentially occurring in the region. However, it is not expected to occur within the ROI. Consequently, the only ESA-listed species and MMPA species with the potential to be impacted by the project are marine mammal species (see Table 3.8-7). Significance thresholds and an analysis of potential impacts for these species are provided in Section 3.8.2.4 and are not repeated here. JBER is coordinating with NMFS for the purposes of ESA and MSA consultation, as well as MMPA compliance. The BA that was prepared for ESA consultation addresses the following impacts:

- Acoustic noise from live-firing events
- Changes to water and sediment quality via introduction of munitions contaminants
- Exposure and bioaccumulation of contaminants in fish that are prey species for ESA-listed marine mammals

The BA (Appendix D) concludes that the proposed project may affect but is not likely to adversely affect Cook Inlet DPS beluga whale and Western DPS Steller sea lion. The BA also concludes that the proposed project may affect but is not likely to adversely affect designated critical habitat for Cook Inlet beluga whale. Impacts to ESA-listed marine mammals are presented in Section 3.8.2.4; no additional analysis of impacts is presented in this section.

For MMPA compliance, JBER submitted a request for an ITA on 1 October 2024. On 3 January 2025, NMFS notified the Air Force that, based on the proposed mitigation and monitoring measures detailed in the ITA request and NMFS' analysis of potential take, NMFS has determined that incidental take of marine mammals is not reasonably likely to occur because the specified activities would not harass (as defined for a "military readiness activity" under U.S.C. § 1362 [18][B])[11] or result in the mortality of any marine mammal or marine mammal stock. Therefore, NMFS determined that an ITA under the MMPA is not necessary for the specified activities. Impacts to marine mammals protected under the MMPA are presented in Section 3.8.2.4; no additional analysis of impacts is presented in this section.

The EFH Assessment for MSA compliance concludes that the proposed training may adversely affect EFH and managed species, although effects would be reduced by protective measures and mitigation (Appendix E). Impacts to EFH and managed species are incorporated into the analysis of impacts to fish habitat and species presented in Section 3.8.2.2; no additional analysis of impacts is presented in this section.

The analysis in this section focuses on special status species in other groups.

Impacts to rare plants would be considered significant if one or more of the following were to occur:

- Eradication of one or more populations of rare plants
- Permanent alteration or degradation of potential rare plant habitat

Impacts to JBER's recognized SSCs would be considered significant if one or more of the following were to occur:

- Failure to meet the requirements of federal or state laws, regulations, or plans protecting SSCs or their habitats, including the BGEPA, MBTA, *Alaska Wildlife Action Plan*, or JBER INRMP
- Long-term degradation of habitat such as nearshore, wetland, or riparian areas in the project area or vicinity such that the continued existence of recognized SSC populations on JBER is at risk

Methodology

The estimated area of rare plant habitat that would be lost or degraded by construction and maintenance activities was calculated using the same methodology used to calculate vegetation disturbance (see Section 3.8.2.1). The estimated area of direct disturbance of rare plant habitat from live-fire training was calculated using the same methodology used to calculate annual soil disturbance (see Section 3.5.2). The estimated indirect impacts from energetic residues on rare plants and habitat from live-fire training were calculated using the same methodology used to calculate annual energetic residues deposited in ERF-IA (see Appendix F).

The methods for determining potential impact to SSCs followed the same methods outlined for terrestrial wildlife (see Section 3.8.2.3), with additional considerations given to the requirements under BGEPA, MBTA, and *Alaska Wildlife Action Plan*. Effects on migratory birds, as defined under the MBTA, such as noise and take of active nests and/or eggs, and effects on nesting habitat, were factored into the analysis.

Alternative 1: All-Season Live-Fire Training with Expanded Impact Area

Under Alternative 1, potential direct and indirect long-term impacts on special status species could occur from noise, including mortality, injury, or behavioral changes from indirect live firing of munitions; habitat

[11] According to 16 U.S.C. § 1362(18)(B), in the case of a military readiness activity "harassment" has a narrower definition that means the action (1) injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild or (2) disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns to a point where they are abandoned or significantly altered.

alteration; and exposure to munitions contamination and bioaccumulation. The affected area and degree of effect would be greatest under Alternative 1 because it would include loss of forested habitat associated with expanding the impact area.

Effects to SSCs are anticipated to be similar to those described under Section 3.8.2.3 for terrestrial wildlife, and with mitigation, these effects would not exceed applicable significance thresholds.

Construction and Infrastructure

Of the rare plants for which suitable habitat is present in the ROI, only Hudson Bay sedge and saltmarsh bulrush have the potential to occur in the proposed expansion area based on available habitat. Potential habitat for these two species occurs in the Black Spruce/Peatmoss Species Western Boreal Scrub Bog Alliance (2.9 acres) and Cosmopolitan Bulrush Low Salt Marsh Alliance (0.2 acres), respectively (Table 3.8-8). However, these habitats occur only in the vegetation buffer, in which forests would be thinned to reduce fire risk and where BMPs would be implemented for construction in and near wetland areas. These two habitats are non-forested wetlands; therefore, impacts from construction to rare plant habitat would not exceed significance thresholds.

Noise impacts to SSCs from construction would be similar to those described for other terrestrial wildlife species in Section 3.8.2.3. Noise disturbances from heavy equipment and construction crews working in the expansion area could cause wildlife to move away from and avoid the construction zone. Some construction activities are anticipated to occur during the breeding period for some SSCs (notably in the summer months), and construction noise could disrupt reproductive activity during these periods, but these short-term impacts are not expected to exceed significance thresholds.

Vegetation clearing would result in the long-term loss of 359 acres of forest and shrub habitat, which would be replaced with grassland habitat that would be maintained through periodic prescribed burns (350 acres) or left unvegetated (9 acres) as roads, pads, and firebreaks. Additionally, thinning in the vegetation buffer could occur in boreal forested wetlands where several bird SSCs occur. SSC bird species nest not only on tree branches and in tree and snag cavities, but also among shrubs and downed vegetation, on open ground, and on cliffs. While adult birds can usually escape construction activities, their eggs and chicks do not have this ability. Destruction of active bird nests, eggs, or nestlings could result from vegetation clearing, grubbing, and other site preparation and construction activities. Clearing and thinning activities could result in direct take of roosts, including maternity roosts. Removal of vegetation that provides suitable habitat for birds and/or bats could result in the disruption of breeding if removal occurs during the breeding season (generally considered the summer months). While unintentional take of migratory birds could occur, JBER would confer and cooperate with the USFWS to develop appropriate conservation measures as required under the MBTA such that effects would not be significant.

Given the small amount of forested habitat affected in relation to the availability of this habitat on JBER and in the region, loss of habitat for other SSC species due to construction activities would not exceed significance thresholds.

Firing and Training Exercises

Potential impacts to rare plants from firing and training exercises include the direct effects associated with crater formation and habitat alteration, and indirect impacts from energetic residues. Rare plant habitat is not present in portions of the proposed expansion area where live-fire training would occur. Thus, impacts to rare plants resulting from firing and training exercises would only impact rare plants in the existing ERF-IA, of which the majority is salt marsh. Of the rare plants for which suitable habitat is present in the ROI, saltmarsh bulrush, sessile-leaved scurvy grass, and horned pondweed are either known to occur or have the potential to occur in ERF-IA based on available habitat. Of these species, sessile-leaved scurvy grass occurs on gravel bars, gravel spits submerged at high tide, and seashores. Most of the habitat for this species occurs in the protective habitat buffers and would therefore be protected from firing. Direct impacts to habitat for the other two species are expected to be similar to those described for earth resources in Section 3.5.2

(Table 3.5-1), while indirect habitat impacts would be similar to those described for wetlands in Section 3.7.2 (Table 3.7-2). However, because most, but not all, of existing ERF-IA is salt marsh, the impacts described in the above-mentioned sections are overestimates for rare plants.

Noise impacts from weapons training activities on SSCs are expected to be similar to those described for other wildlife species in Section 3.8.2.3. Live-fire training during all seasons would increase the likelihood that migratory birds would be present in ERF-IA during training events. Noise disturbance during periods when these species are present would potentially cause some birds to temporarily leave ERF or avoid ERF altogether. Behavioral changes in response to noise disturbance could lead to nest abandonment, which would result in take of migratory birds. All-season live-fire training at ERF-IA could disturb breeding SSCs associated with nearshore and wetland habitat such as Hudsonian godwit (*Limosa haemastica*), short-billed dowitcher (*Limnodromus griseus*), solitary sandpiper (*Tringa solitaria*), lesser yellowlegs, horned grebe, and red-throated loon. While small mammal SSCs may temporarily react to military training noises, their relative abundance and density do not appear to be impacted by loud noises. Acute noises (such as training noise) are not anticipated to have large effects on amphibian SSCs. While intermittent noise from weapons training could lead to unintentional take of migratory birds, JBER would confer and cooperate with the USFWS to develop appropriate conservation measures as required under the MBTA such that effects would not be significant.

Direct munition strikes from firing weapons are potential, but unlikely, stressors to SSCs, particularly birds. Birds in flight or on land in the proximity of a munition detonation could be subject to potential injury or mortality. However, birds are highly mobile, and the training range is contiguous with large tracts of suitable habitat; most birds would be able to flee the area during weapon registration to avoid injury during the subsequent training. Additionally, units would follow all regulations to visually clear areas around targets prior to firing, reducing the likelihood of impacting easily observable SSC species. Therefore, it is not expected that significant impacts to SSCs would occur.

Up to 6 acres of vegetated and non-vegetated areas would be disturbed annually by detonation of HE munitions and associated crater formation, assuming no overlap of craters (Table 3.5-1). In the affected area, particularly around targets, continual alteration of habitat could occur, including during the sensitive breeding season for SSCs. As described in Section 3.8.2.1, the 6 acres is likely an overestimate of the extent of impacts to vegetated and non-vegetated areas and represents a very small portion of available similar habitats on JBER. Consequently, impacts to SSC habitats from training activities would not exceed applicable significance thresholds due to the relatively small amount of impact compared to the extent of available habitat on JBER. SSCs may be impacted by residues even if they do not directly consume plants that uptake munition constituents. The increase in the number of rounds fired annually would increase the amount of residues deposited in the area. Residues deposited in upland conditions (as in the proposed expansion area) may persist in the environment for longer than those deposited into ERF, where most areas are flushed into Eagle Bay through runoff or tidal action. Live-fire training would occur outside the winter months during periods when gravel caps covering WP-contaminated sediment are not protected by ice cover. However, as discussed further in Section 3.15.2.2, with mitigation, there would be a very low risk of an errant round penetrating a gravel cap and exposing SSC species to WP, and it is not anticipated that significant impacts would occur.

Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only

Under Alternative 2, there would be no loss of adjacent upland habitat, because ERF-IA would not be expanded and no associated impacts to SSC bird species that occur in these upland habitats. Potential impacts to rare plants and avian SSCs in the existing ERF-IA would be similar to those described for Alternative 1. There is a potential for more rounds to be fired into ERF under this alternative, which would create more noise disturbances in this area, deposit more munitions residues in this area, and include more habitat modification via cratering than Alternative 1. However, impacts to rare plants and SSCs under Alternative 2 (which does not include an expanded training area) would be less than Alternative 1. JBER would confer and cooperate with the USFWS to develop appropriate conservation measures for migratory birds as required under the MBTA such that effects would not be significant. The risk of disturbing gravel caps and exposing remediated WP would be very low for the reasons provided for Alternative 1.

No Action Alternative

Under the No Action Alternative, impacts to rare plants and SSCs would be similar to those that occur under existing conditions. The ground surface would be frozen during training events, resulting in little to no direct impacts to any rare plants that may be present. With winter-only firing restrictions in place, live-fire training would not occur during the breeding season for avian SSCs or the migratory periods where some SSCs may be present at ERF in greater numbers. Many SSCs are absent from the area during the winter months (e.g., migratory birds), and little to no direct impacts from training activities are expected for these species during that time. Toxins associated with LO detonation of munitions would continue to be introduced to ERF-IA, but under a winter-only firing regime, energetic residues would be more likely to be flushed from the estuary during spring melt and before the active growing season. Toxins would be less likely to be taken up by rare plants, and the potential for accumulation to phytotoxic level would be less than for the action alternatives.

Mitigation

For all four types of mitigation measures (built-in protective measures, BMPs/SOPs, mitigation determined as a result of the analysis, and additional mitigation being considered), the measures discussed in Sections 3.8.2.1 through 3.8.2.4 include measures for special status species, as well as measures for plants, fish, and wildlife. No additional mitigation measures have been identified specifically for special status species.

3.9 WILDLAND FIRE

3.9.1 Affected Environment

3.9.1.1 Resource Definition

Wildland fire is defined as any non-structure fire that occurs in natural fuels. It includes both prescribed (intentional) burns and wildfires, which are unplanned fires caused by natural ignitions such as lightning, as well as human sources (including live-fire training events) and escaped prescribed fire projects (JBER 2023d). The ROI for wildland fire includes ERF-IA, the proposed expansion area, and lands adjacent to these areas that could be affected by wildland fires.

While wildland fire is extremely unlikely to escape the wet, estuarine ERF-IA despite active firing, prescribed burns and fuel loads of upland communities make fire a potential concern in the proposed expansion area. Wildland fire is a natural disturbance process that many ecosystems have evolved with; however, the focus on suppression in the twentieth century altered dynamics. Several upland vegetation communities present on JBER are recognized as benefiting from burning; however, wildland fire remains a concern due to the potential impact on human safety, structures and infrastructure, and natural and cultural resources. In fire-prone areas, climate, weather events, human activities, and vegetation type (available fuels) determine the level of wildfire hazard. Wildland fire risk on JBER is addressed through resource management activities and firefighting planning and response, under the oversight of JBER’s department of Fire and Emergency Services, and in collaboration with the Air Force Civil Engineer Center Wildland Fire Support Module and JBER's Environmental element.

3.9.1.2 Regulatory Setting

JBER’s response to wildland fire risks and use of fire as a management tool is mandated by DoD Regulations and described in the JBER WFMP, as noted below.

AFMAN 32-7003, *Environmental Conservation*, requires military installations to develop INRMPs, which address wildland fire risk as a resource consideration within at-risk installations.

DoDI 6055.06, *DoD Fire and Emergency Services (F&ES) Program*, mandates any installation with burnable vegetation to develop (and regularly update) a WFMP to provide a coordinated approach to wildfire response and risk mitigation. The JBER WFMP was "developed to provide guidance for the suppression and prevention of wildfires on JBER lands and to implement ecosystem management and fuels reduction goals using mechanical fuels treatments and prescription fire in support of the INRMP" (JBER 2023d).

Section 110 of the Clean Air Act, 42 U.S.C. § 7410, requires state and local air pollution control agencies to adopt federally approved control strategies to minimize air pollution. Smoke from prescribed burns requires permitting.

Alaska Air Quality Control Regulation 18 AAC 50 provides open burning policy and guidelines and establishes an Air Permits Program that sets standards for air quality. Under this program, the ADEC Division of Air Quality issues burning permits for prescribed fire to agencies that have a fire management plan and project-specific burn plans prepared that meet state and federal laws and regulations (ADEC 2015).

3.9.1.3 Existing Conditions

Wildland fire is a natural disturbance process across southcentral Alaska, including JBER. Over the past 200 years, an estimated 48 percent of JBER has been affected by fire (Jorgenson et al. 2003). The predominant ignition mechanism is lightning, although intentional fires were set to clear land in the 1800s and early 1900s. The distribution of forest vegetation in terms of age and development (successional stage) indicates that although fires were prevalent and had a strong effect on successional processes during this time period, they were nearly eliminated after 1950 by fire suppression activities due to urban development (Alaska Fire Service data, cited in Jorgenson et al. 2003). JBER has a narrow fire season, spanning just 3 months in most years (JBER 2023a).

Today, most fires in the Anchorage area, including those on JBER, result from human activities and, in many cases, the military mission itself. Wildfire ignitions on JBER have been documented from incendiary devices used during training as well as other human-related sources, such as smoking, debris burning, unattended campfires, and arson (JBER 2023d). Most military activity occurring on JBER does not involve combustible materials/activities, and wildland fires occurring on JBER have primarily been small and confined. A total of 203 wildland fires, all human-caused, have been recorded on JBER since 1956 (JBER 2023d). The largest fire recorded in the area of current-day JBER occurred in 1950 and burned 3,000 acres (JBER 2023d). An average of 28 wildfires have occurred annually since 2021 (JBER 2023d). The current perceived wildfire risk level on JBER is "High" in part due to the ongoing spruce beetle outbreak, which has impacted more than 15,000 acres of spruce forest on JBER, resulting in spruce mortality and increased dry fuel loading. In addition, between 2021 and 2022, there were an average of 28 unplanned ignitions annually, with the largest wildfire in 2022 burning 17.3 acres (JBER 2023d). Further, JBER applies an integrated vegetation management approach to address hazardous fuels and further minimize wildfire risk. The approach accounts for variability in the landscape and fuels composition, as well as identified values at risk (human life, structures and infrastructure, natural resources and cultural resources) and includes planning as well as proactive management of flammable fuels.

To characterize the wildland fuels hazard condition on JBER, the Wildland Fire Support Center at Colorado State prepared a Wildland Fire Risk Assessment (WFSC 2016) that characterized the fuel conditions across JBER. Standard fuel models were assigned to each vegetation class in the ROI as presented in Table 3.9-1. These models represent the fuels conditions and are understood to be dynamic, assigned for purposes of modeling potential fire behavior in the event of an ignition, under the range of predicted weather conditions. For a fire to carry, once a fuel source is ignited, there must be adequate fuels to keep it fed; therefore, the condition and distribution of fuels across a landscape is combined with expectations of potential ignition sources to map fire hazard condition.

Table 3.9-1 Fuel Types in the Region of Influence

Fuel Class	Associated Vegetation	Area (Acres)	Area of ROI (%)
GR1: Short; sparse dry climate; grass	Sedge marsh and wet meadows	1,607.2	52.8%
GS1: Low load; dry climate; grass–shrub	Willow low shrub	17.5	0.6%
GS2: Moderate load; dry climate; grass–shrub	Dry meadows	113.8	3.7%
NB8: Water	Open water	224.9	7.4%
NB9: Barren	Barrens and partially vegetated	86.7	2.8%
SH1: Low load; dry climate; shrub	Sweetgale low shrub	104.1	3.4%
TL2: Low load; broadleaf litter	Balsam poplar forests	17.5	0.6%
TU1: Low load; dry climate; timber–grass–shrub	Paper birch and aspen	326.1	10.7%
TU4: Dwarf conifer with understory	Black spruce forest and woodlands	304.6	10%
TU5: Very high load; dry climate; shrub	Mixed white spruce–birch and white spruce–aspen forests and woodlands	241.0	7.9%
Total		**3,043.5**	**100.0%**

Notes:

[1] Fuel Model is based on U.S. Forest Service Standard Fire Behavior Models (Scott and Burgan 2005), as presented in WFSC 2016.

[2] Mapped vegetation is consistent with vegetation communities presented in Section 3.8.1 (Jorgenson et al. 2003).

Key: ROI = Region of Influence

The five most common fuel types in the ROI are (from most to least common): GR1, TU1, TU4, TU5, and NB8. Combined, these five classes account for 88.8 percent of the ROI. GR1 is the most common fuel type and includes herbaceous vegetation in tidal flats and marshes of ERF and, given the wet soils typical of the vegetation types included in this class, is characterized by a low flame rate and fire spread rate and low risk of wildland fire. Fuel types TU1, TU4, and TU5 include evergreen, deciduous, and mixed forest types with increasing wildland fuel loads, flame lengths, and spread rates from TU1 to TU5. These fuel types pose the highest risk of wildland fire in the ROI and occur in the proposed expansion area and in uplands directly west of ERF. The fuel type NB8 is open water and has no fire potential. The remaining fuel types individually account for <5 percent of the ROI and combined account for 11.2 percent of the ROI. All the classes have a low to moderate flame length and spread rate and pose a low risk of wildland fire.

Consistent with the *Alaska Interagency Wildland Fire Management Plan* (Alaska Interagency Coordination Center 2021; reviewed and updated annually), and with input from the JBER Wildfire Risk Assessment (WFSC 2016), JBER developed its own WFMP addressing wildfire planning, partnerships with other agencies, management strategies and risk mitigation. The WFMP classifies all JBER lands into one of three designated wildland fire management options, which are selected by managers based on legal mandates, policies, regulations, operational constraints, resource management objectives, and unique characteristics such as fuels, topography, and natural resource concerns (JBER 2023d). Fuels characterization is integrated into the fire management options, listed and briefly described in Table 3.9-2. JBER Fire Emergency Services monitors fire weather daily, assigns a fire weather index and tracks patterns, and follows careful detection and reporting procedures to minimize the risk of catastrophic fire. Considering both fuels and ignition, mean fire frequency across the ROI is currently less than 0.5 fires annually for any given location, and the current probability of a given fire exceeding existing control capacity is zero percent across ERF-IA and from zero to less than 20 percent in the proposed expansion area (WFSC 2016).

Table 3.9-2 Fire Management Units in the Region of Influence

Management Option	Characterization of Management Action	Where Mapped in the ROI
Critical Management Option	These lands receive maximum detection coverage and are given highest priority for attack response, which is immediate and aggressive. Adjacent land owners/managers are notified of the situation as soon as possible. These areas receive priority over adjacent lands and resources in the event of escaped fires.	Lands in ERF-IA south of Eagle River
Full Management Option	Areas receive maximum detection coverage as well as immediate initial attack response. If the fire escapes and requires additional suppression, affected land owners/managers are notified, if necessary, to develop a coordinated approach to further suppression or evacuation.	Lands in ERF-IA north of Eagle River, and lands in the proposed expansion area
Limited Management Option	Areas where the resources at risk do not warrant the expense of suppression or where natural fire is important to ecosystem sustainability. Fires within these areas receive routine detection effort. Attack response is based on the need to keep the fire within limited management option areas and the need to protect critical sites. Land owners/managers are immediately notified of the fire situation, and the status of unmanned fires is monitored.	No lands in the ROI meet this characterization

Key: ERF-IA = Eagle River Flats Impact Area; ROI = Region of Influence

Prescribed fire is used by JBER to maintain open grassland for wildlife, control the spread of unwanted plant species, and reduce fuel load so that subsequent wildfires are easier to suppress. Introducing prescribed fire to forested ecosystems at JBER has largely been infeasible because of the challenges and risk associated with proximity to vulnerable infrastructure, narrow burning window, and stringent air quality standards; however, prescribed fire has been successfully applied in non-forested vegetation communities with lower fuel loads. The annual burned area needed to meet natural resource goals and objectives and support Army and Air Force mission requirements is estimated at between 2,000 and 3,000 acres (JBER 2023a). All prescribed burns on JBER must follow state-prescribed fire regulations and accommodate site-specific conditions (NWCG 2017; JBER 2023d).

In 2015, JBER Emergency Services established a Memorandum of Agreement (MOA) with the U.S. Forest Service and the ADNR Division of Forestry to manage fuels in active firing ranges and to execute training and response to wildland fire (JBER 2023a). The primary goal of the MOA is to reduce human-caused fires and minimize the damage caused by natural fires, while facilitating healthy ecosystem function. UXO presence at JBER poses a potential challenge to addressing and suppressing wildland fire, as the potential for encountering UXO within portions of JBER that may experience wildfire is possible. Use of heavy equipment to implement prescribed burns or suppress fires can cause UXO to detonate, posing a serious risk to firefighter safety. For this reason, UXO areas are considered off-limits for wildfire suppression or natural resource management activities unless they have been cleared by trained UXO detection specialists (JBER 2023d). The JBER WFMP identifies all portions of the ROI as containing potential UXOs.

As noted in Section 3.16, spruce beetle infestation and resulting spruce tree mortality in southcentral Alaska increases the flammability of existing fuels by increasing the fuel load of dry large woody debris. Since 2016, approximately 15,000 acres of spruce forest on JBER are displaying spruce mortality due to the spruce beetle outbreak. This mortality increases fuel loading and risk for severe and catastrophic wildfires. In 2019, the Swan Lake Fire that occurred approximately 40 miles southwest of JBER on the Kenai Peninsula burned over 167,000 acres and was caused in part by an abundance of fuels associated with spruce beetle mortality in the area (BLM 2019b).

3.9.2 Environmental Consequences

Fire plays an important role in Alaskan ecosystems and is therefore generally seen to have a positive impact on the natural environment. Adverse impacts from wildland fire occur when fire threatens life, property, and/or the military mission. This section addresses the potential effect to wildland fire risk on JBER, including existing plans and programs, from the modification of existing wildland fuels and/or additional ignitions associated with the alternatives.

Impacts to wildland fire risk would be significant if an alternative were to result in any of the following:

- An increase in wildland fire risk (introduction of new ignitions or new/more flammable fuels conditions) in areas not currently addressed by current JBER fire suppression strategies
- An increase in wildland fire risk in populated areas or areas containing vulnerable infrastructure
- An increase in wildland fire risk such that existing suppression personnel, planning, management strategies and infrastructure would be insufficient to address fires resulting from new ignition sources

Activities such as live-fire training exercises and prescribed burning could increase unplanned ignitions, thereby increasing the extent and duration of ignition sources in the ROI. While these activities commonly occur on JBER and their effects are well-known and mitigated within the existing WFMP, under the proposed action, there would be an increased wildland fire risk and a commensurate increase in demand for management resources. The decision to conduct live-fire training during the fire season would consider a wildlife fire risk assessment and include consultation between the Range Control Officer and the JBER Fire and Emergency Services, as described in the JBER WFMP, and would consider wildland fire conditions and management resource availability. Effects beyond the scope of the current WFMP, and requiring a revision of the WFMP, would be considered a significant impact to wildland fire risk.

3.9.2.1 Methodology

The impact analysis considers the degree to which wildland fire risk in the ROI and on JBER would change as a result of implementation of the action alternatives and how compatible that changed condition would be with existing fuel management options mapped across JBER. Changes in location and seasonal timing of live-fire training can increase wildland fire risk by increasing potential ignition sources. The degree to which new ignitions change wildland fire risk depends on the type, conditions, and arrangement of fuel on the landscape, as the outcome of successful ignition and existing fuel largely predicts the associated, anticipated fire behavior.

Fuels

Changes in wildland fuels were determined by examining vegetation management actions proposed under the action alternatives and determining if the existing fuel loads associated with the resulting landscape units would change to a more hazardous condition.

Ignitions

Changes in ignition potential were determined by reviewing anticipated artillery and mortar munitions volumes and timing against current conditions (No Action Alternative). Current conditions have been shown to have a zero-ignition rate, as all firing occurs during winter and outside of Alaska’s fire season, when JBER is too wet/covered in snow to support a fire. Ignition potential, or the chance that an ignition lights a fire, was calculated by multiplying ignition probability, defined as the likelihood of a fired round starting a fire (WFSC 2016), by the maximum number of live rounds fired under a given alternative. Blank rounds were excluded from the calculation of ignition potential as they cannot spark a fire. Climate limits the possibility of successful ignition and fire spread on JBER, as snow generally precludes successful ignition of fuels between October through late April, and peak precipitation makes late summer fires (late August and September) less common (WFSC 2016). Therefore, all-season firing training activities and release of live rounds were assumed to be equally distributed throughout the year, and ignition potential was assumed to be equal to a quarter of the maximum number of rounds to correspond with the 3-month fire season (May through July).

3.9.2.2 Alternative 1: All-Season Live-Fire Training with Expanded Impact Area

Long-term impacts to wildland fire risk would occur as a result of expanding ERF-IA into an upland area adjacent to forests and modifying the timing of training to include the spring and summer months. These impacts would not exceed significance thresholds. Impacts associated with expanding the impact area would only occur under Alternative 1. While the same number of rounds would be fired under both action alternatives, ignition risk would be higher under Alternative 1 because some rounds would target the upland expansion area.

Construction and Infrastructure

Over the short term, use of harvest equipment and other tools to clear and thin vegetation in the proposed expansion area could throw sparks and introduce new ignition sources; however, the risk would be low because spark arrestors are included with all modern chainsaw models, and equipment would be operated by qualified personnel. Creation of a firebreak in the proposed expansion area would further reduce fire hazard by providing a clear line of sight to the vegetated perimeter where errant ignitions could land and spark a fire.

Clearing the expansion area and seeding with grass would change the fuel hazard in this area. The 359 acres that would be cleared are currently mapped as upland forest and would change from a moderate fuel hazard to bare ground (9 acres) or early succession grasses (350 acres) following reseeding (Table 3.9-3). Annually, the seeded areas would oscillate between live grass and dead grass, with an approximate 2-week period after prescribed burning when dead grass has been burned off, resulting in a short period of exposed mineral soil in the clear-cut area. There is a high likelihood that the clear-cut area would be encroached on over time by bluejoint reedgrass, a native rhizomatous grass that forms dense swards up to 4 feet in height. Bluejoint is a highly receptive fuel that would increase fuel loads and wildfire risk, thus offsetting to some degree the reduction in fuel load associated with clear-cutting and thinning in the expansion area. Additionally, annual prescribed fires would occur in the clear-cut area and mineral soil firebreak, which would reduce the risk of fires by regularly clearing fuels. Forest thinning under Alternative 1 would change the fuel type in 226 acres (Table 3.9-3) by removing up to a third of the basal area of trees within the vegetation buffer and opening the canopy, allowing grasses and shrubs to encroach.

Table 3.9-3 Potential Fuel Modifications under Alternative 1

Fuel Model[1]	Fuel Description	Fuels Removed (acres)[2,3]	Vegetation Buffer (Fuels Thinned) (acres)[3]	Fuels Replaced (acres)[4]
GR1	Short; sparse dry climate grass	0.0	1.0	0.0
GR2	Moderate load; dry climate grass-shrub	0.0	0.0	349.9
NB8	Water	0.0	1.6	0.0
NB9	Barren	0.0	0.0	9.3
TL2	Low load broadleaf litter	0.0	17.0	0.0
TU1	Low load dry climate timber grass shrub	227.4	54.8	0.0
TU4	Dwarf conifer with understory	92.1	141.9	0.0
TU5	Very high load; dry climate shrub	39.6	9.7	0.0
Total		**359.2**	**226.1**	**359.2**

Notes:

[1] Fuel Model terminology is based on U.S. Forest Service Standard Fire Behavior Models (Scott and Burgan 2005), as described in the JBER Wildland Fire Risk Assessment (WFSC 2016) and AFMGTG (2018).

[2] The mapped vegetation community associated with each fuel model is presented in Table 3.8-1 and is consistent with vegetation communities presented in CEMML (2022) and cross-referenced to the most similar Viereck et al. (1992) vegetation class.

[3] Potential vegetation removal and thinning are only associated with actions proposed under Alternative 1; no vegetation removal or thinning is anticipated under Alternative 2 or the No Action Alternative.

[4] The acres of fuels in the expansion area that would replace the fuels removed.

Key: JBER = Joint Base Elmendorf-Richardson; ROI = Region of Influence

Prescribed burning is an intentional ignition source that is also an important tool for reducing fuel loads to reduce the risk of future wildfire. JBER follows detailed protocols outlined in the WFMP to apply the technique safely and effectively, when weather is appropriate and the risk of fire escape is lowest. All prescribed burning efforts require a *Prescribed Fire Plan*, for which an EA or other NEPA-compliant action must be taken to assess potential impacts (JBER 2023d).

Modification of fuels and changes in land use associated with Alternative 1 would be consistent with current Fire Management Unit descriptions and planning presented in the WFMP. The expansion area is currently characterized under FM2 (Full Management) where "fire will primarily be used for fuels reduction around the training ranges in order to reduce the potential for wildfire ignitions associated with training operations," which is consistent with the expansion of prescribed fire under Alternative 1 in that area. The existing ERF-IA is currently characterized under Fire Management Unit 1 (Critical Fire Management), where prescribed fire is "not intended to be used widely for natural resources purposes" and would not be applied under Alternative 1 (JBER 2023d).

Firing and Training Exercises

Under Alternative 1, there would be a long-term increase in the annual number of potential ignition sources fired in the ROI. A maximum of 15,270 rounds would be fired annually, approximately 2,910 of which are assumed to be potential ignition sources based on type of munition and season of firing (Table 3.9-4). Approximately 470 of these potential ignition sources would target the proposed expansion area, which would have an effective fuel load comparable with fuel models GR1 and NB9, as discussed previously. Despite reduced fuel volume across the portion of the expansion area intended to receive and contain live fire, the cleared area is surrounded on three sides by forest lands with moderate to high fuel loads. A misfire of live munitions could ignite that vegetation during training, although the risk of such an occurrence would be low.

Table 3.9-4 Number of Rounds and Potential Ignitions by Alternative

Metric	Alternative 1	Alternative 2	No Action
Total Annual Rounds	15,270	15,270	7,087
Existing ERF-IA	13,392	15,270	7,087
Proposed Expansion Area	1,878	0	0
Total Potential Ignitions[1]	2,910	2,910	0
Existing ERF-IA	2,440	2,910	0
Proposed Expansion Area	470	0	0

Notes: [1] Excludes 105-mm blank rounds. For Alternatives 1 and 2, this number is calculated as a quarter of the total rounds fired. The No Action Alternative has no associated potential ignitions, as all live fire occurs during the winter months when weather prohibits vegetation from catching fire.

Key: ERF-IA = Eagle River Flats Impact Area; mm = millimeter

Alternative 1 would also result in an estimated 2,440 live rounds targeted into the existing ERF-IA during the 3-month fire season from late April through July. Much of this area exhibits a low fuels hazard condition because it is composed primarily of short-stature, wetland vegetation that is not easily ignited and is surrounded by a matrix of wetlands and water. Conducting live-fire training during the fire season would result in a slight increase in wildland fire risk in areas of non-forested wetland vegetation, which can carry fire over during the spring and summer months. In the event that live rounds temporarily ignite dry grass vegetation, the risk of catastrophic wildfire carrying to adjacent upland areas would be low in wetland areas. The ability to fire rounds over Eagle River would result in the addition of targets near the forested uplands of ERF-IA south of ERF. There is a chance that rounds would miss their targets and land in these upland forested areas, which would have a higher risk of wildland fire than wetland areas. The increased wildfire risk associated with firing during spring and summer would be assessed prior to initiating all-season firing in ERF-IA and annually thereafter, in accordance with the WFMP, and appropriate measures implemented based on identified risk factors. Prior to training activities that involve pyrotechnic rounds during the fire season, the Army would consider fire risk and management resource availability and communicate with JBER Fire and Emergency Services to decide whether to proceed.

JBER's existing WFMP and detection system, as well as suppression tools, cover the full extent of JBER and therefore have characterized wildfire suppression needs within the forests north of ERF, including those along the perimeter of the proposed expansion area, and would effectively suppress any fires started along the newly created vegetation perimeter during live-fire training. Further, the clearing and removal of vegetation and construction of a firebreak through the expansion area would reduce the connectivity of wildland fuels and provide access to the perimeter forest to expedite fire suppression response if needed. While the presence of UXO hazard would affect access, the JBER wildland fire response is designed to address this limitation. Clearing UXO from the expansion area after each training exercise would also reduce access limitations.

The active application of JBER's prescribed burning program and wildland fire detection system would reduce the hazard associated with the increase in potential ignitions to start a fire by applying measures to suppress an ignition before it has the chance to erupt into a large fire. The WFMP classifies ERF-IA north of Eagle River (including the proposed expansion area) as "Full Management Option" and ERF-IA south of Eagle River as "Critical Management Option" (Table 3.9-2). Lands under both management options receive maximum detection coverage as well as immediate initial attack response by JBER firefighting personnel and equipment. Given the overall low wildland fire risk on JBER, it is expected that existing wildland fire detection and suppression systems would be prepared to respond to any increases in ignitions associated with expanded live-fire training.

3.9.2.3 Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only

Under Alternative 2, there would be long-term impacts associated with increasing the number of potential ignitions and expanding live-fire training into the summer fire season, but these impacts would not exceed significance thresholds. The degree of impact would be less than under Alternative 1 because there would be no upland expansion area, and all potential ignition sources would be targeted into the existing ERF-IA. The number of potential ignitions would increase to 2,910 (Table 3.9-4), which is a larger increase than under Alternative 1. Potential impacts associated with expanding live-fire training to include the fire season would be similar to those described for Alternative 1, with a slight increase in risk in areas of non-forested wetland vegetation and a higher increase in risk in forested uplands south of ERF. The increased wildfire risk would be assessed annually, in accordance with the WFMP, and appropriate measures implemented based on identified risk factors.

If the smoke produced from a localized ignition were picked up by Fire and Emergency Service's detection system, it could increase the need for short-term monitoring of ERF-IA, but due to the wet conditions and low-lying vegetation within the ignition target areas, this elevated need for response personnel would be short-lived. The presence of UXO would affect access for fire suppression, but JBER wildland fire response is designed to address this limitation.

3.9.2.4 No Action Alternative

Winter-only use of ERF-IA under the No Action Alternative would be consistent with past use, which has effectively avoided igniting vegetation and causing recordable fire events. The wildland fire risk associated with live-fire training would continue to be low.

3.9.2.5 Mitigation

Standard BMPs to minimize, reduce, or compensate for impacts to wildland fire risk, particularly from use of prescribed fire in the proposed expansion area include the following:

- Implement the WFMP within the RTA at JBER.
- Maintain all tree-cutting and removal equipment (feller bunchers, skid steers, tractors, graders, trucks, etc.) and firefighting equipment (wildland engines, water tenders, utility task vehicles, trucks, mobile support cache, and remote weather station) in good condition and inspect prior to use to confirm that equipment is in compliance with fire safety standards, including but not limited to spark arrestors, fire extinguishers, and other firefighting equipment.

Additionally, the following mitigation has been determined as a result of the wildland fire analysis to reduce potential impacts from construction of the expansion area and live-fire training:

- Conduct pile-burning of logging slash after the onset of fall rains or during the spring prescribed burn window, which occurs between loss of snow cover and green-up (Alternative 1 only).
- Provide fire suppression resources with UXO and impact area maps to use when planning suppression response if an ignition is detected.

3.10 CULTURAL RESOURCES AND SUBSISTENCE

3.10.1 Affected Environment

3.10.1.1 Resource Definition

Cultural Resources

The term “cultural resources” refers to tangible remains and material evidence resulting from past human activity and/or specific locations of traditional importance. Cultural resources include prehistoric and historic archaeological sites, structures, buildings, districts, landscapes, or other locations or objects determined important for scientific, traditional, religious, or societal reasons. They include Native American and Alaska Native sacred sites and Traditional Cultural Properties. The ROI for cultural resources is equivalent to the Area of Potential Effect (APE; defined in Section 3.10.1.2) and includes the portion of ERF-IA that may contain unidentified historic properties and the proposed expansion area.

