AMENDMENT TO BRADLEY LAKE HYDROELECTRIC PROJECT (FERC No. 8221), BRADLEY LAKE EXPANSION PROJECT

Wildlife Habitat Evaluation Study Draft Report

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYMS AND ABBREVIATIONS

A	
ABR	ABR, Inc.—Environmental Research & Services
ADF&G	Alaska Department of Fish and Game
AEA	Alaska Energy Authority, formerly Alaska Power Authority
APA	Alaska Power Authority, now Alaska Energy Authority
AR	at-risk species
B	
BCC	Birds of Conservation Concern
BGEPA	Bald and Golden Eagle Protection Act
BPIF	Boreal Partners in Flight
Bradley Lake Project	Bradley Lake Hydroelectric Project (FERC No. 8221)
C	
CBSD	common birds in steep decline
D	
DSP	Draft Study Plan
E	
El.	Elevation
ESA	Endangered Species Act
F	
FERC	Federal Energy Regulatory Commission
G	
GMU	Game Management Unit
H	
H	high concern (priority shorebird species)
I	
ICD	Initial Consultation Document
L	

L	low concern (priority shorebird species)

M

M	moderate concern (priority shorebird species)

N

N/A	not applicable

P

PM&E	protection, mitigation, and enhancement
Project	Bradley Lake Expansion Project

S

SGCN	species of greatest conservation need
SWAP	State Wildlife Action Plan

U

USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service

W

WL	watchlist
WLFZ	water level fluctuation zone

1.0 INTRODUCTION

1.1 Background

The Alaska Energy Authority (AEA), licensee and owner of the 120-megawatt Bradley Lake Hydroelectric Project (Bradley Lake Project; Federal Energy Regulatory Commission [FERC] No. 8221), is pursuing a FERC license amendment. The purpose of the proposed amendment is to gain authorization to divert runoff and seasonal meltwater coming from Dixon Glacier at the headwaters of the Martin River to Bradley Lake and to raise the Bradley Lake Dam and spillway to increase the reservoir's storage capacity and produce more power.

AEA filed an Initial Consultation Document (ICD) (AEA 2022a) with FERC on April 27, 2022. The ICD describes existing facilities and current Bradley Lake Project operations; characterizes the affected environment; and describes two proposed project alternatives for producing energy from Dixon Glacier meltwater. Following the ICD filing, AEA hosted Joint Agency and Public Meetings in Homer, Alaska, on June 14, 2022, to discuss the ICD and receive stakeholder input. In November 2022, AEA filed a Draft Study Plan (DSP) (AEA 2022b) with FERC, based on the two alternatives, outlining 10 studies, including the Wildlife Habitat Evaluation Study. Stakeholders filed comments to the DSP in December 2022. AEA briefly paused the FERC amendment process while it conducted additional feasibility studies and narrowed down the proposed project alternatives.

Based on further investigations, AEA decided to move forward with the proposed alternative diverting Dixon Glacier meltwater to raise the level of Bradley Lake (Bradley Lake Expansion Project or Project). The proposed Project would include construction of a diversion dam, diversion pool, and tunnel intake near the toe of the Dixon Glacier; construction of an approximately 4.6-mile-long water-diversion tunnel bored through bedrock from Dixon Glacier to Bradley Lake; development of tunnel boring spoils (tunnel muck) placement sites; diversion of water from the Martin River basin to Bradley Lake; construction of approximately 1 mile of new, 16-foot-wide, gravel-surfaced access road from the existing Upper Battle Creek diversion access road to the outlet of the proposed diversion tunnel (together referred to as the Dixon Diversion); as well as development of material sites; construction of a worker camp; and modification of the existing Bradley Lake Dam to raise the maximum pool elevation of Bradley Lake by 16 feet, from Elevation

(El.) 1,180 feet to El. 1,196 feet[1] (referred to as the Bradley Lake Pool Raise). The entire proposed Project is located on state-owned land.

AEA re-initiated the amendment process in 2024 by hosting public meetings in March and April 2024 and January 2025 to review the selected Project alternative, stakeholder comments on the DSP, and AEA's proposed modifications to the DSP. Consultation specific to this study can be found in Exhibit E of the FERC License Amendment Application. AEA implemented several studies in 2024 and 2025, including this one. This report describes the results of the Wildlife Habitat Evaluation Study completed by ABR, Inc.—Environmental Research & Services (ABR) in 2025.

1.2 Modifications to the Draft Study Plan

The Wildlife Habitat Evaluation Study DSP (AEA 2022b, Section 4.8) states that the wildlife species of concern to be assessed for potential Project impacts would be developed in consultation with agency stakeholders. The proposed set of wildlife species to be assessed for habitat values was discussed with agency staff at the Terrestrial Resources Meetings on March 19, 2024. Subsequent to the meeting, Alaska Department of Fish and Game (ADF&G) and United States Fish and Wildlife Service (USFWS) requested that additional wildlife species be included in the habitat evaluation. A second consultation meeting was held on April 1, 2024, and AEA adopted the recommendations of both agencies, and the set of wildlife species of concern to evaluate was finalized (see Section 4.1 below). The Wildlife Habitat Evaluation Study DSP also states that the study area used would match the areas mapped in the Vegetation and Wildlife Habitat Mapping Study (AEA 2022b, Section 4.7), which includes a 250-meter (820-foot) buffer around the proposed Project elements including the shoreline of Bradley Lake, where the maximum pool elevation would increase by 16 feet (see Section 1.1 above). During the meeting on April 1, 2024, AEA also agreed with ADF&G's request to conduct additional habitat mapping in buffer zones with a 2-kilometer (1.2-mile) radius surrounding the proposed Dixon Diversion tunnel inlet and outlet, the new proposed access road, and the existing Bradley Lake Dam. This was done to assess the availability of suitable habitats in these areas that could be used by five sensitive mammal species (mountain goat [*Oreamnos americanus*], black bear [*Ursus americanus*], brown bear [*Ursus arctos*], moose [*Alces alces*], and wolverine [*Gulo gulo*]) that could be displaced by blasting activity during construction. In addition to these five mammal species, the mapping of suitable habitat for nesting Golden Eagles (*Aquila*

[1] Unless otherwise specified, all elevations reference the Bradley Lake Vertical Datum.

chrysaetos) in the blasting area buffer zones was also conducted because nesting Golden Eagles were found during the Raptor Nesting Study in summer 2025 near the proposed Dixon Diversion site and the Bradley Lake Dam (ABR 2026a). Similar to the five mammal species of concern to ADF&G, Golden Eagles are also known to be sensitive to human activities. A final agency meeting on terrestrial resources was held on January 30, 2025, and no additional comments or recommendations for study changes were made at that time.

1.3 Project Nexus

The proposed Bradley Lake Expansion Project construction and operation activities would result in the loss and alteration of wildlife habitats, which necessitates implementation of the Wildlife Habitat Evaluation Study in conjunction with the Vegetation and Wildlife Habitat Mapping Study to address potential impacts to wildlife habitats. The Proposed Action would include development of material sites, construction of a worker camp, construction of an approximately 1-mile-long access road, construction of the Dixon Diversion dam and associated infrastructure, disposal of tunnel muck, and modification of the Bradley Lake Dam to raise the maximum pool elevation in the lake. These activities would result in the loss and alteration of habitat for birds, mammals, and amphibians. There would also be temporary construction impacts on wildlife including increased noise and human disturbance in construction zones. Lastly, the partial diversion of Dixon Glacier meltwater at the headwaters of the Martin River would seasonally reduce flows in the river, affecting water volume, flow rates, sediment deposition, and water quality. The expected reductions in overbank flooding and channel braiding in particular (Watershed GeoDynamics 2025) are expected to result in the expansion of riparian habitats in the river floodplain. The combined effects of these Project activities would result in habitat loss and gain and habitat alteration impacts, as well as potentially behavioral and life-history impacts (displacement) of wildlife from suitable habitats. This study is designed to assess these Project-related impacts in the context of natural changes to wildlife habitats that are expected to occur in the future from the effects of climate change and plant succession in the Kachemak Bay area. This information is used to design and implement protection, mitigation, and enhancement (PM&E) measures to avoid or minimize the expected Project impacts to wildlife species.