Subsistence

Subsistence is a way of life in Alaska for many Upper Cook Inlet Dena’ina and Ahtna people. The harvest and processing of wild resources for food, raw materials, and other uses have been a central part of the customs and traditions of all Indigenous cultural groups throughout Alaska. Subsistence consists of more than harvesting food. It is a system of cultural practice, resource distribution, and community connections that extends beyond the boundaries of the household and community. Subsistence activities include hunting, fishing, trapping, gathering, camping, and ceremonial activities, in addition to processing, sharing, use, consumption, trade, and barter of wild resources. Subsistence resources include fish, mammals, birds, marine invertebrates, edible and medicinal plants, mushrooms, and firewood. Subsistence resources are considered renewable resources that provide food, fuel, and materials to make clothing, shelter, tools, and art. For Indigenous people, subsistence activities are rooted in traditional cultural values, spirituality, and a sense of community.

The ROI for direct effects to subsistence is ERF-IA and the proposed expansion area. For indirect effects, the ROI is consistent with fish and wildlife resources as described in Section 3.8.1, inclusive of Eagle Bay and adjacent portions of Knik Arm, and other areas where these resources could be affected by live firing noise, munitions contaminant exposure, and sediment releases to aquatic habitat.

3.10.1.2 Regulatory Setting

Cultural Resources

Section 106 of the NHPA (54 U.S.C. § 300101 et seq.) requires federal agencies to consider effects to historic properties from an agency undertaking. A historic property is defined as any prehistoric or historic district, site, building, structure, or object included on, or eligible for inclusion on, the NRHP, including artifacts, records, and material remains relating to the district, site, building, structure, or object (54 U.S.C. § 300308). Per AFMAN 32-7003 and 36 CFR § 800.8, this analysis incorporates NHPA Section 106 review into the NEPA analysis. The Section 106 process consists of four stages set forth at 36 CFR Part 800: (1) initiate the Section 106 process (36 CFR § 800.3); (2) define the undertaking's APE and identify historic properties (36 CFR § 800.4); (3) assess adverse effects (36 CFR § 800.5); and (4) resolve adverse effects (36 CFR § 800.6) as agreed upon between consulting parties including the SHPO, Tribes, local jurisdictions, and other parties with a demonstrated interest in the project.

As defined under 36 CFR § 800.16(d), the APE is "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist." The APE is determined by the scale and nature of the undertaking and may be different for different kinds of effects caused by various project activities. For the purposes of this project, the APE has been defined in a PA for the project (see Section 3.10.2.5) as the 905 acres of ERF-IA that may contain unidentified historic properties and the proposed expansion area.

Subsistence

State and federal law define subsistence uses as the "customary and traditional uses" of wild resources for food, clothing, fuel, transportation, construction, art, crafts, sharing, and customary trade. ADF&G defines subsistence fishing as the taking of, fishing for, or possession of fish, shellfish, or other fisheries resources by a resident of the state for subsistence uses with gill net, seine, fish wheel, long line, or other means defined by the Board of Fisheries (ADF&G n.d.). To qualify as a subsistence use, the resource cannot be commercially sold (ADF&G 2018).

Title VIII of the Alaska National Interest Lands Conservation Act (ANILCA) applies to federal public lands in Alaska. As a result, some subsistence hunting and fishing in Alaska are regulated by the federal government. Alaska state law (AS 16.05.940[32], [33]) and federal law currently differ as far as who qualifies for participation in subsistence fisheries and hunts. Under federal law, rural Alaska residents qualify for subsistence harvesting. Since 1989, all Alaska residents are entitled to participate in subsistence hunts and fisheries outside nonsubsistence use areas under state law (ADF&G 2022c).

3.10.1.3 Existing Conditions

Cultural Resources

<u>Cultural Context: Archaeological Sites and Sites of Traditional Cultural Importance</u>

Current Alaska Native cultural entities that have ancestral ties to JBER lands are the Dena'ina and Ahtna people of Upper Cook Inlet. The Dena'ina speak a dialect of the Athabascan language and have cultural affiliations with Athabascan-speaking Tribes in Interior Alaska. The federally recognized Tribes of Native Village of Eklutna, Knik Tribe, and Native Village of Tyonek are composed of Dena'ina people. The members of Chickaloon Village Traditional Council are Ahtna and occupied JBER. They are collectively referred to as the Dene. The Cook Inlet Dena'ina are unique among the Dene in that in addition to hunting land mammals, they focused on harvesting ocean resources, hunting sea mammals, and fishing for salmon and other fish (Bancroft 1970; Fall 1981; Townsend 1981; Kari 1988; Davis and the Dena'ina Team 1994; Yarborough 1996; Fall et al. 2003; Hedman et al. 2003; Stone 2006, 2008a; Kari and Fall 2016).

Archaeological and linguistic evidence indicate that the Dena'ina migrated from Interior Alaska to Upper Cook Inlet roughly 1,500 years ago (Reger 1981; Kari 1988; Reger and Wygal 2016). The science of archaeology divides the earlier prehistoric occupations of the Cook Inlet into the following phases based on artifact styles, radiocarbon dating, and geologic context: (1) the American Paleoarctic Tradition from roughly 10,000 to 8,000 years ago, which archaeologists view as representative of the region's first inhabitants; (2) the Northern Archaic Tradition, inhabiting the region from around 5,500 to roughly 4,000 years ago; (3) the Ocean Bay Tradition, which was focused on hunting sea mammals and fishing the inlet's waters from roughly 4,700 to 3,000 years ago; and (4) the Kachemak Tradition, ancestral Alutiiq living in the region from 3,000 to 1,500 years ago (De Laguna 1975; Reger 1981; McMahan and Holmes 1996; Workman 1996; Reger and Boraas 1996; Reger and Pinney 1996). Archaeologists view these various traditions as reflective of different ethnic and cultural identities, with Alutiiq progenitors inhabiting the Cook Inlet immediately prior to the Dena'ina arrival.

Located less than 15 miles from ERF-IA, the Native Village of Eklutna is the closest of the Upper Cook Inlet Tribes to JBER. For centuries the Dene inhabited what are now the installation's lands, hunting, fishing, gathering, and establishing seasonal settlements. In addition, all of the Dene Tribes of Upper Cook Inlet used these same lands to differing degrees during seasonal subsistence rounds and trading excursions (Bancroft 1970; Fall 1981; Townsend 1981; Kari 1988; Davis and the Dena'ina Team 1994; Yarborough 1996; Fall et al. 2003; Hedman et al. 2003; Stone 2006, 2008a; Kari and Fall 2016).

Dena'ina place names for specific locations in and around the project area demonstrate intimate knowledge and traditional use of Eagle River prior to the lands being reserved for military use by the federal government (Davis and the Dena'ina Team 1994; Kari and Fall 2016.). Within the APE, Eagle River is known as *Nuk'elehitnu*, which translates to "Fish Run Again Creek." Eagle River Flats is called *Nuk'elehitnu Kaq'* "Mouth of Fish Run Again Creek," and Clunie Creek is called *T'usq'a*, which translates to "Cutting Place," demonstrating former Dena'ina use of ERF-IA for fish harvesting and processing. Names for features near the project area, such as *K'ka Bena* for Otter Lake, *Cha'ak'dinlen Bena,* which was the site of the final battle between the migrating Dena'ina and Alutiiq at either Six-Mile Lake or Green Lake, *K'qiydulghakt* ("Where We Harvest Fish") for Point Whitney, and *Ke'el Taydeght* for the bluff north of the mouth of Eagle River, are a testament to the long Dena'ina history in the area (Davis and the Dena'ina Team 1994; Kari and Fall 2016).

Numerous Dena'ina names for features in Upper Eagle River (e.g., Kari and Fall 2016:328) attest to traditional Dena'ina use of the river as a travel corridor from Knik Arm to the Chugach Mountains. This is further supported by historical sources. In 1898, Walter Mendenhall, a geologist with an Army mapping expedition, explored Eagle River from its mouth at the Cook Inlet. He noted a well-worn, heavily traveled trail and several Dena'ina camps along the shore of the creek. Mendenhall noted that the camps contained abundant remains of moose and Dall sheep, demonstrating the Dena'ina use of Eagle River as a hunting and travel corridor to the mountains, as well as a fish harvesting location (Kari and Fall 2016).

Ancestral Trees

In addition to naming landscape features, the Dene also modified and altered trees growing in the region. Culturally modified trees (CMTs), also called Ancestral Trees, were marked or shaped to provide information such as waypoints, shelter, tools, medicines, food, hunting aids, and other purposes. CMTs may exhibit a blaze that would serve as a waypoint for trails used by hunters, stripped birch bark that is peeled for basketmaking, topped trees to improve a hunter's field of vision, cut lower branches, stockpiled poles, and concentrations of stumps signifying a campsite (Deur et al. 2020). Holistically "linked to healing, medicinal, and spiritual practices," CMTs now hold cultural importance for present-day Tribal communities who view these visible markers as gifts from their elders and ancestors that continue to orient their culture (Deur et al. 2020). JBER consults with Tribes to document ancestral trees before they are removed, as they are considered resources of traditional significance.

Historic Context

Venturing as far as the mouth of the Knik River in May–June of 1778, Captain James Cook was the first European known to have explored the inlet that now bears his name. On May 30 and 31 of that year, while anchored near Tyonek, Cook's ships were visited by parties of Dena'ina paddling skin boats, marking the first recorded European-Alaska Native contact in the inlet and heralding a period of dramatic cultural upheaval (Bancroft 1970; Kari 2106). The Tyonek Dena'ina oral tradition also has accounts of this historic meeting (Kari 2016). Soon after, by the mid-1780s, the Russians established settlements and trading posts in the outer inlet and Kenai Peninsula (Bancroft 1970).

While Russian exploration and settlement of Outer Cook Inlet and Kenai at the time are well-documented, there is little evidence of a Russian presence in Knik Arm in the early to mid-nineteenth century. Russian records about the upper inlet from this time are scarce. There are, however, reports of a Dena'ina village at the mouth of the Matanuska River and Dena'ina camps scattered along the Knik Arm shore (Bancroft 1970; Kari and Fall 2016). At the same time, the only Dena'ina report of any Russian presence in the Upper Cook Inlet region is the statement by Talkeetna Nicholie that a Russian once died on the Kichatna River (Kari and Fall 2016:17-18).

At the time of the U.S. purchase of Alaska from Russia in 1867, Upper Cook Inlet remained isolated. The U.S. presence in the upper inlet gradually increased with the opening of Alaska Commercial Company stores at Knik and Tyonek and U.S. military expeditions to explore and map the region (Davis and Davis 1996). The Gold Rush at the end of the nineteenth century spawned rapid logistical and commercial development in the area, with dramatic cultural impacts as more Euro-Americans moved into Dena'ina lands (Davis and the Dena'ina Team 1994).

The early twentieth century saw an influx of people. Construction of the Alaska Railroad spurred the formation of Anchorage in the site of what was once a large Dena'ina village. In 1914, the lands now under JBER jurisdiction were opened to homesteading (Daugherty and Saleeby 1998; Hollinger 2001). While homestead applications were open to Alaska Natives, there were inherent cultural differences in land use that led to little interest on the part of the Dene. Instead, the Dene continued to interact with the land in largely a traditional manner, harvesting subsistence resources and co-existing with their new neighbors (Davis and the Dena'ina Team 1994; Hollinger 2001).

In 1939 to 1940 as part of the World War II Alaska defensive buildup, the Army established Fort Richardson. Homesteading ceased, and the new settlers were forced to move elsewhere. Several major land acquisitions expanded Fort Richardson's boundaries up until 1949. Subsistence and other traditional activities on the installation's boundaries were severely restricted. The Dene continued traditional use of what are now JBER lands through 1946 at *Nutl'eghghulk'et'*—the Eklutna Vocational School fish camp located on the shore of Knik Arm roughly 3.5 miles north of ERF-IA—and later. Up until the 1960s some Upper Cook Inlet Dene still used the coastal areas of military lands for fish camps and hunting. Elders report using the school fish camp location as a hunting camp up until 1969 (Davis and the Dena'ina Team 1994).

During World War II, Fort Richardson was a center of command for Alaska's defense. The installation played a critical logistics role in repelling the Japanese invasion of the Aleutian Islands, the U.S.–Russian Lend-Lease program, and bombing missions against the Japanese Kurile Islands (NPS 1997; USAF 2023d). During the war, the project area was used for live-fire training into ERF-IA. Since at least 1944, and possibly as early as 1940, ERF-IA was used for range practice by coastal artillery and other large caliber arms engaged in Fort Richardson's defense. Training maneuvers were held in surrounding lands (Gaines 2017). To defend against Japanese attack, defensive sites such as foxholes, bunkers, and firing points were built on high points near the project area that overlook Knik Arm (USAF 2023d).

ERF-IA and adjacent training areas were then used more or less continually for Army training exercises throughout the Cold War and into the modern period. This includes small arms training, large arms training, aerial gunnery, training villages, mock sites, troop and vehicle maneuvers, and large-scale operations (Bacon et al. 1986; Denfield 1994; Waddell 2003; Archibald et al. 2010a, 2010b, 2010c; Smith et al. 2010; Gaines 2017; Prior et al. 2017). See Section 1.3 for further details on JBER RTA and ERF-IA history.

Cultural Resources and Historic Properties in the Area of Potential Effect/Region of Influence

Based on the cultural and historical context, several types of cultural resource types could be expected within the APE: (1) sites of Dene traditional cultural importance; (2) archaeological sites—prehistoric or historic archaeological sites, or more recent World War II defense-related sites and later training features; and (3) architectural resources related to the Cold War, World War II, or the historic period.

Several previous studies and cultural resource surveys that focused on identifying and evaluating cultural resources on JBER lands have included portions of the APE. These have included both ethnographic studies performed to identify Dene sites of traditional religious and cultural importance (Davis and the Dena'ina Team 1994; Fall et al. 2003; Stone 2008a, 2008b; Kari and Fall 2016) and systematic surveys focused on identifying and evaluating historic and prehistoric archaeological sites (Steele 1980; Hedman et al. 2003; Robertson et al. 2004; Smith et al. 2018; Blanchard 2019; Blanchard et al. 2021). Cultural resource sites identified by these studies were registered with the Alaska Heritage Resource Survey, which is the statewide database of cultural resources maintained by the State of Alaska Department of Natural Resources, Office of History and Archaeology (ADNR OHA 2023), as well as with JBER's 673d CES/Installation Management Flight, Conservation Element cultural resources manager. Table 3.10-1 lists archaeological sites in ERF-IA, and Table 3.10-2 lists sites in the proposed expansion area. Several sites are located on the upland areas adjacent to and surrounding the APE. To ensure adequate consideration of all potentially affected cultural resources, sites within 500 meters of the APE were identified and are listed in Table 3.10-3.

There are some limitations to the data used for this analysis. Due to safety concerns from UXO, it is Army policy not to conduct archaeological surveys of active live-fire impact areas such as ERF-IA. Therefore, not all of the APE has been subjected to historic property identification specified by 36 CFR § 800.4. Complicating the matter, in alluvial contexts such as ERF, archaeological remains can be deeply buried, thereby hindering identification by standard survey techniques (Waters 1992; Dilley 1996). At the same time, creek mouths on Cook Inlet are considered high-probability locations for archaeological remains and sites of traditional importance (Steele 1980; Dilley 1996; Hedman et al. 2003; Robertson et al. 2004). No future survey or evaluation work will be conducted in ERF-IA due to its status as an active impact area and associated UXO concerns.

Sites of Traditional Dene Cultural Importance

In accordance with EO 13175, EO 13007, DoDI 4710.02, DAFI 90-2002, and AFMAN 32-7003, the Air Force consulted with federally recognized Alaska Native Tribes, Alaska Native Claims Settlement Act (ANCSA) corporations, and Tribal government entities on a government-to-government basis. These include the Native Village of Eklutna, Knik Tribe, the Native Village of Tyonek, Chickaloon Village Traditional Council, Cook Inlet Region, Inc., and Eklutna Inc. (Appendix B). The Air Force also conducted consultation with the same Alaska Native entities as required under Section 106 of the NHPA and its implementing regulations (36 CFR § 800.2[c][2]), and NEPA (Appendix B).

The cultural resource surveys, ethnographic reports, and historical accounts detailed in the preceding section verify traditional historical Dene use of ERF-IA to harvest and process fish and marine resources and establish seasonal camps, as well as use of Eagle River as a travel corridor from Knik Arm to upland areas for land mammal hunting. The available data demonstrate that Eagle River and ERF were important to the Dene and have historically been the location for traditional subsistence activities. In the absence of systematic field surveys, however, no physical remains from Dene activity have been identified in ERF-IA. Nor have there been any sacred sites or Traditional Cultural Properties identified within the APE. Site ANC-02606 in the proposed expansion area was proposed as a traditional Dena'ina *Qeshqa* (chief's house) site at the time of discovery (Stone 2008a). A recent study in 2019 (Blanchard 2019) failed to identify the presence of the reported *Qeshqa* house, but the site was relocated in 2021 (Blanchard et al. 2021) and most of the features were confirmed. Additionally, ERF-IA contains site ANC-04565, which includes a house pit that appears to date from the Late Dena'ina period, and site ANC-04564, identified as a Dena'ina house pit that dates to between AD 1726 and 1813 (224–140 cal BP). In addition to material evidence such as this site, historical, linguistic, and ethnographic evidence indicates that ERF-IA contains locations of historical Dene importance.

Archaeological Sites

Two historic archaeological sites—ANC-00264 and ANC-00265—have been identified in ERF-IA (Table 3.10-1). Both consist of log cabin remains from the historical or homesteading period. Both have been evaluated and found not eligible for listing on the NRHP (USAF 2023d).

Table 3.10-1 Archaeological Sites in the Area of Potential Effect for Existing ERF-IA

AHRS No.	Site Name	Description	NRHP Eligibility
ANC-00264	Cabin #2 Ruins	Log cabin remains	Not Eligible
ANC-00265	Cabin #3 Ruins	Log cabin remains	Not Eligible

Key: AHRS = Alaska Heritage Resource Survey; ERF-IA = Eagle River Flats Impact Area; NRHP = National Register of Historic Places
Sources: ADNR OHA 2023; USAF 2023d

Six archaeological sites are located within the proposed expansion area (Table 3.10-2): ANC-02602, ANC-02603, ANC-2606, ANC-04563, ANC-04654, and ANC-04565. Three sites (ANC-2606, ANC-04564, and ANC-04565) were identified in 2021 and evaluated as being individually eligible for the NRHP as well as contributing resources to a NRHP-eligible archaeological district (ANC-04610). Site ANC-02602 was found not eligible for listing on the NRHP. Site ANC-02603 was evaluated as individually eligible for the NRHP, and site ANC-04563 was related to military activities and was not evaluated for the NRHP. Additional resources within 500 meters of the area of potential effects are listed in Table 3.10-3.

Table 3.10-2 Archaeological Sites in the Proposed Expansion Area

AHRS No.	Site Name	Description	NRHP Eligibility
ANC-02602	Bear Kill Caches	Ammo can scatter, six reported possible cache pits	Not Eligible (non-contributing)
ANC-02603	Log Cabin	Cabin remains and possible housepit	Determined Eligible
ANC-04563	ANC-04563	10 fighting positions along a bluff with round depressions, foxholes, cans, foil, and shrapnel	Not Evaluated
The following three sites contribute to Archaeological District ANC-04610			
ANC-02606	MK-19 *Qeshqa*	Depressions, downed target drone	Determined Eligible
ANC-04564	ANC-04564	Multi-room structure with bermed walls	Determined Eligible
ANC-04565	ANC-04565	Single-room structure with high bermed walls	Determined Eligible

Key: AHRS = Alaska Heritage Resource Survey; NRHP = National Register of Historic Places
Sources: ADNR OHA 2023; USAF 2023d

Table 3.10-3 Archaeological Sites within 500 Meters of Area of Potential Effect

AHRS No.	Site Name	Description	NRHP Eligibility
ANC-01167/ANC-04525	Folberg Homestead/Mannick Cabin remains	Homestead site/Log cabin remains	ANC-01167 – Determined Eligible ANC-04525 – Not Eligible (cabin moved to cantonment)
ANC-02598	Cole House	Structure/shelter with doorway, smokehole, hearth with hearthstones, and a fire stirring stick leaning by the doorway	Not Evaluated
ANC-02599	Otter Creek	Military Training Features	Determined Eligible
ANC-02600	Hunter’s Cache	Possible cache pit/bear den	Not Eligible
ANC-02601	5 House Hill	Five possible housepit depressions	Not Evaluated
ANC-02604	Far Point	Two possible housepit depressions	Not Evaluated
ANC-02605	NW Gwenn Caches	Three possible cache pits	Not Evaluated
ANC-04418	Kulin Homestead	Historic artifacts, pit features, concrete	Determined Eligible
ANC-04496	ANC-04496	Subterranean cellar and associated activity areas	Not Eligible

Key: AHRS = Alaska Heritage Resource Survey; NRHP = National Register of Historic Places
Sources: ADNR OHA 2023; USAF 2023d

Architectural Resources

There are no NRHP-eligible architectural resources in the APE.

The nearest historic architectural resource to the APE is the NRHP-listed Fort Richardson National Cemetery (ANC-00013), located on the north side of the Davis Highway roughly 2 miles southeast of ERF-IA. It is outside the area of potential physical damage, destruction, or change in character of property’s use, as well as outside the area of introduction or modification of visual, auditory, and atmospheric elements from the proposed action. The cemetery is outside the existing 57 dB CDNL noise contour (Figure 3.1-3) but within the existing 115 dB peak noise contour (Figure 10 in Appendix C) for live-fire training at ERF-IA, and within the 87 dB contour, but outside the 104 dB peak noise contour for small arms use from the AICUZ ranges (Figure 3.1-2). There would be no change in the cemetery’s auditory environment from the proposed action; therefore, the cemetery was not included in the APE and is not considered further in this EIS.

Because there are no historic architectural resources inside the APE/ROI, the project would have no impact on these resources and they are not discussed further in this EIS.

Subsistence

No locations in ERF-IA are currently used for subsistence, and the area has been restricted from traditional activities and subsistence use since the establishment of Fort Richardson. However, under the North Anchorage Land Use Agreement, Eklutna Inc. is not precluded from conducting future subsistence activities should the federal government ever declare JBER lands excess to military requirements. Subsistence activities such as berry picking and harvesting traditional plant resources are allowed on JBER in other locations.

JBER is within the traditional territory of the Dene, who occupied the area and harvested resources. The Native Village of Eklutna, located approximately 10 miles north of JBER, is the nearest of the Upper Cook Inlet Tribes to JBER.

Typically, the harvesting of subsistence resources in Alaska follows a seasonal round, or a cyclical schedule of activities that is based on weather, ground conditions, and timing of species' movements.

Marine mammals used as subsistence resources use habitat in Knik Arm adjacent to JBER in Eagle Bay and Eagle River. The Cook Inlet beluga whale, which has been recorded in and near ERF-IA, was harvested as a subsistence resource by the Dene until 1999, when the decline of the Cook Inlet stock resulted in a voluntary suspension of the subsistence hunt by Alaska Natives (Mahoney and Shelden 2000). In 2000, NMFS issued a rule designating the Cook Inlet beluga whale as depleted under the MMPA, triggering regulation of the subsistence harvest. In 2008, the Final Subsistence Harvest Regulations (73 FR 60976) were issued, implementing a long-term plan to manage subsistence harvests of Cook Inlet beluga whales, from 2008 to recovery. Cook Inlet beluga whale were listed as endangered in 2011, and NMFS will not authorize a subsistence hunt if it is determined that the activity is likely to jeopardize the continued existence of the species (NMFS 2016b). Although subsistence harvest of Cook Inlet beluga whales is currently prohibited, Alaska Native groups are interested in resuming subsistence harvest of this species in the future (Steven R. Braund & Associates 2011). It is unknown at this time when the population could recover to levels that would allow subsistence harvest to resume. The recovery plan for this species (NMFS 2016b) noted that recovery could take up to two generations (50 years).

The Steller sea lion, which is currently listed as endangered, is another marine mammal that is harvested for subsistence use in Upper Cook Inlet. Steller sea lions rarely occur in ERF-IA or Knik Arm (Appendix D). Between 1992 and 2008 (the most recent data available), 26 Steller sea lions were reported as harvested for subsistence use in the Upper Kenai–Cook Inlet area, with only four harvested after 1995 (ADF&G and Alaska Native Harbor Seal Commission 2009). Residents from the Chickaloon Native Village have historically harvested Steller sea lions. Residents of Tyonek hunt Steller sea lions as opportunity allows.

Between 1992 and 2008, 947 harbor seal were estimated as being taken for subsistence use in the Upper Kenai–Cook Inlet area (much of which is outside the ROI for subsistence), with somewhat reduced annual harvests in recent years (ADF&G and Alaska Native Harbor Seal Commission 2009). Based on 2013 data from ADF&G, harbor seal are harvested by Tyonek and Chickaloon residents. There are no data to indicate that Upper Cook Inlet is an important harbor seal hunting area.

Although there are several subsistence salmon fisheries in Upper Cook Inlet and Knik Arm, subsistence harvest of fish does not occur on JBER at present. According to ethnographic and archaeological data, Upper Cook Inlet Dene harvested all five species of salmon, eulachon, stickleback, and saffron cod in the area.

Subsistence harvest data for communities of Upper Cook Inlet for Tyonek and Chickaloon were reviewed in the Community Subsistence Information System, a database maintained by ADF&G. There is no summary information available from this source for Eklutna or Knik (ADF&G 2022d). The 2013 data for Tyonek (the most recent year for which Community Subsistence Information System data are available) reports that Tyonek harvested an estimated 24,248 pounds of subsistence resources, predominantly multiple salmon species (i.e., Chinook, pink, coho), herring, cod, and Pacific halibut (*Hippoglossus stenolepis*). Tyonek harvested an estimated 16,765 pounds of salmon and 1,863 pounds of non-salmon fish. Marine mammals harvested included a harbor seal. Terrestrial wildlife harvested in Tyonek in 2013 included moose (3,471 pounds), birds and eggs (166 pounds), and small land mammals, including beaver (77 pounds) and porcupine (52 pounds).

More recent (2018) subsistence salmon harvest data were obtained from the salmon fisheries in the Tyonek Subdistrict in Upper Cook Inlet (Jones and Fall 2020). The 2018 estimated harvest of 1,649 salmon was lower than the 2017 harvest of 2,089 salmon and the historical (1980 to 2018) average of 1,825 salmon. Of the total estimated subsistence salmon harvest in 2018, 1,308 were Chinook salmon (79 percent), 188 were sockeye salmon (11 percent), 136 were coho salmon (8 percent), 10 were chum salmon (1 percent), and 7 were pink salmon (1 percent) (Jones and Fall 2020). Due to a low preseason Chinook salmon forecast for the 2019 season, the Tyonek subsistence fisheries were restricted by emergency order from 3 days per week to 2 days per week (Jones and Fall 2020). Chickaloon also harvests salmon as a primary resource.

3.10.2 Environmental Consequences

Analysis of potential impacts to cultural resources and historic properties considers impacts that may occur by physically altering, damaging, or destroying all or part of a resource; altering characteristics of the surrounding environment that contribute to the resource's significance; introducing visual, atmospheric, or audible elements that are out of character with the property or diminish the integrity of the property's significant historic features or alter its setting; or neglecting the resource to the extent that it deteriorates or is destroyed. To evaluate impacts, historic properties are subject to the criteria of adverse effect specified for the Section 106 process (36 CFR § 800.5[a]).

In addition to those impacts considered and resolved within the Section 106 process, NEPA requires consideration of impacts to cultural resources that are not eligible for the NRHP. A number of cultural resources located in ERF-IA that are not eligible for the NRHP may be impacted by the project. Effects to cultural resources not eligible for the NRHP would likely not be significant due to their lack of historical significance.

An adverse impact occurs when the integrity of a resource is diminished by an action. Under Section 106, Agreement Documents (MOA or PA) are developed to resolve adverse effects through mitigation.

A significant impact to cultural resources would occur if one or more of the following were to occur:

- Adverse impacts on a historic property listed or eligible for listing on the NRHP that results in the irretrievable loss of a historic property
- Creation of conditions that would stop the use of traditional use areas or sacred or ceremonial sites or resources, in the absence of Section 106 consultation or contrary to the stipulations of a Section 106 Agreement Document
- Prevention of access to traditional use areas or sacred or ceremonial sites or resources due to human health and safety considerations
- Violation of compliance with Native American Graves Protection and Repatriation Act or irretrievable or irreversible damage to burials (particularly unmarked or poorly marked cemeteries)

Analysis of potential impacts to subsistence considers impacts to the ways in which ERF-IA and surrounding areas are used for subsistence by the Dene. Additionally, impacts to subsistence resources that use ERF-IA intermittently (e.g., marine mammals, waterfowl, and fish) could affect individuals and stocks that are harvested in the region but outside of ERF-IA.

Impacts to subsistence resources would be considered significant if an alternative resulted in substantial changes to subsistence resources or practices that reduce the availability of subsistence resources for harvest (fish, waterfowl, mammals), reduced access to harvest areas, or impeded recovery of the Cook Inlet beluga whale population to the point that subsistence harvest for that species cannot resume in the future.

3.10.2.1 Methodology

Cultural Resources

Consistent with AFMAN 32-7003, the analysis of potential impacts on cultural resources that are eligible for, listed in, or not yet evaluated for the NRHP considered both direct and indirect impacts. Impacts were assessed qualitatively by determining the known and potential locations of cultural resources in the APE and considering proposed activities that could affect cultural resources in these areas through direct impacts to the resource or its surrounding environment, or indirect visual, atmospheric, or audible effects.

Consistent with Section 106 of the NHPA, NEPA, EO 13175, DoD Instruction 4710.02, and DAFI 90-2002, the Air Force consulted with the Native Village of Eklutna, the Knik Tribal Council, the Native Village of Tyonek, Chickaloon Village Traditional Council, Cook Inlet Region, Inc., and Eklutna Inc. to receive input on potential impacts to cultural resources in addition to measures to avoid, minimize impacts to, and mitigate for impacts (Appendix B). Impacts were analyzed based on several assumptions. Cultural resources present in the APE/ROI that have not been evaluated are assumed eligible for the NRHP. No further archaeological survey or evaluation or field investigation will be performed in the active, live-fire ERF-IA due to Army policy and UXO risks to human health and safety.

Subsistence

Because subsistence data in the ROI are limited, the subsistence harvest data from Tyonek and Chickaloon were used to identify the types of wildlife that have been historically harvested for subsistence use in the region. The analysis of impacts to subsistence incorporates conclusions presented in discussions of impacts to fish, terrestrial mammals, and marine mammals (Sections 3.8.2.2, 3.8.2.3, and 3.8.2.4) and considers the past and current level of subsistence use that would be impacted, the extent to which opportunities to harvest and experiences are altered, and the ability of subsistence users to use alternative areas with similar harvest opportunities and experiences. While there is a lack of data on subsistence harvest of avian species, the analysis considers potential impacts to waterfowl and associated impacts to subsistence use. The location and season of construction and live-fire training, as well as potential changes to subsistence use areas, were also considered.

3.10.2.2 Alternative 1: All-Season Live-Fire Training with Expanded Impact Area

Cultural Resources

Under Alternative 1, there would be a potential for long-term adverse impacts to cultural resources associated with live-fire training in the proposed expansion area. Although the sites have the potential to be physically destroyed by firing, planned mitigation would reduce the potential for impacts that would otherwise potentially exceed significance thresholds. Impacts would be greatest under Alternative 1 because it is the only alternative that would include expansion of the impact area into upland areas where NRHP-eligible resources are present.

Construction and Infrastructure

During construction of the proposed expansion area, all vegetation clearing, soil disturbance, and placement of gravel associated with expanding the impact area would occur outside the identified vegetation buffer within which the archaeological sites (ANC-02602, ANC-02603, ANC-02606, ANC-04563, ANC-04564, and ANC-04565) documented in Table 3.10-2 are located. The planned project roads, pads, and firebreaks were designed to avoid encroaching on the boundaries of these archaeological sites during construction, thereby preventing physical damage that may affect site integrity. Clearing limits would be clearly marked to avoid inadvertent impacts to these sites, consistent with the ICRMP (USAF 2023d). Thinning within the vegetation buffer could occur in the vicinity of the archaeological sites. This activity has the potential to adversely impact sites ANC-02603, ANC-02606, ANC-04564, and ANC-04565. A site protection measure in the PA (Section 3.10.2.5) would prohibit thinning within 200 feet of eligible historic properties to avoid adverse effects. Additionally, forest thinning within the cultural resource buffer would require monitoring by an archaeologist to avoid damage to NRHP-eligible archaeological resources.

Periodic prescribed burning of the expansion area would have no adverse impact on cultural resources, because the sites in this area are archaeological in nature. No subsurface digging with the potential to impact cultural resources would occur as a part of prescribed burns.

Firing and Training Exercises

While no targets would be placed in the vegetation buffer where the archaeological sites are located, shrapnel from detonating HE rounds could travel outside of the target areas and potentially strike cultural resources thus damaging their historic integrity and/or diminishing their potential traditional cultural importance to Alaska Native peoples.

Live-fire training during the summer months when sediments are unfrozen could impact known or unknown archaeological site or sites of traditional cultural importance in ERF-IA. Physical damage from munitions could have permanent adverse effects on integrity, NRHP eligibility, or aspects of cultural importance. No NRHP-eligible resources have been documented in this area, no Traditional Cultural Properties have been reported, and there are no known specific locations of traditional cultural importance in ERF-IA. However, archaeological models indicate that creek mouths on the Cook Inlet are high-probability locations for archaeological remains and sites of traditional importance (Dilley 1996), underscoring the potential for significant cultural resources in ERF despite the lack of systematic survey of the impact area. The 500-meter buffer along Eagle Bay would continue to provide some protection for any undiscovered cultural resources situated in high-probability areas at the mouth of Eagle River and Garner Creek. Additionally, the mitigation strategies identified in a Section 106 PA developed for the project (see Section 3.10.2.5) would offset adverse impacts to previously identified and unidentified cultural resources. The mitigation measures would include additional identification efforts, monitoring, systematic subsurface testing, and data recovery. These measures are designed to minimize and mitigate the impacts from project operations.

Beneficial impacts to cultural resources within ERF-IA or the proposed expansion area would occur, as these areas would remain off-limits to the public and unauthorized personnel, thereby protecting the sites from looting or vandalism.

Alternative 1 would have no adverse impacts to historic architectural resources. As detailed in Section 3.10.1.3, all historic architectural resources at JBER are located outside the APE/ROI for cultural resource impacts.

Subsistence

Because ERF-IA is currently restricted from traditional activities and subsistence use, proposed live-fire training would not directly impact subsistence under Alternative 1. However, impacts to fish, terrestrial wildlife (including waterfowl), and marine mammals that are subsistence resources could impact subsistence uses in the ROI outside ERF-IA. Under Alternative 1, potential impacts to subsistence resources could occur as a result of all-season training at ERF-IA during periods when these subsistence resources are likely to be present. With mitigation measures for fish, terrestrial wildlife, and marine mammals in place, impacts to subsistence would not exceed significance thresholds.

Construction and Infrastructure

Expanding the impact area under Alternative 1 would have a low risk of adversely impacting subsistence resources. Similar habitats are available nearby, and terrestrial wildlife that use these habitats are common in the larger region. As discussed in Section 3.8.2.2, the potential for sedimentation into Eagle River or ERF from clearing and construction areas is very low, and it is not expected to alter fish habitat to the extent that subsistence would be affected.

Firing and Training Exercises

Fish, particularly salmon, make up a large portion of the annual subsistence harvest for the Dene. As discussed in Section 3.8.1.3, ERF-IA provides habitat for juvenile and adult salmon and other fish species. Salmon are found in Eagle River and Otter Creek, as well as in tidal marsh complexes. Fish may also be found in ponded flats and wetland areas in ERF, including those outside of proposed protective buffers. Based on the analysis in Section 3.8.2.2, Alternative 1 may have long-term adverse impacts on fish resources in Eagle River and Otter Creek, as there is potential for mortality, injury, and behavioral effects of fish through exposure to underwater noise, munitions strikes, alteration of habitat in unbuffered areas, and exposure to munitions residues. Although mitigation measures would reduce the degree of impact, fish populations could still be adversely impacted at the watershed scale.

There are no communities that currently utilize or depend on Eagle River or Otter Creek for subsistence use. The Eagle River watershed (which includes Otter Creek) is one of many watersheds that contribute to regional salmon populations that are regularly utilized for subsistence. As detailed in Table 3-7 of Appendix E, the recent salmon escapement monitoring data available for tributaries of Knik Arm, Eagle River (including Otter Creek) contributed 4.6 percent of total salmon escapement for the year span of 2010 to 2022. Given its relatively small contribution to regional fish stocks, impacts to fish in Eagle River and Otter Creek are not expected to result in significant adverse impacts to subsistence resources for the communities of Cook Inlet. Mitigation to continue salmon enumeration studies (Section 3.8.2.2), which was determined as a result of the analysis for fish resources, could allow JBER to better understand impacts to salmon populations from all-season live-fire training and potentially identify additional measures to reduce observed effects. Alternative 1 is not likely to adversely impact the abundance of, availability of, or access to fish harvested for subsistence uses, as subsistence harvesting does not happen in ERF.

Based on the analysis in Section 3.8.2.3, noise from live-fire training may affect terrestrial wildlife, including species harvested for subsistence, to varying degrees, but many species would be able to habituate or avoid the area during training events. Under this alternative, training at ERF-IA would increase in frequency, include use of louder 155-mm rounds, and occur outside the winter ice season during periods when breeding or migrating waterfowl may be present at ERF. While subsistence harvest does not occur at ERF, waterfowl that use ERF are likely to also use areas outside of ERF-IA. During training events, waterfowl may temporarily move to areas away from detonation sites or leave ERF entirely, potentially to areas where subsistence harvest occurs. While noise disturbance can cause behavioral changes that have the potential to lead to nest abandonment, planned mitigation (Section 3.8.2.3) to visually clear areas around targets and avoid harassment of wildlife would reduce the risk of population-level effects and associated reduced availability of subsistence resources in the region. As discussed in Section 3.8.2.3, residues from munitions are unlikely to be present in ERF in levels that would be toxic to wildlife, and WP munitions are no longer fired into ERF. The mitigation in Section 3.8.2.3 includes measures to prevent discharge of WP from gravel-capped areas during firing outside the winter ice season, such as not placing targets on gravel-capped areas during off-ice conditions and not using delay fuzes to minimize ground penetration. These measures would prevent exposure of waterfowl to WP at ERF. Impacts under Alternative 1 are expected to be minor modifications to behavior that would not adversely impact the abundance of, availability of, or access to terrestrial species harvested for subsistence uses.