2.0 GOALS AND OBJECTIVES

The overall goals of the Wildlife Habitat Evaluation Study are to categorically assess habitat values for a set of bird and mammal species of concern in the Project area and to quantitatively determine the extent of potential loss or alteration of suitable habitats for wildlife from Project impacts. The assessment of potential Project impacts was conducted within the context of how habitats will change in the future due to the natural forces of climate change and plant succession. Additionally, an assessment of suitable habitat availability for a selected set of sensitive mammal and bird species was conducted in areas near where blasting is planned during construction, and the likelihood of behavioral impacts to those species during construction is discussed.

The specific objectives of the Wildlife Habitat Evaluation Study are as follows:

1. Review Project-specific wildlife habitat-use information and the scientific literature to determine local habitat associations for those wildlife species that are of conservation, management, subsistence/recreational hunting, or ecological concern (species of concern) that are known or expected to use the wildlife habitat types mapped in the area and are expected to be impacted by development of the Project.

2. Categorically rank habitat values for each wildlife species of concern for each of the wildlife habitat types mapped in the Project area using a matrix wildlife habitat relationship procedure.

3. Based on the mapping of wildlife habitats in the Vegetation and Wildlife Habitat Mapping Study, quantitatively determine the acreage of suitable habitats for wildlife species of concern that could be lost or altered from development of the Project.

4. Based on the availability of suitable habitats, evaluate the possibility of occurrence of a subset of sensitive wildlife species in buffer zones surrounding areas where blasting is planned during construction.

5. Evaluate the potential Project impacts to suitable wildlife habitats and behavioral displacement of wildlife during construction within the context of the long-term changes expected in wildlife habitats as a result of the natural forces of climate change and plant succession.

The information from this study will be used in the FERC License Amendment Application for the Project to assess the potential habitat and behavioral impacts to wildlife species of concern and to develop PM&E measures that would be implemented to avoid or minimize impacts to wildlife habitats and impacts to wildlife species known to be sensitive to construction disturbance.

2.1 Report Organization

- This report begins with a brief summary of the future habitat changes that are expected in the Project area (see Sections 4.2.1 and 4.2.2) to establish the discussion of how the availability of suitable habitats for the wildlife species of concern assessed are likely to change because of those habitat changes. The full discussion of wildlife habitat changes is presented in the Vegetation and Wildlife Habitat Mapping Study (ABR 2026b).
- The report then summarizes the existing habitat association information for the wildlife species of concern that was the primary basis for the determination of habitat values for each bird and mammal species assessed (see Section 5.1).
- The wildlife habitat evaluation information is discussed next in Sections 5.2.1, 5.2.2, 5.2.3, and 5.2.4, which forms the heart of the study. This information is presented separately for the two primary study area components—the area outside the Martin River and the Martin River floodplain—because the Project impacts would differ substantially in these two areas. Within each study area component, the wildlife habitat values for current and future conditions are discussed. The future conditions time frame spans a 60-year period that starts after Project construction is complete and operations begin.
- In Section 5.2.5, we discuss the availability of suitable habitats for sensitive wildlife species within buffer zones surrounding areas where construction blasting is expected to be necessary and discuss the likelihood of behavioral displacement of these species during construction.
- Lastly, we present a set of draft PM&E measures that could be implemented to avoid or minimize impacts to wildlife habitats and wildlife species known to be sensitive to construction disturbances (see Section 6.4).

3.0 STUDY AREA

The study area for the Wildlife Habitat Evaluation Study was developed in consultation with the ADF&G and USFWS during March and April 2024. This report evaluates two distinct geographic areas within the overall study area, outside the Martin River and in the Martin River floodplain, because the expected impacts from development of the Project would vary significantly between those two areas. An additional assessment of wildlife habitat values was made in buffer zones around areas where blasting is planned to occur during construction.

3.1 Outside the Martin River

The study area component outside of the Martin River (Figure 3.1-1) consists of a 250-meter (820-foot) buffer surrounding the maximum proposed Bradley Lake pool elevation, the existing Bradley Lake Dam and spillway, the proposed tunnel outlet access road, material extractions sites, staging areas, the worker camp, and the tunnel muck placement site. This buffer zone encompasses all areas where wildlife habitats are expected to be affected by Project development. At the time the study area buffer was created in 2024, the pool-raise alternative with the largest elevation increase (28 feet) was used as the maximum pool elevation. The study area component outside the Martin River encompasses a total of 7,600 acres.