Based on the analysis in Section 3.8.2.4, Alternative 1 would have the potential to affect marine mammals through noise disturbance from live-fire training, strikes from munitions fragments, habitat alteration (impacts to prey), and potential bioaccumulation of munitions constituents from live-fire training. However, mitigation identified for marine mammals (Section 3.8.2.4) would avoid noise exposures and minimize the risks of fragment strikes to a negligible level.

Live-fire training under Alternative 1 could potentially affect marine mammal prey (fish) that heavily utilize Eagle River and/or Otter Creek but is not expected to result in a noticeable reduction in availability of marine mammal species that may be regionally utilized for subsistence (such as harbor seal). Additionally, mitigation to continue salmon enumeration studies (see Section 3.8.2.2, *Mitigation*) would allow JBER to obtain a better understanding of impacts to fish from all-season live-fire training and potentially identify additional measures to reduce observed effects.

Airborne noise from live-fire training would extend beyond ERF-IA and may be audible to hauled-out seals and sea lions along the shores of Knik Arm or adjacent portions of Cook Inlet. As described in Section 3.8.2.4, exposure to this airborne noise may result in temporary behavioral effects to hauled-out seals and sea lions, such as alerting or returning to the water; however, NMFS has determined that such behavioral effects would not rise to the level of take under the MMPA. There are no data indicating that Upper Cook Inlet is an important hunting area for harbor seal, so there is a low risk of live-fire training occurring at the same time as subsistence harvest in these areas, and behavioral impacts from airborne noise are not expected to significantly impact subsistence use of these species.

With mitigation (built-in protective measures, BMPs, SOPs, and mitigation determined as a result of the analysis) in place, Alternative 1 could result in temporary disturbances to small numbers of marine mammals, but impacts are expected to be minor modifications to behavior for a limited number of individuals. Because it is not anticipated that Alternative 1 would adversely impact the availability of marine mammal species for subsistence uses; impacts to subsistence use of marine mammals are expected to be less than significant.

3.10.2.3 Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only

Cultural Resources

Under Alternative 2, impacts to cultural resources would be less than under Alternative 1 because the impact area would not be expanded. Associated potential impacts to the six archaeological sites (ANC-02602, ANC-02603, ANC-02606, ANC-04563, ANC-04564, and ANC-04565) located in this area from tree thinning, prescribed fire, and live-fire training would not occur. Of these six archaeological sites, three sites (ANC-2606, ANC-04564, and ANC-04565) were identified in 2021 and evaluated as being individually eligible for the NRHP as well as contributing resources to an NRHP-eligible archaeological district (ANC-04610). Potential adverse impacts to important unidentified archaeological sites or locations of traditional cultural importance in ERF-IA from live-fire training during the summer months would be similar to those described for Alternative 1. However, risks would be slightly higher, as there could be a greater concentration of rounds fired in the existing ERF-IA under Alternative 2 if all live-fire training occurs at JBER.

Potential adverse impacts would be offset by the mitigation identified in the PA developed for the project, which is discussed further in Section 3.10.2.5 and Appendix I.

Subsistence

Under Alternative 2, potential project impacts on fish and terrestrial wildlife (including waterfowl) harvested for subsistence would be similar to those described for Alternative 1, except that there would be no proposed expansion area, and all live-fire training would target the existing ERF-IA. Impacts to fish, marine mammals, and terrestrial wildlife that use ERF-IA would have the potential to be greater than those under Alternative 1 if all training is done at JBER during the year. However, with mitigation measures in place, impacts would not exceed significance thresholds.

3.10.2.4 No Action Alternative

Cultural Resources

Under the No Action Alternative, potential impacts to cultural resources within ERF-IA would not differ from those under current use. Beneficial impacts would continue to occur to archaeological sites or sites of traditional cultural importance within ERF-IA, as this area would remain off-limits to the public and unauthorized personnel, thereby protecting sites from looting or vandalism. Units stationed at JBER would continue to deploy to other Army training lands in Alaska to conduct a portion of their annual training. Transporting these units via highway would not have the potential to affect cultural resources.

Subsistence

Overall impacts to subsistence under the No Action Alternative would be lower than under Alternative 1 and Alternative 2 and would not differ from those under current use. No construction and associated loss or alteration of habitat for terrestrial wildlife would occur. Winter-only firing restrictions would remain in place, and live-fire training would not occur during migration periods for adult salmonids. Seasonal restrictions would continue to limit the potential for impacts to marine mammals, as all live-fire training would occur during the winter months, when Eagle River is frozen and marine mammals cannot access ERF-IA.

3.10.2.5 Mitigation

Cultural Resources

Protective measures built into the proposed action include a 500-meter buffer along Eagle Bay that would continue to provide some protection for undiscovered cultural resources that may occur at the mouth of Eagle River and Garner Creek. Standard cultural resources BMPs detailed in JBER's ICRMP (USAF 2023d) would be implemented under all alternatives and would help minimize, avoid, and mitigate potential impacts to cultural resources from the proposed action. The SRA program would continue to educate soldiers and ensure operations and activities within the impact area are carried out in a sustainable manner to preserve cultural resources. During construction in the expansion area, these BMPs would include marking the clearing limits to avoid inadvertent impacts to archaeological sites and monitoring by an archaeologist during forest thinning within the cultural resource buffer to avoid damage to sites. Additionally, an SOP would require the Army to cease fire and conduct an investigation for any round that impacts outside the target area or is not observed impacting.

Mitigation based on an analysis of potential impacts to cultural resource were developed in consultation with Alaska Native Tribes, the Advisory Council on Historic Preservation, Alaska SHPO, and Municipality of Anchorage Historic Preservation Commission. These mitigation measures are detailed in the *Programmatic Agreement (PA) Among 673d Air Base Wing, 11 Airborne Division, and the Alaska State Historic Preservation Officer Regarding Proposal for Mortar and Artillery Training at Richardson Training Area, Joint Base Elmendorf-Richardson, Alaska* (Appendix I) and were designed to offset adverse impacts to cultural resources from the proposed action. Correspondence related to the PA is in Appendix J.

Mitigation measures agreed to in the signed PA would be implemented:

- If previous surveys of the proposed expansion are more than 10 years old, complete a new survey to evaluate NRHP eligibility of cultural resources present prior to construction (Alternative 1 only).
- Implement protective measures to prevent impacts to eligible historic properties in the proposed expansion area, including vegetation buffers at least 200 feet around affected properties, placement of barriers along the vegetation buffer, prohibiting training and maintenance activities within 200 feet of properties, and monitoring of site conditions annually (Alternative 1 only).
- Prepare a data recovery plan that includes excavation and systematic subsurface testing to identify stratified features and activity areas at the four NRHP-eligible archaeological sites in the proposed expansion area and implement the plan prior to construction (Alternative 1 only).
- Implement the Inadvertent Discovery, Unanticipated Effects, and Discovery of Human Remains protocols, as described further in the PA.

Subsistence

For all four types of mitigation measures (built-in protective measures, BMPs/SOPs, mitigation determined as a result of the analysis, and additional mitigation being considered), the measures discussed in Sections 3.8.2.2, 3.8.2.3, and 3.8.2.4 for fish, terrestrial wildlife (including waterfowl), and marine mammals would reduce potential effects to subsistence resources and uses. No additional mitigation measures have been identified specifically for subsistence.

3.11 LAND USE AND RECREATION

3.11.1 Affected Environment

3.11.1.1 Resource Definition

The term "land use" refers to real property classifications that indicate either natural conditions or development on a parcel of land. In many cases, land use descriptions are codified in local zoning laws. State and local governing bodies have jurisdiction over land use within their jurisdictional boundaries. On

JBER, the Air Force is responsible for managing installation lands. The Air Force uses 13 general land use categories for on-installation planning purposes and follows a comprehensive planning process that divides the installation into identifiable planning districts based on geographical features, land use patterns, building types, and/or transportation networks (USAF 2015).

Recreational resources provide outdoor recreational opportunities and enhance and encourage well-being. These resources include public and community facilities, natural areas, and associated improvements such as picnic areas, campgrounds, historical and educational sites, and trails that are designated for public outdoor recreational use. Recreational access is important to Alaskans, who are accustomed to a vast amount of public land available for recreational interests. Common recreational activities in Alaska include fishing, hunting, camping, wildlife viewing, horseback riding, photography, hiking, off-roading, boating, and a variety of winter sports. Recreational access on military lands by DoD personnel and the public depends on compatibility with military readiness and security.

The ROI for land use is the entirety of JBER and off-installation communities in the immediate vicinity of JBER that occur within JBER's noise contours associated with range operations, specifically the area in which the Air Force seeks compatible development with local communities (see Section 3.1). The ROI for recreation is the entirety of JBER and adjacent areas within the project large arms noise contours, including Knik Arm.

3.11.1.2 Regulatory Setting

Surrounding Land Use

Alaska Statute 29.40, Planning, Platting, and Land Use Regulation, requires that home rule (the authority of a constituent part of a U.S. state to exercise powers of governance delegated to it by its state government) first- and second-class boroughs, unified municipalities, and first-class and home rule cities outside of boroughs provide planning, platting, and land use regulation. Lands surrounding JBER are in the jurisdictions of the Municipality of Anchorage and the Matanuska–Susitna Borough.

The Municipality of Anchorage's Assembly carries out the legislative functions for the municipality, while the executive power is entrusted to the mayor. Community Councils serve in an advisory role to the Assembly in local government processes. The Planning and Zoning Commission prepares and recommends to the Assembly policies, plans, and ordinances relating to land use planning. Land use is further managed by the Municipality of Anchorage's planning department (USAF 2019a). The most recent land use planning document is the 2040 *Land Use Plan*, which was adopted in September 2017.

The Matanuska–Susitna Borough, a second-class borough, has a Planning Commission consisting of appointed citizens that serve as an advisory group to the Assembly on issues and activities related to planning land use regulation and community development. The Planning Department leads land use planning (Matanuska–Susitna Borough 2022). Community Councils serve as a non-profit, voluntary, self-governing association of residents. They are recognized through an Assembly resolution but do not serve as a governing arm of the Borough (USAF 2019a).

In 1971, Congress passed ANCSA to settle outstanding land claims and create clear title to land and resources in Alaska. The act established 12 regional corporations and a method of conveying surface estate (land) and subsurface estate (minerals or other resources) to each of the established regional corporations. In addition to the 12 regional corporations, ANCSA created village corporations and granted them the right to land surrounding the village, subject to valid existing rights and according to Section 11 of the act. Native corporations are the largest private landowners in Alaska, with title to 44 million acres of selected land throughout the state. The ANCSA requires every corporation to be organized under Alaskan law. The four ANCSA Village Corporations within the ROI are Eklutna Inc., Chickaloon-Moose Creek Native Association, Knikatnu, Inc., and Tyonek Native Corporation. The ANCSA Regional Corporation within the ROI is Cook Inlet Region, Incorporated.

Four federally recognized Alaska Native Tribes have an interest in JBER lands: the Chickaloon Native Village, the Native Village of Eklutna, the Knik Tribe, and Native Village of Tyonek (USAF 2019a) (see Section 3.10).

A conflict arose after the State of Alaska and Eklutna Inc. selected the same parcels on JBER for allocation under ANCSA. The North Anchorage Land Agreement (NALA) was established in 1982, under the authority of the ANILCA, to resolve these land disputes and determine future ownership of military lands. NALA signatories were the State of Alaska, Municipality of Anchorage, and Eklutna Inc., which were each approved by the Commissioner of the Alaska Department of Natural Resources and the Alaska Legislature. DoD was not a signatory. The agreement resolved the conflicting claims by identifying which parcels each party to the agreement would select if the federal government ever declared JBER lands excess to military requirements. The agreement also provided for a generalized land use plan for compatible uses of JBER lands while reserved for military use. This agreement allowed for a valid Eklutna Inc. selection at any time such lands would be made available, unless Eklutna Inc. should relinquish their claim (USAF 2012).

JBER Land Use

Installation development and proposed land use actions at JBER are accomplished in accordance with the Air Force Comprehensive Planning Program established in AFI 32-1015, *Integrated Installation Planning*. AFI 32-1015 sets service requirements for the AICUZ and noise program, which is designed to promote compatible land use around military installations, and AR 200-1, *Environmental Protection and Enhancement*, implements federal laws concerning environmental noise from Army activities. As described in Section 3.1, AFH 32-7084 requires use of modeled noise contours to analyze noise levels at noise-sensitive areas.

The 2015 JBER IDP was created in accordance with AFI 32-7062, *Comprehensive Planning*, with principles from Unified Facilities Criteria 2-100-01, *Installation Master Planning*. The IDP is a comprehensive planning document that provides guidance for development decisions for 20 to 30 years. (USAF 2015). AFI 32-7062 was superseded by AFI 32-1015, *Integrated Installation Planning*, in 2019.

Recreation

The Sikes Act (16 U.S.C. § 670 et seq.), which provides for natural resource management on DoD lands, requires DoD to prepare and implement an INRMP for each installation and requires public access for recreation to be considered when it does not conflict with training or other mission requirements. Under DoDI 4715.03, *Natural Resources Conservation Program*, INRMPs must include outdoor recreation plans. AFMAN 32-7003, *Environmental Conservation*, implements these Air Force and DoD Policy Directives and explains how to manage natural resources on Air Force property to comply with state, federal, and local laws and standards for natural resource management. In addition to policies and guidance for utilizing natural resources for outdoor recreation, the Air Force also has a duty to ensure the morale, welfare, and well-being of servicemembers. Per DAFI 34-101, *Department of the Air Force Morale, Welfare and Recreation (MWR) Programs and Use Eligibility*, outdoor recreation capabilities support mission readiness through programs and facilities delivering service members and families resilience and readiness, and enhance team building, unit cohesion, and trust among service members.

At JBER, the INRMP prescribes the policies and responsibilities for management and conservation of land, water, forest, fish, wildlife, and outdoor recreation resources, as well as historical and archaeological site protection on JBER lands. The INRMP states that lands and natural resources on JBER will be managed according to several priorities, including development, management, and conservation of areas capable of providing intensive recreational use, such as winter sports areas, picnic areas, and nature trails. Such areas are maintained for their recreational value.

3.11.1.3 Existing Conditions

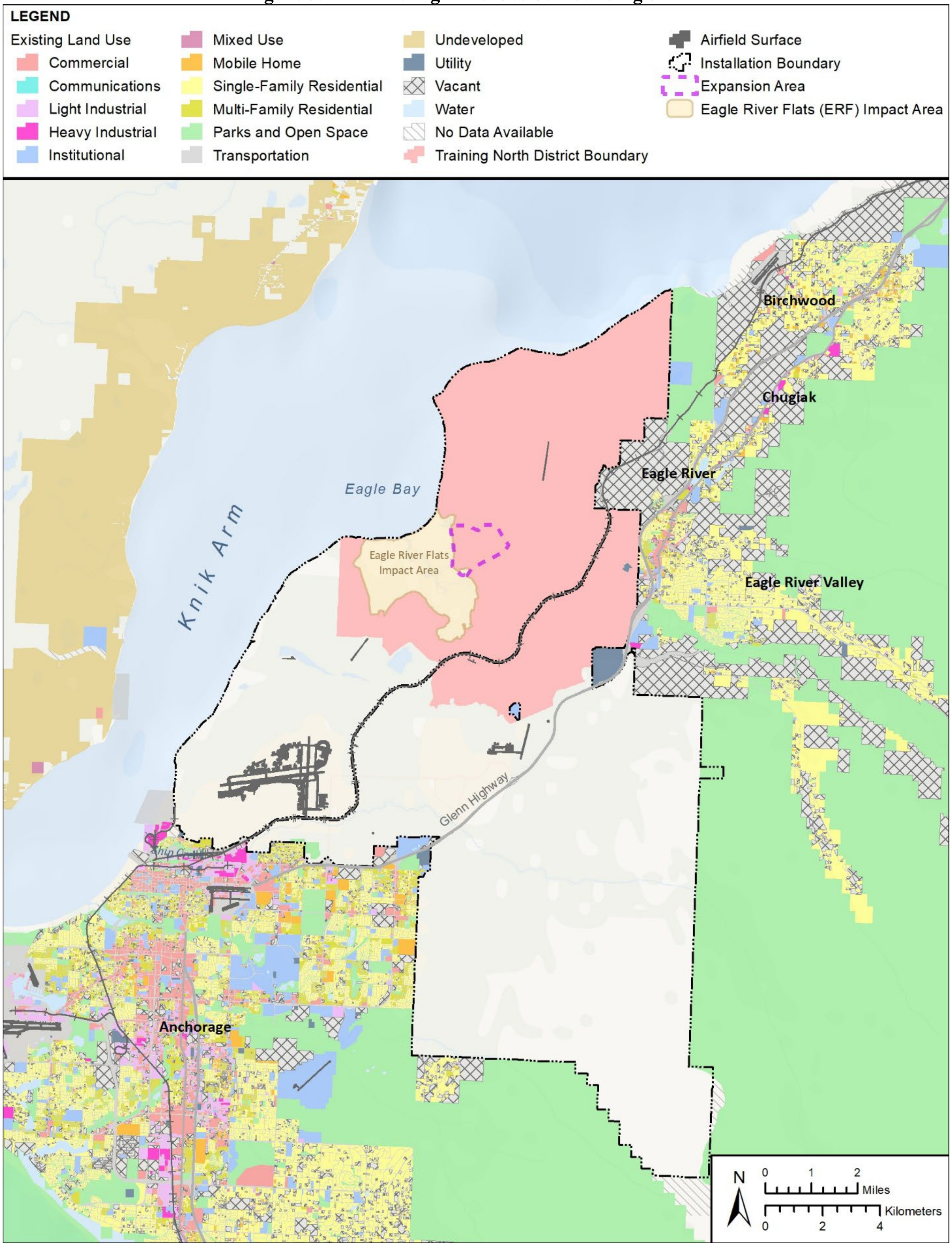
Surrounding Land Use

Existing land uses in the vicinity of JBER are shown in Figure 3.11-1, with additional information provided in Table 3.11-1.

Noise contours associated with JBER mission activities extend into the communities surrounding JBER. When noise contours exceed certain thresholds, some uses (e.g., residential land uses) are normally considered incompatible. Under the AICUZ program, JBER shares information about noise contours with surrounding jurisdictions to promote and encourage compatible development. The 2019 AICUZ Study (USAF 2019a) presents noise contours associated with JBER and provides an analysis of land use compatibility concerns within the noise contours. The composite of existing noise contours for JBER activities that extend off the installation and the underlying land use are illustrated in Figure 3.1-1 and discussed in Section 3.1. Only contours associated with large arms training would potentially change as a result of the proposed action.

In an effort to establish long-term compatibility for lands in the vicinity of military installations, the DoD has created land use compatibility recommendations (AFI 32-1015) based on the FHWA's Standard Land Use Coding Manual. For the purpose of this analysis, land use compatibility was determined using Air Force guidance and the DoD AICUZ compatibility guidelines (AFI 32-1015). Land use compatibility falls into one of four categories: (1) Compatible; (2) Compatible with Restrictions; (3) Incompatible; and (4) Incompatible with Exceptions. Conditionally compatible land uses (i.e., categories 2 and 4) may require incorporation of noise attenuation measures and further evaluation to be considered "compatible."

Figure 3.11-1 Existing Land Use Surrounding JBER



Sources: JBER 2019a, 2020a, 2023b, 2023c

Table 3.11-1 Land Uses in the Vicinity of JBER

Location	Existing Land Uses
Southwest	Transportation, Light Industrial and Heavy Industrial, a mix of Single-family and Multi-family Residential uses, Mobile Homes, Commercial, Vacant, and Institutional uses.
South	Areas of predominantly Parks and Open Space, with additional areas of Vacant land and Single-family and Multi-family uses.
Southeast and East	Chugach State Park borders the installation to the southeast. Existing land use along the eastern boundary largely consists of Parks and Open Space, with areas of Institutional, Single-family Residential, Transportation, and Vacant land. Small areas of Commercial and Light and Heavy Industrial, Mobile Homes, and Multi-family Residential land uses are also present, in addition to the railroad. Further east, there are larger areas of Institutional, Parks and Open Space, and Single-family Residential land uses continue, with pockets of Mobile Homes, Multi-family Residential, and Vacant land uses.
West	Parks and Open Space, Vacant land, Transportation (predominantly Ted Stevens Anchorage International Airport), and Single-family Residential land uses toward the western area of Anchorage, west of the railroad. Throughout this area, there are pockets of Institutional, Light Industrial, and Water land uses.
Northwest and North	Across Knik Arm and northwest of the base in the Matanuska–Susitna Borough, the existing land use is mostly Undeveloped (i.e., no buildings are present). Other land uses in the area include Single-family Residential, Institutional, and Mobile Homes in Knik–Fairview. At Point MacKenzie, other land uses include Single-family Residential, Mixed Use, Transportation, and Institutional.
Along Transportation Corridors	Commercial, Light Industrial, and Heavy Industrial are located along transportation corridors, including the railroad. Areas of Commercial and Industrial land uses continue east from the railroad, particularly along transportation thoroughfares, including Glenn Highway.

Notes: "Vacant" land refers to AICUZ (USAF 2019a) generalized codes, which were determined from land use data for the surrounding communities. Typically it refers to lands that currently contain no structures, which may be zoned for various uses by the community.

Key: AICUZ = Air Installation Compatible Use Zone; JBER = Joint Base Elmendorf-Richardson

Source: USAF 2019a

This EIS analyzes large arms CDNL noise for land use compatibility. The 57–62 dB CDNL noise zone for large arms extends east off JBER into the community of Eagle River, where land use is primary Vacant, Transportation, and Water, which are considered compatible land uses. The 62–70 dB CDNL noise zone extends off JBER where land use is Vacant, Transportation, and Water, which are considered compatible land uses. The >70 dB CDNL does not extend into communities surrounding JBER. The surrounding land use acreages within the CDNL noise zones are presented in Table 3.11-2.

Table 3.11-2 Surrounding Land Use[1] Acreage within Large Arms CDNL Noise Zones

Land Use Category	Land Use Acres by Noise Zone (CDNL, dBC)	
	57–62	62–70
Vacant	143.53	64.27
Transportation	115.50	70.53
Water[2]	0.74	0.35
No Data Available	0.19	--
Sub-Total	**259.95**	**135.14**
Total	**395.09**	

Notes:

Some totals may not reflect the sum of values due to rounding.

[1]All noise contour areas on JBER are excluded from the acreage counts.

[2] Knik Arm is not included in water calculations.

Key: dBC = C-weighted decibel; CDNL = C-weighted Day-Night Average Noise Level; JBER = Joint Base Elmendorf-Richardson

JBER Land Use

JBER has 73,041 acres of airfields, training lands, ranges, and cantonment areas that offer a unique combination of capabilities, strategic location, and rugged training environments. The installation's assets include two paved airfields with three runways. A significant portion of JBER is designated for training purposes. Training assets are managed in accordance with installation planning documents to ensure safe, efficient, and compatible use of land.

The 13 land use categories on JBER are Airfield (Pavement), Aircraft Operations and Maintenance, Industrial, Administrative, Community (Commercial), Community (Service), Medical/Dental, Housing (Accompanied), Housing (Unaccompanied), Training, Outdoor Recreation, Open Space/Buffer Zone, and Water. Additionally, JBER has identified 11 planning districts, which are shown in Figure 3.11-2. Existing land use complements the established planning districts, with minimal adjacent incompatible land uses.

ERF-IA and the proposed expansion area are within the Training North planning district, with a land use category of Training. The district includes dozens of ranges, drop zones, and training areas, as well as ERF-IA. The existing land use and development are consistent with the planning district and designated land use (USAF 2015). ERF-IA and the proposed expansion area are within a designated training range and part of the larger JBER training area and military range network. The proposed expansion area is in TAs 406 and 408, which are bordered by other training ranges and Eagle Bay to the north.

The ranges at JBER are a key asset for maintaining troop readiness, and nearly all mission partners at JBER use the training ranges.

Noise contours associated with JBER mission activities extend over almost the entirety of JBER. As noted above, only contours associated with large arms training would potentially change as a result of the proposed action. JBER land use acreages within each CDNL noise zone are presented in Table 3.11-3.

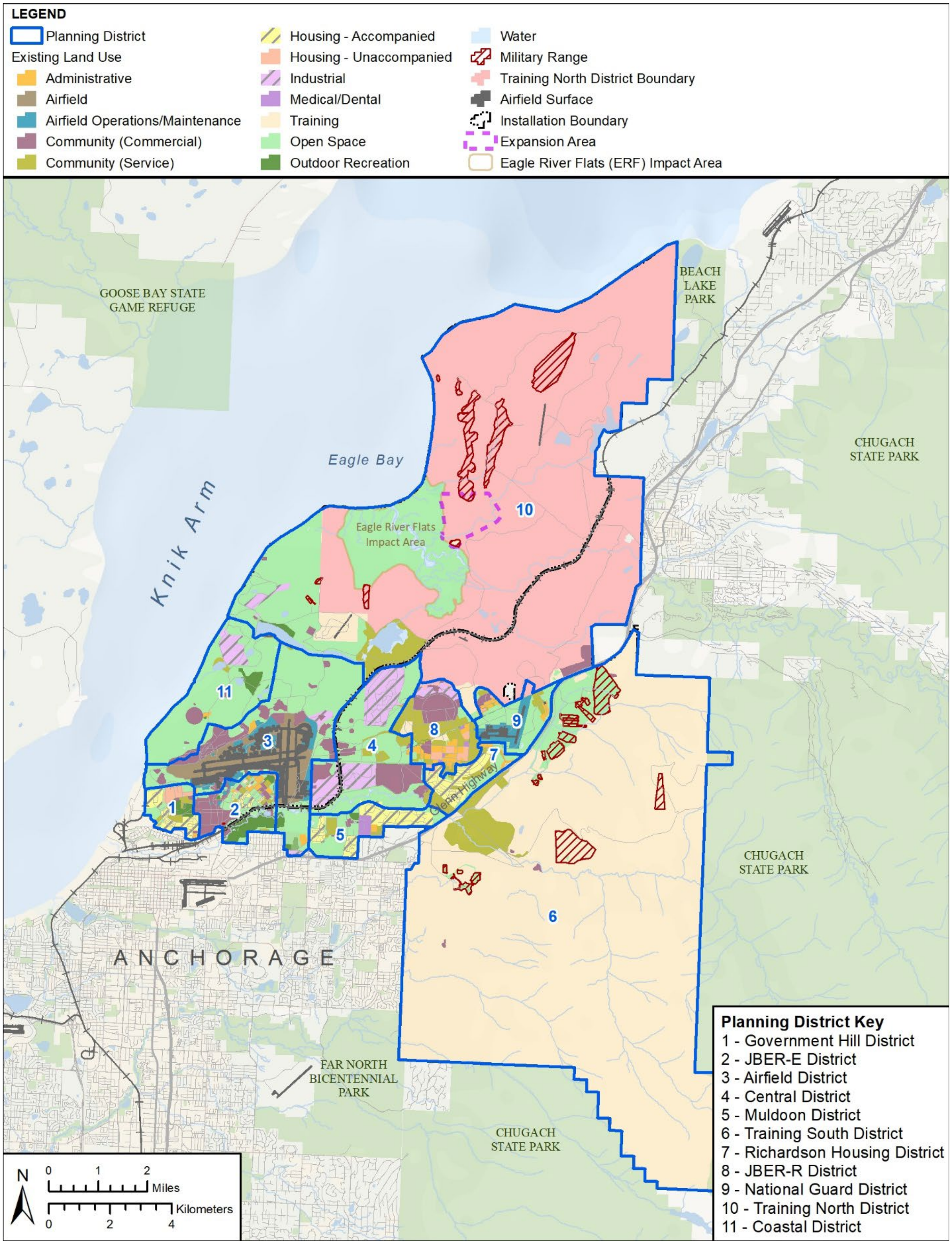
Table 3.11-3 JBER Land Use Acreage within Large Arms CDNL Noise Zones

Land Use Category	Land Use Acres by Noise Zone (CDNL, dBC)		
	57–62	62–70	>70
Community Commercial	90.15	18.63	11.54
Community Service	19.29	324.66	80.40
Industrial	294.28	38.90	0
Land Restoration	104.25	0	0
Open Space/Buffer Zone	1,629.84	1,914.96	1,745.70
Outdoor Recreation	22.12	0	0
Training	5,991.63	7,845.08	2,674.25
Range	27.70	0	0
Water[1]	208.00	128.03	260.34
Sub-Total	**8,387.25**	**10,270.26**	**4,772.23**
Total	**23,429.75**		

Note: [1] Knik Arm is not included in water calculations.

Key: dBC = C-weighted decibel; CDNL = C-weighted Day-Night Average Noise Level

Figure 3.11-2 JBER Existing Land Use



Sources: JBER 2019a, 2020a, 2023b, 2023c; ADNR 2020; Municipality of Anchorage 2020

Compatible development is encouraged on JBER and implemented when practical. All JBER land uses are compatible within the 57–62 dB CDNL noise zone. Community Commercial, Community Service, Open Space/Buffer Zone, Railroad, Training, and Water are compatible within the 62–70 dB CDNL noise zone. Land uses within the >70 dB CDNL noise zone are generally compatible because they are fulfilling the designated use of the land, such as Training and Open Space/Buffer Zone, or supporting the training mission, including two areas in the Training North planning district designated as Community Commercial and Community Service. The Community Service polygon within the 62–70 dB CDNL noise zone includes the recreational area associated with Otter Lake. Based on information in the 2015 IDP, the planned future use of this area is Outdoor Recreation.

Recreation

JBER provides quality-of-life opportunities that build on the climate and culture of Alaska. The installation has several recreational lakes, ranges, trails, camping, fishing, hunting, and snowmachine routes, and one ski slope. JBER is also home to a nationally significant Cold War site (the Nike Site Summit), which provides architectural and historic interest (USAF 2015).

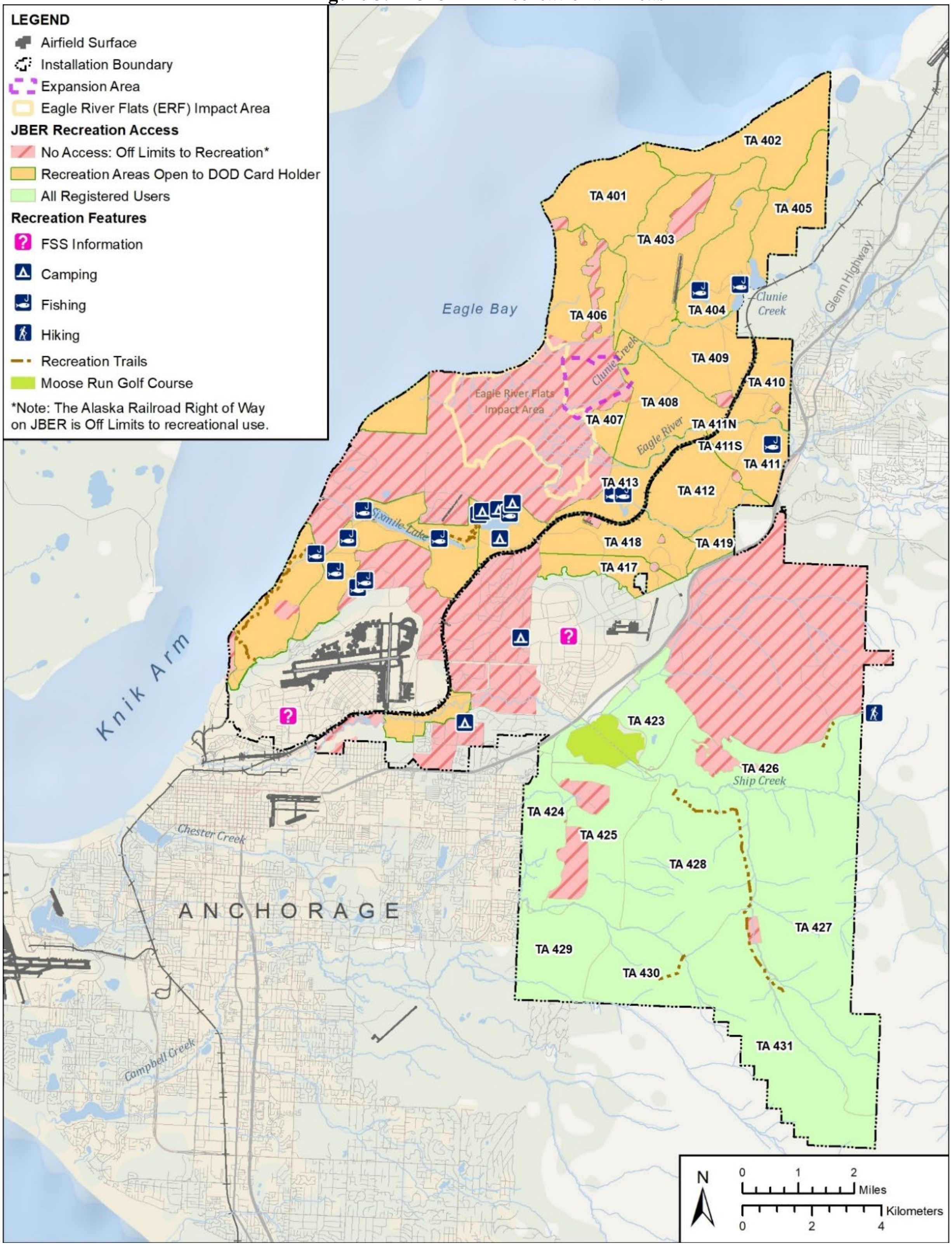
While areas for outdoor recreation are provided and use is encouraged, recreational use of the installation is secondary to military training. JBER recreational lands are categorized as Recreational Areas Open to All Registered Users, Recreational Areas Open to DoD Card Holders (open to individuals who either possess a DoD ID card or are escorted by an individual who possesses a DoD ID card), and Off Limits to Recreation. Specific recreational activities are further delineated throughout the open recreation areas. Figure 3.11-3 illustrates the recreational areas on JBER and highlights common recreational activities. As shown in the figure, ERF-IA is currently "Off Limits to Recreation" and is closed to recreational pursuits. Additionally, approximately 555 acres (95 percent) of the proposed expansion area is "Off Limits to Recreation." The remainder (30 acres) is a "Recreational Area Open to DoD Card Holders." Eagle River has been formally designated by USACE as a restricted area from the span of Bravo Bridge to its mouth at Knik Arm. The restricted area designation closes ERF-IA to vessels, watercraft, and individuals. Range personnel have posted danger/warning signs upstream of Bravo Bridge to alert recreational raft and small craft users of the closure and will be placing large signs at the mouth of Eagle River to warn/inform Knik Arm boaters of the closure. Inadvertent or intentional illegal entry into the impact area could still occur.

The affected environment for live-fire training at ERF-IA includes TAs 401 through 419, as these areas are periodically closed during live-fire training activities. According to JBER's GIS data, these areas are generally identified as recreation multi-use areas, and most are also identified as black bear/small game hunting areas.

Recreational pursuits on JBER lands are accomplished through the recreational access program and implemented in part through the RecAccess Program (previously this management was through the iSportsman Conservation Management Program) (RecAccess 2023). Recreational activities on JBER training lands require adherence to specific policies and procedures noted in the JBER INRMP and are by recreational permit only (JBER 2023a).

Table 3.11-4 provides a summary of recreational user data in the form of iSportsman check-ins for calendar year (CY) 2022. Fishing was the most popular recreational activity category (33 percent), followed by Running, Walking, Hiking, or Bicycling (21 percent). Based on iSportsman data, recreational use is greatest during May and September and lowest during February (Brandt 2023).

Figure 3.11-3 JBER Recreational Areas



Sources: JBER 2019a, 2020a, 2023b, 2023c, 2024b

Table 3.11-4 Recreational User Data, iSportsman Check-ins by Activity for CY 2022

Recreational Activites	Number of Check-ins
Running, Walking, Hiking, or Bicycling	4,007
Sightseeing	1,721
Wildlife Viewing or Photography	2,338
Fishing	6,192
Firewood Cutting	181
Harvesting Berries, Mushrooms, etc.	448
Small Game Hunting	824
Moose Hunting on Elmendorf – Bowhunters	332
Moose Hunting on Richardson – Muzzleloaders	599
Moose Hunting on Richardson – Bowhunters	1,567
Black Bear Special Draw Hunt	392
Off Road Vehicle Use	322
Christmas Tree Cutting	0
Total	**18,923**

Notes: Check-ins do not represent individual people that have recreated on JBER but rather the number of times recreators have signed-in using the iSportsman system. Permit holders can check in to multiple areas at once and can include guests on their permit. Hunting check-ins for the CY overlap two regulatory hunt years (Brandt 2023).

Key: CY = calendar year; JBER = Joint Base Elmendorf-Richardson

During CY 2022, most (76 percent) iSportsman check-ins were in recreational areas north of Glenn Highway. Of the approximately 44 areas for recreational access (access fluctuates based on training and corresponding access), approximately 40 percent of check-ins were for Elmendorf 001, 002, 003 and 005, which includes the Green, Spring, Triangle, Fish, Hillberg, Upper and Lower Sixmile Lakes (Figure 3.11-3). These recreational areas are southwest of ERF-IA. Comparatively, recreational use of TAs 406 and 408, where the proposed expansion area is located, was low, at approximately 0.41 percent and 1.23 percent of check-ins, respectively.

Common recreational activities on Knik Arm, which is outside JBER's boundaries but adjacent to ERF-IA, include recreational boating, fishing, and sightseeing.

3.11.2 Environmental Consequences

Impacts to land use and recreation were assessed by analyzing anticipated changes in land use and recreation in the areas within the ROI, including the level of land use sensitivity in areas affected by an alternative. Impacts could arise from the incompatibility of an alternative with existing or future land uses and recreational activities.

Impacts to land use or recreation would be significant if an alternative were to:

- Preclude the viability of a land use or the continued use or occupation of the area;
- Preclude the viability or disproportionately reduce recreational pursuits or the continued use or access to recreational areas;
- Be incompatible with adjacent land use to the extent that public health and safety is threatened;
- Conflict with planning criteria established to ensure the safety and protection of human life and property; and/or
- Result in noncompliance with laws, regulations, or orders applicable to land use.

Other relevant factors considered when evaluating potential impacts on land use and recreation include current and future land use designations on and adjacent to areas impacted by an alternative, the proximity of adjacent land use parcels to the areas impacted by an alternative, the duration of the proposed activity, and its permanence.

3.11.2.1 Methodology

Land Use

The results of the community noise analysis (Section 3.1) were used to identify whether existing and future or noise-sensitive land uses on or near JBER are within the large arms >57 dB CDNL or louder noise contours that were developed for the alternatives (Figure 3.1-4). Depending on the land uses within these contours, compatibility concerns may exist, and land use controls may be needed to enhance the health, safety, and welfare of those living or working in the affected areas (AFI 32-1015 and AR 200-1). Changes in compatibility in comparison to existing conditions are also considered in the impact analysis.