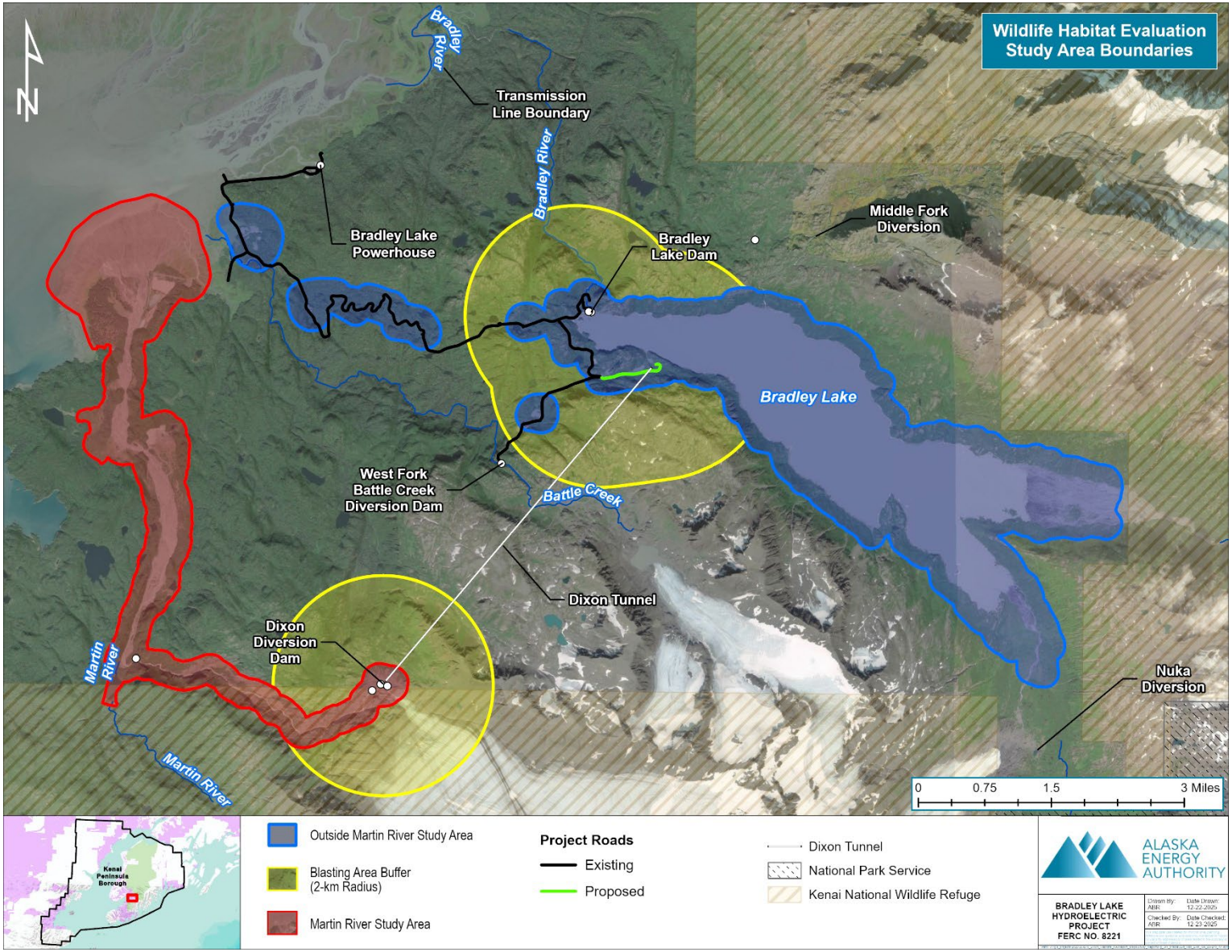

Figure 3.1-1 Study area boundaries for the wildlife habitat evaluation, Bradley Lake Expansion Project.

3.2 Martin River Floodplain

The Martin River floodplain portion of the study area includes a 250-meter (820-foot) buffer surrounding the edges of the active river floodplain from the toe of the Dixon Glacier to its confluence with Kachemak Bay and the entire intertidal delta area (Figure 3.1-1). This buffer zone encompasses all areas where wildlife habitats are expected to change from river flow reductions and climate change-driven plant succession. The study area for the Martin River floodplain encompasses 3,580 acres.

3.3 Blasting Area Buffer Zones

As described in Section 1.2, in addition to the two primary study area components, wildlife habitat-value assessments were also made in buffer zones consisting of a 2-kilometer (1.2-mile) radius surrounding areas where blasting is planned to occur during construction (Figure 3.1-1). This was done to assess the availability of suitable habitats in those areas that could be used by a selected set of disturbance-sensitive mammal species and Golden Eagles. The two blasting area buffer zone study areas combined encompass a total of 8,464 acres, though suitable habitats for the focal wildlife species within those buffer zones encompass only 6,989 acres.

4.0 METHODOLOGY

4.1 Assessment of Current Habitat Values

To assess the value of the existing habitats in the Project area for wildlife species and to address potential impacts to wildlife species from the proposed Project, a list of bird and mammal species of concern that are likely to occur in the vicinity of the Project and that could potentially experience Project impacts was developed (Table 4.1-1). Species of concern were identified for analysis when they met one or more of the following criteria: (1) they are federally listed under the Endangered Species Act (ESA; 73 FR 63667 63667-63668) or protected under the Bald and Golden Eagle Protection Act (BGEPA; 16 United States Code 668-668d); (2) they are present on the species of conservation concern lists reviewed for the Project (Alaska Shorebird Group 2019; ADF&G 2015; Handel et al. 2021; USFWS 2021); (3) they are in a species group experiencing population declines nationwide (e.g., bats); or (4) they were specifically requested for inclusion by ADF&G or USFWS personnel (Table 4.1-1). This species of concern list was developed in consultation with the resource management agencies in a series of meetings in March and April 2024 and January 2025 and includes 49 bird and 14 mammal species.

Fourteen mammal species were selected as species of concern based on their conservation status, their ecological or subsistence/recreational hunting importance, and the potential for these species to experience impacts from the Project (Table 4.1-1). These species warrant specific attention and are described below, drawing upon information in existing licensing study reports for the Bradley Lake Project and local knowledge of mammal occurrence on the Kenai Peninsula.

None of the 14 mammals included as species of concern are listed under the federal ESA or on two other prominent global conservation listings that include mammals (the International Union for Conservation of Nature Species of Concern and NatureServe Global Concern lists). The ADF&G, however, lists conservation concerns for several small mammals and one bat species in the Project area (Table 4.1-1). Other mammal species were added to the list of species of concern to be evaluated for impacts based on requests from ADF&G and USFWS personnel. A single dead specimen of western long-eared bat (*Myotis evotis*), which was separated taxonomically from Keen's myotis (*M. keenii*) in Alaska, was reported and collected from the Homer Spit several years ago (personal communication between J. Herreman, ADF&G, and Joseph Welch, Senior Scientist, ABR,

September 24, 2025), and its inclusion as a species of concern was requested by ADF&G. However, no other specimens or acoustic recordings of this species have been identified north of southeast Alaska (personal communication between J. Reimer, University of California-Davis, and Joseph Welch, Senior Scientist, ABR, September 24, 2025). Therefore, western long-eared bat was excluded from the habitat evaluation.

Table 4.1-1 Avian and mammalian species of concern assessed in the wildlife habitat evaluation.