For potential off-post impacts, land use GIS data for the community of Eagle River were used in the analysis, as this is the only adjacent community potentially affected, based on the large arms noise contours. Table 3.11-5 presents the results of overlaying the noise contours on the Eagle River land use data. Eagle River land use plans were used to assess future development and potential growth areas.

For potential on-post impacts, current land use data for JBER were used in the analysis. Table 3.11-6 presents the results of overlaying the noise contours on the JBER land use data. The analysis also considers future land use and planning goals for the Training North planning district and JBERs long-term development vision for the installation.

Table 3.11-5 Surrounding Land[1] Use Acreage within Large Arms CDNL Noise Zones and Comparison of Alternatives

Land Use Category	No Action Alternative			Alternatives 1 and 2			Difference Between No Action Alternative and Alternatives 1 and 2		
	Acres by Noise Zone (CDNL)			Acres by Noise Zone (CDNL)			Acres by Noise Zone (CDNL)		
	57–62	62–70	>70	57–62	62–70	>70	57–62	62–70	>70
Vacant	143.5	64.3	0	224.4	137.9	0	+ 80.9	+ 73.6	0
Transportation	115.5	70.5	0	75.2	148.9	0.3	- 40.3	+ 78.4	+ 0.3
Institutional	0	0	0	33.8	0	0	+33.8	0	0
No Data	0.2	0	0	0.4	<0.1	0	+ 0.2	+ <0.1	0
Utility	0	0	0	14.6	0	0	+14.6	0	0
Undeveloped	0	0	0	<0.1	0	0	+ <0.1	0	0
Water[2]	0.7	0.4	0	0.8	0.5	0	+0.1	+ 0.1	0
Subtotal	**259.9**	**135.2**	**0**	**349.2**	**287.3**	**0.3**	**+ 89.3**	**+ 152.1**	**+ 0.3**
Total	**395.1**			**636.8**			**+241.7**		

Notes:

Some totals may not reflect the sum of values due to rounding.
A "+" symbol is an increase in acres compared to existing conditions/No Action Alternative. A "-" symbol is a decrease in acres.
[1]Noise contour areas on JBER are excluded from the acreage counts.
[2]Knik Arm is not included in water calculations.

Key: CDNL = C-weighted Day-Night Average Noise Level; JBER = Joint Base Elmendorf-Richardson

Table 3.11-6 JBER Land Use Acreage within CDNL Noise Zones and Comparison of Alternatives

Land Use Category	Existing Conditions and No Action Alternative			Alternatives 1 and 2			Difference Between No Action Alternative and Alternatives 1 and 2		
	Acres by Noise Zone (CDNL)			Acres by Noise Zone (CDNL)			Acres by Noise Zone (CDNL)		
	57–62	62–70	>70	57–62	62–70	>70	57–62	62–70	>70
Commercial	90.2	18.6	11.5	375.5	34.6	11.5	+285.3	+16.0	0
Community Services	19.3	324.7	80.4	161.3	324.7	87.4	+ 142.0	0	+7
Unaccompanied Housing	0	0	0	4.2	0	0	+4.2	0	0
Industrial	294.3	38.9	0	407.0	85.3	0	+112.7	+ 46.4	0
Land Restoration	104.3	0	0	128.3	0	0	+24.0	0	0
Open Space	1,629.8	1,915.0	1,745.7	2,267.3	1,771.8	2,141.7	+637.5	-143.2	+396.0
Outdoor Recreation	22.1	0	0	36.2	0	0	+ 14.1	0	0
Administrative	0	0	0	34.8	0	0	+34.8	0	0
Range	27.7	0	0	33.5	0	0	+5.8	0	0
Air Operations (Maintenance)	0	0	0	7.2	0	0	+7.2	0	0
Training	5,991.6	7,845.1	2,674.3	6,340.1	9,176.7	4,091.9	+348.5	+ 1,331.6	+ 1,417.6
Water	208.0	128.0	260.3	186.3	216.5	278.4	-21.7	+88.5	+ 18.1
Subtotal	**8,387.3**	**10,270.3**	**4,772.2**	**9,981.5**	**11,609.6**	**6,611.0**	**+1,594.2**	**+ 1,339.3**	**+ 1,838.8**
Total			**23,429.8**			**28,202.1**			**+ 4,772.3**

Notes: Some totals may not reflect the sum of values due to rounding. A "+" symbol is an increase in acres compared to existing conditions/No Action Alternative. A "-" symbol is a decrease in acres.
Key: CDNL = C-weighted Day-Night Average Noise Level; JBER = Joint Base Elmendorf-Richardson

Recreation

The analysis of potential impacts to recreational resources is qualitative. It considers whether the alternatives would preclude, displace, or alter the suitability of an area or facility within JBER training lands and adjacent Knik Arm for ongoing or planned recreational pursuits. This could be prompted by changes in access to, availability of, or quantity and/or quality of recreational resources within an area that contribute to recreational opportunities.

3.11.2.2 Alternative 1: All-Season Live-Fire Training with Expanded Impact Area

Land Use

Construction and Infrastructure

Construction activities to expand ERF-IA would have no effect on off-post land uses, as these activities would occur exclusively on JBER. As discussed in Section 3.1.2, noise from construction would not extend off-base to adjacent communities.

On JBER, construction could have a short-term impact on training, as the construction area would be closed to training uses during the construction period. Over the long term, use of this area as a dedicated impact area would preclude other types of training from occurring over this 585-acre area. However, expansion of the impact area is compatible with future land uses and meets installation planning goals, which recommend that live-fire ranges be "expanded to the extent possible to provide flexibility and accommodate the evolution of training requirements" and to "improve, maintain, and modernize ranges" (USAF 2015). The purpose of the proposed action is to accommodate live-fire training requirements and provide the Army with the flexibility to meet its training requirements at JBER.

Firing and Training Exercises

The increase in large arms training under Alternative 1 would increase the on- and off-post area subject to noise levels of 57 to >70 dB CDNL during firing activities at ERF-IA (Figure 3.1-1) and would result in large arms noise impacts during the summer months.

Off-post, approximately 242 acres of the community of Eagle River would be affected. Existing land uses in this area include Vacant, Transportation (Glenn Highway and Alaska Railroad Corporation [ARRC]), Institutional, and Water land uses, which are considered compatible with the weapons noise increase.

Future land use within large arms CDNL noise zones in the community of Eagle River is designated as a Development Reserve, with the potential for future residential development (USAF 2019a). Residential development would be a compatible land use in the 57–62 dB CDNL noise zone but would be primarily incompatible with some exceptions (i.e., noise attenuation measures) in the 62–70 dB CDNL noise zone. Of the 242 affected off-post acres, approximately 155 acres (current land use–Vacant) is available for potential residential development; however, some of this undeveloped land may not be suitable for development due to bedrock areas, preserved wetlands, or floodplains. Specific information about future residential development in this area, which could potentially be incompatible, is unknown at this time. Approximately 26 acres of this land has a restrictive use easement under the JBER Readiness and Environmental Protection Integration Program, which will prevent the land from being used for incompatible land uses in the future. Based on existing land use designations, it is not anticipated that there would be associated risks to public health and safety from noise increases over baseline conditions, although these increases should be considered during future planning in Eagle River.

On JBER, the area affected by noise levels 57 to >70 dB CDNL during firing activities at ERF-IA would increase by approximately 4,770 acres under Alternative 1 (Table 3.11-6). Existing land uses in this area include Open Space, Training, Commercial, Community Services, Industrial, Administrative, Land Restoration, Outdoor Recreation, Air Operations (Maintenance), Range, Water, and Unaccompanied Housing land uses. Increases in the 57–62 dB CDNL noise zone (1,594 acres) would not affect land use compatibility, as all JBER land uses are compatible within this zone. Increases in the 62–70 dB CDNL noise zone (1,339 acres) are primarily in Training land use, as well as some Industrial, Community Commercial, and Water areas. All of these land uses are considered compatible in this zone. Finally, the >70 dB CDNL noise zone would increase by approximately 1,839 acres. This increase would occur over an area that is primarily Training land, which is considered compatible because it is fulfilling the designated use of the land. There are 396 acres of Open Space that are also considered compatible. Approximately 7.0 acres of the increase would occur in a Community Service land use area in the vicinity of Otter Lake, which is generally considered incompatible. These 7 acres are slivers of forested land on the west and east sides of the lake that do not overlap fixed recreational features such as cabins or docks. Dispersed recreational uses in these areas could be periodically and temporarily impacted by increased noise levels of >70 dB CDNL. Additionally, recreational areas that are currently in the CDNL >62 dBC noise contours (e.g., Otter Lake cabins) would be newly exposed to noise from live-fire training during the summer months. This increase in noise levels over baseline conditions is not contrary to law or regulation and would not threaten public health and safety. The JBER Public Affairs office would notify the public of planned training exercises 2 weeks in advance.

Recreation

Construction and Infrastructure

Under Alternative 1, expansion of the impact area would make 30 acres of recreational area in TAs 406 and 408 (combined) off-limits to recreation. This closure would be long term and would continue for as long as the impact area designation is in effect. The total new area off-limits to recreation would amount to 0.07 percent of JBER areas open for recreation and 0.04 percent of total JBER land area. Based on 2022 iSportsman check-in data, TAs 406 and 408 account for only 0.41 percent and 1.23 percent of check-ins, respectively. A negligible amount of recreation would be displaced to other areas on JBER. Hunting success may increase in other areas if wildlife is displaced during construction activities (e.g., moose pushed out of the cleared area moving into authorized hunting areas). Expanding the impact area would not affect access to other areas of JBER for recreational pursuits and would not affect recreational pursuits in Knik Arm.

Firing and Training Exercises

The most frequently checked-into activities for TA 406 include Small Game Hunting, Moose Muzzleloader Hunting, Black Bear Hunting, Wildlife Viewing, and Running/Walking/Hiking/Biking. The proposed expansion area would reduce the area that state-drawn lottery big game hunters would be permitted to hunt (from training exercise areas and adjacent). Creation of the expansion area would result in 30 acres (combined) of TAs 406 and 408 becoming off-limits to recreation and could result in displacement of recreational activities to other areas. No fishing activity was recorded by iSportsman in CY 2022 in TA 406, TA 407, or TA 408, as there are no fishing lakes in these TAs. Anglers near the expansion area would likely be displaced to other areas during training in the expansion area. Live-fire training would disturb fish and game, which may impact the success of hunters and anglers on JBER. Impacts to other activities would be minimal because they are permitted in other areas of the installation.

The increased frequency of live-fire training at ERF-IA would result in more frequent temporary closures of TAs on the North Post during training activities, as well as increased large arms noise that could be experienced by recreational users both on and off JBER. Depending on which firing points are used and the layout of SDZs, one or more of TAs 401 through 419 could be periodically closed to recreation for the duration of the scheduled training exercise or made temporarily inaccessible by closure of access routes. Under Alternative 1, these closures could occur during all seasons and would affect a wider range of recreational uses than closures under the No Action Alternative. However, because these closures would be intermittent and temporary, other recreation areas would be available, and information about planned closures would be available to recreational users on post, impacts to recreation would not be significant.

The off-installation area potentially affected by large arms noise would not increase substantially; however, based on peak noise contours, 86 acres of Beach Lake Park could be exposed to periodic peak weapons noise levels of 115 to 130 dB peak pressure (see Appendix C) under Alternative 1, which corresponds to a medium complaint risk. While the weapons noise would not pose a health or safety use to recreational users, it could periodically lessen the recreational experience for users on JBER, at Beach Lake Park, and on Knik Arm. Additionally, the action would introduce weapons noise during the summer, which is when most recreational visits to JBER (and the surrounding areas) occur. As discussed above for land use, 7 acres of forested land near Otter Lake would have periodic increased noise levels that exceed 70 dB CDNL. These areas do not overlap fixed recreational features such as cabins and docks. While increased noise levels in these localized areas could periodically and temporarily lessen the quality of recreational experiences, no disproportionate reductions to recreation would occur. Recreational areas that are currently in the CDNL >62 dBC noise contours (e.g., Otter Lake cabins) would be newly exposed to noise from live-fire training during the summer months. Information about periodic closures of training areas to recreational use caused by scheduled training events at ERF-IA is accessible to recreational users on JBER and the surrounding communities through RecAccess, which helps recreational users avoid impacts by allowing them to plan recreational visits for periods when training is not scheduled (2 weeks advance notice). Therefore, impacts would not be significant.

3.11.2.3 Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only

Land Use

Under this alternative, there would be no short-term impacts to training associated with construction, as ERF-IA would not be expanded. Failure to increase the size of ERF-IA could have a long-term adverse effect on achieving JBER land use planning goals, as this alternative would not "expand live-fire ranges to the extent possible to provide flexibility and accommodate the evolution of training requirements." However, units could still travel off-post as needed for required training.

Assuming a scenario in which all annual training would occur at ERF-IA, impacts on land use associated with large arms noise would be identical to those discussed for Alternative 1, as there would be no difference in the number of rounds fired in the course of a year and no difference in the associated large arms noise contours as compared to Alternative 1. The proposed training would increase the area affected by noise levels 57 to >70 dB CDNL both on and off JBER, which would include approximately 129 acres of vacant land where potential future development would occur (this excludes 26 acres with restrictive use easements). These areas would be newly exposed to noise from live-fire training during the summer months. Based on existing land use designations, it is not anticipated that there would be associated risks to public health and safety from noise increases over baseline conditions, although these increases should be considered during future planning in Eagle River.

Recreation

Alternative 2 would have no effect to area off-limits to recreation in TAs 406 and 408, as ERF-IA would not be expanded; the 30 acres that would become restricted access under Alternative 1 would remain open to recreation by DoD card holders under Alternative 2. Assuming all training occurs at ERF-IA, potential impacts associated with increased frequency of large arms training in areas around ERF-IA, to include the high recreation-use summer season, would be similar to those described for Alternative 1. One or more training areas in the North Post could be periodically closed to recreation for the duration of training exercises, and closures could occur during any season. However, the area affected by closures could be less with no expansion of the impact area. If some training occurs at alternative locations, there would be fewer training events annually and therefore fewer closures and instances where noise could lessen the recreational experience. Similar to Alternative 1, posting information about periodic closures of training areas to recreational use caused by scheduled training events at ERF-IA would help recreational users plan their activities to avoid impacts (2 weeks advance notice).

3.11.2.4 No Action Alternative

Land Use

The No Action Alternative would have no effect on existing or future land uses off JBER and no effect on existing land uses on JBER. ERF-IA would remain its current size and would be used for live-fire training at a similar frequency as at present. Over the long term, however, this alternative would have an adverse effect on land use planning goals, as the installation would not meet its goal of expanding live-fire ranges to improve flexibility and accommodate changing training requirements.

Recreation

The No Action Alternative would have no additional effects on recreation, as ERF-IA would not be expanded, and live-fire training would continue at the current frequency and would only occur during winter when ice conditions are met.

3.11.2.5 Mitigation

SOPs would continue to be in place under both action alternatives that would reduce impacts to land use and recreation from noise associated with large arms training, particularly during the summer months. JBER would notify the public in surrounding communities of scheduled training 30 days in advance, with a focus on nighttime training events, and range schedules would be released for public dissemination every 2 weeks.

Because the project would not result in significant adverse impacts to land use or recreation under either action alternative, no mitigation has been determined as a result of the impact analysis for land use and recreation.

3.12 TRANSPORTATION AND CIRCULATION

3.12.1 Affected Environment

3.12.1.1 Resource Definition

Ground traffic and transportation infrastructure includes the public roadway network, public transportation systems, airports, railroads, pedestrian/bicycle facilities, and waterborne transportation for the movement of people, materials and goods. Roadways are typically assigned a functional classification by state departments of transportation. Functional classification is the process by which streets and highways are grouped into classes, or systems, according to the character of service they are intended to provide.

The ROI for transportation and circulation includes the entirety of JBER, predominantly the ground transportation routes to ERF-IA and the proposed expansion area, regional access to JBER provided by the Glenn Highway corridor (Alaska Route 1), and military convoy routes and rail lines used to transport personnel and equipment to Fort Wainwright. Aviation as a means of transportation and related circulation systems is not discussed in this EIS, as the proposed project would not result in any changes to the airspace over or surrounding JBER, nor in changes to aircraft use.

3.12.1.2 Regulatory Setting

Transportation networks on JBER are managed as part of the Air Force Comprehensive Planning Program established in AFI 32-1015, *Integrated Installation Planning*. Defense Transportation Regulation 4500.9-R Part II, *Cargo Movement*, and Part III, *Mobility*, are issued under the authority of DoD Directive 4500.09, *Transportation and Traffic Management*. These directives assign responsibilities for performing traffic management functions (including for military movements on public roads) and establish criteria for cargo and mobility movement.

Movement of personnel and equipment must adhere to 11th ABN DIV and USARAK Regulation 55-2, *11th ABN DIV and USARAK Transportation Operations and Planning in Alaska* (*Transportation and Travel)*, which establishes policies and procedures for use of transportation resources in support of Army operations. It covers highway, air, and rail movements to transport brigade equipment and soldiers within Alaska in support of garrison operations and unit training exercises. All military convoys moving over the Alaska State highway system require a convoy clearance, which is issued by the Movement Control Center after coordination with and approval from the Alaska State authorities (11th ABN DIV and USARAK Regulation 55-2). Movement by rail must adhere to 11th ABN DIV and USARAK Regulation 55-2.

The Alaska Department of Transportation and Public Facilities (ADOT&PF) designs, constructs, operates and maintains the state's transportation infrastructure systems, buildings, and other facilities.

3.12.1.3 Existing Conditions

Regional Access

Transportation systems in the ROI fall within the Northern and Central Regions of the ADOT&PF. The Northern Region is headquartered in Fairbanks and maintains portions of Glenn Highway, while the Central Region is headquartered in Anchorage (ADOT&PF 2022a).

Regional access to JBER is provided by Glenn Highway (Alaska Route 1), which bisects the installation and serves as the primary highway connection to much of the state; it links Anchorage to the communities of Eagle River and Chugiak to the northeast, as well as communities located on the Kenai Peninsula to the south. Glenn Highway terminates in Glennallen, where it intersects with the Richardson Highway that continues north to Delta Junction and Fairbanks. In Anchorage, traffic flow is generally considered good, although several intersections along Glenn Highway corridor experience higher volumes of traffic and impaired levels of service during peak commuting periods, including Airport Heights Drive, Bragaw Street, and Boniface Parkway (USAF 2018; AMATS 2020).

The Municipality of Anchorage's People Mover bus system serves the metropolitan area, with routes extending to Peters Creek, Oceanview, and the Hillside. The municipal bus system currently has routes that pass directly by JBER's Government Hill and Muldoon gates.

The POA provides facilities for transporting containerized freight, bulk petroleum, and various industrial products and materials. JBER is directly accessible to the port via rail and roadway (USAF 2015). The ARRC operates year-round service from Seward, a port city, through Anchorage, to the interior city of Fairbanks (ARRC 2022). The Denali Star passenger line provides rail service from Anchorage to Talkeetna in the interior, and the Coastal Classic passenger line provides service to Seward and other towns on the Kenai Peninsula to the south (USAF 2018).

Segments of the roads and railroads discussed in the preceding paragraph are designated as National or State Scenic Byways. Glenn Highway between Anchorage and Little Nelchina River (approximately 139 miles) is designated as a National Scenic Byway. Designation as a National Scenic Byway indicates that a route possesses distinctive cultural, historic, natural, or other qualities that are unique among neighboring states. The Richardson Highway between Delta Junction and Fairbanks (approximately 101 miles) is designated as a State Scenic Byway by ADOT&PF. The Alaska Railroad is also designated as a State Scenic Byway. Designation as a State Scenic Byway provides recognition that a route provides access to Alaska scenic areas, cultural interests, and recreation resources (ADOT&PF 2022b).

JBER

Transportation and circulation systems on JBER include gate operations, vehicular circulation, parking, traffic control, pedestrian/bicycle systems, and a railroad (Figure 3.12-1). Five primary gates provide access to JBER: Boniface, Muldoon, Post Road, Government Hill, and D Street/Richardson. The primary Visitor Control Center is at the Boniface gate, and the secondary Visitor Control Center is at the D Street/Richardson gate. Commercial vehicles enter JBER through the Post Road gate and are subject to inspection at the Commercial Vehicle Inspection area. Commuters from residential areas in the Anchorage area can also use Post Road Gate and Government Hill Gate to access JBER from the west. Access to JBER from the east is provided by the D Street/Richardson Gate. A sixth gate, Arctic Valley, an exit-only gate, is generally closed, but may be used to provide access to the southbound lanes of Glenn Highway for emergencies or special events.

Driving is the predominant mode of transportation at JBER. The road network serves all types of traffic, including heavy vehicles and tactical military vehicles. The installation transportation network consists of approximately 140 miles of paved roads and 475 miles of unpaved roads that are minimally maintained and occur primarily within the training ranges (Figure 3.12-1). No transit or bus services are available within the installation, and dedicated bicycle facilities are limited (USAF 2015).

Existing ERF-IA and the proposed expansion area are normally accessed by a combination of paved and unpaved roads that are also designated munitions and hazardous cargo routes. There are no public transportation routes in or near designated training areas on JBER. Route Bravo, a secondary paved road, runs east of ERF-IA and the proposed expansion area. The ARRC rail line is located approximately 0.3 miles south of these areas.

Military convoys are required to transport personnel and equipment to Fort Wainwright for training (Table 2.4-1). A convoy is a group of vehicles organized for the purpose of control and orderly movement. Any group of five or more vehicles temporarily organized to operate as a column, proceeding together under a single commander, is considered a convoy. During training deployments, the transportation corridor used by convoys traveling between JBER and Fort Wainwright includes Glenn Highway and portions of the Richardson Highway and the ARRC railroad corridor (Figure 2.4-5). The round-trip distance from JBER to Fort Wainwright is approximately 710 miles. A typical convoy to and from a training activity consists of dozens of vehicles traveling in groups along two-lane roadways with few pullouts and passing lanes. Convoys transiting to/from Fort Wainwright create additional traffic during the summer months when roadways are already heavily congested by tourists and recreational traffic.

Per 11th ABN DIV and USARAK Regulation 55-2, when the number of vehicles in a convoy exceeds 20, the convoy is broken down into serials, with each serial containing no more then 20 vehicles. The groups are separated by 30-minute gaps to alleviate traffic pressure on the highway system. Highway speed for a military convoy is not expected to exceed 40 mph and is consistent with safe driving speed based primarily on road conditions, with a catch-up speed no greater than 45 mph. This restriction includes areas with posted speed limits in excess of 50 mph. Convoys are normally not authorized to travel during peak traffic hours.

3.12.2 Environmental Consequences

The analysis of impacts to transportation and circulation considers the potential for disruption of movement of people, materials, and goods, both on- and off-base.

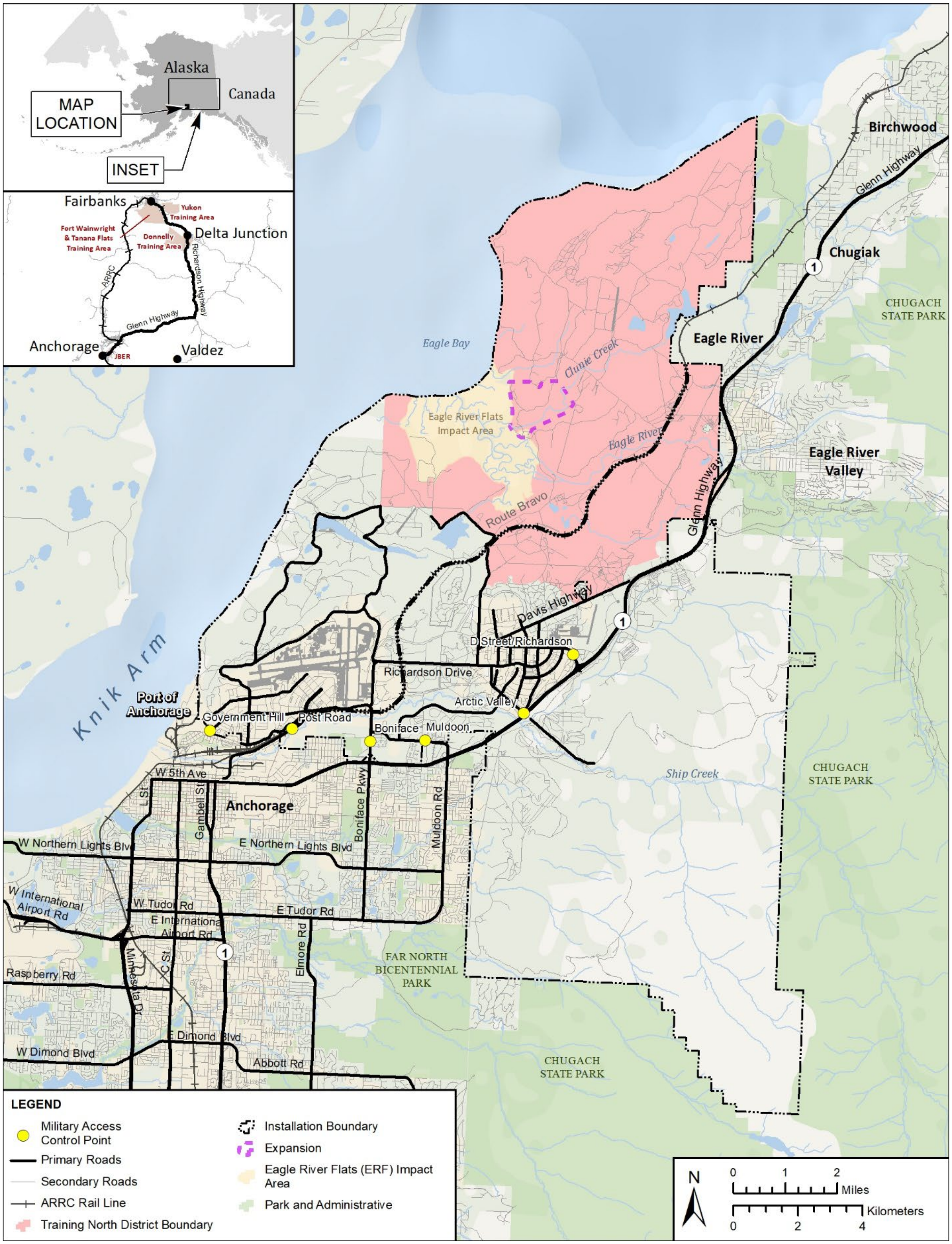
Impacts to transportation and circulation would be significant if an alternative were to:

- Substantially reduce the usability of the existing on-base transportation network or contribute to the degradation of such facilities;
- Substantially increase congestion at JBER gates and increase time to access the installation; and/or
- Substantially increase traffic to and from JBER and the use of the off-base transportation network.

3.12.2.1 Methodology

The impact analysis consisted of a qualitative assessment of how the proposed project could affect use of on-installation and off-installation rail and roadway systems, the physical condition of the transportation network, or traffic on any roadway. The analysis considered the likely number of trips to Fort Wainwright under each of the alternatives.

Figure 3.12-1 Transportation and Circulation Network in the Region of Influence



Sources: ADOT&PF 2018; JBER 2019a; Municipality of Anchorage 2020; AECOM 2020a

3.12.2.2 Alternative 1: All-Season Live-Fire Training with Expanded Impact Area

Alternative 1 would have direct short-term and long-term impacts on transportation and circulation associated with possible degradation of road surfaces and congestion at the JBER gates. These impacts would not exceed applicable significance thresholds. Long-term beneficial impacts would occur under both action alternatives, as both alternatives would reduce or eliminate the need to travel to Fort Wainwright for training. Short-term impacts associated with construction would only occur under Alternative 1.

Construction and Infrastructure

Construction of gravel roads and service pads within the proposed expansion area would have a short-term impact on on-base transportation and circulation during construction associated with the presence of construction-related vehicles and traffic. During clear-cutting and development of the proposed expansion area, delivery of proper equipment and materials to the area and subsequent removal of vegetation from the site would add a minimal amount of traffic in comparison to the existing traffic volume, both on-installation and off-installation. Increased traffic associated with these activities would contribute to congestion at the Post Road gate where commercial vehicles enter JBER and may contribute to degradation of road surfaces. This additional traffic and congestion would last only for the duration of the construction period.

Construction of 1.8 miles of gravel service roads (Figure 2.4-1) would facilitate access and use of the proposed expansion area. There would potentially be a direct, long-term beneficial impact on the internal transportation infrastructure, particularly if the expanded road network would support other training needs and provide an additional means to transport required munitions within the installation. The upland expansion area would be designed to avoid land use conflicts, and any necessary transportation or circulation features would be constructed to avoid impacts to existing infrastructure.

Firing and Training Exercises

Alternative 1 would have a direct, long-term beneficial impact on the regional off-base transportation network, specifically Glenn Highway and Richardson Highway, from a reduction in use, because training deployments to Fort Wainwright would no longer be required (although they could still occur). Military convoys transporting personnel and equipment and consisting of dozens of vehicles would no longer need to travel along this transportation corridor. The reduction in travel along these roads would help maintain their condition for a longer period of time, resulting in fewer maintenance costs, and would also eliminate or reduce periodic traffic congestion and travel delays along these roads, specifically during the summer months, when there is already additional traffic from tourists and other recreation.

As a result of the increased training time at JBER by the Army, soldiers would use the on-base transportation network (i.e., areas outside of the Training North District) more frequently than at present because there would be an estimated seven fewer trips to Fort Wainwright annually under Alternative 1. Approximately 2,098 total soldiers (Table 2.4-1), or 7.7 percent of the total personnel employed at JBER, would no longer need to deploy to Fort Wainwright one to two times a year. These soldiers would spend more time at JBER and would access the transportation network by way of personal vehicles via the on-base transportation network. This change would not result in a significantly noticeable difference in installation access or circulation, as these soldiers currently access the installation during the fall and winter seasons, and because JBER users currently practice staggered work schedules.

Conducting indirect live-fire training at JBER during all seasons would increase the frequency with which the existing road network in the Training North District is used by vehicles and equipment associated with the proposed action. Accelerated degradation of these unimproved roads, which are already difficult to maintain due to harsh weather conditions in the winter, could occur. However, the addition of vehicles in the spring and summer months would not contribute substantially to the degradation of existing paved and unpaved roads within JBER.

Similarly, soldiers that do not need to deploy to Fort Wainwright would use the local off-base transportation network more during the year than at present. However, the existing transportation infrastructure would continue to support travel by soldiers while they are at home, and there would be no substantial change to local traffic patterns.

Live-fire training activities at ERF-IA, including transport of munitions, would have no impact on public transportation routes, rail lines, gate operations and access control points, parking, traffic control, or pedestrian/bicycle systems.

3.12.2.3 Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only

Under Alternative 2, there would be no short-term impacts associated with construction or long-term benefits associated with development of new roads, as ERF-IA would not be expanded. The types of long-term impacts (both adverse and beneficial) associated with training would be the same as those described for Alternative 1, but the degree of effect would potentially be less, as it is likely that some travel to Fort Wainwright would occur under Alternative 2. Impacts would not exceed applicable significance thresholds.

If soldiers stationed at JBER complete all their training at ERF-IA, direct and indirect impacts on transportation and circulation associated with live-fire training would be as described for Alternative 1. However, it is more realistic that some deployments to Fort Wainwright would occur, with a best estimate that there would be three fewer trips to Fort Wainwright annually than under existing conditions, or four more than under Alternative 1. Benefits to traffic along military convoy routes would be as described for Alternative 1, but the degree of effect would be less than under Alternative 1, as some travel would still occur. Approximately 96 soldiers would no longer need to deploy to Fort Wainwright once per year, and 1,647 soldiers would deploy once per year instead of twice per year. These soldiers would spend more time at JBER, and their personal vehicles would use transportation networks on and off JBER. However, there would be no substantial change to local traffic patterns associated with this change, as discussed for Alternative 1.

Live-fire training activities at ERF-IA, including transport of munitions, would have no impact on public transportation routes, rail lines, gate operations and access control points, parking, traffic control, or pedestrian/bicycle systems.

3.12.2.4 No Action Alternative

Under the No Action Alternative, JBER units would continue to travel to the Fort Wainwright to fulfill their training requirements during the spring and summer seasons. Over the long term, these deployments would continue to impact regional transportation networks and contribute to traffic congestion as a result of military convoys transporting personnel and equipment on Glenn Highway and Richardson Highway. The frequency of these periodic deployments would be the same as at present. The deterioration of road conditions within this corridor would continue independent of training deployments, but continued use by JBER units would accelerate the process. There would be no change in the amount that soldiers drive personal vehicles on JBER and regional roads under this alternative.

3.12.2.5 Mitigation

The Army would adhere to all existing applicable regulations and BMPs/SOPs pertaining to travel and transportation on JBER and in convoys to and from Fort Wainwright. Pertinent regulations, standards, and other guidance documents that specify BMPs and SOPs that would be followed under all alternatives are listed in Section 3.12.1.2. Because the project would not result in significant adverse transportation impacts, no mitigation has been determined as a result of the transportation and circulation impact analysis for the action alternatives. Mitigation for resources that indirectly impact transportation (e.g., air quality, land use and recreation, and noise) is addressed in the respective resource sections (where applicable).

3.13 SOCIOECONOMICS

3.13.1 Affected Environment

3.13.1.1 Resource Definition

Socioeconomics refers to the interaction of social and economic factors in a population and environment. It includes military personnel and expenditures, soldier time away from home and quality of life, and the broader population, economic activity, and housing values that could be affected by the proposed action. It also considers other resources that indirectly affect the population, such as noise, air quality, and land use and recreation; these resources are described in Sections 3.1, 3.2, and 3.11, respectively. The ROI for socioeconomics includes JBER, the Municipality of Anchorage, the MSB, and the Anchorage, Alaska, metropolitan statistical area comprising the Municipality of Anchorage and MSB.

3.13.1.2 Regulatory Setting

There is no applicable regulatory setting for socioeconomics.

3.13.1.3 Existing Conditions

JBER is in the Municipality of Anchorage and is part of the larger Anchorage metropolitan statistical area economy that includes MSB. The Municipality of Anchorage is Alaska's most populous area (39 percent of the state's population) (ADOLWD 2023a) and its commercial center. The military has had a major role in Alaska's development, and JBER is strongly linked to the population and economy of the Municipality of Anchorage and MSB. Military personnel at JBER tend to be homeowners and renters, send their children to community schools, spend money in the retail and restaurant sectors, and support recreation and tourism related businesses (Northern Economics 2016).

In fiscal year (FY) 2022, JBER had 27,374 appropriated fund military personnel and their dependents (JBER 2022c). Population estimates for the Municipality of Anchorage and MSB in 2022 were 289,810 and 111,752, respectively (ADOLWD 2023a), making JBER's military personnel and dependents almost 7 percent of the region's population.

JBER had 15,731 personnel on its payroll in FY 2022, including 12,178 appropriated fund military and 1,634 appropriated fund civilians. Its total annual payroll was $1.121 billion (JBER 2022c), averaging $81,196 per person. In 2022, the Municipality of Anchorage had an average monthly employment of 143,416 and average monthly wages of $5,662 ($67,944 annually). During the same period, MSB had average monthly employment of 27,900 and average monthly wages of $4,346 ($52,152 annually) (ADOLWD 2023b).[12]

In FY 2022, expenditures for construction; services; and procurement of materials, equipment, and supplies at JBER totaled $308.5 million (not including services supplied to other Air Force installations), of which almost half were services (JBER 2022c).

As noted in Section 1.6, soldiers travel to Fort Wainwright to conduct indirect live-fire mortar and artillery training, generally during April through November. The round-trip distance from JBER to Fort Wainwright is approximately 710 miles, and a typical convoy for this training consists of dozens of vehicles (Section 2.4.3.1). The U.S. Army (2010) estimated the annual transportation cost of training at Fort Wainwright at $366,282 (not adjusted for inflation) based on seven iterations per year.

JBER military personnel and their dependents who live off base can be found in communities throughout the Municipality of Anchorage and MSB. The Eagle River area occurs along JBER's eastern boundary, and a number of community councils in northern Anchorage border JBER's western and southern boundaries. Most who live in Anchorage are in the northeast part of the municipality, and in 2015, active duty personnel

[12] Note that this data set only covers employees covered by the state's unemployment insurance laws or programs and excludes self-employed persons, members of the military, and other groups.

accounted for approximately 3.4 percent of the Eagle River-Chugiak area and 1.4 percent of northeast Anchorage community councils (Northern Economics 2016). Census data show 167,865 housing units with a median value of $306,700 for owner-occupied housing units in the Anchorage Metro Area (U.S. Census Bureau 2021).

3.13.2 Environmental Consequences

The socioeconomic analysis focuses on the effects of the proposed action with respect to the socioeconomic factors of military expenditures, soldier quality of life, and the broader ROI's population, economic activity, and housing values. It also considers the indirect effects to socioeconomics caused by impacts to other resources such as air quality, land use and recreation, and noise.

Impacts to socioeconomic resource would be significant if any of the following were to occur:

- A change to military personnel or expenditure levels that impacts JBER's financial viability or its mission.
- Long-term degradation of soldier and family quality of life and well-being due to increased time away from home station.
- Changes to economic activity and population in the ROI by more than historical annual variations.
- Preclusion of residential development or changes to housing values by more than historical annual variations.

3.13.2.1 Methodology

The impact analysis consisted of a qualitative and quantitative assessment of how the proposed project could affect socioeconomics by increasing or decreasing the amount of soldier time away from home, military expenditures, population, and housing values.

3.13.2.2 Alternative 1: All-Season Live-Fire Training with Expanded Impact Area

Alternative 1 would have direct and indirect, temporary to long-term impacts on socioeconomics predominantly associated with reduced travel to Fort Wainwright. Beneficial impacts of the proposed action would likely be greatest under this alternative because no travel to Fort Wainwright would be needed. These impacts would not exceed applicable significance thresholds.

Elimination of the need to travel to Fort Wainwright would result in the beneficial impact to military expenditures associated with lower travel-related costs, with a reduction of up to $618,300 annually (Table 3.13-1). Units would still have the option to train at Fort Wainwright; cost savings would be lower if some travel to Fort Wainwright continued to occur.

Table 3.13-1 Potential Annual Travel Cost Savings, Alternative 1

Unit Type	Number of Iterations/Year	Travel Cost per Iteration	Total Travel Cost
105-mm Battery (two batteries)	1	$23,400.00	$23,400.00
155-mm Battery	1	$18,300.00	$18,300.00
Artillery Battalion/Headquarters	1	$110,800.00	$110,800.00
Infantry Battalion	2	$171,600.00	$343,200.00
Cavalry Squadron	2	$61,300.00	$122,600.00
Total or Average	7	$88,328.57	$618,300.00

Notes: Total row shows the total number of iterations, average travel cost per iteration, and total travel cost. This table presents the maximum cost savings if no travel to Fort Wainwright occurs.

Key: mm = millimeter

Source: Tucker 2023c

Reduced travel to Fort Wainwright would have a long-term beneficial effect on soldier quality of life, as soldiers would spend less time away from home and more time with their families than under current conditions.

Impacts on economic activity would be negligible. While the increased time that soldiers would spend at home could shift the timing of purchases in the community (e.g., dining out, entertainment, and other/retail purchases), the action is not expected to result in an increase in soldiers' spending over time. The impact would be neither adverse nor beneficial because overall soldier spending would remain the same. If construction of the proposed expansion area is done by military personnel and equipment, no economic impacts are expected from construction of the expansion area. If site clearing and construction are done by contractor, Alternative 1 would have a minor short-term benefit to the economy in the ROI. Spending on fuel would be reduced; however, because fuel is produced outside the ROI, the change in spending would have a negligible impact on the economy in the ROI.

There would be no impacts on population under Alternative 1. The increase in training at ERF-IA would not result in changes to the military population, nor would the negligible impacts on economic activity affect the ROI population.

There would be no direct impacts on housing values from Alternative 1, because the action would not affect the number of people stationed or working at JBER. There are not expected to be any indirect impacts on housing values as a result of impacts to other resource areas, including air quality, land use and recreation, and noise, based on where impacts to those resource areas would occur and the location of residential areas.

3.13.2.3 Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only

The types of effects under Alternative 2 would be similar to those under Alternative 1, but the degree of effect would likely be less because while all live-fire training could occur at ERF-IA under Alternative 2, it is more likely that some amount of travel to Fort Wainwright would occur. The impacts would not exceed applicable significance thresholds.

Beneficial impacts to military expenditures could be as high as those under Alternative 1, if no travel to Fort Wainwright occurs. However, a more likely scenario is that a reduced number of trips would occur. Estimated associated cost savings would be $262,900 annually (Table 3.13-2).

Table 3.13-2 Estimated Annual Travel Cost Savings, Alternative 2

Unit Type	# of Iterations/Year	Travel Cost per Iteration	Total Travel Cost
105-mm Battery (one battery)	1	$11,700.00	$11,700.00
15-5mm Battery	1	$18,300.00	$18,300.00
Infantry Battalion	1	$171,600.00	$171,600.00
Cavalry Squadron	1	$61,300.00	$61,300.00
Total or Average	4	$88,328.57	$262,900.00

Notes: Total row shows the total number of iterations, average travel cost per iteration, and total travel cost. This table presents the cost savings associated with a reasonable estimate based on planning assumptions only about the number of trips to Fort Wainwright.

Key: mm = millimeter

Source: Tucker 2023c

Long-term beneficial effects on soldier quality of life could be the same as under Alternative 1 if no trips to Fort Wainwright occur. However, it is more likely that there would be some time spent away from families, although less than under the No Action Alternative.

Impacts on economic activity would be negligible and similar to those described for Alternative 1, although there could be less time spent at home under Alternative 2. There would be no impacts on population or housing values, similar to Alternative 1.

3.13.2.4 No Action Alternative

The No Action Alternative would have no effect on socioeconomics. Military expenditures would remain unchanged. When live-fire training takes place at Fort Wainwright, costs would be similar to existing conditions. Soldier quality of life would continue to be adversely impacted by training time spent away from families. There would be no effect on population, economic activity, or housing values relative to the baseline conditions.

3.13.2.5 Mitigation

Because the project would not result in more than negligible adverse socioeconomic impacts, no mitigation has been identified for the action alternatives. Mitigation for resources that indirectly impact socioeconomics (e.g., air quality, land use and recreation, and noise) is addressed in the respective resource sections (where applicable).

3.14 INFRASTRUCTURE AND UTILITIES

3.14.1 Affected Environment

3.14.1.1 Resource Definition

Infrastructure consists of the systems and physical structures that enable proper function of operations on the installation. Infrastructure is primarily human made, with a high correlation between the type and extent of infrastructure and the degree to which an area is characterized as urban or developed built environment. Infrastructure at JBER includes base facilities such as airfields, ranges, administrative buildings, medical centers, and developed cantonment areas, as well as unaccompanied and family housing units.

Utilities consist of the systems that provide services such as water, energy, waste treatment, and communications to an area. Utility systems at JBER include electric distribution, natural gas, water supply and distribution, wastewater treatment, solid waste facilities, and telecommunication systems. The availability of infrastructure and utilities and their existing capacity and potential for expansion are essential to the ability of JBER to fulfill mission requirements and provide for the needs of employees and residents. Infrastructure associated with JBER's transportation network is described in Section 3.12.

The ROI for infrastructure is the entirety of JBER.

3.14.1.2 Regulatory Setting

There is no applicable regulatory setting for infrastructure resources.

3.14.1.3 Existing Conditions

Infrastructure

The majority of the infrastructure on JBER occurs in its central portion, near its border with the Municipality of Anchorage. Infrastructure in the Training North District where ERF-IA and the proposed expansion area are located is generally limited to small buildings associated with range operations, secondary paved and gravel roads that provide access to training areas, and security fencing. The ARRC runs northeast-southwest through this district, approximately 0.3 miles from ERF-IA at its nearest location (USAF 2015). Route Bravo, a secondary paved road, runs east of ERF-IA and south of the proposed expansion area. Firing points occur throughout the Training North District, as shown in Figure 1.4-1. Firing points are generally open areas that have been cleared of vegetation, sometimes designated by survey markers (USAF 2019a). Infrastructure in ERF-IA and the proposed expansion area is limited to two firing points, security fences, and secondary gravel roads (USAF 2015, 2019a, 2019c).

Utilities

Utilities in the Training North District are generally limited to electric distribution. There are no utilities in ERF-IA or the proposed expansion area (USAF 2015, 2019c). An above-ground primary electric transmission line runs east-west approximately 0.4 miles south of ERF-IA. This electric line extends from the Anchorage Landfill/Power Plant and is within the Doyon Electric Domain (USAF 2019c). Because of the high cost associated with extending natural gas infrastructure, structures associated with range training use electric resistance heating (USAF 2019c).

Utilities on JBER that are used by soldiers stationed at the installation include electricity supplied by Chugach Electric Association, water supplied by a reservoir on Ship Creek, and three groundwater wells, described further in Section 3.6.1.3. A single natural gas pipeline serves the entire Anchorage area and JBER. Natural gas, the primary source for heating and hot water, is privatized to ENSTAR Natural Gas Company on JBER-Elmendorf[13] and to Doyon (which subcontracts to NORSTAR, a subsidiary of ENSTAR) on JBER-Richardson.

JBER operates two separate wastewater collection systems at JBER-Elmendorf and JBER-Richardson. Wastewater is discharged to the Anchorage Water & Wastewater Utility Asplund Wastewater Treatment Facility, approximately 6 miles southwest of JBER, where it is treated to remove impurities and released into the Cook Inlet (Anchorage Water & Wastewater Utility 2022). JBER does not have any active solid waste landfills. The installation is served by the Anchorage Landfill/Power Plant, owned and operated by the Municipality of Anchorage and located near the installation's eastern boundary adjacent to Glenn Highway.

Doyon and JBER's 673d Civil Engineering Group provide telecommunications; they jointly operate the centralized Supervisory Control and Data Acquisition, and Energy Management Control Systems. Cellular phone towers in the region provide service from several carriers, including GCI, Verizon, and AT&T. Cell towers are located throughout the developed central portion of JBER as well as along Glenn Highway (City Data 2023).

3.14.2 Environmental Consequences

The analysis for potential impacts to infrastructure and utility systems is based on potential disruptions to usability of existing infrastructure, potential disruptions to utilities, and potential increases in use of infrastructure and utilities associated with the proposed action. Impacts to infrastructure and utilities would be considered significant if one or more of the following were to occur:

- A long-term reduction in the usability of an existing infrastructure asset
- A long-term increase in utility demand that adversely affects JBER's ability to meet the needs of planned installation uses
- An exceedance of the capacity of a utility or treatment facility
- A long-term reduction in local utility supply to the detriment of local communities

3.14.2.1 Methodology

This impact analysis considered changes to utility use associated with unit presence at JBER throughout the calendar year. It consisted of a qualitative assessment of the potential increase in usage of infrastructure and utility systems under each alternative and an assessment of whether these systems would be adequate to support changes in use under each of the alternatives. The qualitative assessment considered the existing infrastructure and utility systems (use and capacity) and the degree of increased use that would be caused by the project to assess whether impacts have the potential to be significant.

[13] In this document, JBER-Elmendorf refers to the area that was formerly Elmendorf Air Force Base, and JBER-Richardson refers to the area that was formerly Fort Richardson.

3.14.2.2 Alternative 1: All-Season Live-Fire Training with Expanded Impact Area

Alternative 1 would have long-term impacts associated with development of new infrastructure assets and increased training at home station. These impacts would not exceed applicable significance thresholds. Alternative 1 would have the greatest affected area and degree of effect because it is the only alternative that would expand ERF-IA.

Construction and Infrastructure

Expansion of ERF-IA and associated development of new gravel service roads and pads would support the military mission and allow the Army to complete the required training at home station. Existing infrastructure assets at ERF-IA (firing points, security fences, and gravel roads) would continue to be used to support training activities and would see additional use under this alternative, but with regular maintenance there would not be a long-term reduction in their usability. More frequent maintenance of these assets could be required as a result of the increased training at JBER under Alternative 1.

Firing and Training Exercises

Under Alternative 1, there would be a long-term increase in annual utility demands at JBER as a result of increased training. Units (comprising 2,098 soldiers, or 7.7 percent of total appropriated fund military personnel and their dependents; Table 2.4-1) that currently make one to two trips to Fort Wainwright during the spring and summer months would instead be able to complete their training requirements at JBER. Increased unit presence would contribute to greater utility demand at JBER. While the exact increase in utility demand associated with increased unit presence at JBER is not known at this time, it would be relatively small and would not exceed the available capacity of JBER's utility systems, as a similar level of usage occurs under baseline conditions whenever units are not deployed. There would be no exceedance of utility systems or treatment facilities, and utility systems serving adjacent local communities would not be impacted.

3.14.2.3 Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only

Under Alternative 2, the affected area and degree of effect would be less than under Alternative 1. No infrastructure improvements would occur at ERF-IA. Similar to Alternative 1, the Army would be able to complete the required training at the existing impact area, which would likely require more frequent maintenance as a result of the increase in usage. Some training would likely occur at Fort Wainwright, but less than under the No Action Alternative (estimated at up 2,002 soldiers making only one trip annually). Increased utility usage at JBER would occur, but it would not exceed the available capacity of JBER's utility systems, there would be no exceedance of utility systems or treatment facilities, and utility systems serving adjacent local communities would not be impacted.

3.14.2.4 No Action Alternative

No impacts to infrastructure or utility systems within the ROI would occur under the No Action Alternative. Infrastructure at JBER would remain in its current condition, and utility usage would be unchanged. Use of infrastructure and utilities would be lowest under this alternative, as live-fire training would only occur during the winter months, and more training would be conducted at Fort Wainwright throughout the year.

3.14.2.5 Mitigation

Because project impacts would not exceed applicable significance thresholds under the action alternatives, no mitigation measures have been identified for infrastructure and utilities. While there would be an increase in infrastructure and utility demand associated with unit presence, it would not exceed the available capacity. No specific mitigation would be required for the utilities and infrastructure systems.

3.15 HAZARDOUS MATERIALS AND WASTE

3.15.1 Affected Environment

3.15.1.1 Resource Definition

For the purpose of NEPA documentation, the term "hazardous material" is more inclusive than the regulatory definition found in the U.S. Department of Transportation hazardous material regulations (49 CFR Parts 100–185). In this EIS, hazardous materials also include any "hazardous substance" as defined under the CERCLA of 1986, as amended by the Superfund Amendments and Reauthorization Act of 1986 (42 U.S.C. §§ 9601–9675) and "any extremely hazardous substance," "hazardous chemical," and "toxic chemical" as defined under the Emergency Planning and Community Right-to-Know Act of 1986 (42 U.S.C. §§ 11001–11050), as amended. Hazardous materials include any substances that, due to quantity, concentration, or physical, chemical, or infectious characteristics, may present substantial danger to public health, welfare, or the environment. Examples of hazardous materials on JBER include petroleum products, fuels, and other flammable liquids; paints, solvents and degreasers; compressed gasses; and pesticides and other toxic chemicals.

"Hazardous waste," a subset of hazardous materials, is classified under the Resource Conservation and Recovery Act (RCRA) of 1976 (42 U.S.C. § 6901 et seq.) in 40 CFR Part 261, *Identification and Listing of Hazardous Waste*, as solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may- (a) cause, or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (b) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed. Hazardous wastes may exhibit a hazardous characteristic of ignitability, corrosivity, reactivity, and/or toxicity under 40 CFR Part 261, Subpart C, or may be listed under 40 CFR Part 261, Subpart D. Hazardous wastes on JBER are primarily generated from vehicles and aircraft maintenance (e.g., contaminated fuels, fuel filters, battery acid), and facility operations (e.g., spent solvents, waste paints).

The Military Munitions Rule, 40 CFR Part 266, Subpart M, promulgated in 1997, identifies the management standards for military munitions under RCRA. Under the Military Munitions Rule, military munitions on a firing range are not solid wastes and therefore cannot be RCRA hazardous wastes (40 CFR § 266.202). Because ERF-IA is an active range and the proposed expansion area is currently a maneuver live-fire training area, where the munitions are used for their intended purposes, any military munitions located on these specific areas are not hazardous wastes. Munitions constituents are presented in Appendix F, and safety and occupational health regarding UXO is addressed in Section 3.4.

The ROI for hazardous materials and waste is the entirety of JBER.

3.15.1.2 Regulatory Setting

Hazardous materials and wastes are managed under a framework of federal, state, and local rules and regulations. OSHA is the federal agency responsible for implementing on-site hazardous material storage. USEPA is the federal agency directed under RCRA to develop regulations for on-site accumulation of hazardous wastes. USEPA and the U.S. Department of Transportation are the federal authorities for transportation of hazardous material/waste. Section 3010 of Subtitle C of RCRA requires any person who generates, transports, or recycles regulated wastes, or who owns or operates a facility for the treatment, storage, or disposal of regulated wastes, to notify USEPA of their activities, including the location and general description of the activities and the regulated wastes handled. RCRA regulations governing hazardous waste identification, classification, generation, management, and disposal are contained in 40 CFR Parts 260–268.

ADEC requires JBER to prepare and implement an approved *Oil Discharge Prevention and Contingency Plan* (C-Plan) (18 AAC 75). ADEC regulates contaminated sites and provides guidance and assistance with spills (18 AAC 75). Typically, a state receives authorization from USEPA to implement and enforce its own RCRA program; however, Alaska lacks authorization for a State RCRA program, and RCRA regulations are enforced by USEPA Region 10. These regulations are incorporated by reference in 18 AAC 62, *Hazardous Waste*.

The DoD developed the Military Munitions Response Program (MMRP) in 2001 to address munitions-related concerns, including explosive safety, environmental, and health hazards from UXO, discarded military munitions, and munitions constituents found at locations other than operational ranges on active and Base Realignment and Closure installations and Formally Used Defense Sites property (U.S. Army n.d). The MMRP addresses non-operational range lands with suspected or known hazards from munitions and explosives of concern that occurred prior to September 2002 but are not already included within an Installation Restoration Program (IRP) site cleanup activity (U.S. Army n.d.).

The IRP was developed by the DoD to identify, characterize, and remediate contamination from past hazardous waste disposal operations and hazardous materials spills at DoD facilities. Sites on DoD property suspected to be contaminated from past munitions use are investigated and cleaned up under the MMRP. Together, the IRP and MMRP make up the DoD's current Environmental Restoration Program (ERP). Depending on the circumstances, ERP sites are investigated and cleaned up in accordance with the CERCLA or RCRA, or an integrated approach based on both laws. The Air Force currently addresses MMRP sites under CERCLA. AFI 32-7020, *Environmental Restoration Program*, provides guidance and procedures for executing the Air Force ERP within the U.S. The JBER ERP includes sites from the IRP and the MMRP to fulfill the requirements of AFI 32-7020.

Specific to the Air Force, AFMAN 32-7002, *Environmental Compliance and Pollution Prevention*, establishes procedures and standards that govern the management of hazardous materials. AFMAN 32-7002 does not include munitions in its definition of hazardous materials. AFMAN 32-7002 identifies compliance requirements for hazardous waste, including a requirement for each installation to develop and implement a hazardous waste management plan. The document also requires that each installation have a hazardous waste minimization program in place to reduce the volume and toxicity of waste generated in accordance with RCRA. Any waste streams that cannot be avoided through source reduction and that cannot be reused or recycled are disposed of in an environmentally safe manner in compliance with all federal, state, and local regulations. The JBER *Hazardous Waste Management Plan* (JBER 2021) and *Integrated Hazardous Material Plan* (JBER 2020e) provide guidance for compliance with the Air Force Environmental Management System requirements, properly managing hazardous materials and waste, and spill prevention and response. These plans also fulfill the AFMAN 32-7002 requirement to develop and implement a hazardous waste management plan. JBER's SPCC/C-Plan describes the facility's procedures for the storage, handling, dispensing, containment and cleanup of oil/fuels and hazardous materials (JBER 2023f). The SPCC/C-Plan is required per 40 CFR Part 112 and 18 AAC 75 to reduce/eliminate and effectively respond to oil discharges.

3.15.1.3 Existing Conditions

Hazardous Materials and Waste on JBER

JBER is a large quantity generator of hazardous waste that operates under USEPA Identification No. AK8570028649. Both hazardous materials and hazardous wastes are managed using the Enterprise Environmental, Safety and Occupational Health Management Information System, which supports source reduction/pollution prevention and the procurement/distribution of all hazardous materials conducted by JBER's Hazardous Materials Pharmacy.

RCRA regulations provide for two types of on-site accumulation of hazardous waste: satellite accumulation located at or near the point of generation, and central accumulation (up to 90 days for large quantity generators) prior to being transported off-site. There are approximately 220 satellite accumulation areas and one 90-day, central waste accumulation site on JBER (JBER 2021). In addition, there are hundreds of accumulation areas for universal waste, used oil, and recyclable materials. The number of accumulation areas changes to accommodate variations in the quantity of hazardous waste produced in support of operations at JBER.

Contaminated Sites

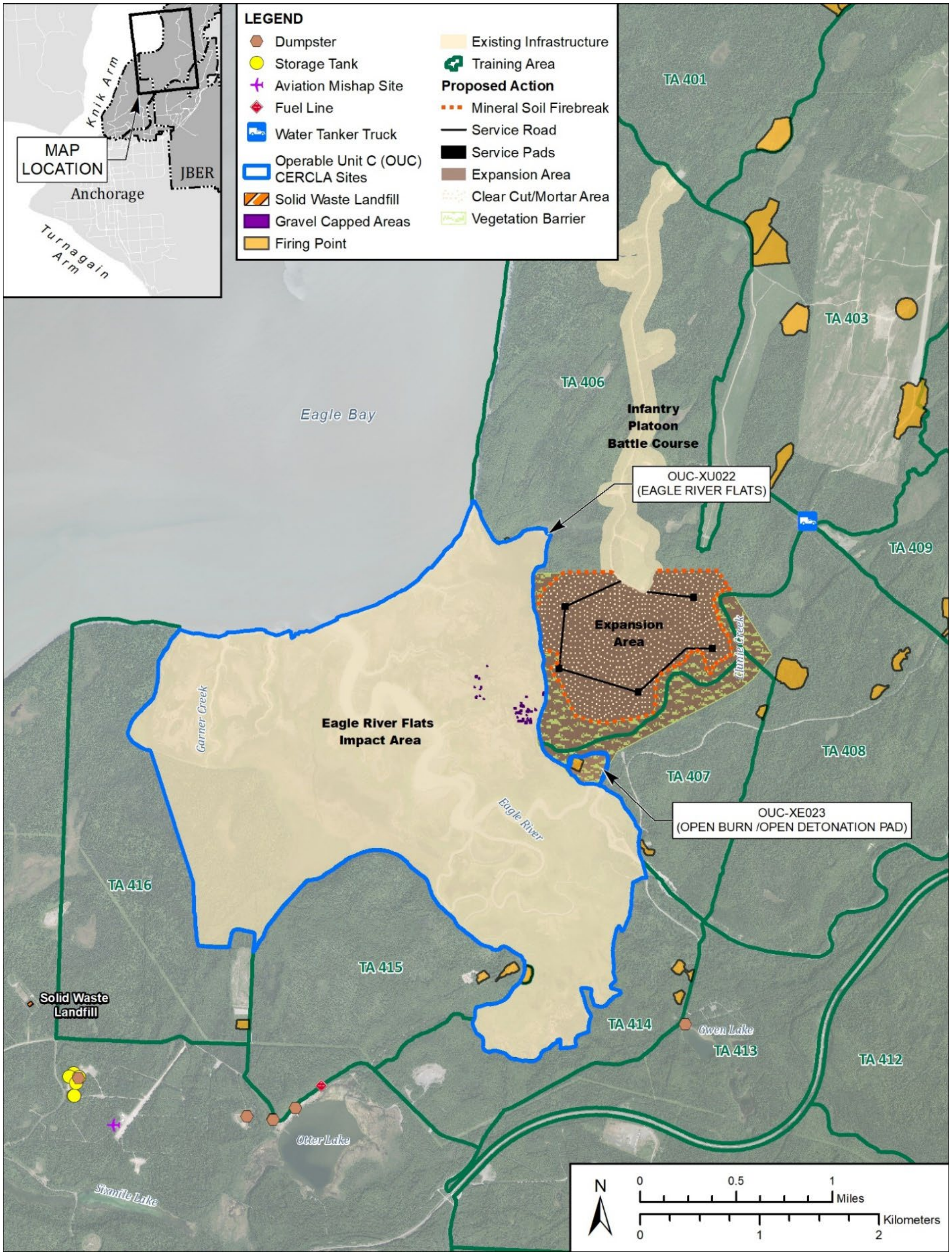
In 1994, all of former Fort Richardson (which includes ERF-IA) was placed on the NPL and designated as a CERCLA Site. The NPL is the list of sites of national priority among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the U.S. and its territories. JBER currently has 346 contaminated sites, of which 314 are IRP sites (97 open), and 32 are MMRP Sites (3 open) (Aide 2023). In 1994, the Army, USEPA, and ADEC signed a Federal Facility Agreement that outlines the investigation into associated remedial actions and schedule for CERCLA sites. The Fort Richardson Federal Facility Agreement divided CERCLA sites on Fort Richardson into operable units (OUs), which were grouped according to source areas, similarity of contamination, and amount of effort required for remedial investigation. OU-C is located in the existing ERF-IA and consists of two source areas: ERF (XU022) and an open burning/open detonation pad (XE023) (Figure 3.15-1). These two source areas are also listed as contaminated sites by ADEC. Portions of the capped ponds within CERCLA site XU022 extend slightly into the proposed expansion area (Figure 3.15-1). There are no other known contaminated sites in this area.

ADEC lists XE023 as a "cleanup complete – institutional controls" contaminated site (ADEC 2022c). The 1998 ROD determined that no further action was required under CERCLA at XE023. The 2024 5-year review determined that all institutional controls at XE023 "are still in place and remain protective. There is no other information or reason to suggest that the delayed closure of XE023 is not protective or viable. The selected remedy remains protective" (JBER 2024c). Despite the no further action determination for this site in the 1998 ROD, as described below, USEPA and ADEC do not concur with JBER's recommendation of no further action for the site in the latest 5-year review report. The ROD notes that XE023 is still subject to RCRA closure requirements. USEPA, however, has approved a delay of closure, as discussed in the ROD.

ADEC lists XU022 as an "active" contaminated site due to the presence of WP in sediments. Remedial investigation activities conducted in 1996 eliminated all other munition constituents as constituents of concern. 2,4-DNT was detected near the open burning/open detonation pad but at levels well below the risk-based criteria for soil ingestion at an industrial site (JBER 2024c). A ROD for OU-C, issued in 1998, confirmed the single constituent of concern at XU022 was unoxidized WP in sediments and laid out remedial action objectives. The remedial action objectives were to reduce the dabbling duck mortality rate due to WP to 50 percent of the 1996 mortality rate within 5 years, and to within 1 percent of the 1996 mortality rate due to WP within 20 years. These objectives for XU022 were met in 2006 by draining ponds with WP-contaminated sediments to allow the sediments to dry and the WP to oxidize. For ponds that did not dry sufficiently to oxidize the WP, the contaminated sediments were capped and filled to reduce exposure of WP to ducks. The use of WP for training in wetland impact areas is suspended nationwide. In January 2024, JBER published the *Fifth Five-Year Review Report for CERCLA Sites JBER-Richardson, Alaska* in accordance with CERCLA requirements (JBER 2024c). The review reiterated a previous finding that all short- and long-term remedial action objectives at XU022 had been achieved and recommended the site for no further action, despite USEPA and ADEC nonconcurrence. As of the time of this Draft EIS, the site has not been moved to no further action status. The results of waterfowl monitoring (as described in Section 3.8.1.3) most recently completed in 2021 (USAF 2022a) indicate that objectives for XU022 related to waterfowl mortality have continued to be achieved.

Under the ERP, approximately 57 acres of ponds and sediments have been remediated at XU022, of which approximately 0.5 acres were capped because dewatering was not sufficient to reduce WP concentrations (JBER 2024c). Ongoing maintenance of gravel caps and fill areas is done to protect waterfowl populations from existing WP contamination.

Figure 3.15-1 Hazardous Materials and Waste Features at and near ERF-IA and Proposed Expansion Area



Sources: JBER 2019a, 2019b, 2020a, 2020c, 2023c

Continued restrictions at ERF include (JBER 2024c):

- No firing of munitions containing WP into ERF;
- Restricting firing to winter months when required ice conditions are met;
- Restricting activities that disturb wildlife in prime waterfowl habitat;
- Monitoring for impacts to wetlands habitat and waterfowl use of ERF;
- Maintaining equipment and structures;
- Implementing cap-and-fill operations to address newly identified WP-contaminated areas and monitoring existing cap-and-fill material integrity; and
- Maintaining institutional controls to restrict access to and require training for personnel who work at OU-C source areas.

Potential impacts to wildlife due to the presence of WP in ERF are detailed in Section 3.8. Potential impacts to earth resources due to munitions use are detailed in Section 3.5.

3.15.2 Environmental Consequences

The analysis of impacts considers new hazardous materials and waste generated by the proposed action, as well as potential incompatibilities with contaminated sites. Impacts would be considered significant if one or more of the following were to occur:

- Generation of hazardous materials and waste at a level that exceeds the capacity of the existing management system
- An increased likelihood or severity of release of hazardous materials that cannot be minimized through existing procedures
- Failure to adhere to applicable federal and state regulations
- Disturbance of one or more contaminated sites, or creation of a new contaminated site

3.15.2.1 Methodology

The impact analysis considered the types and quantities of hazardous materials and wastes that would be generated during construction (Alternative 1) and training operations (Alternatives 1 and 2). It consisted of a qualitive assessment of how existing conditions and waste management systems would accommodate project increases. The impact analysis also focused on the contaminated site within ERF-IA and qualitatively assessed whether increased live-fire training, including training during conditions when protective ice cover is not present, would have the potential to disturb capped WP remediation areas.

3.15.2.2 Alternative 1: All-Season Live-Fire Training with Expanded Impact Area

Alternative 1 would have short-term impacts associated with generation of new hazardous materials and waste during construction, and long-term impacts associated with expanding the impact area and firing during conditions when gravel caps are not protected by ice cover. With mitigation to minimize risks, these impacts would not exceed significance thresholds. Alternative 1 would have the largest affected area, but Alternative 2 would entail more rounds landing in ERF.

Construction and Infrastructure

Under Alternative 1, additional land at JBER would be permanently designated as an impact area. Land clearing and construction activities associated with expanding ERF-IA would temporarily increase the use of hazardous materials and generation of hazardous waste. The increase in vehicle and equipment activity in the expansion area would increase the risk of spills of hazardous materials such as fuels and other POLs. Current best practices for spill prevention would be implemented as set forth in spill prevention and cleanup procedures outlined in the most current INRMP, SPCC/C-Plan, and Industrial SWPPP to minimize the risk and impacts associated with potential spills. Contractors working on-site are required to develop and implement their own SPCC plan and adhere to JBER's SPCC/C-Plan.

Existing management procedures for procuring, distributing, collecting, and processing hazardous materials and waste established in JBER's *Hazardous Waste Management Plan* (JBER 2021) and *Integrated Hazardous Material Plan* (JBER 2020e) are sufficient for the potential temporary increase in use and production during construction of the expansion area. All hazardous materials used, as well as hazardous waste generated during the construction of the expansion area, would be handled, stored, and disposed of in accordance with all federal, state, and local regulations.

Firing and Training Exercises

Under Alternative 1, it is assumed that all live-fire training in a year would occur at ERF-IA, rather than some occurring at Fort Wainwright. With the increase in training, there would be an increased potential for spills in the vicinity of firing points, although there would be less vehicle travel overall under this alternative, and an associated reduction in risk of spills overall. Best practices for spill prevention and response would be implemented in accordance with the JBER SPCC/C-Plan. As discussed in Section 3.15.1, military munitions used for their intended purposes on firing ranges are not considered hazardous wastes. While rounds containing WP would not be used at ERF-IA, live-fire training would occur outside the winter months when gravel caps would not be covered by ice. Although damage of a gravel cap could result in a complete exposure pathway in the event the capped WP has not naturally attenuated, with protective measures and mitigation (Section 3.15.2.5) in place, there would be a very low risk of a gravel cap being struck by an errant round. The locations of gravel caps have been mapped, and as an SOP, these areas would not be intentionally targeted during firing outside of winter ice conditions. Most gravel-capped areas are underwater during months when ERF is not frozen, and no targets would be placed on them. In the event of a misfire into a gravel-capped area, there would be a cease fire and a follow-up investigation. Additionally, mitigation to prohibit use of delay fuzes would minimize the potential for penetration of the gravel cap in the event of such a misfire. If a gravel cap is inadvertently struck, it would be assumed that damage has occurred, and gravel would be placed in the affected area when practicable to prevent exposure of any WP that may be present. Given the very low risk of disturbing gravel caps, it is not anticipated that significant impacts would occur.

3.15.2.3 Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only

The affected area under Alternative 2 would be less than under Alternative 1 because ERF-IA would not be expanded. No additional land would be designated as impact area at JBER. Because all live-fire training could potentially occur at JBER under this alternative, risks of spills associated with vehicle use would be similar to those described for Alternative 1. It is likely, however, that some travel to Fort Wainwright would occur, although the total number of vehicle miles traveled would likely remain below that of the No Action Alternative. Similar to Alternative 1, military munitions used in live-fire training would not be considered hazardous wastes. While all allotted rounds could potentially be fired into ERF under Alternative 2, the risk of disturbing gravel caps and exposing remediated WP would be very low based on the reasons provided for Alternative 1. It is also likely that some rounds would be fired at other training locations. With the BMPs/SOPs and mitigation determined as a result of analysis of impacts (Section 3.15.2.5), it is not anticipated that significant impacts would occur.

3.15.2.4 No Action Alternative

Under the No Action Alternative, there would be no increase in risk of spills on JBER and no additional land designated as impact area. Vehicle travel and associated risks of spills at other locations would be the greatest under this alternative. However, limiting firing activities to periods of sufficient ice thickness would continue to limit the potential for disturbance of gravel caps and associated re-exposure of remediated WP by an errant round.

3.15.2.5 Mitigation

Protective measures built into the proposed action that would avoid or reduce impacts associated with deposition of munitions constituents under Alternative 1 include prohibiting use of WP in the expansion area and clearing unexploded rounds from the expansion area after each training events. WP is already prohibited from use in the existing ERF-IA.

The Army would adhere to all existing applicable regulations, BMPs, and SOPs for management of hazardous materials and wastes. Pertinent regulations, standards, and other guidance documents that specify pertinent BMPs and SOPs are listed in Section 3.15.1.2. During construction under Alternative 1, the spill prevention and cleanup procedures in the current INRMP, SPCC/C-Plan, and Industrial SWPPP would be implemented to reduce risks from spills. Additional BMPs/SOPs that would continue to be implemented to avoid or reduce impacts associated with hazardous materials and waste include the following:

- Cease fire and initiate an investigation for any round that impacts outside the target area or is not observed impacting.
- Do not place targets on gravel-capped areas.
- Avoid remediated areas during training exercises to the extent practicable.
- Require all contractors to produce their own SPCC Plan (Alternative 1 only).
- Require all personnel who access ERF-IA and associated firing points to adhere to JBER's SPCC/C-Plan, *Integrated Hazardous Material Plan*, and *Hazardous Waste Management Plan* regarding spills and hazardous materials and waste management.
- Perform a Munitions and Explosives of Concern Investigation prior to clearing the expansion area (Alternative 1 only).
- Maintain access controls to restrict access to the impact area.

Additionally, the following mitigation has been determined as a result of the impact analysis to prevent exposure of WP at gravel-capped areas during training when ice cover is not present:

- Prohibit use of delay fuzes to minimize ground penetration.
- Make GIS-based tables and a map of remediated areas in ERF-IA available to the units that train at ERF-IA.
- If an errant round strikes a gravel cap, assume damage and place gravel in the affected area when practicable.

3.16 FOREST RESOURCES

3.16.1 Affected Environment

3.16.1.1 Resource Definition

Forest resources include commercial wood products, such as lumber and paper, as well as "special forest products," such as floral greenery, seedlings, Christmas trees, medicinal herbs, fungi, and firewood (BLM 2023). Forest resources in Alaska are derived from conifer and hardwood species found on JBER, including white spruce, black spruce, resin birch, quaking aspen, and black cottonwood or balsam poplar (*Populus balsamifera* ssp. *balsamifera*). Dwarf forms of black spruce and alder and willow shrubs are not typically consumed as forest products. This section addresses the use of special forest products, specifically firewood, on lands at JBER that are under long-term withdrawal from the public domain under direct oversight of the BLM.

The ROI for forest resources includes all areas subject to potential disturbance under the proposed action that potentially contain forest resources, including ERF-IA and the proposed expansion area.

3.16.1.2 Regulatory Setting

Approximately 65,262 acres (89 percent) of land currently used by JBER is under indefinite withdrawal from the public domain lands originally assigned to the BLM. These lands are subject to BLM policies addressing natural resource management as well as JBER policies and DoDIs.

The Federal Land Policy and Management Act of 1976, as amended, presents the basis for public lands to be managed following land use plans developed and approved by the underlying land management agency, regardless of whether such lands previously have been withdrawn. Under this act, BLM-managed lands follow a multiple-use sustained-yield management model to balance multiple uses of the lands and ensure sustained yield of these uses in perpetuity (BLM 2001; CRS 2019).

The process by which forest management occurs on BLM-managed lands is described in 43 CFR Subtitle B, Chapter II.E (Parts 5000-5510)—Forest Management, which specifies that visitors to a BLM-managed forest can harvest special forest products in reasonable amounts for personal use without a permit, such as collecting firewood for use at a campsite. Harvesting more than small amounts requires a permit and in some cases a contract.

DoDI 4715.03, *Natural Resources Conservation Program*; AFMAN 32-7003, *Environmental Conservation*; and the Sikes Act require management of woodlands, forests, and landscaping by federal agencies on land under DoD oversight.

DoDI 4715.03 (Enclosure 3, para. 4.a.[1][a]) states that marketable forest products requiring removal, including those on lands designated for privatization (or withdrawn from public use), must be disposed of by the Military Service or the values of the forest products will be deposited into the Military Service forestry account. Marketable forest products shall not be abandoned, destroyed, or donated, and forest products may be sold for salvage when their condition or value is adversely affected by natural disasters, insect damage, or other events. Forest products as defined by this regulation include, but are not limited to, standing timber/trees, downed trees, and pine straw.

The Alaska Forest Practices Act applies to all state and private lands in Alaska. It specifies harvesting procedures and BMPs and provides penalties for non-compliance. Although not regulatory on federal lands, most federal land management agencies accept these standards as a minimum (JBER 2023a).

3.16.1.3 Existing Conditions

In the ROI, forest resources include small diameter trees, consumed primarily as special forest products, particularly firewood. Of the tree species found in the ROI, all but dwarf spruce may be consumed as firewood. The ROI contains approximately 7,700 cords of firewood, an estimate based on aerial photograph assessments of typical stand densities and associated fuel wood conversions presented in the JBER *Forest Stand Management Final Report* (Jenkins and Hightower 2020) and by Eric Geisler, former BLM State Forester (Geisler 2020). Table 3.16-1 includes the approximate cord/acre estimates used to derive total cords and the associated firewood volumes for each of the forest resources represented in the ROI.

Table 3.16-1 Forest Resources Extent and Volume in the Region of Influence

Vegetation Class	Forest Type[1]	Area (acres)	Approximate Volume per acre by Forest Type (cords)[2]	Estimated Firewood Volume (cords)
Black Cottonwood / Salmonberry Riparian Woodland Association	Open Black Cottonwood	0.0	10	0.3
Black Spruce / Bog Labrador-tea Southern Forest Alliance	Open Black Spruce	56.5	10	564.6
Paper Birch – Resin Birch – White Spruce Forest Alliance	Open Spruce–Paper Birch	59.3	10	593.1

Vegetation Class	Forest Type[1]	Area (acres)	Approximate Volume per acre by Forest Type (cords)[2]	Estimated Firewood Volume (cords)
Paper Birch – Resin Birch Southern Forest Association	Closed Paper Birch	170.7	10	1707.4
Quaking Aspen – Paper Birch – Balsam Poplar Forest Alliance	Open Paper Birch–Aspen, Closed Paper Birch–Aspen	155.4	7	1087.8
Resin Birch – Paper Birch – White Spruce Woodland Alliance	Open Spruce–Paper Birch	40.0	10	399.9
White Spruce – Black Spruce Forest Alliance	Open Black Spruce–White Spruce	233.3	10	2333.2
White Spruce – Quaking Aspen – Balsam Poplar Ruderal Forest Alliance	Open Quaking Aspen–Spruce	141.7	7	991.6
Total		**856.9**	**--**	**7,677.9**

Notes:

[1] Forest types are based on level IV Types presented in Viereck et al. (1992).

[2] Estimates of volume per acre of Forest Type were provided by Geisler 2020.

Key: BLM = Bureau of Land Management; GIS = Geographic Information System

Sources: Acreages and community names are based on GIS data associated with CEMML (2022), and forest types are the most similar type from Viereck et al. (1992).