Species Group	Common Name	Scientific Name	ESA[a] Listed	SWAP Species of Concern[b]	Priority Shorebird Species[c]	BPIF Landbirds of Concern[d]	USFWS BCC[e]	Agency Request[f]
Landbird	Alder Flycatcher	*Empidonax alnorum*		SGCN, AR				
Landbird	American Pipit	*Anthus rubescens*		SGCN, AR				USFWS
Landbird	Bank Swallow	*Riparia riparia*						USFWS
Landbird	Belted Kingfisher	*Megaceryle alcyon*		SGCN, AR				
Landbird	Blackpoll Warbler	*Setophaga striata*						USFWS
Landbird	Fox Sparrow	*Passerella iliaca*		SGCN, AR				
Landbird	Horned Lark	*Eremophila alpestris*						USFWS
Landbird	Lapland Longspur	*Calcarius lapponicus*						USFWS
Landbird	Olive-sided Flycatcher	*Contopus cooperi*		SGCN, AR		WL	X	USFWS
Landbird	Orange-crowned Warbler	*Leiothlypis celata*		SGCN, AR				
Landbird	Rock Ptarmigan	*Lagopus muta*						
Landbird	Rufous Hummingbird	*Selasphorus rufus*		SGCN, AR		WL	X	USFWS
Landbird	Savannah Sparrow	*Passerculus sandwichensis*		SGCN, AR				
Landbird	Song Sparrow	*Melospiza melodia*		SGCN, AR				
Landbird	Willow Ptarmigan	*Lagopus lagopus*						
Landbird	Wilson's Warbler	*Cardellina pusilla*		SGCN, AR		CBSD		
Landbird	Northern Yellow Warbler	*Setophaga aestiva*		SGCN, AR				

Species Group	Common Name	Scientific Name	ESA[a] Listed	SWAP Species of Concern[b]	Priority Shorebird Species[c]	BPIF Landbirds of Concern[d]	USFWS BCC[e]	Agency Request[f]
Raptor	Bald Eagle	*Haliaeetus leucocephalus*		SGCN				
Raptor	Golden Eagle	*Aquila chrysaetos*		SGCN, AR				
Raptor	Northern Harrier	*Circus hudsonius*		SGCN, AR				
Raptor	Peregrine Falcon	*Falco peregrinus*		SGCN				USFWS
Raptor	Red-tailed Hawk	*Buteo jamaicensis*		SGCN, AR				
Raptor	Short-eared Owl	*Asio flammeus*		SGCN, AR		CBSD		USFWS
Seabird	American Herring Gull	*Larus smithsonianus*						USFWS
Seabird	Arctic Tern	*Sterna paradisaea*		SGCN				USFWS
Seabird	Black-legged Kittiwake	*Rissa tridactyla*						USFWS
Seabird	Bonaparte's Gull	*Chroicocephalus philadelphia*						USFWS
Seabird	Kittlitz's Murrelet	*Brachyramphus brevirostris*		SGCN, AR			X	
Seabird	Marbled Murrelet	*Brachyramphus marmoratus*		SGCN, AR			X	USFWS
Seabird	Pelagic Cormorant	*Urile pelagicus*						USFWS
Shorebird	Greater Yellowlegs	*Tringa melanoleuca*			L			USFWS
Shorebird	Lesser Yellowlegs	*Tringa flavipes*		SGCN, AR	H		X	USFWS
Shorebird	Rock Sandpiper	*Calidris ptilocnemis*		SGCN, AR	H		X	
Shorebird	Semipalmated Plover	*Charadrius semipalmatus*			L			
Shorebird	Semipalmated Sandpiper	*Calidris pusilla*		SGCN, AR	H			USFWS

Species Group	Common Name	Scientific Name	ESA[a] Listed	SWAP Species of Concern[b]	Priority Shorebird Species[c]	BPIF Landbirds of Concern[d]	USFWS BCC[e]	Agency Request[f]
Shorebird	Short-billed Dowitcher	*Limnodromus griseus*		SGCN, AR	H		X	USFWS
Shorebird	Spotted Sandpiper	*Actitis macularius*		SGCN, AR	L			
Shorebird	Wandering Tattler	*Tringa incana*						USFWS
Shorebird	Western Sandpiper	*Calidris mauri*		SGCN, AR	M			USFWS
Waterbird	Barrow's Goldeneye	*Bucephala islandica*						USFWS
Waterbird	Black Scoter	*Melanitta americana*		SGCN, AR				
Waterbird	Common Goldeneye	*Bucephala clangula*						USFWS
Waterbird	Common Merganser	*Mergus merganser*						
Waterbird	Harlequin Duck	*Histrionicus histrionicus*						
Waterbird	Long-tailed Duck	*Clangula hyemalis*		SGCN				USFWS
Waterbird	Northern Pintail	*Anas acuta*						USFWS
Waterbird	Red-breasted Merganser	*Mergus serrator*						
Waterbird	Red-throated Loon	*Gavia stellata*						USFWS
Waterbird	Steller's Eider	*Polysticta stelleri*	X					USFWS
Bat	Little brown myotis	*Myotis lucifugus*		SGCN				
Furbearer, Aquatic	American beaver	*Castor canadensis*						
Furbearer, Aquatic	River otter	*Lontra canadensis*						