Forest Management

JBER forests are generally managed following multiple-use sustained-yield principles, and specifically using an ecosystem management system, where forest management activities are determined by observations of forest health and driven by available funding and resources. Forest management activities are planned and executed with a focus on the following multiple uses: supporting military mission requirements, minimizing large-scale disturbance events, improving ecosystem functionality, sustaining forest biodiversity, increasing the value of forest stands for wildlife, and maximizing ecosystem services. Where possible, JBER forests are also managed with an emphasis on providing services to the public, notably opportunities for firewood collection and Christmas tree cutting. JBER forest management is guided by the INRMP, which states that "the primary objectives of forest management on JBER are to maintain and enhance the ecological integrity of forested landscapes for supporting the military mission, biodiversity conservation, and maintenance of ecosystems services. Forestlands will be managed for a variety of purposes under the concept of integrated resources management" (JBER 2023a). The plan notes that commercial harvest of timber products from JBER lands under long-term withdrawal from the BLM will be coordinated with the BLM, as detailed in a Memorandum of Understanding (MOU) between JBER and the BLM, signed September 2018 (BLM Memorandum of Understanding AK-2018-013; JBER-IAA-N214-FY18) (JBER 2018b). Per the MOU, removal of timber for military purposes follows Air Force timber management practices. There is no information on past timber harvest in the proposed expansion area, as timber is not harvested in rotation in the RTA; harvests occur when clearing is necessary for development.

Forest Health Considerations

Plant pathogens (including insects and diseases) are natural ecosystem elements that affect forest resource health. At present, one native forest insect, the spruce beetle, has an observed role in the ROI related to forest resource extent, productivity, and viability. Although not considered a biotic forest health factor, wildland fire also affects forest health; its role in the ROI is addressed in detail in Section 3.9.1.

Spruce beetle is a native pathogen with infestations documented throughout the state that pose a threat to vulnerable spruce forests, and therefore forest resources, in southcentral Alaska (USFS 2022). The galleries excavated into the bark by the spruce beetle eventually kill the host tree by girdling the phloem (the vascular tissue responsible for the transport of sugars from leaves) and disrupting the downward translocation of food. This species is therefore of greater concern than defoliating insects, which often reduce host vigor but do not cause mortality. White spruce is more frequently infested than black (USFS 2008); however, recent ground observations have confirmed that spruce beetle successfully attacks and kills black spruce (USFS 2022). The spruce beetle is believed to occur throughout JBER in forested white spruce areas, including those in the ROI (Hedges 2020).

The current outbreak in southcentral Alaska began in 2016, and recent statewide aerial surveys indicate the spruce beetle outbreak in southcentral Alaska impacted more than 1.86 million cumulative acres of mixed spruce and birch forests between 2016 and 2021 (USFS 2022). Current and prior outbreaks have been attributed to warming winters that allow the species to complete its life cycle more rapidly (in 1 year instead of 2), thus increasing population size. Wind is also recognized as a natural driver of the composition, structure, and extent of forests in southcentral Alaska. Windthrow events are identified as a factor that can exacerbate insect outbreaks by providing a source of breeding material (downed trees) (Barrett and Christensen 2011). In addition, human activities such as fire suppression and improper disposal of slash and handling of cut firewood from infected trees enhance conditions for beetle outbreaks (USFS 2022). A serious outbreak of spruce beetle began on JBER during 1991–1992. It spread to portions of Chugach State Park and killed more than 80 percent of the mature white spruce on the base by 2001 (JBER 2023a). Data on beetle outbreak collected during aerial surveys of JBER in 2020 indicated that the ROI only contains one small area of "very light damage" (Jenkins and Hightower 2020); however, beetle activity documented in the ROI has likely spread since 2020.

3.16.2 Environmental Consequences

The analysis of impacts to forest resources considers effects associated with removal of forest trees and changes to forest health. Impacts to forest resources would be considered significant if one or more of the following were to occur:

- An increase in spruce beetle infestation-related tree mortality noticeably above the natural variability in insect and disease infestation in the area
- Removal of forest resources in a way that is not consistent with resource management goals for JBER, the Sikes Act, and/or the BLM-USAF MOU related to beneficial re-use of resources on public lands
- An increase in the vulnerability of residual trees to windthrow mortality, wildfire, or insect outbreak that results in a need to revise forest management strategies on JBER

3.16.2.1 Methodology

Impacts associated with forest removal were assessed by identifying the quantity and composition of trees to be removed or modified (trimmed) under each of the alternatives and then considering how well the removal and disposal of that wood would comply with BLM and JBER forest management guidelines and standards for lands under long-term withdrawal from the public domain (BLM 2001; CRS 2019; Jenkins and Hightower 2020).

The analysis of potential impacts on forest health assumed that all spruce trees (white spruce and black spruce) are potentially vulnerable to spruce beetle infestations. The extent of forest edge that would be newly exposed was identified in GIS, as leave-tree vulnerability to windthrow along the edges of clear cuts is extensively documented (Harris 1999), and the collapse of edge trees could indirectly impact forest health by increasing stand vulnerability to spruce beetles, which breed in recently downed trees.

3.16.2.2 Alternative 1: All-Season Live-Fire Training with Expanded Impact Area

Alternative 1 would have long-term impacts on forest resources associated with tree removal and increased vulnerability of forests. These impacts would not exceed applicable significance thresholds. Alternative 1 would have the greatest affected area and degree of effect because it is the only alternative that would require forest resources removal.

Construction and Infrastructure

Under Alternative 1, approximately 359 acres of forest resources would be clear-cut within the proposed expansion area, and 226 acres thinned. Per AFMAN 32-7003 and consistent with the JBER-BLM MOU, the installation would make an attempt to offer for sale any forest products that require removal prior to initiation of the proposed land clearing operations. If the appraised value does not exceed $25,000, then forest products would be offered for public consumption as fuel wood through sale through JBER's Personal Use Firewood Cutting Program.

The volume of forest resources removed from the clear-cut area would equal approximately 3,184 cords of firewood (Table 3.16-2). While the volume of wood that would be removed from the vegetation buffer has not been quantified, thinning to improve sight lines would typically target underbrush and standing dead trees rather than timber quality/size trees. Firewood would either be disposed through contract sale or piled in a designated staging location for collection by firewood permit holders, consistent with the JBER-BLM MOU and the JBER INRMP. Because previously cleared areas would be used as staging areas for cut trees, no additional clearing would be required. The guidelines for harvest would be consistent with the JBER forest management program goals of managing forest resources to provide a reasonably safe and realistic training environment and providing stewardship of publicly withdrawn lands (Jenkins and Hightower 2020). Removal of forest resources would establish a new training area that meets the military mission, and the cut would be disposed of in a way that fulfills stewardship goals.

Table 3.16-2 Forest Types and Quantity of Fuel Wood Removed under Alternative 1

Vegetation Class	Forest Type[1]	Area Base-wide (acres)[2]	Area Clearcut (acres)[3]	Firewood Volume Removed Clearcut (cords)[4]	Proportion of Forest Type Base-wide Clearcut
Spruce and Mixed Spruce–Birch Forests		**N/A**	**131.9**	**1,319**	**2.7%**
White Spruce – Black Spruce Forest Alliance	Open Black Spruce–White Spruce	4,276.5	92.2	922	2.2%
Paper Birch – Resin Birch – White Spruce Forest Alliance	Open Spruce–Paper Birch	7,610.4	10.1	101	0.1%
Resin Birch – Paper Birch – White Spruce Woodland Alliance	Open Spruce–Paper Birch	7,517.6	29.6	296	0.4%
Broadleaf Forests		**N/A**	**227.3**	**1,865**	**6.4%**
Paper Birch – Resin Birch Southern Forest Association	Closed Paper Birch	10,350.9	91.2	912	0.9%
Quaking Aspen – Paper Birch – Balsam Poplar Forest Alliance	Open Paper Birch–Aspen, Closed Paper Birch–Aspen	2,478.8	136.1	953	5.5%
Non-forest	**Non-forest**	**N/A**	**0**	**N/A**	N/A
Total		**32,234.2**	**359.2**	**3,184**	N/A

Notes:

[1] Forest types are based on level IV Types presented in Viereck et al. (1992).

[2] Base-wide areas by vegetation class are from CEMML (2022).

[3] Includes the clear-cut area, mineral soil firebreak, and service road and pads. See Table 3.8-8 for details.

[4] Estimates of firewood volume removed are based on estimates of cords per forest type (Geisler 2020) and listed in Table 3.16-1. These estimates were not confirmed in the field using site-specific plot data, due to limitations associated with the COVID-19 pandemic.

Key: BLM = Bureau of Land Management; N/A = not applicable

Tree removal in the proposed expansion area would reveal approximately 3 miles of new forest edge, potentially directly and indirectly increasing the vulnerability of the residual, adjacent forest to the spruce beetle and other insect pathogens. Forest edge has been identified as a secondary driver of colonization and tree mortality by spruce beetles due to increased stress experienced by edge trees (Karvemo et al. 2016). Residual trees along the edge of the proposed expansion area may also be more vulnerable to windthrow after clear-cutting (see below). However, the clearing and thinning would reduce the density of spruce over a localized area and could reduce (or at least not increase) the vulnerability of residual adjacent spruce stands to spruce beetle outbreaks.

Direct impacts to forest health could occur if cut trees are improperly stored and processed (i.e., left in place over winter) and provide breeding habitat for spruce beetles, thus placing the adjacent spruce trees at an increased risk of infestation and mortality. These impacts would be minimized by following BMPs for the proper handling of cut trees (Section 3.16.2.5) and would not be significant.

Forest removal under Alternative 1 would also increase the potential for wind-driven events to indirectly affect the residual forest, as the 3 miles of new forest edge would consist of trees that are less structurally resilient due to the loss of their neighbors. Collapse of edge trees during a wind event could trigger a blowdown resulting in ample downed spruce trees that could serve as hosts to breeding spruce beetles, although trees grown in open conditions, such as the spruce in and adjacent to the proposed expansion area, have been observed to be less vulnerable to windthrow (Kozlowski and Pallardy 1997). The relationship of prevailing winds to the forest edge also impacts leave-tree vulnerability to wind throw. Prevailing winds in the Anchorage area, based on historical summaries, are generally from the north or south (Alaska Climate Research Center 2022), indicating about half of the new forest edge would be directly at risk.

The forest resources that would be removed from the proposed expansion area would be equivalent to approximately 1 percent of the total area of the affected forest types on JBER. Creation of approximately 3 miles of new forest edge would increase susceptibility to windthrow and insect pathogens. There would be increased risk of exacerbating spruce beetle outbreak by cutting and relocating receptive host material, which would be mitigated by following BMPs (Section 3.16.2.5). Impacts would not exceed significance thresholds.

Firing and Training Exercises

As discussed in Section 3.9.2, live-fire training in the proposed expansion area would have a risk of starting fires that could reach adjacent forest areas. The JBER WFMP employs a sophisticated fire detection and response protocol for suppressing fires started during training, and the proposed firebreak would expedite suppression efforts and protect residual forest resources from indirect impacts associated with wildland fire. Expansion of live-fire training into the summer months could increase the incidence of fire starts, as discussed in Section 3.9.2. ERF-IA contains limited small stands of white spruce that have not yet hosted a spruce beetle outbreak despite years of winter firing exercises. Due to their size and location, these white spruce would not be expected to display increased vulnerability to a spruce beetle attack with an increase in live-fire training. Addition of targets near the forested uplands south of ERF could result in impacts to forests if rounds miss their targets, through increased fire risk or other damage. Residual forest resources would continue to be managed consistent with JBER Forest Management standards. Firing and training exercises in the proposed expansion area would increase the risk of forest fires associated with increased live-fire training and expanding ERF-IA, which would be minimized by following the WFMP. The increased wildfire risk associated with firing during spring and summer would be assessed prior to initiating all-season firing in ERF-IA and annually thereafter, in accordance with the WFMP, and appropriate measures implemented based on identified risk factors. Impacts would not exceed significance thresholds.

3.16.2.3 Alternative 2: All-Season Live-Fire Training at Existing ERF-IA Only

While there would be a potential increase in fire starts under Alternative 2 associated with more frequent training that extends into the summer month, the affected area would be limited to the existing ERF-IA. No removal of forest resources would occur under Alternative 2. The increased risk of fire starts would largely be in the small stands of white spruce that occur within ERF-IA, particularly the upland forested areas south of ERF. As described for Alternative 1, there is not expected to be an increase in vulnerability of white spruce to spruce beetle outbreaks, and increased wildfire risk would be assessed annually in accordance with the WFMP. Alternative 2 would not conflict with resource management goals for lands under long-term withdrawal from the public domain or the availability of forest resources. It would have a negligible effect on the vulnerability of existing forest resources on JBER to mortality from fire, pests, and disease.

3.16.2.4 No Action Alternative

The No Action Alternative would have no effect on forest resources. No removal of forest resources would occur under this alternative, and continued winter firing would be unlikely to lead to an outbreak of spruce beetle in the few, small patches of white spruce in ERF-IA. The No Action Alternative would not conflict with resource management goals for lands under long-term withdrawal from the public domain and would not change the availability or vulnerability to mortality, including fire, pest, and disease, of existing forest resources on JBER.

3.16.2.5 Mitigation

Under both action alternatives, the Army would continue to follow the BMPs, SOPs, and guidelines pertaining to management of forest resources, which can be found in the regulatory information provided in Section 3.16.1.2. The following BMPs and SOPs in particular would avoid or reduce impacts

to forest resources under Alternative 1, particularly from decreased forest health related to spruce beetle vulnerability and proper handling of cut trees:

- Delimb all felled trees and pile logging slash in a location away from live spruce stands. Process all spruce logging slash on-site by either chipping, burning, or burying.
- If contract sale is not possible:
  - Move all felled logs to an established woodlot for disposal through the personal use firewood cutting program. Woodlot must be in direct sunlight.
  - Stack felled spruce away from live spruce trees. Debark all spruce trees (at logging site prior to moving to woodlot) to expedite the drying of the logs and prevent use of logs by spruce beetles as host material.
  - For hardwoods, either debark or apply a saw-kerf cut the length of the log to expedite drying of material. Cut logs into lengths no greater than 72 inches.

Additionally, the following mitigation has been determined as a result of the impact analysis for Alternative 1 to reduce potential impacts associated with disposal of cut trees in the expansion area.

- Conduct pile-burning on-site before winter snow prohibits burning or hydroax/mulch/chip as an alternative to burning.

As Alternative 2 would have a negligible effect on forest resources, no mitigation measures been identified for this alternative.

Mitigation measures for wildland fire (Section 3.9.2.5), which includes standard BMPs and mitigation determined as a result of the impact analysis, would also reduce potential effects to forest resources from increased fire risk.

4.0 CUMULATIVE IMPACTS

4.1 GEOGRAPHIC SCOPE

The geographic scope or ROI for the cumulative effects analysis includes the area within which the ROIs of all resources analyzed in this EIS occur. The ROI is shown in Figure 4.2-1: the project area itself (ERF-IA and the proposed expansion area), the entirety of JBER, and surrounding communities and aquatic areas. Figure 4.2-1 also identifies the locations of ongoing and reasonably foreseeable future actions in the ROI.

4.2 PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS

The following sections summarize the major projects and activities on JBER and nearby lands from the early 1900s to the present (2024). In addition, known reasonably foreseeable future actions are identified that may result in cumulative effects in combination with the incremental effects of the proposed action.

4.2.1 Past Actions

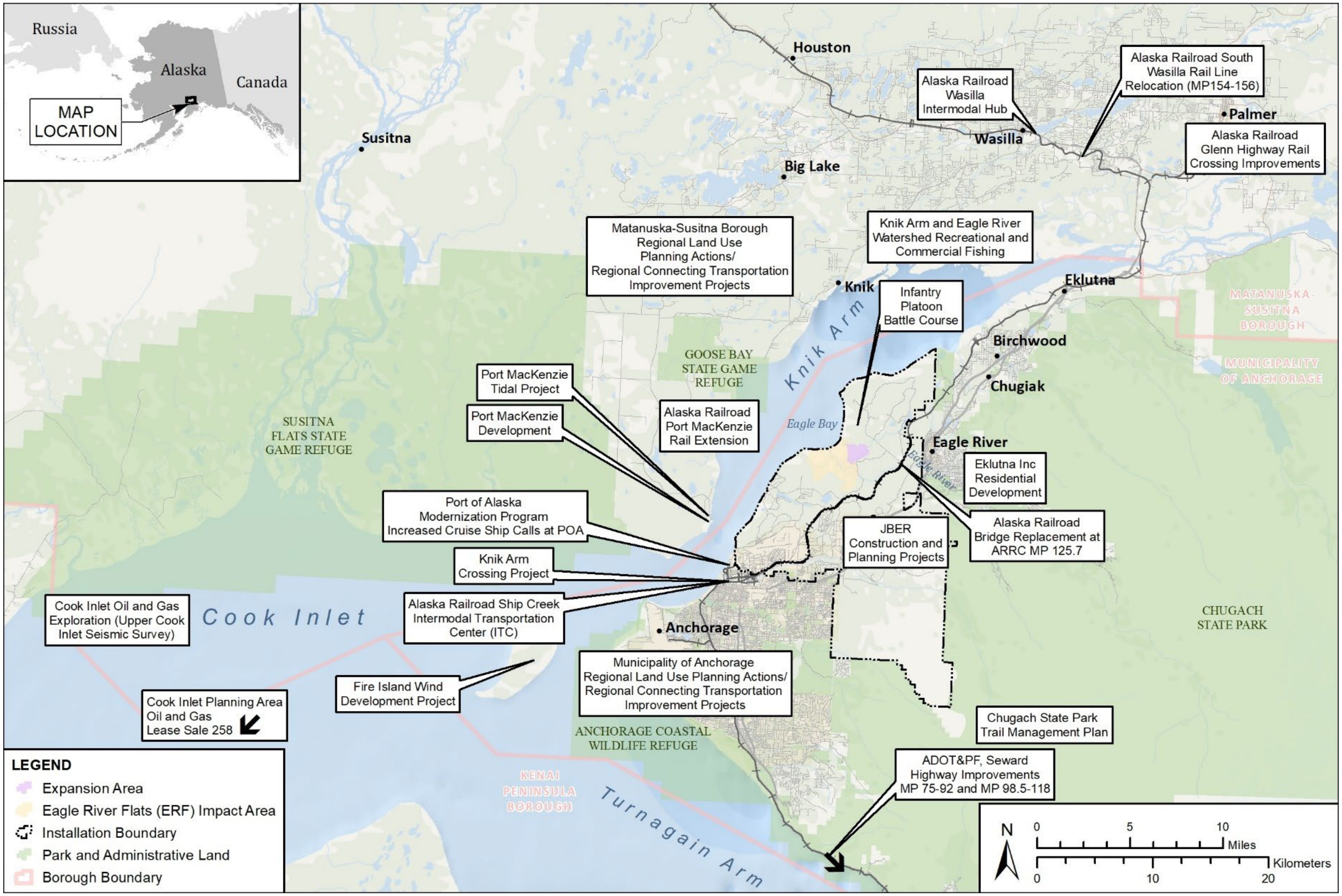
Discussion of past actions within this cumulative effects analysis focuses not on the historical details of individual past actions but rather on the aggregate effects of past actions and how they relate to the potential impacts of the proposed action.

4.2.1.1 Past Regional Actions

Past actions shape the growth, use, and changes within an area. Actions such as infrastructure changes, park formations, state or national disasters, and other events are all noteworthy when considering the cumulative effects of a project. Major past actions that have shaped the regional environment around JBER include the following:

- Alaska Railroad built, 1913–1923
- Anchorage founded, 1915
- Alaska statehood, 1959
- Kenai Peninsula and Upper Cook Inlet oil and natural gas developed, 1960s
- Beluga River Gas Field, including Cook Inlet Oil and Gas Exploration (Upper Cook Inlet Seismic Survey), 1950s–1960s
- Fire Island Wind Development Project, 2009–2012
- Chugach State Park Planning Efforts, 2016
- Greater Anchorage Area Borough incorporated, 1963
- Good Friday earthquake, 1964
- Chugach State Park established, 1970
- Municipality of Anchorage formed, 1975
- Palmer Hay Flats, Goose Bay, and Susitna Flats State Game Refuges established, 1975

Figure 4.2-1 Cumulative Effects ROI



Sources: ADNR 2020; JBER 2020a, 2023b, 2023c

Past actions served to establish a military presence in the Anchorage area as well as the primary transportation network in Alaska. These actions have led to the creation of a political framework that exhibits strong support of the military, encourages population growth concurrent with military training activities and land use, and established and maintains regional natural resource conservation efforts while promoting the continuance of recreational opportunities for the regional community simultaneous with population growth.

4.2.1.2 Past Actions on JBER

JBER is located adjacent to Anchorage and the community of Eagle River. Knik Arm of Cook Inlet borders the northern boundary of the installation, and Chugach State Park lies to the south and southeast. The community of Eagle River lies along the northeast border. Anchorage and Cook Inlet form the western boundary.

The following past actions have influenced the environment and baseline conditions of resources on JBER that are analyzed in this EIS:

- Former Fort Richardson established at current location of former Elmendorf AFB, 1940–1941
- World War II-related expansion, 1941–1945
- Former Fort Richardson moved to current location, 1949–1950
- Mechanized armored unit (tank) training, 1950s–1970s
- Light infantry training including use of mortars and howitzers, 1963–present
- USARAK Transformation, 2004
- Conversion of an Airborne Task Force to an Airborne Brigade Combat Team, 2005
- Stationing of Mechanized Engineer Brigade under Army's Force Structure and Realignment Program, 2008
- C-17 Beddown
- F-22A Beddown at JBER-Elmendorf
- 176th Wing Relocation to JBER-Elmendorf
- F-22A Plus-Up
- JBER at full operational capacity, 2010
- EOD Training Village, 2019

Eagle River Flats Impact Area

As discussed in Section 1.1, the Army has used ERF-IA as its primary munitions impact area since the late 1940s, with firing limited since 1991 to winter conditions when ERF is frozen. Remedial actions were implemented to clean up WP between 1998 and 2007, and remedial action objectives for WP cleanup have been maintained since 2006.

On JBER, the following past actions have influenced resources at ERF-IA:

- ERF first used as impact area, 1947. Impacts from past training activities include cratering from artillery and mortar fire, WP residues, and other munitions residues.
- Good Friday earthquake, 1964. The Good Friday earthquake caused ERF to subside approximately 60 centimeters.
- Land Management Branch staff and Army biologists noticed unusually high waterfowl mortality beginning in 1978.
- During the years 1983 through 1988, samples of water, sediment, and animal tissues from ERF were collected and analyzed. Extensive analyses and laboratory experiments later implicated WP as the cause of the unusually high waterfowl mortality.

- Army temporarily suspended firing at ERF-IA due to suspected relationship between waterfowl mortality and munitions firing, 1990.
- Army began implementing winter-only firing restrictions, 1991. Since this time, live-fire training has been conducted during winter months under specified conditions.
- Army began treatment of ERF, 1998. The treatment process greatly benefited ERF by removing WP. Additionally, short-term habitat changes resulted from draining contaminated ponds.
- Treatment of WP-contaminated areas has been completed, 2007.

Proposed Expansion Area

Alternative 1 would expand ERF-IA by approximately 585 acres. The expansion area is an undeveloped, primarily wooded area in the context of this analysis.

On JBER, the following past actions have influenced resources at the proposed expansion area:

- Prescribed burns, development of a mineral soil firebreak, and optional fuel management for wildfire have influenced the vegetation cover and risk to public safety.
- The proposed expansion area is within the Training North planning district, which includes ranges, drop zones, and training areas. The proposed expansion area is within a designated training range and part of the larger JBER training area and military range network. The expansion area has one developed firing point.
- Recreational activities such as hunting influence land use and wildlife management.
- Construction of paved and unpaved roads that are also designated munitions and hazardous cargo routes.
- One contaminated site (XU022) extends slightly into the proposed expansion area. The site is an active contaminated site due to the presence of WP in sediments from previous training activities.

4.2.2 Present and Reasonably Foreseeable Future Actions

Projects or actions that are currently taking place, in addition to reasonably foreseeable future actions, were assessed to determine cumulative impacts (Table 4.2-1). Project location, timing, size, and typical impact concerns were taken into consideration to determine whether the project would result in significant cumulative impacts when considered in addition to the effects of the proposed action and other past, present, and reasonably foreseeable future actions. Actions in Table 4.2-1 are roughly ordered southwest to northeast for local and regional actions, followed by actions on JBER.

Table 4.2-1 Present and Reasonably Foreseeable Future Actions

Location	Project/Activity	Description	Time Frame	Resource Interaction
Port MacKenzie	Port MacKenzie Development	Development intended to increase use of Port MacKenzie for the transportation of goods that are currently transported through the POA or on the highway.	Ongoing	Noise, air quality, water resources, biological resources (wildlife and fish), infrastructure and utilities, socioeconomics

Location	Project/Activity	Description	Time Frame	Resource Interaction
Port MacKenzie	Alaska Railroad Port MacKenzie Rail Extension	Construction and operation of a new rail line to connect the Borough's Port MacKenzie to ARRC's rail system. The port lies about 30 miles southwest of Wasilla and about 5 miles due north of Anchorage, across Cook Inlet. The selected route involves 32 miles of new rail line extending from Port MacKenzie to the Alaska Railroad's mainline just south of Houston.	Ongoing	Noise, air quality, safety and occupational health, transportation and circulation, socioeconomics, infrastructure and utilities
Port MacKenzie, Upper Cook Inlet	Port MacKenzie Tidal Projects	Use tidal energy to power the cathodic protection systems that prevent metal structures at Port MacKenzie from corroding. Ocean Renewable Power Company is partnering with the Matanuska–Susitna Borough to test its RivGen Power System at Port MacKenzie to evaluate the ability to harness the tidal current of Upper Knik Arm to power the cathodic protection systems, which prevent the metal structures from corroding at the port.	Future	Air quality, water resources, biological resources (wildlife and fish)
Federally owned portion of Cook Inlet	Cook Inlet Planning Area Oil and Gas Lease Sale 258	Oil and gas exploration, development, and production.	Future	Air quality, water resources, biological resources (wildlife and fish), socioeconomics, hazardous materials and waste
Point MacKenzie and POA/ Anchorage area	Knik Arm Crossing Project	Proposes to construct a new means of improved access between the Municipality of Anchorage and the Matanuska–Susitna Borough through an efficient and financially feasible crossing of Knik Arm, including adequate connections to the committed roadway network.	Ongoing	Noise, air quality, earth resources, water resources, biological resources, cultural resources, socioeconomics, infrastructure and utilities
Knik Arm and Eagle River Watershed	Recreational and Commercial Fishing	Fisheries harvest for commercial or recreational purposes	Ongoing	Water resources, biological resources (wildlife and fish), subsistence, recreation, socioeconomics
POA	Increased Cruise Ship Calls at POA	Cruise ship companies are expected to continue expansion and development at the POA and are expected to attract more major cruise companies.	Future	Air quality, biological resources (wildlife and fish), transportation and circulation, socioeconomics, infrastructure and utilities
POA	POA Modernization Program	A series of infrastructure improvement projects at the POA to upgrade and replace aging infrastructure. A south floating dock was completed in 2022, and a petroleum and cement terminal was completed. The next phases of the program will include a new cargo terminal; work will start in 2025 and extend through 2031.	Ongoing	Noise, air quality, water resources, biological resources (wildlife and fish), socioeconomics, infrastructure and utilities

Location	Project/Activity	Description	Time Frame	Resource Interaction
POA	POA Dredging Program	Annual dredging	Ongoing	Noise, air quality, water resources, biological resources (wildlife and fish), socioeconomics, infrastructure and utilities
Matanuska–Susitna Borough/ Municipality of Anchorage	Matanuska–Susitna Borough/Municipality of Anchorage Regional Land Use Planning Actions	Anchorage 2040 *Land Use Plan* was an update to the *Anchorage 2020—Anchorage Bowl Comprehensive Plan* and will shape development for the next 20 years. The Anchorage Metropolitan Area Transportation Solutions is in the process of updating its *Metropolitan Transportation Plan*, which will shape transportation development through 2050.	Ongoing	Air quality, safety and occupational health, biological resources, wildland fire, land use and recreation, socioeconomics, infrastructure and utilities
Matanuska–Susitna Borough/ Municipality of Anchorage	Matanuska–Susitna Borough/Municipality of Anchorage Regional Connecting Transportation Improvement Projects	The Municipality of Anchorage has identified several transportation improvement projects within the Matanuska–Susitna and Anchorage areas.	Ongoing	Air quality, transportation and circulation, socioeconomics, infrastructure and utilities
Northwest of Eagle River	Eklutna Inc. Commercial and Residential Development	Development of Eklutna landholdings is expected to occur within the next 15 years. Powder Reserve Tract 40A is located near ERF-IA.	Ongoing	Noise
Downtown Anchorage	Alaska Railroad Ship Creek Intermodal Transportation Center	Construction of an Intermodal Transportation Center could cause impacts from construction and operation of the new transportation center.	Ongoing	Noise, air quality transportation and circulation, infrastructure and utilities, socioeconomics
Between Anchorage and Palmer	Alaska Railroad Bridge Replacement at ARRC MP 125.7 (Eagle River)	Bridge replacement project.	Ongoing	Noise, air quality, water resources, biological resources, recreation, transportation and circulation, infrastructure and utilities
Palmer	Alaska Railroad Glenn Highway Rail Crossing Improvements	The ARRC and the Department of Transportation plan to build a frontage road and other infrastructure at railroad crossings along Glenn Highway for increased safety and reduced traffic congestion.	Ongoing	Safety and occupational health, transportation and circulation, socioeconomics, infrastructure and utilities
Wasilla	Alaska Railroad Wasilla Intermodal Hub	Plan to build an intermodal hub in Wasilla.	Future	Noise, air quality, safety and occupational health, transportation and circulation, socioeconomics, infrastructure and utilities
Wasilla	Alaska Railroad South Wasilla Rail Line Relocation (MP 154–156)	ARRC plans to straighten curves along the mainline track in South Wasilla.	Ongoing	Noise, safety and occupational health, transportation and circulation, socioeconomics, infrastructure and utilities

Location	Project/Activity	Description	Time Frame	Resource Interaction
Between Anchorage and Turnagain Arm	ADOT&PF – Seward Highway Projects	ADOT&PF Seward Highway Milepost (MP) 75 to 90 (along Turnagain Arm) Project included geophysical and geotechnical testing, onshore blasting, pile removal and installation at stream crossings, and fill placed into Turnagain Arm to facilitate roadway straightening. MP 98.5 to 118 (Bird Flats to Rabbit Creek) Project proposes safety and capacity improvements to the alignment and road cross section.	MP 75-92 completed October 2023; MP 98.5 – 118 in early planning phases	Noise, air quality, water resources, biological resources
JBER	JBER Training (e.g., demolition training/EOD activities)	The Army continues to make changes to the force structure at JBER in accordance with transformation initiatives. These changes in force generally mean changes to the training regime and not to the infrastructure at JBER.	Ongoing	Noise, socioeconomics, infrastructure and utilities
JBER	Joint Base Installation Master Plan	Master plan providing a framework for future development to meet both Army and Air Force missions as a result of joint-basing.	Ongoing	Socioeconomics, infrastructure and utilities
JBER	Extension of North/South Runway	The U.S. Air Force is extending the North/South Runway at JBER to upgrade the airfield to enable full use of the North/South Runway by a variety of aircraft that presently exist at JBER. Estimated completion 2025.	Ongoing	Noise, air quality, water resources, biological resources, socioeconomics, infrastructure and utilities
BAAF, JBER	Implementation of a BASH Program at BAAF	The Alaska Army National Guard is proposing to implement a BASH program at BAAF similar to what exists at the JBER airfield such that risks to pilots flying out of BAAF are avoided and/or minimized to the extent possible.	Ongoing	Safety and occupational health, biological resources
JBER	JBER Range Military Construction (e.g., new or upgrades to current range, course, and trailing facilities)	Includes Military Construction projects throughout JBER ranges to improve weapons and maneuver capabilities to meet training requirements. These projects include new or upgrades to the following current ranges and facilities: Known Distance Range, Light Demolition Range, Light Anti-Armor Range, Grenade Launcher Range, Urban Assault Course, Combined Arms Collective Training Facility, Tactical Unmanned Vehicle Facility, and the Convoy Live Fire Range, etc.	Future	Air quality, water resources, biological resources, land use and recreation, wildland fire, socioeconomics, infrastructure and utilities
JBER	JBER Cantonment Sustainment, Restoration, and Modernization Construction (e.g., infrastructure repairs, demolition, and minor construction)	Includes general construction and maintenance projects throughout JBER within cantonment. Projects vary in size and scope, including facility earthquake repairs, replacing water mains, resurfacing parking areas, and renovation. Projects may include demolition of current facilities.	Ongoing/ Future	Air quality, water resources, socioeconomics, infrastructure and utilities

Location	Project/Activity	Description	Time Frame	Resource Interaction
JBER	JBER ITAM Program Projects (e.g., trail maintenance and reconfiguration, land cleanup and repair)	Includes trail and vegetation maintenance and land cleanup and repair throughout JBER. Current and known future projects include hardening of trails to provide better access to areas of JBER, repair of trails and areas, vegetation maintenance, flattening and contours of an old berm, filling and contouring vehicle ruts, disposal of soil/wood debris piles, and disposal of scrap metal debris piles.	Ongoing/ Future	Noise, water resources, biological resources, infrastructure and utilities
JBER	Range Clearing	Army clearing projects include new range reconfiguration for AT4 range and construction of new towers at FP Cole and Eagle.	Ongoing/ Future	Noise, air quality, socioeconomics, infrastructure and utilities
JBER	Construct Range Operations and Storage Building for the JBER Davis Range Shoot House	Construct a range operations and storage building in the vicinity of range control to allow for increased requirements of unit stationing and use of ranges.	Future	Noise, infrastructure and utilities
JBER	Construct Ammunition Break Down Facility at Zero Range, Sport Fire Range, Small Arms Complex Shoot House, Davis Range Shoot House, Statler Range, and Oates Range	Construct an Ammunition Breakdown Building to meet TC25-8 standards to allow the safe daily storage and issue of ammunition used on the range.	Future	Noise, air quality, infrastructure and utilities
JBER	Multipurpose Training Range Structural Repair	Replace target and PC pits, which are currently of Gabion basket design. Add defilade positions in accordance with TC25-8 to meet required training.	Ongoing	Noise, infrastructure and utilities
JBER	Grezelka 10-meter Baffle Range	Move current 10-meter range and construct a baffled range to eliminate deviation and road guard requirements.	Future	Noise, infrastructure and utilities
JBER	UAC Attack and Defend House	Construct an attack and defend house on the current UAC to meet TC 25-8 standards and all training requirements.	Future	Noise, infrastructure and utilities
JBER	Repair Infantry Squad Battle Course Service Road	Repair the service road on the Infantry Squad Battle Course. The current road along with several targets flood during winter warm-up conditions and spring break-up, rendering the road and part of the range unusable.	Ongoing	Noise, air quality, infrastructure and utilities
JBER	Expand the Malemute FLS to meet C17 requirements	Expand the southern end of the Malemute Drop Zone FLS in accordance with Air Force regulations for safely landing, turning around, and taking off a C17 aircraft.	Ongoing	Noise, air quality, infrastructure and utilities

Location	Project/Activity	Description	Time Frame	Resource Interaction
JBER	Joint Integrated Test and Training Center	Construct new 112,200 SF simulator building with training bays for integrated virtual training. Construction anticipated 2023. Project to be constructed in already developed cantonment area.	Ongoing	Noise, infrastructure and utilities
JBER	Camp Mad Bull Range Expansion	Expand capacity for Arctic Field training capabilities at Camp Mad Bull. Addition of storage facilities, latrine, office space, mock runway, and LZ capable.	Ongoing	Noise, safety and occupational health, biological resources, cultural resources, infrastructure and utilities
JBER	Installation Security	Expand installation security infrastructure around boundary areas where trespassing occurs or where security is compromised from lack of security features.	Ongoing	Noise safety and occupational health, water resources, biological resources, cultural resources, land use and recreation, infrastructure and utilities, forest resources
JBER	Water Treatment Facility	Doyon to construct new water treatment facility at Ship Creek site; demolish old water treatment plant due to toxics.	Ongoing	Noise, water resources, infrastructure and utilities
JBER	Combat Rescue Helicopter Simulator Building	8,500 SF building to be constructed near other simulator facilities by 176 Air National Guard. Project to be constructed in already developed cantonment area.	Ongoing	Noise, infrastructure and utilities
JBER	F-22 Fuel Dispensing Station	Construct new fuel dispensing station, new JP-8 fuel farm, and fuel connections to existing 15 bays.	Ongoing	Water resources, infrastructure and utilities
JBER	Combat Alert Cell	Construct new 8-bay fighter aircraft hangar within existing airfield.	Future	Noise, air quality, infrastructure and utilities
JBER	Army National Guard Aircraft Maintenance Hangar	Construct new 54,250 SF aircraft maintenance hangar within existing BAAF.	Future	Noise, air quality, infrastructure and utilities
JBER	Additional Personnel	The Army will likely be adding personnel and support infrastructure for those personnel in support of potential new weapons systems and potential mission requirements. There will be no changes to indirect fire systems (artillery or mortar).	Future	Noise, air quality, infrastructure and utilities

Key: ARRC = Alaska Railroad Corporation; BAAF = Bryant Army Airfield; BASH = Bird/wildlife Airstrike Hazard; EOD = explosive ordnance disposal; ERF-IA = Eagle River Flats Impact Area; FLS = flight landing strip; FP = Firing Point; ITAM = Integrated Training Area Management; JBER = Joint Base Elmendorf-Richardson; LZ = landing zone; MP = milepost; POA = Port of Alaska; SF = square foot; UAC = Urban Assault Course

4.3 CUMULATIVE IMPACTS ANALYSIS

Table 4.3-1 summarizes the potential for cumulative effects of the proposed action when combined with potential impacts from the other regional actions described in Table 4.2-1. Duration, affected area, and degree of impact were considered in determining whether cumulative impacts would be potentially significant, as were BMPs, protective measures, and the mitigation measures determined during the effects analysis presented in Chapter 3.

Table 4.3-1 Summary of Cumulative Effects

Resource Area	Proposed Action	Other Cumulative Projects	Cumulative Effects	Cumulative Effects Evaluation
Legend**:** ○ – No or negligible contribution of project(s) to cumulative effects, or beneficial effects □ – Impacts would occur but would be less than significant (considers mitigation, where applicable) Δ – Potentially significant impacts; monitoring needed to determine impact and need for additional mitigation ● **–** Significant and unavoidable impacts even after mitigation				
Noise	□	□	□	Future development projects in the region would result in short-term construction noise, and some would result in long-term operations noise. However, the affected areas would not overlap ERF-IA or the proposed expansion area. Short-term construction noise under Alternative 1 is not expected to extend into off-base communities and therefore would have a negligible contribution to cumulative noise effects. Both action alternatives would result in expansion of large arms CDNL contours and more frequent training on JBER. Off-post land uses within the CDNL contours are compatible, and there are no noise-sensitive land uses within the predicted CDNL. Therefore, long-term community noise impacts associated with live-fire training at ERF-IA under either action alternative would not approach significance thresholds. Future development of the proposed Eklutna Inc. residential development might encroach on the new large arms CDNL contours. Information on noise contours could be provided to community planners so that placement of noise-sensitive receptors that are incompatible could be avoided.
Air Quality	□	□	□	Emissions associated with the expansion of ERF-IA under Alternative 1 would generate PM_{10} in exceedance of the insignificance factor during Year 1 construction and would be additive to other projects in the region that increase air quality emissions. However, with implementation of controls such as dampening soils and unpaved areas with water twice daily, these short-term cumulative effects would not be significant. Over the long term, both action alternatives would result in reduced air quality impacts associated with less vehicle travel to Fort Wainwright. Alternative 1 would increase the amount of prescribed burning done on JBER annually, although JBER's prescribed fire program would help reduce the risk of future wildfires. Net emissions from the proposed project would be additive to air quality impacts associated with ongoing and future projects in the region, although under Alternative 2 there would likely be an offset.
Sub-arctic Climate Considerations	○	□	□	The cumulative effects of potential regional warming on the past, present, and reasonably foreseeable future actions are highly dependent on each project's specific location, design considerations, and degree to which resiliency and sustainability have been incorporated. The proposed action does not alter other projects' levels of risk or vulnerability to regional warming.
Safety and Occupational Health	○	□	□	Construction work and prescribed burns under Alternative 1 would be done by trained contractors who would follow and implement AFOSH and OSHA safety standards to establish and maintain

Resource Area	Proposed Action	Other Cumulative Projects	Cumulative Effects	Cumulative Effects Evaluation
				safety procedures and mitigate risks and would not introduce new occupational hazards and associated cumulative safety risks for these workers. The action alternatives would not result in cumulative risks associated with live-fire and munitions safety, as none of the projects would increase the total amount of training done by the Army annually or otherwise introduce new range-related safety risks. Both alternatives would decrease the number of convoys to Fort Wainwright and have beneficial impacts on soldier safety. For the above reasons, the cumulative effects of the proposed action are negligible.
Earth Resources	•	□	□	Under both action alternatives, firing during non-frozen conditions would have an additive effect on cratering and soil disturbances already present from past training exercises and munitions firing within ERF. Alternative 1 would expand the extent of soil disturbance to the proposed expansion area, and impacts in this area would be significant and additive to other areas of long-term soil loss and disturbance in the ROI. These effects would contribute to topographic changes, surface disturbances, and potential changes to natural processes (erosion and sedimentation) that have been impacted by historical activities. The potential persistence of sequestered WP contamination from historical activities within ERF-IA could interact with proposed activities, resulting in cumulative effects. However, the risk of WP recontamination would be very low and would be further reduced with the implementation of BMPs and mitigation to protect gravel caps. While many projects listed in Table 4.2-1 may impact earth resources regionally, and soil impacts from the project would be significant locally, within the larger analysis area, long-term cumulative effects to soil resources would not be significant.
Water Resources	□	□	□	Past and ongoing firing exercises in ERF-IA have not been shown to cause significant impacts to local or regional water quality, flow, or suitability for use. Under both action alternatives, firing into ERF-IA would increase, with additional explosive residues being deposited and likely flushed into Knik Arm, where they would be additive to other discharges into Knik Arm from future development projects and other activities in the region. With the requirement for project-specific spill prevention and stormwater pollution prevention plans under the Clean Water Act, impacts from regional development projects and operations would generally be minimized and localized in extent, and the potential for cumulative effects would be reduced. The Alaska Nonpoint Source Water Pollution Control Strategy (ADEC 2020) provides an overarching plan for preventing cumulative impacts from nonpoint source runoff throughout the region. Additionally, sampling and monitoring of hydrologic conditions (which may include water quality sampling) will be performed in areas within and adjacent to the proposed project area. Cumulative impacts to regional waters from the proposed alternatives, when added to other regional impacts, are not expected to be significant. The project would adversely affect floodplain function only in localized areas affected by detonations and would not affect the function of the floodplain as a whole. Cumulative impacts to regional floodplains from the proposed alternatives, when added to other regional impacts, are not expected to be significant.

Resource Area	Proposed Action	Other Cumulative Projects	Cumulative Effects	Cumulative Effects Evaluation
Wetlands	□	□	□	Under both action alternatives, the loss and degradation of project area wetlands would be additive to impacts to wetland resources from other projects in the region. Watersheds with a reduced abundance and extent of wetlands have lower capacity to attenuate surface water flow and are more likely to experience erosion and sedimentation. The impact area expansion under Alternative 1 would not result in loss or degradation of wetland habitat, although functional losses would occur over a small, affected area. Under both action alternatives, live-fire training during non-frozen periods would impact the wetlands in ERF, an area where live-fire training between 1940 and 1991 previously resulted in losses of wetland vegetation and alterations of wetland soils and hydrology. The resumption of all-season firing under Alternatives 1 and 2 would expose wetlands in previously affected areas to new and additional disturbance. Given that the action is occurring in a previously disturbed area, the contribution of the proposed action to cumulative wetland impacts would be low. Regionally, wetland mitigation would be required for all projects with wetland impacts, which would help to minimize their cumulative effects to less than significant levels. In addition, the establishment of the Palmer Hay Flats, Goose Bay, and Susitna Flats State Game Refuges and the Chickaloon River Flats within the Kenai National Wildlife Refuge has helped to conserve the functional capacity and value of wetlands in the greater Cook Inlet watershed.
Biological Resources – Vegetation	□	□	□	Alternative 1 would result in long-term conversion of forest to non-forested herbaceous communities (350 acres) and non-vegetated firebreaks, service roads, and pads (9 acres), which would be additive to removal and conversion of forested habitats in the region associated with other actions. The return to all-season firing under Alternatives 1 and 2 would re-expose vegetation to disturbance from munitions detonation during the growth period for plants in previously affected areas. Under Alternative 1, the area impacted by this type of disturbance would expand beyond the extent of the previous disturbance. None of the actions listed in Table 4.2-1 would occur in ERF-IA or the proposed expansion area, but many would affect vegetation in the larger region. Given the prevalence of forested habitats in the region and that impacts to estuarine wetland vegetation would occur in an area that has been disturbed similarly in the past, cumulative impacts would not be significant.
Biological Resources – Fish	Δ	□	Δ	Both action alternatives would result in a range of potential adverse impacts to fish that are expected to be localized in extent to a portion of individual runs but could potentially affect fish at the watershed scale. Impacts from both action alternatives have the potential to exceed applicable significance thresholds, even with the proposed protective and mitigation measures. Continued salmon enumeration studies could allow JBER to obtain a better understanding of impacts to fish from the proposed action and potentially identify additional measures to reduce observed effects. Other projects summarized in Table 4.2-1 could potentially have a significant adverse effect on fish, but it is anticipated that each permitting process will require the implementation of protective and mitigation measures to reduce impacts to less than significant. However, the additive effects from other projects within the ROI would exacerbate stressors to fish from the proposed action alternatives. Cumulative effects such as noise, pollution, and habitat

Resource Area	Proposed Action	Other Cumulative Projects	Cumulative Effects	Cumulative Effects Evaluation
				loss/modification will continue in the ROI and while each incremental project alone may not cause effects that exceed significant thresholds, the effects from the proposed action alternatives and other projects combined could affect fish at the watershed scale. Injury and mortality that might occur as a result of the proposed action would be additive to injury and mortality associated with other actions. Continued fisheries harvest management, annual salmon enumeration studies, and habitat protection are important to effectively manage fish resources in ERF-IA and throughout JBER and would help offset any potential cumulative effects. Further, future restoration projects and fishery management actions by other private or public entities within Upper Cook Inlet would help offset these effects.
Biological Resources – Terrestrial Wildlife	□	•	•	Under Alternative 1, the removal or alteration of forested and shrub habitats would be additive to habitat losses and alterations resulting from other actions on JBER and in the region. Cumulative effects from construction of the expansion area would not be significant because the cumulative affected area would be small in relation to overall presence of habitat in the region. Under both action alternatives, intermittent live-fire training would occur during seasons when waterfowl and other wildlife are more likely to be present at ERF-IA. While wildlife generally returns to the area shortly after firing, or would become habituated to noise, temporary displacement of wildlife may be a larger impact when the shortage of alternate suitable habitat is considered. Additionally, waterfowl counts in ERF during migration have been declining since roughly 2010, although the factors for their decline could be far removed from the cumulative effects analysis region. Proposed protective measures and mitigation to avoid disturbing waterfowl (e.g., not using HE munitions during fall migration) would help reduce the contribution of the proposed action to cumulative effects, but with all other actions in the region considered, cumulative effects would likely be significant.
Biological Resources – Marine Mammals	□	□	□	The primary mechanism by which the proposed action may contribute to cumulative effects is through noise that may emanate from the restricted area at JBER and impacts to marine mammal prey. With regard to noise impacts, the proposed action protective measures and mitigation would reduce the impacts of live-fire training to less than significant. The marine mammals that inhabit Cook Inlet are regularly exposed to noise from anthropogenic sources, such as vessel traffic, marine construction, aircraft, and firearm noise from hunting. Noise from the sources can interrupt the normal behavior of marine mammals, which rely on sound to communicate and echolocate. Noise can also adversely affect marine mammal prey items. Underwater noise generated by proposed live-fire training under Alternatives 1 and 2 would only be above background levels within portions of Eagle Bay and is not expected to be audible to marine mammals in other portions of Cook Inlet. Airborne noise from live-fire training may be audible over greater distances within the Upper Cook Inlet, where pinnipeds are also exposed to airborne noise from various other sources in the baseline, including aircraft, boats, and hunting firearms. Pile driving noise or other underwater and airborne noise from other projects identified may be audible within Eagle Bay and/or the Upper Cook Inlet, and there may be a cumulative impact associated with the incremental increase in background noise

Resource Area	Proposed Action	Other Cumulative Projects	Cumulative Effects	Cumulative Effects Evaluation
				in that location. During the permitting process of other projects in the region, mitigation measures would be expected to reduce cumulative impacts. With regard to marine mammal prey, impacts have the potential to occur under both action alternatives. Continued salmon enumeration studies could allow JBER to obtain a better understanding of impacts to marine mammal prey from the proposed action and potentially identify additional measures to reduce observed effects. Other projects summarized in Table 4.2-1 could potentially have a significant adverse effect on fish, but it is anticipated that each permitting process will require the implementation of protective and mitigation measures to reduce impacts to less than significant. The additive effects from other projects within the ROI would exacerbate stressors to marine mammal prey species from the proposed action. Cumulative effects such as noise, pollution, and habitat loss/modification will continue in the ROI and while each incremental project alone may not cause effects that exceed significance thresholds, the effects from PMART and other projects combined could affect fish at the watershed scale. Injury and mortality that might occur as a result of the proposed action would be additive to injury and mortality associated with other actions. Continued fisheries harvest management, annual salmon enumeration studies, and habitat protection are important to effectively manage fish resources in ERF-IA and throughout JBER and additional measures determined and implemented as a result of these studies would help offset any potential cumulative effects. Further, future restoration projects and fishery management actions by other private or public entities within Upper Cook Inlet would help offset these effects.
Biological Resources – Special Status Species	□	•	•	The discussion above for marine mammals applies to Cook Inlet beluga whales, which are vulnerable to many stressors and threats, including pollution, habitat degradation, predation, harassment, interactions with commercial and recreational fisheries, oil and gas exploration, disease, and other types of human disturbance such as underwater noise. Many of these actions are currently present and are expected to increase in the future. The Cook Inlet population faces additional threats because of its proximity to the most densely populated area of Alaska (Anchorage) during the summer season. Many actions presented in Table 4.2-1 have the potential to increase underwater noise, but during the permitting process (such as ESA consultation) mitigation measures to reduce impacts would be required. Underwater noise impacts from all-season live-fire training under the action alternatives could potentially be additive or synergistic to noise impacts from other projects in the region. For example, it is possible that the response of a previously stressed beluga whale would be more severe than the response of an unstressed beluga whale. Proposed protective measures and mitigation would reduce the contribution of the proposed action to cumulative effects. Similar to the discussion above for terrestrial wildlife, the removal or alteration of forested and shrub habitats would be additive to habitat losses and alterations resulting from other actions in the region. Cumulative effects resulting in habitat loss or alteration from construction of the expansion area would not be significant because the cumulative affected area would be small in relation to overall presence of habitat for SSCs in the region. While noise from weapons training activities does have potential to disturb SSCs in the impact areas, these impacts are anticipated to be intermittent,

Resource Area	Proposed Action	Other Cumulative Projects	Cumulative Effects	Cumulative Effects Evaluation
				are not expected to make the habitat unsuitable for these species, and with planned protective measures, would not exceed applicable significance thresholds. Waterfowl counts in ERF during migration have been declining since roughly 2010, although the factors for their decline could be far removed from the cumulative effects analysis region. Proposed protective measures and mitigation would help reduce the contribution of the proposed action to cumulative effects, but with all other actions in the region considered, cumulative effects to migratory birds would likely be significant. Continued development on JBER and in the greater region contributes to the loss, degradation, and fragmentation of vegetation resources, including rare plant habitat. The action alternatives would have the potential to add to cumulative effects if rare plants are adversely affected. Under Alternative 1, the risk of impacts to rare plants from construction of and training in the proposed expansion area would be low because potential habitats for rare plants would largely be protected. Under the action alternatives, the proposed live-fire training outside of ice-covered conditions would affect potential rare plant habitats in ERF-IA. However, the affected area has been previously disturbed by similar activities in the past. Therefore, cumulative impacts to rare plants would not be significant.
Wildland Fire	□	□	□	Expansion of the impact area under Alternative 1 would contribute to cumulative fire risk over the affected area by converting forest to grasses that are more receptive to fire and easily ignitable. There would also be an increased potential for ignitions from live-fire training and prescribed fire, which would be additive to other increases in ignitions on JBER and in the region. However, most planned projects do not include large-scale vegetation conversion or introduction of ignition sources, and the long-term cumulative effect would not be significant. Under Alternative 2, the increased training in ERF-IA is anticipated to contribute a negligible amount to cumulative impacts to wildland fire risk, given the poor quality of the available fuel, even in summer, as an ignition source. Under both alternatives, the JBER *Wildland Fire Management Plan* would mitigate the potential for ongoing wildland fire risk and would be updated appropriately to mitigate the potential for future actions on JBER to increase wildland fire risk. Outside of JBER, the potential for ignitions from construction activities would be reduced with implementation of standard construction BMPs, and municipal fire response agencies would adjust their planning and response strategies in conjunction with planned new infrastructure and housing.
Cultural Resources	□	□	□	Potential adverse effects to archaeological sites in the proposed expansion area under Alternative 1 would be additive to impacts from other actions to archaeological sites, historic structures, and locations of Dene traditional importance. Under both action alternatives, training during non-frozen conditions could impact unknown archaeological sites or sites of Dene traditional cultural importance in ERF-IA. Potential impacts from the proposed action would be avoided or offset by the mitigation strategies detailed in an NHPA Section 106 Programmatic Agreement. Additionally, impacts associated with other actions that have a federal nexus will continue to be addressed in accordance with NHPA Section 106, NEPA, DoD and Air Force policies. if applicable, and other

Resource Area	Proposed Action	Other Cumulative Projects	Cumulative Effects	Cumulative Effects Evaluation
				pertinent cultural resource regulations during individual project planning, with unavoidable impacts mitigated following the processes set forth in 36 CFR Part 800 and/or NEPA. With these processes in place, cumulative impact to cultural resources would not be significant.
Subsistence	□	□	□	While no locations within ERF-IA are currently used for subsistence, cumulative impacts to fish and wildlife resources could carry over to subsistence harvest by reducing the availability of subsistence resources in nearby areas traditionally used for harvest. For fish and marine mammals, as described earlier in this table, the potential for cumulative impacts exists, but permitting for projects with the potential to impact these groups and their habitats would require identification of mitigation measures to reduce impacts to less than significant levels. With regard to subsistence salmon fisheries, impacts from both action alternatives have the potential to exceed applicable significance thresholds, even with the proposed protective and mitigation measures. The additive effects from other projects within the ROI would exacerbate stressors to fish from the proposed action alternatives. Cumulative effects such as noise, pollution, and habitat loss/modification will continue in the ROI and while each incremental project alone may not cause effects that exceed significant thresholds, the effects from the proposed action and other projects combined could affect fish at the watershed scale. Injury and mortality that might occur as a result of the proposed action would be additive to injury and mortality associated with other actions. Ongoing annual salmon enumeration studies could allow JBER to obtain a better understanding of impacts to salmon from the proposed action and potentially identify additional measures to reduce observed effects. Continued fisheries harvest management, annual salmon enumeration studies, and habitat protection are important to effectively manage fish resources in ERF-IA and throughout JBER and would help offset any potential cumulative effects. Further, future restoration projects and fishery management actions by other private or public entities within Upper Cook Inlet would help offset these effects. With regard to marine mammals, the proposed action protective measures and mitigation would reduce the impacts of live-fire training to less than significant. For marine mammals that are currently harvested, there would not be a significant cumulative effect on harvest for subsistence use. Live-fire training under Alternative 1 could potentially affect marine mammal prey (fish) at the watershed scale. This may result in affects to marine mammal populations that heavily utilize Eagle River and/or Otter Creek but is not expected to result in any noticeable availability of marine mammal species that may be regionally utilized for subsistence (such as harbor seal). In the case of the Cook Inlet beluga whale, subsistence harvest is currently prohibited until the population recovers to adequate levels. The cumulative effect of behavioral effects from the proposed action, when added to other projects in the region and other stressors of this species, has the potential to slow the recovery of the species. However, regulation of these actions by NMFS under ESA and MMPA would require mitigation and monitoring such that the continued existence of the species is not jeopardized.
Land Use and Recreation	○	□	□	Under both action alternatives, increased training at ERF-IA would generate more frequent large arms noise that would predominantly affect areas on JBER with compatible land use designations.

Resource Area	Proposed Action	Other Cumulative Projects	Cumulative Effects	Cumulative Effects Evaluation
				Large arms noise contours would expand into a larger area in the community of Eagle River but would overlay compatible land uses (Vacant, Transportation, and Water). A potential Eklutna Inc. residential development within the expanded noise zones would have the potential to result in incompatible land uses over a small area, but significant impacts could be avoided through community planning and placement of noise-sensitive receptors outside of incompatible areas. Expansion of ERF-IA under Alternative 1 would be additive to other projects on JBER that reduce areas accessible for recreation, either temporarily or permanently. This cumulative reduction in recreational areas would take place over time, thereby allowing recreational users to identify alternative areas to fulfill recreational pursuits, and cumulative reduction in recreational areas would be relatively small compared to the available recreational lands. Habitat loss and impacts from the proposed action on terrestrial wildlife species that are recreationally hunted would be additive to impacts from other projects that remove or degrade habitats and disturb these species. Cumulative effects would not be significant, given that wildlife would likely seek alternative suitable areas, and there is a large amount of similar available habitat in the region. Increased live-fire training under both action alternatives would introduce periodic noise during the summer into some adjacent areas used for recreation but would not contribute to significant cumulative effects to recreation over baseline conditions.
Transportation and Circulation	○	○	○	Under Alternative 1, construction-related vehicles and traffic within JBER would have temporary impacts on traffic and circulation that would be cumulative to other sources of traffic on the installation but would not be significant. Construction of new gravel service roads, when considered in addition to other projects to improve infrastructure on JBER, would result in beneficial cumulative effects. Under both action alternatives, increased use of the road network in the training north district would be cumulative to other uses of this road network, but with training and range scheduling, these impacts would not be significant. Soldiers would deploy to Fort Wainwright less, but the maximum number of soldiers on base at any given time would not increase, and there would be a negligible contribution to cumulative impacts to existing on-base and off-base transportation networks. Less deployment would have a beneficial impact on regional off-base transportation, particularly during the summer months, which would help offset impacts from projects that increase regional traffic.
Socioeconomics	○	○	○	Alternatives 1 and 2 would have beneficial impacts to military expenditures through reduced travel costs. These impacts would help offset expenditures associated with other training costs. Impacts on soldier quality of life would also be beneficial. It is expected that there would be adequate military or contractor personnel and equipment to complete the impact area expansion under Alternative 1, as well as other construction projects planned at JBER and in the region. The workforce in the ROI is expected to be capable of absorbing any economic activity associated with impact area expansion and other reasonably foreseeable future activities, such that cumulative socioeconomic effects would

Resource Area	Proposed Action	Other Cumulative Projects	Cumulative Effects	Cumulative Effects Evaluation
				not be significant. Both alternatives would have no or negligible contributions to cumulative impacts on population, and housing.
Infrastructure and Utilities	□	□	□	Under Alternatives 1 and 2, use of existing range infrastructure would increase as a result of increased live-fire training at JBER, which would be additive to increased use resulting of future planned actions at JBER. Regular maintenance of infrastructure would offset potential cumulative impacts. The small annual increase in utility demand under Alternatives 1 and 2 would be additive to other actions on JBER that increase utility demand (e.g., stationing actions and development of new facilities). Impacts would not be significant, as increases would take place over time, actions would consider utility needs during planning, and all of JBER's utility systems currently have capacity for expansion.
Hazardous Materials and Waste	□	○	□	While hazardous materials and waste would be generated under Alternative 1, handling, storage, and disposal would follow applicable regulations, and the affected area would be geographically removed from other projects in the region that generate hazardous materials and waste. While both action alternatives would entail firing into ERF when gravel caps are exposed, the risk of a misfire damaging gravel caps and re-releasing WP into ERF-IA would be very low with avoidance measures and mitigation. In addition, no rounds that contain WP would be fired into ERF-IA, and none of the projects listed in Table 4.2-1 would affect the CERCLA sites present in ERF-IA.
Forest Resources	□	□	□	Alternative 1 would result in long-term conversion of 359 acres of forest to non-forest, which would be additive to removal of forest resources resulting from regional development actions. Creation of new forest edge would be cumulative to the effects of other actions that increase the vulnerability of forest stands to spruce beetle infestations. Future planned development projects on JBER would follow applicable guidance to properly dispose of white spruce and not introduce additional ignition sources. The spatial separation of regional development projects from JBER reduces the likelihood of a cumulatively significant increase in spruce beetle activity and related tree mortality in the region. None of the planned projects on JBER involve large-scale forest land removal. Alternative 2 would have a negligible contribution to cumulative impacts to forest resources, as no removal of forest vegetation would occur.

Key: AFOSH = Air Force Occupational Safety and Health; BMP = best management practice; CDNL = C-weighted Day-Night Average Noise Level; CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act; CFR = Code of Federal Regulations; DoD = Department of Defense; ERF = Eagle River Flats; ERF-IA = Eagle River Flats Impact Area; ESA = Endangered Species Act; GHG = greenhouse gas; HE = high explosive; JBER = Joint Base Elmendorf-Richardson; MMPA = Marine Mammal Protection Act; NEPA = National Environmental Policy Act; NHPA = National Historic Preservation Act; NMFS = National Marine Fisheries Service; OSHA = Occupational Safety and Health Administration; PM_{10} = particulate matter less than or equal to 10 micrometers in diameter; PMART = Proposed Mortar and Artillery Training; ROI = Region of Influence; SSC = Species of Special Concern; WP = white phosphorus

4.4 MARINE MAMMAL CUMULATIVE IMPACTS ANALYSIS

Because this proposed action has the potential to impact marine mammals within the ROI, the Air Force has provided a detailed cumulative effects analysis for this resource area. In reviewing the information provided in the previous sections of this Draft EIS about the ROI, the Air Force and NMFS determined that activities with the potential to impact a resource would be expected to have additive or synergistic impacts if they affect the same population, even if the effects were separated geographically or temporally. Therefore, this cumulative effects analysis considers these potential impacts; however, it focuses on activities that may temporally or geographically overlap with the Air Force's proposal to expand indirect-fire artillery training at ERF-IA such that the effects of harassment warrant consideration for potential cumulative impacts to the following potentially affected marine mammal species: Cook Inlet beluga, Steller sea lion, harbor porpoise, and harbor seal.

Marine mammal individuals found in the ROI may be affected by activities anywhere within their habitat range, and a number of natural and human activities occur in Cook Inlet. These generally include subsistence hunting, pollution, fisheries interaction, vessel traffic, air traffic, coastal zone development, military activities at and around JBER, and marine mammal research.

The primary mechanism by which the proposed action may contribute to cumulative effects is through noise that may emanate from the restricted area at JBER and impacts to marine mammal prey. With regard to noise impacts, the proposed protective measures and mitigation would reduce the impacts of live-fire training to less than significant. The marine mammals that inhabit Cook Inlet are regularly exposed to noise from anthropogenic sources, such as vessel traffic, marine construction, aircraft, and firearm noise from hunting. Noise from these sources can interrupt the normal behavior of marine mammals, which rely on sound to communicate and feed. Noise can also adversely affect marine mammal prey items. Underwater noise generated by proposed live-fire training under Alternatives 1 and 2 would only be above background levels within Eagle River and portions of Eagle Bay and is not expected to be audible to marine mammals in other portions of Cook Inlet. In-air noise relevant to pinnipeds may be audible for over 50 kilometers.

Other stressors may include pollutants, direct strike by vessels, entanglements in fishing gear, and direct interaction with humans during marine mammal research activities; these stressors are addressed below in the relevant activity sections.

The following sections briefly summarize the natural and human-related activities affecting the marine mammal species in the ROI and any known potential additive or synergistic effects.

4.4.1 Subsistence Hunting

The practice of hunting marine mammals for food, clothing, shelter, heating, and other uses is an integral part of the cultural identity of Alaska Native peoples and communities. In Cook Inlet, Alaska Natives historically hunted beluga whales and continue to hunt harbor seals for subsistence purposes. However, NMFS determined that subsistence harvest activities by Alaska Natives would not contribute to significant cumulative impacts when considered with other past, current, or reasonably foreseeable future actions. The only marine mammal species that may be impacted by the proposed action and is currently used for subsistence purposes in Cook Inlet is the harbor seal. Alaska Natives have not hunted Cook Inlet beluga whales since 2005 (NMFS 2016b) and it is unlikely hunting of beluga whales would resume within the time frame of the Air Force's activity. While Steller sea lions are used for subsistence purposes in Alaska, in general, they are not regularly hunted in Cook Inlet, given their uncommon occurrence in the ROI.

Based on harvest limitations established for harbor seals, known annual harvest rates (as monitored by the Alaska Native Harbor Seal Commission and ADF&G), combined with the fact that no subsistence takes of harbor seals are known to occur in the vicinity of the proposed project, NMFS and the Air Force have reasonably concluded that take associated with subsistence harvest would have no significant cumulative impacts on the harbor seal population.

4.4.2 Pollution

The amount of pollutants that enter Cook Inlet is likely to increase as populations in urban areas continue to grow. Sources of pollutants in urban areas include runoff from streets and discharge from wastewater treatment facilities. Gas, oil, and coastal zone development projects (see Sections 4.4.6 and 4.4.7) also contribute to pollutants that enter Cook Inlet through discharge. These sources of pollutants are expected to continue in Cook Inlet; therefore, with additional minor sedimentation and explosives residues from the proposed action, it would be anticipated that pollutants could increase in upper Knik Arm, including Eagle River and Eagle Bay, and possibly be transported to other areas of Cook Inlet via tidal flow.

Potential sources of pollution that could affect marine mammals in Cook Inlet include offshore oil and gas development; municipal waste and bilge discharge; marine oil spills; runoff from roads, airport, military sites, mines, construction sites, and farms; terrestrial and marine spills of contaminants other than oil; resuspension of contaminants through dredging; ship ballast discharge; watercraft exhaust and effluent; coal transportation and burning; auto exhaust; antifouling paint; and trash. Possible contaminants marine mammals in Cook Inlet could be exposed to include persistent organic pollutants, aromatic hydrocarbons, chlorinated hydrocarbons, heavy metals, endocrine disruptors, pharmaceuticals, antibiotics, sanitizers, disinfectants, detergents, insecticides, fungicides, and de-icers. While NMFS has some data about levels of traditionally studied contaminants in Cook Inlet beluga whales (e.g., dichlorodiphenyltrichloroethane [DDT], PCBs, PAHs, etc.), very little is known about other emerging pollutants of concern and their effects on marine mammals. The emerging pollutants of concern include endocrine disruptors (substances that interfere with the functions of hormones), pharmaceuticals, personal care products (chemicals such as soaps, fragrances, insect repellants, etc.), prions (infectious proteins that cause neurodegenerative disease), and other bacterial and viral agents that are found in wastewater and biosolids.

In 2007, in support of the ongoing EIS to reinstate all-season indirect live-fire training at JBER, water quality samples were collected during three separate sampling events from areas along Eagle River, including areas upriver from ERF and at the river’s mouth. Samples were analyzed for the presence of metals, explosives, and polychlorinated biphenyls. No explosive residues or compounds (including HMX, RDX, TNT, or PCBs) were detected in the river. In addition, none of the samples contained metals in excess of drinking water maximum contaminant levels. This suggests that munition contaminants and residues from winter firing activities are either breaking down or not being released into waterbodies where they could be available to marine mammal prey species.

There is a potential for degradation of water quality from introduction of munitions constituents into the environment as a result of firing rounds into ERF-IA, which could affect marine mammal habitat and prey. However, testing has consistently shown that traditional munitions constituents are not accumulating in or migrating out of ERF-IA. The presence of munitions-related compounds has been studied at 31 military ranges in the United States and in Canada, including at ERF-IA (Jenkins et al. 2007; Walsh et al. 2010). Lotufo et al. (2013) reviewed the fate and effects of several munitions constituents used at JBER and found that most constituents rapidly degraded in aqueous exposure systems, showed a significant binding affinity with organic matter, and were unlikely to result in biological effects to fish; however, the study states that verification of this conclusion should be pursued by determining site-specific exposure risk.

Live firing would discharge metal shrapnel fragments, containing small percentages of copper and zinc, into firing and target areas of ERF during munition detonation. The proposed habitat protective buffers that prohibit targets in areas within 50 to 500 meters of flowing waters would prevent most shrapnel from directly entering waterbodies. Contaminants and shrapnel fragments could enter waterbodies during tidal flushing events. Studies of sites impacted by munitions constituents generally only find trace amounts of copper and zinc (Rectanus et al. 2015). Considering the site characteristics and the small amounts of these metals that comprise munitions at JBER, the bioavailability of copper and zinc to marine mammal prey species is expected to be low. No studies specific to ERF were found that discuss accumulation or transport rates of IM, but recent investigations at ERF-IA indicate that 3 nitro-1,2,4 triazol-5 one and nitroguanidine are highly water soluble and likely to migrate with surface water or into groundwater. These IM compounds and their breakdown products have been identified as limiting growth in aquatic organisms and causing behavioral abnormalities, with ultraviolet light potentially causing increased toxicity to aquatic organisms if these constituents are mobilized into waterbodies (Moores et al. 2021). These compounds appear to have low bioaccumulation and biomagnification potential, which would reduce risk of transferring toxicity from fish to marine mammals. More persistent IM compounds would be subject to soil breakdown pathways likely accelerated by presence of anaerobic soils and organic matter at ERF-IA. It is possible that degradation may occur even more rapidly because ERF-IA is a tidal estuary. Many residues are likely to be flushed out of the impact area and into Eagle Bay in runoff and subsequently diluted, with a flushing of residues deposited during the winter in spring snowmelt. It is possible that salmonids near a LO detonation (i.e., partial detonation) crater or degrading UXO could experience adverse effects, particularly if they consume contaminated prey items within these areas. There is a low risk of munition contaminants entering Eagle River, Otter Creek, or associated wetland complexes at levels that could result in sublethal effects to juvenile salmonids.

The predominantly anaerobic environment at ERF-IA and various breakdown pathways (e.g., soil sorption, dissolution, phototransformation, and biodegradation) are expected to reduce exposure of munition contaminants to aquatic species. However, site-specific sampling would be needed to further evaluate the potential for newer IM constituents to exhibit bioaccumulation at ERF-IA. The proposed expansion of mortar and indirect-fire artillery training at JBER's ERF-IA would result in an increased risk of exposure of munitions residue to marine mammal prey species, but the protective avoidance and minimization measures, including habitat protective buffers, seasonal and tidal firing restrictions, avoiding ground penetration in areas where WP contamination has been capped, and selective targeting within unbuffered areas, would reduce risk of contaminants entering waterbodies where they could potentially be consumed or accumulate in tissues of prey species. The risk of munitions contaminants to affect prey species would be low to moderate due to (1) contradictory study results and uncertainty about breakdown efficiencies and toxicological effects from IM on fish and aquatic invertebrates, and (2) dynamic processes in ERF that could mobilize and transport IM and other traditional munitions into year-round rearing habitats for sensitive juvenile coho and other salmonids. It is possible that juvenile salmon that ingest invertebrates that have been exposed to munition residues could experience toxicological effects.

Exposure to contaminants found in pollution may be the result of marine mammals' direct contact with contaminants found in the water, inhalation of contaminants in the air, or ingestion of contaminants found in prey, mud, or silt. There is little information on the potentially deleterious effects of contaminants on marine mammals, but it is likely that chronic exposure to contaminants may compromise an individual whale's health, with the potential for population-level impacts. A recent study of Cook Inlet beluga whales suggests a potential link between gastrointestinal cancer in beluga whales to environmental PAH contamination (Poirier et al. 2019). There is also evidence of female marine mammals passing contaminant loads to offspring (Peterson et al. 2018; Andvik et al. 2021) as well as a relationship between contaminant exposure and congenital abnormalities (Burek-Huntington et al. 2022). However, the effects of repeated transfer of contaminant loads to offspring repeatedly across generations is unclear, and additional research on the causes of congenital abnormalities in Cook Inlet beluga (including effects of contaminant exposure, genetic diversity, and nutrition) is needed. Of note, while the *Recovery Plan for the Cook Inlet Beluga Whale* identifies pollution as a threat, it notes that available information indicates that the magnitude of the pollution threat to Cook Inlet beluga appears low, though not all pollutants to which Cook Inlet beluga are exposed have been studied in that environment (NMFS 2016b).

Bioaccumulation of pollution from primary prey species (i.e., salmon) could potentially impact the health of marine mammals; the potential ecotoxicological impacts of the various existing pollutants when combined with the discharges from the proposed action are unknown. However, there is no evidence suggesting that marine or freshwater pollution would increase the susceptibility of primary prey to stressors associated with the proposed action and result in additional cumulative effects. Between 2007 and 2011, Army personnel collected 102 tissue samples from 15 fish species captured in the tidally influenced portions of Eagle River (Garner et al. 2008; USACHPPM 2008a, 2008b, 2009; USAPHC 2011). These samples were taken from all five Pacific salmon species, eulachon, starry flounder, and Pacific staghorn sculpin. The concentration of munitions residues in the samples did not exceed the detection limit in any of the fish tissue samples (Garner et al. 2008; USACHPPM 2008a, 2008b, 2009; USAPHC 2011). The results of this study indicate that munitions residues are not bioaccumulating in the fish that use the tidally influenced portions of Eagle River. Many of these fish were captured in the mouth of Eagle River, at its juncture with the waters of Knik Arm. This, taken with the fact that several of the analyzed species were primarily marine species (e.g., saffron cod, starry flounder), suggest that fish in Knik Arm are also not bioaccumulating munitions residues. Additionally, continued fisheries harvest management, annual salmon enumeration studies, and habitat protection are important to effectively manage fish resources in ERF-IA and throughout JBER and would help offset any potential cumulative effects. Further, future restoration projects and fishery management actions by other private or public entities within Upper Cook Inlet would help offset these effects.

USEPA and ADEC will continue to regulate the amount of pollutants that enter Knik Arm from point and non-point sources through Alaska Pollutant Discharge Elimination System permits. As a result, permit holders will be required to renew their permits, verify that they meet permit standards, and upgrade facilities if necessary.

With implementation of avoidance and minimization measures and other conservation measures, the incremental amounts of pollution resulting from the Air Force's action are not anticipated to result in cumulatively significant impacts to marine mammals.

4.4.3 Fisheries Interaction and Entanglements

Fishing is a major industry in Alaska. Cook Inlet supports several commercial fisheries (e.g., chum, sockeye, coho, Chinook, and pink salmon) and recreational fisheries (e.g., Chinook and coho salmon, Pacific cod, and halibut). The average annual commercial harvest of salmon in Upper Cook Inlet from 1966–2016 was 3.5 million (Shields and Dupuis 2017). The most recent 10-year average annual commercial salmon fishery harvest is 2.5 million fish, and the 2022 harvest of 1.4 million was 44 percent less than the 10-year average. The 2022 Upper Cook Inlet commercial harvest compared to the recent 10-year average was down 34 percent for chum, 43 percent for sockeye, 44 percent for coho, 58 percent for Chinook, and 72 percent for pink salmon (ADF&G 2023). At this point, it is hard to know if these results are a short-term reflection of natural variation or are an indicator of a more systematic shift and downward trend. Salmon are the primary prey item for Cook Inlet beluga whales, and these numbers may be a cause for concern; at best, they indicate there are fewer salmon available for commercial fisheries; recreational, personal and subsistence use; and beluga whales.

On 30 April 2024, NMFS issued a final rule (89 FR 34718) to implement amendment 16 to the *Fishery Management Plan for the Salmon Fisheries in the EEZ off Alaska* (NPFMC et al. 2021), which establishes federal fishery management for all salmon fishing that occurs in the Cook Inlet Exclusive Economic Zone, which includes commercial drift gillnet and recreational salmon fishery sectors.

The 2024 List of Fisheries identifies Cook Inlet beluga whales, Steller sea lion, humpback whales, harbor porpoise, Dall's porpoise (*Phocoenoides dalli*), and harbor seal as species likely to interact with salmon fisheries (89 FR 12257). Potential impacts from commercial fishing on marine mammals include ship strikes, harassment, gear entanglement, reduction of prey, and displacement from important habitat. For example, the Kenai River is a heavily fished river in Alaska; beluga whales no longer use waters near the river during salmon fishing season, despite the fact that it has the largest salmon run in Cook Inlet and was heavily used beluga foraging habitat in the past (Ovitz 2019).

Steller sea lion entanglements are rare in any Alaska commercial fishery, with the exception of the salmon troll fishery where they target the bait. There have been no serious injuries or mortalities of Steller sea lions in the salmon drift gillnet fishery in Cook Inlet observed by the Alaska Marine Mammal Observer Program (AMMOP) or reported through the Marine Mammal Authorization Program (MMAP) self-reports, suggesting that either this is a very rare occurrence or that occurrences are not self-reported. Additionally, Cook Inlet is not an important foraging area for Steller sea lions, and they are not usually present in the ROI in large numbers.

Between 2005 and 2017, McGuire et al. (2020) documented 14 instances of scars on Cook Inlet beluga whales, based on stranding and dual-side photo identification, which could be from entanglement. Of these, 11 observations were possible entanglement scars that may have involved monofilament line, netting, or rope/line, and three were confirmed scars from a net injury, a heavy braided line, and a gillnet. However, AMMOP did not observe any serious injuries or mortalities of Cook Inlet beluga whales in salmon drift gillnet gear, and none have been reported through the MMAP. It is uncertain where or in which fisheries these entanglements may have occurred. The only known mortality of a beluga was a young animal recovered from a set net in 2012 (NMFS 2016b).

As long as fish stocks are sustainable, subsistence, personal use, recreational, and commercial fishing would continue in Cook Inlet. As a result, continued prey competition, risk of ship strikes, potential harassment, potential for entanglement in fishing gear, and potential displacement from important foraging habitat would occur for beluga whales and other marine mammals. An important remaining unknown is the extent to which Cook Inlet marine mammal prey is made less available due to commercial, subsistence, personal use, and sport fishing either by direct removal of the prey or by human-caused habitat avoidance. Continued fisheries harvest management, annual salmon enumeration studies, and habitat protection are important to effectively manage fish resources in ERF-IA and throughout JBER and would help offset any potential cumulative effects. Further, future restoration projects and fishery management actions by other private or public entities within Upper Cook Inlet would also help offset potential cumulative effects. NMFS assumes that ADF&G will continue to manage fish stocks and monitor and regulate fishing in Cook Inlet to maintain sustainable stocks.

4.4.4 Vessel Traffic

Cook Inlet is a regional hub of marine transportation throughout the year and is used by various classes of vessels, including container ships, bulk cargo freighters, tankers, commercial and sport-fishing vessels, and recreational vessels. Vessel traffic in Cook Inlet transits through the Port of Kodiak, Port of Homer, and the POA in Anchorage. Off-shore vessels, tug vessels, and tour boats represent 86 percent of the total operating days for vessels in Cook Inlet (BOEM 2016). Vessel traffic density is concentrated along the eastern margin of the inlet between the southern end of the Kenai Peninsula north to Anchorage. Eighty percent of large ship operations were made by only 15 vessels that regularly called at Homer, Nikiski, or Anchorage (Eley 2012). Vessel traffic north of the POA in Knik Arm is limited to the few vessels per year that call at Port MacKenzie (approximately two large ships [a landing craft and/or a barge]), and recreational small vessels.

Major contributors to vessel traffic throughout Cook Inlet include port facilities, oil and gas development, and commercial and recreational fishing. The POA is a major Alaskan port located adjacent to Anchorage in Upper Cook Inlet, approximately 8.5 miles south of the mouth of Eagle River. It handles half of all Alaska inbound fuel and freight (shipped via marine, road, and air), half of which is delivered to final destinations statewide, outside the Municipality of Anchorage. It serves approximately 90 percent of Alaska's population (POA 2019), providing access to fuel and non-fuel cargo items such as food, consumer goods, building materials, cars, cement, and other goods critical for Alaskans' everyday requirements. Seventy-five percent of all non-petroleum marine cargo shipped into Alaska (not including Southeast Alaska, which is served from barges directly from Puget Sound) moves through the POA (POA 2019a). Major vessels calling to the POA include cargo ships, barges, tankers, dredgers, military ships, and tugboats (POA 2009). According to data from 1998 to 2011, an average of approximately 450 vessels call to the POA annually (POA 2014). Reasonably foreseeable future activities include an increase in the number of cruise ships calling at the POA (currently fewer than 5 per year). The POA is adjacent to JBER, and marine mammals accessing Eagle River and Eagle Bay would necessarily transit past the POA through Knik Arm. The POA yields a high volume of vessel traffic, some of which may be present during firing activities at ERF. In addition, the POA is currently under construction to modernize its facilities (see Section 4.4.6.2); however, these facility updates are not expected to increase vessel traffic. An increase in vessel traffic could occur, however, from continuing city and state development and growth.

Port MacKenzie is located in Upper Cook Inlet, across Knik Arm from the POA and approximately 7.6 miles from the mouth of Eagle River, and contributes to vessel traffic in and around Knik Arm. It receives approximately two large ships (a landing craft and/or a barge) annually, which is substantially fewer than the POA. The Port MacKenzie Rail Extension Project, when completed, will connect Port MacKenzie to the Alaska Railroad Corporation's existing mainline between Wasilla and Willow and will provide freight service between Port MacKenzie and Interior Alaska. Currently, no funding is allocated for completion of the rail extension, and no work has been conducted since 2015. Additionally, Port MacKenzie has long-term plans to expand its deep-draft dock; however, no funding is currently allocated for design or construction. If it is expanded, the number of ships calling at Port MacKenzie is anticipated to increase. Increased vessel traffic could result in increased in-water noise and potential ship strikes to marine mammals.

Effects of vessel traffic on marine mammals in the area are largely unknown. Vessel traffic, especially large vessels, are channeled through dedicated shipping lanes so as to limit the footprint of the large vessel traffic, leaving large portions of Cook Inlet and particularly Knik Arm north of the POA free of large vessels and available for marine mammal use. However, small vessel use (e.g., personal watercraft) is much more difficult to characterize. Increased vessel traffic may contribute to increased pollution, increase in ambient noise, and increased risk of vessel strike. Increased pollution and increased ambient noise level may have long term sub-lethal effects such as increased contaminant load or masking of communication between marine mammals (Duarte et al. 2021). Commercial ships are a prominent source of anthropogenic noise across Cook Inlet and particularly in the southern portion of Knik Arm, both in percent of overall anthropogenic noise time and mean duration of events. Sounds produced from commercial shipping are sometimes at levels loud enough to potentially mask beluga whale hearing and interfere with their communication (Castellote et al. 2018).

Marine mammals may also avoid areas with increased vessel noise (e.g., Malme et al. 1984; Palka and Hammond 2001). Beluga whales in the St. Lawrence Estuary in Canada have been reported to increase levels of avoidance with increased boat presence by way of increased dive durations and swim speeds, decreased surfacing intervals, and by bunching together into groups (Blane and Jaakson 1994). Avoidance, however, is anticipated to be short term, with animals returning to the area once the noise has ceased (e.g., Bowles et al. 1994; Goold 1996; Stone et al. 2000; Morton and Symonds 2002; Gailey et al. 2007).

Vessel strike has the potential to result in serious injury or mortality to marine mammals and can be under-reported in cases involving large vessels where crew may be unaware of the strike (Schoeman et al. 2020). Ship and small-vessel traffic in Cook Inlet and Knik Arm is regular, but there are no available data on vessel strikes of cetaceans in this area. The Cook Inlet beluga recovery plan notes that while vessel strikes have not been a confirmed source of beluga mortality, there have been documented avoidance reactions to small vessels, and necropsy findings for two animals (one each in 2007 and 2012) were consistent with injuries from boat strikes (NMFS 2016b). Additionally, propeller scars have been documented on living individuals in the population (NMFS 2016b). Vessel strikes appear to be relatively rare in the Cook Inlet beluga population, and no strikes of other species have been reported in the area. Despite the high chance of injury or mortality resulting from a strike, the effects are typically limited to a singular marine mammal, limiting the potential of a population-level effect.

The proposed action does not involve vessels; therefore, cumulative impacts to marine mammals resulting from increased vessel presence are not expected to occur. JBER also recently received approval from USACE for the establishment of a restricted area within Knik Arm to prevent vessels and individuals from entering the explosive arc area of the Six Mile Munitions Storage Area (88 FR 18051). Except for authorized vessels and individuals in support of military training and management activities, the restriction is always in effect. The restricted area is located between Eagle Bay and the POA.

4.4.5 Air Traffic

Commercial, military, and personal aircraft are prevalent throughout Alaskan airspace; in Anchorage, Ted Stevens Anchorage International Airport (ANC) serves most commercial needs, and as of 2022 is the third busiest cargo airport worldwide. ANC counted 93,816 total landings (approximately 46 percent passenger flights and 54 percent cargo flights) between 1 July 2022 and 30 June 2023 (Alaska International Airport System 2023). Smaller commercial and recreational aircraft frequently utilize Merrill Field and Lake Hood Seaplane Base; military aircraft are based at JBER. In Alaska, aviation accounts for approximately 10 percent of all jobs and up to 8 percent of the state's gross domestic product (Alaska Department of Transportation and Public Facilities 2015).

Aircraft and air traffic may impact marine mammals in Cook Inlet through pollutants (addressed in Section 4.4.2) and noise transmitted via air or into the water during overflights (Castellote et al. 2018; Erbe et al. 2018; Kuehne et al. 2020). Castellote et al. (2018) noted four different categories of aircraft that could be identified on underwater passive acoustic recordings: jet aircraft (commercial or military non-fighter), military fighter jets, helicopters, and propeller aircraft. Recordings made in and around Eagle Bay in August and September of 2010 captured 68 instances of fighter aircraft noise and 3 instances of non-fighter aircraft over 59 days. Elsewhere in Knik Arm, non-fighter aircraft were more commonly recorded, particularly in the vicinity of ANC (Castellote et al. 2018).

Underwater and in-air noise levels from aircraft are dependent on altitude (Erbe et al. 2018; Castellote et al. 2018). For sound that is transmitted underwater, the duration of these events is typically short (less than 30 seconds per event). All species of marine mammals found in Cook Inlet may perceive noise from aircraft overflights at some point in their lives, particularly in the areas around Anchorage, including Knik Arm, Eagle Bay, and ERF. Pinnipeds, which may temporarily haul out along the shoreline of Knik Arm, are likely to be exposed to aircraft noise both underwater and in air.

During visual monitoring conducted by NMFS in conjunction with a previous POA project, MMOs noted that beluga whales occasionally reacted to military jet activity from JBER (Easley-Appleyard and Leonard 2022). Beluga whales were notably far more likely to dive when the military jets passed overhead, especially at the North Extension Area station, where the noise was loud enough to require hearing protection for the MMOs. The beluga whales usually had extended dive times of 10+ minutes during these occurrences.

Table 4.2-1 shows existing and reasonably foreseeable future actions expected for JBER. These include projects that may increase aircraft activity on and around JBER, particularly in the case of runway expansions, new aircraft hangers, and force modifications. If these projects are approved and implemented, potential increases in aircraft overflights could increase exposure to airborne noise by pinnipeds. The proposed action at JBER is likely to increase the amount of airborne transient noise events (i.e., aircraft overflights and artillery firing noise) to which marine mammals in and around Eagle Bay will be exposed. However, the existing acoustic environment in both air and water is characterized by transient anthropogenic noises occurring at irregular intervals, particularly from existing military jet aircraft. The proposed action does not include any increases in aircraft overflights. Increases in commercial and personal aircraft flights departing from or arriving at Anchorage-area airports would be expected to have a more noticeable impact on the ambient in-air noise levels. A moderate increase in transient, short-duration explosive noise events from increased artillery firing would not be expected to have any cumulative impacts on marine mammals present in Cook Inlet.

4.4.6 Coastal Zone Development

Coastal zone development in Cook Inlet may result in the loss of habitat, increased vessel traffic, increased pollutants, increased sedimentation, and increased noise associated with project construction and operations. Potential projects in and around Cook Inlet include mining projects, renewable energy projects (Fire Island Wind Project Phase 2 and tidal energy development), and coastal construction (e.g., port expansions and maintenance, road and railway construction). Figure 4.2.1 shows a representation of the types of projects occurring in Knik Arm.

Anthropogenic activities related to coastal development may detrimentally affect marine mammal habitat through loss or degradation of habitat and alterations in the availability of prey in critical habitat areas. Coastal development activities in Cook Inlet broadly include road and transportation infrastructure construction; port development; dredging; construction of docks, bridges, breakwaters, or other structures; and other activities. These activities may cause avoidance or destruction of an area used by marine mammals as a result of anthropogenic disturbance. Permanent structures, such as docks, platforms, or bridges, can alter marine habitat by altering local tidal flow. However, because anthropogenic structures may repel some species, but attract others, the net effect remains unknown.

Cities, villages, ports, airports, wastewater treatment plants, refineries, highways, and railroads are situated adjacent to the shoreline of Cook Inlet and Knik Arm. This development has resulted in the alteration of nearshore marine mammal habitat and changes in habitat quality due to vessel traffic, noise, and pollution (NMFS 2008, 2016b).

Table 4.2-1 shows projects or actions that are currently taking place, in addition to reasonably foreseeable future actions.

4.4.6.1 Road and Railway Construction

Road and railway construction along the shores of Cook Inlet and its tributary rivers could have impacts on marine mammals via changes to the available habitat from increases in pollutants, runoff, and airborne noise. Construction and use of roadways and railroad tracks in coastal areas may directly affect hauled-out pinnipeds via airborne noise; however, there are no known pinniped haulouts in Upper Cook Inlet, and individuals would regularly be exposed to airborne noise from existing roadways and train traffic, as well as overflights from aircraft. Potential road and railway expansion projects may include temporary construction stressors such as in-water dredging and pile driving and may permanently remove small areas of coastal habitats.

Road and rail development that may affect Knik Arm (as shown in Table 4.2-1) includes Port MacKenzie development (road and Alaska Railroad), the Knik Arm Crossing Project; Matanuska–Susitna Borough/Municipality of Anchorage Regional Connecting Transportation Improvement Projects; the Alaska Railroad Ship Creek and Alaska Railroad Wasilla Intermodal Hub; Alaska Railroad bridge construction and track realignment projects; and Alaska Railroad Glenn Highway Rail Crossing Improvements. Large-scale road and rail construction projects that could directly impact marine mammals in Knik Arm are limited to the Knik Arm Crossing Project, which is not included in the Municipality of Anchorage's long-term 2050 Metropolitan Transportation Plan (Anchorage Metropolitan Area Transportation Solutions 2024) and for which funding was withdrawn in 2016 (State of Alaska 2022). There are no current plans to resume the Knik Arm Crossing Project. The 2050 Metropolitan Transportation Plan shows additional planned transportation projects throughout the Municipality of Anchorage.

On JBER, road and railway projects include Extension of the North/South Runway; JBER Cantonment Sustainment, Restoration, and Modernization Construction (e.g., infrastructure repairs, demolition, and minor construction); and Infantry Squad Battle Course service road repair. Construction-related vehicles and traffic within JBER would have temporary impacts on traffic and circulation that would be cumulative to other sources of traffic on the installation but would not be significant. Construction of new gravel service roads, when considered in addition to other projects, may slightly increase runoff and airborne noise in the immediate area; however, these effects would not be considered significant.

In other areas of Cook Inlet, ADOT&PF Seward Highway Milepost 75 to 90 (along Turnagain Arm) Project included geophysical and geotechnical testing, onshore blasting, pile removal and installation at stream crossings, and fill placed into Turnagain Arm to facilitate roadway straightening. The project also included resurfacing 15 miles of roadway, straightening curves, installing new passing lanes and parking areas, and replacing eight existing bridges. Replacement of these bridges included vibratory and impact pile installation and removal of both 24- and 48-inch steel pipe piles. In-water work on this project was avoided from 15 May to 15 June to avoid harassment of Cook Inlet beluga whales during the eulachon run, and work that was conducted in-water below mean high water required marine mammal monitoring by MMOs. This project reached substantial completion in October 2023.

ADOT&PF's Seward Highway Milepost 98.5 to 118 (Bird Flats to Rabbit Creek) Project proposes safety and capacity improvements to the alignment and road cross section. The upgrades would likely require widening the highway corridor either into the mountainside or toward the marine waters and may include relocating railroad track sections. Activities may include geophysical and geotechnical testing, onshore blasting, pile installation and removal at stream crossings for new bridges, and fill placed into Turnagain Arm. The project is still in the early planning phases, and no construction schedule is available.[14]

Ongoing and upcoming road and railway projects would contribute to potential increases in airborne and underwater noise, sedimentation, and pollutants and may permanently alter some areas of coastal habitats. However, all projects would be subject to appropriate permitting processes and mitigation measures intended to reduce impacts to less than significant. When combined with the potential for low to moderate increases in noise and pollutants due to the proposed action, no significant cumulative impacts to marine mammals are anticipated.

4.4.6.2 Port Development and Operations

The POA is Alaska's largest seaport and provides 90 percent of the consumer goods for about 85 percent of all of Alaska. It currently includes three cargo terminals, two petroleum terminals, one dry barge berth, two railway spurs, a small craft floating dock, and 220 acres of land facility. It is located in the Municipality of Anchorage, and approximately 450 ships call at the POA each year.

Operations began at the POA in 1961 with a single berth. Since then, the POA has expanded to a terminal with five berths that moves more than 4 million tons of material across its docks each year (McDowell 2020). The POA is undertaking expansion and improvement activities to modernize the port's infrastructure as part of the Port of Alaska Modernization Program (PAMP). The PAMP includes multiple construction projects to enable continued port operations, update facilities for operational efficiency, accommodate modern shipping operations, and improve seismic resiliency.[15] In 2019, the POA completed construction of the South Backlands Stabilization Project, and construction of the Petroleum and Cement Terminal and South Floating Dock was completed in 2022. The next phase of the PAMP includes construction and demolition associated with the North Extension Stabilization (NES1) Project (Phase 2A; 2024) and replacement of General Cargo Terminal 1 and Terminal 2 (Phase 2B; expected in 2025–2032). Other phases of the PAMP include replacing POL Terminal 2, NES Step 2, and demolition of Terminal 3. Phases 3, 4, and 5 of the PAMP depend upon funding that is not yet secured. The PAMP website describes the funding requests to the State of Alaska and alternative sources of funding such as taxes or cargo tariffs. Additional information is provided below.

The POA is currently working on the PAMP NES1 Project as well as design and permitting for replacement of Terminals 1 and 2 as part of Phase 2 of the PAMP, the Cargo Terminals Replacement Project (CTR Project). The NES1 Project, which began ground improvement work in 2023 and in-water work in 2024,

[14] https://safersewardhighway.com/

[15] https://modernization.portofalaska.com/

will remove the North Extension (a failed sheet pile structure located north of the existing general cargo docks) and reconfigure and realign the shoreline. The project will convert approximately 13 acres of developed land back to intertidal and subtidal habitat within Knik Arm. Terminals 1 and 2 are the existing container and general cargo terminals and are the only deep-water marine cargo terminals in Anchorage. The POA cargo services supply goods for 87 percent of Alaska's population. Replacement of Terminals 1 and 2 is currently estimated to begin in 2025. The likely effects of the NES1 Project are limited to Level A harassment (slight permanent threshold shift) and Level B harassment consisting of, at worst, temporary modification in the behavior of individual marine mammals. Specific to Cook Inlet beluga whales, effects are anticipated to be limited to Level B harassment consisting of temporary modifications in behavior such as increased swim speeds, tighter group formations, and cessation of vocalizations, but not through the loss of foraging capabilities or abandonment of habitat.

The CTR Project includes demolition of the two existing marine terminals and construction of two new marine terminals, 140 feet farther seaward than the existing terminals. Each terminal would include a pile-supported platform, pile-supported access trestles, a mooring system, and a fender system. Terminal 1 would support a lift-on/lift-off ship-to-shore rail-mounted gantry crane system for the transfer of cargo. Terminal 2 would support a roll-on/roll-off and lift-on/lift-off cargo transfer system. Terminal 2 would also include a single mooring dolphin. Excavation and placement of fill and armor rock would take place adjacent to Terminals 1 and 2 to protect the shoreline. The project would involve impact and vibratory pile driving. The likely effects of the CTR Project are consistent with the likely effects described above of the NES1 Project.

Other future phases of the PAMP include replacing POL Terminal 2 as Part of Phase 3 and further stabilization of NES2 and demolition of Terminal 3 as part of Phases 4 and 5. It should be noted that the NES1 and NES2 Projects will remove existing filled areas and convert them to open marine waters, resulting in beneficial impacts on the marine environment. The construction schedules for Phases 3 through 5 are currently uncertain.

USACE has been conducting maintenance dredging annually at the POA since 1965 and continues to do so throughout each year. The POA is dredged to the depth of minus 35 feet MLLW. Dredged materials are dumped 3,000 feet abeam of the POA dock face at the Anchorage Harbor Open Water Disposal Site. NMFS issued a Letter of Confirmation under the ESA for its current USACE permit in 2017. In 2023, USACE issued a FONSI for the POA to conduct transitional dredging at the terminal facility and dredged material disposal offshore. These activities will provide the needed depths for berthing vessels at the new terminal facility (mentioned above). Once the POA's dredging is complete, USACE will maintain dredging at this location.

As discussed in Section 4.4.4, Port MacKenzie also has the potential to expand its facilities, depending on future needs associated with large resource development projects. An increase in vessel traffic may have an effect on marine mammals. Construction activities, as well as the placement of piers and abutments, may have an effect on marine mammals, their habitat, and their prey species. However, NMFS is not currently aware of any specific planned and funded projects at Port MacKenzie. Any impacts to marine mammals from construction at Port MacKenzie would be expected to be consistent with those described for the NES1 and CTR Projects at the POA.

Port development and construction projects at the POA and Port MacKenzie are the most likely contributors to potential cumulative impacts to marine mammals. In-water noise from PAMP construction is expected to be prevalent between the months of April and November until at least 2032, and any increases in dredging or port operations (e.g., vessel traffic) are likely to be long term or permanent. Anticipated effects to marine mammals from in-water construction activities are limited to Level A harassment (slight auditory injury) and Level B harassment consisting of, at worst, temporary modification in the behavior of individual marine mammals. Specific to Cook Inlet beluga whales, effects are anticipated to be limited to Level B harassment consisting of temporary modifications in behavior such as increased swim speeds, tighter group formations, and cessation of vocalizations, but not through the loss of foraging capabilities or long-term abandonment of habitat. Previous monitoring efforts have indicated that Cook Inlet beluga whales appear to travel more quickly and silently through Knik Arm in more cohesive groups in relation to pile driving activities (Kendall and Cornick 2015; Castellote et al. 2020). Definitive behavioral reactions to in-water pile driving or avoidance behaviors have not been documented; however, potential reactions (e.g., altering travel trajectories away from the sound source) and instances where beluga whales moved toward active in-water pile driving have been recorded. During these instances, impact driving appeared to cause potential behavioral reactions more readily than vibratory hammering (61N Environmental 2021, 2022a, 2022b, 2022c).

The proposed action includes a seasonal closure window from 9 August to 18 October, which would reduce the potential for cumulative effects to marine mammals when they are found in Knik Arm in greatest numbers. However, marine mammals that experience disturbance during passage through Knik Arm to Eagle Bay may also be exposed to in-air or underwater noise from artillery firing outside of this window. Cook Inlet beluga whales are known to spend extended periods of time in upper Knik Arm year-round (Goetz et al. 2012), and additional disturbance in this area could increase overall stress levels (Thomas et al. 1990; Romano et al. 2004; Norman 2011; Lyamin et al. 2011), reduce foraging success, or have other detrimental effects on health and welfare of individuals within the population. Implementation of proposed mitigation measures would prevent a significant increase in cumulative impacts from the proposed action.

4.4.6.3 Joint Base Elmendorf-Richardson

Table 4.2-1 shows existing and reasonably foreseeable future actions expected for JBER. These projects include mostly land-based activities including training and personnel actions; runway expansions; implementation of a bird-strike avoidance program; range construction; and minor trail and roadway maintenance projects, among other activities. Except for those projects addressed in Section 4.4.6.1, none of these activities would be expected to directly affect marine mammals or their habitat. Potential increases in aircraft overflights associated with new hangars and force modifications could increase exposure to airborne noise by pinnipeds, as addressed in Section 4.4.5. No additional cumulative impacts to marine mammals are anticipated from other projects planned to occur on JBER.

4.4.7 Energy and Resource Extraction

Energy and resource extraction activities are currently concentrated in Middle Cook Inlet, with the potential for additional tidal energy projects to be located in areas of extreme tidal velocity (i.e., Knik and Turnagain Arms). Renewable and non-renewable energy development and mining activities may impact marine mammals through noise (from operations, construction, and vessel movements), pollutants, and direct strike. However, these projects are located outside the PMART project ROI, and no reasonably foreseeable future tidal energy, oil and gas extraction, and mining projects have been identified inside the ROI. Therefore, no cumulative effects from these stressors are anticipated.

4.4.8 Marine Mammal Research

Many important aspects of marine mammal biology remain unknown or are incompletely studied. Additionally, management of these species and stocks requires knowledge of their distribution, abundance, migration, population, ecology, physiology, genetics, behavior, and health. Therefore, free-ranging marine mammal species are frequently the subjects of scientific research and studies.

Research activities frequently include one or more of the following methods: close approach by vessel and aircraft for line-transect surveys; behavioral observation; photo identification and photo-video-grammetry; passive acoustic recording; attachment of scientific instruments (tagging) by both implantable and suction cup tags; biopsy sampling, including skin and blubber biopsy and swabbing; land-based surveys; and live capture for health assessments, blood and tissue sampling, pinniped tooth extraction, and related pinniped anesthesia procedures. All researchers using methods that may disturb, harm, injure, or kill a marine mammal are required to obtain scientific research permits from NMFS Office of Protected Resources under the MMPA and/or ESA (if an ESA-listed species is involved). Permits authorizing research in Cook Inlet on beluga whales, harbor seals, harbor porpoises, Steller sea lions, humpback whales, and killer whales may have cumulative effects on these species and stocks, but they are expected to be negligible to minor based on the specific research methodology. NMFS anticipates that scientific research on marine mammals in Cook Inlet will continue, and possibly expand, due to the increasing need to better understand distribution and abundance relative to temporal (e.g., seasonal, diel, or tidal) and spatial (e.g., geographic, bathymetric) parameters. The acoustic research currently conducted on beluga whales in Cook Inlet is non-invasive and passive in nature (hydrophone-based) and has no impact on marine mammals.

At the time of preparation of this Draft EIS, there are seven active scientific research and/or enhancement permits that authorize take of Cook Inlet beluga whales. Two of those permits are for research on one captive individual Cook Inlet beluga whale that was not releasable to the wild after rehabilitation efforts. This means there are five scientific research permits that authorize take of free-ranging Cook Inlet beluga whales. One study, led by the Cook Inlet Beluga Whale Photo-ID Project, is using photo-identification methods to identify individual whales and to provide information about movement patterns, habitat use, survivorship, reproduction, and Cook Inlet beluga whale population size. Other studies, led by the Marine Mammal Laboratory at the NOAA Fisheries Alaska Fisheries Science Center and NMFS Office of Protected Resources, Marine Mammal Health and Stranding Response Program, are designed to monitor cetacean population trends, abundance, distribution, and health in the North Pacific Ocean, Bering, Beaufort, and Chukchi Seas, and Gulf of Alaska (including adjoining bays and inlets) through the following techniques: crewed and uncrewed aerial surveys for counts, observations, photo identification, photogrammetry, and video of cetaceans; vessel surveys for counts, collection (prey remains, sloughed skin, and eDNA), observation, photo identification, video, sampling (exhaled air, feces, skin and blubber), instrumenting (invasive [dart/barb, dorsal fin/ridge, deep-implant] and non-invasive [suction cup] tags), and acoustic playbacks. Similar methods are used by another permit holder (the Marine Ecology and Telemetry Research group and HDR) to assess the biology and ecology of cetaceans in the North Pacific, including in Alaska, particularly within and around Navy training ranges.

Migura and Bollini (2022) assert that an increase in the authorized number of takes of Cook Inlet belugas when projected to occur through 2025 is statistically correlated with the decreasing population size of this population. However, the authors did not evaluate the severity of the potential impacts from the authorized take. For instance, the vast majority of the authorized research takes (which comprise over 99 percent of the total authorized take in any year) are for remote, non-invasive methods such as photo identification during aerial and vessel surveys that have the potential to result in only a minor degree of Level B harassment under the MMPA. For example, permitted researchers conducting aerial or vessel-based surveys are directed to count each sighting that is closer than the distances of NMFS wildlife viewing guidelines as a take because the activities have the potential to harass animals, regardless of the likely severity of those takes. Given this difference, it is unlikely that the correlation Migura and Bollini (2022) strive to make (between projected future authorized take numbers and the Cook Inlet beluga whale population decline) exists. In addition, long-term trend analysis of authorized take levels is not advisable because there have been changes in how take is interpreted and characterized in research permits. This means that, in some cases, take numbers across permits and across years are not directly comparable and at face value may seem like an increase in authorized take numbers. In recent years, managers have simplified how take numbers in research permits are determined to provide a more consistent approach to counting take across incidental and directed take permitting programs. NMFS will continue to closely analyze the number of takes requested and used by researchers each year.

4.4.9 Conclusion

Based on the summation of past, present, and reasonably foreseeable future actions provided in this section, the incremental impacts to marine mammals and their habitat from the expansion of indirect-fire artillery training at ERF-IA would not result in cumulatively significant impacts to marine mammals when added to other past, present, and reasonably foreseeable future activities. While consideration of these activities in sum suggests an increase in industrialization of Cook Inlet, many of these activities are spatially and temporally limited and do not permanently reduce or degrade the habitat available to marine mammals or their prey species. Cook Inlet is also a geographically vast area, and many activities, including the activities proposed by the Air Force, are geographically distinct to various portions of the inlet, which prevents the continued or permanent disruption of one particular portion of the inlet for extended durations.

The proposed expansion of mortar and indirect-fire artillery training at JBER's ERF-IA would add an incremental contribution to the combined environmental impacts of other past, present, and reasonably foreseeable future actions; however, those direct and indirect adverse impacts are expected to be mainly short term, localized, and minor, as described in this Draft EIS. None of the impacts would overlap in space with impacts from the Air Force's activities; however, overlap in time is possible with development and construction activities at the POA, and it is possible that marine mammals could swim past the POA and into Eagle Bay and experience noise exposure from authorized activities in both locations. Any cumulative impacts would affect only a few individuals, and the potential for cumulative impacts on marine mammals would not likely be realized. In summary, cumulative impacts resulting from the proposed action, in combination with other actions, would be negligible for Cook Inlet beluga whales, harbor porpoise, Steller sea lion, and harbor seals.

4.5 OTHER ENVIRONMENTAL CONSIDERATIONS

4.5.1 Relationship Between Short-Term Uses and Long-Term Productivity

Short-term effects would include localized disruptions as vegetation is removed from the proposed impact area expansion and firebreak and gravel roads are constructed. Impacts could include higher noise levels due to vegetation removal and construction activity and transportation disruptions from route changes on base. Long-term adverse impacts to air quality from carbon sequestration loss would be associated with 359 acres of clear-cutting and 226 acres of alteration through thinning under Alternative 1.

Except for earth resources in the proposed expansion area under Alternative 1, the proposed action and alternatives would not significantly impact the long-term productivity of the land or air over the baseline, as training exercises have been regularly occurring at JBER since the 1940s. The activities that would occur on JBER are consistent with existing operations. As described in Section 3.5.2.2, firing and training exercises under Alternative 1 would have long-term significant impacts on earth resources, namely soils, in the proposed expansion area. The productive use of the proposed expansion area as a training facility comes with an opportunity cost of the loss of the use of this area for other purposes, for example, loss of future timber harvest (a loss of 3,184 cords of future firewood production; see Table 3.16-2).

With regard to the aquatic resources at JBER (habitat for fish and marine mammals), potential impacts of intermittent firing events would occur throughout the year, as described in *Habitat Alteration* in Section 3.8.2.2 and *Impacts to Marine Mammal Prey* in Section 3.8.2.4, respectively. As described in Section 3.8.2.2, live-fire training under Alternative 1 could potentially affect fish at the watershed scale. It is anticipated that there would be some reduction in coho (and potentially Chinook and sockeye) escapement and productivity in Eagle River and Otter Creek primarily due to loss or modification of habitat in unbuffered areas. Impacts to long-term productivity have the potential to exceed significance thresholds but would be reduced with implementation of additional mitigation measures. Continued salmon enumeration studies (see Section 3.8.2.2, *Mitigation*) could allow JBER to obtain a better understanding of impacts to fish from all-season live-fire training and potentially identify additional measures to reduce observed effects.

With regard to the long-term behaviors of marine mammals, potential impacts from intermittent firing events are described in *Noise Impacts* in Section 3.8.2.4. In the absence of mitigation, live-fire training would have the potential to expose marine mammals in Eagle River and Otter Creek to underwater noise above NMFS thresholds. This impact would be long term, with exposures that exceed NMFS thresholds potentially occurring several times a year. Mitigation measures such as restricting firing of HE rounds and 155-mm training rounds during inundating tide events and implementation of the seasonal closure period (see Section 3.8.2.4, *Mitigation*) would ensure that NMFS thresholds for underwater noise are not exceeded. Training under the proposed project may cause a slight and very brief startle response in a small number of animals such that there are no anticipated impacts on survival or fitness. As a result, it is not anticipated that there would be meaningful changes in the utilization of Eagle Bay, Eagle River, and Otter Creek by marine mammals over the long term.

During prior consultations with NMFS regarding the impacts of noise on Cook Inlet beluga whale, NMFS concurred that intermittent noise such as overflights by F-22s and explosive ordinance may affect, but is not likely to adversely affect, the Cook Inlet beluga whale or designated Cook Inlet beluga whale critical habitat (Department of the Air Force 2022; JBER 2023a). More information is provided in the project BA (Appendix D). The analyses in past consultations support the conclusion that with built-in protective measures, BMPs/SOPs, and mitigation measures determined as a result of the analysis, noise from year-round live-fire training would not have long-term, negative consequences on the use of Eagle Bay, Eagle River, and Otter Creek by marine mammals.

Elimination or reduction of the need to travel to Fort Wainwright under Alternative 1 and Alternative 2, respectively, would result in the beneficial impact to military expenditures associated with lower travel-related costs and soldier safety associated with reduced risk of traffic accidents. The reduction in traffic to Fort Wainwright would also benefit the regional transportation systems and would reduce contribution to GHGs.

4.5.2 Irreversible and Irretrievable Commitment of Resources

Under Alternative 1 and Alternative 2, most impacts are short-term and not significant. Resources that would be irreversibly and irretrievably committed to the alternatives analyzed in this EIS include the following (mitigation is noted where applicable):

- **Earth Resources**—Earth resources would be irreversibly committed in locations where cratering and soil disturbances resulting from firing activities would further contribute to topographic changes, surface disturbances, and potential changes to natural processes (erosion and sedimentation).
- **Wetlands and Vegetation**—Ground disturbance due to project construction would cause irreversible impacts, including permanent land alteration, permanent soil displacement, permanent vegetation removal, and permanent alteration or removal of wetlands and other waters. Operations would cause vegetation to be continuously managed to maintain the firing range. Wetland boundaries within the proposed expansion area would be verified by USACE prior to implementation of the proposed action, and project components would be further adjusted as needed to avoid wetlands. Appropriate compensation for unavoidable adverse impacts to wetlands would be made through participation in an approved off-site mitigation bank or in-lieu fee instrument. In addition, wetland impacts would be reduced by following the mitigation measures presented in Section 3.7.2.5.
- **Cultural Resources**—Any inadvertent effects to cultural resources would result in an irreversible commitment of resources. Impacts would be reduced by adherence to the PA with SHPO.
- **Land Use and Recreation**—Lands and areas for recreation would be irreversibly committed to use as the expanded firing range.
- **Resource Consumption**—Irreversible consumption of renewable and non-renewable resources would be required for infrastructure development, including gravel and other materials.
- **Resource Committal**—Non-renewable resources (e.g., gasoline, diesel) would be irreversibly committed for project construction. Fuels would be required to operate motor vehicles, machinery, and construction equipment.
- **Funds and Labor**—Funds and labor would be irretrievably committed for project permitting and development.

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David Pecora	Subject Matter Expert	Marine Mammal Resources, Biological Assessment	B.S., Marine Biology 16 years of experience
Andy Clodfelter	Subject Matter Expert	Fish and Essential Fish Habitat	B.S., Biology 24 years of experience

Name/Title	Project Role	Subject Area	Qualifications
Aaron Wells, Ph.D.	Subject Matter Expert	Wetlands, Water and Earth Resources, Forest Resources, Vegetation, Wildland Fire	Ph.D., Soils Science 20 years of experience
Kirk Ranzetta, Ph.D.	Senior Architectural Historian	Cultural Resources	M.A./Ph.D., Urban Affairs and Public Policy 28 years of experience
Christine Archer	Senior Reviewer	Ecotoxicology	B.S., Zoology 27 years of experience
Fang Yang	Subject Matter Expert	Community Noise	B.S., Physics; M.S. Atmospheric Science 35 years of experience
Carrie Kyzar	Subject Matter Expert	Land Use, Recreation, Transportation and Circulation, Safety and Occupational Health	B.S., Environmental Science 21 years of experience
Courtney Brozovsky	GIS Analyst	GIS analysis	B.S., Environmental Science 14 years of experience
Anne Minihan, AICP	Subject Matter Expert	Subsistence	B.A., American Studies; Juris Doctorate 13 years of experience
Jessica Evans	Subject Matter Expert	Land Use and Recreation, Socioeconomics, Cumulative Impacts	M.S., Bioregional Planning 13 years of experience
Danni Kline	Technical Editor	Technical Editing	B.S., Botany 20 years of experience
Erin Arrington	Technical Editor	Technical Editing	B.A., Journalism 6 years of experience
Arika Mercer	Subject Matter Expert, Public Involvement and Administrative Record	Infrastructure and Utilities, Transportation and Circulation, Safety and Occupational Health	B.S., Emergency Management 5 years of experience
Jefferson (JD) Brooks	Subject Matter Expert	Terrestrial Wildlife	M.S., Biology 10 years of experience
Dan Botto	Subject Matter Expert	Noise (2019–2022)	B.S., Aviation Business Administration 14 years of experience
Lindsay Flagstad	Subject Matter Expert	Wetlands, Functional Assessment (2019–2021)	M.S., Biology 10 years of experience

Key: GIS = Geographic Information System; NEPA = National Environmental Policy Act

Third-Party Contractor Development Team (Subcontractors)

Name/Title	Project Role	Subject Area	Qualifications
Mike Fisher Northern Economics, Inc.	Subject Matter Expert	Socioeconomics	MBA, Project Management Professional 23 years of experience
Sheyna Wisdom	Fairweather Sciences, Inc.	Marine Mammals (2019–2020)	M.S., Marine Science 21 years of experience
Melanie Austin	JASCO Applied Sciences	Noise Modeling (2020–2022)	Ph.D., Ocean Acoustics 20 years of experience
Jorge Quijano	JASCO Applied Sciences	Noise Modeling (2020–2022)	Ph.D., Electrical Engineering 20 years of experience
Ned Gaines	Brice Environmental	Cultural Resources (2019–2021)	M.S., Anthropology 25 years of experience

7.0 LIST OF REPOSITORIES

Wasilla Public Library
500 N. Crusey Drive
Wasilla, AK 99654

Z.J. Loussac Public Library
3600 Denali Street
Anchorage, AK 99503

Chugiak–Eagle River Branch Library
12001 Business Blvd. #176
Eagle River, AK 99577

JBER Library
123 Chilkoot Avenue, Bldg. 7
JBER, AK 99505

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