Species Group	Common Name	Scientific Name	ESA[a] Listed	SWAP Species of Concern[b]	Priority Shorebird Species[c]	BPIF Landbirds of Concern[d]	USFWS BCC[e]	Agency Request[f]
Furbearer, Terrestrial	Wolverine	*Gulo gulo*						USFWS and ADF&G
Furbearer, Terrestrial	Hoary marmot	*Marmota caligata*						ADF&G
Large mammal	Moose	*Alces alces*						
Large mammal	Mountain goat	*Oreamnos americanus*						
Large mammal	Black bear	*Ursus americanus*						
Large mammal	Brown bear	*Ursus arctos*						
Small mammal	Snowshoe hare	*Lepus americanus*		SGCN				
Small mammal	Singing vole	*Microtus miurus*		SGCN				
Small mammal	Tundra (root) vole	*Microtus oeconomus*						USFWS
Small mammal	Dusky shrew	*Sorex monticolus*		SGCN				
Small mammal	Western water shrew	*Sorex navigator*		SGCN				

[a] ESA = Endangered Species Act.
[b] SWAP = State Wildlife Action Plan; species of greatest conservation need = SGCN; at-risk species = AR; ADF&G (2015).
[c] H = high concern, M = moderate concern, L = low concern; Alaska Shorebird Group (2019).
[d] BPIF = Boreal Partners in Flight; WL = watchlist (species of highest conservation concern at the continental scale), CBSD= common birds in steep decline; Handel et al. (2021).
[e] 2021 USFWS Birds of Conservation Concern (BCC); USFWS (2021).
[f] USFWS = United States Fish and Wildlife Service, ADF&G = Alaska Department of Fish and Game.

Many of the bird species likely to occur in the vicinity of the Project area use the upper Kachemak Bay tidal flats area north of Battle Creek and will not be impacted by the Project. Therefore, they were not included in the list of species of concern. Casual, vagrant, and transient bird species that occur as single individuals or in very low numbers and do not occur annually and rare species that will not make use of habitats in the study area were not included in the list of species of concern. Of the 49 bird species included for assessments of habitat value, one species, Steller's Eider (*Polysticta stelleri*), is listed as threatened under ESA, though it is likely to occur only rarely in winter in marine habitats in upper Kachemak Bay. Twenty-eight other species are listed as of conservation concern on one or more of the four conservation concern lists assessed for the Project (Table 4.1-1).

In the wildlife habitat evaluation, habitat values for each of the 63 species of concern were assessed for the set of 34 currently available wildlife habitats that occur in both study area components combined and that were identified and mapped in the Vegetation and Wildlife Habitat Mapping Study (ABR 2026b). This was done using a matrix wildlife habitat relationship procedure (Patton 1992; Johnson and O'Neil 2001; Morrison et al. 2006). This involved creating a matrix of the 63 wildlife species of concern (49 birds and 14 mammals) and the 34 mapped habitats and assigning a categorical habitat-value ranking to each mapped wildlife habitat type for each species of concern. The habitat-value classes (high, moderate, low, or negligible value; Table 4.1-2) were determined by focusing on wildlife use of habitats in the study area during important life-history stages (e.g., breeding, foraging, denning, migration, shelter, overwintering). Rankings were made regardless of species abundance, as some species (e.g., many raptors, owls, and some shorebirds) occur annually as breeders in suitable habitats but they have large territories and are naturally found in low densities. When categorizing habitat value for wildlife, the combination of moderate- and high-value habitats represents those with a higher probability of species occurrence and represents the set of habitats that can be regularly used by wildlife (Marcot et al. 2015; Welch et al. 2023). Throughout this report, the term "suitable habitat" is used when discussing the combination of moderate- and high-value habitats and is used interchangeably with those terms.

Table 4.1-2 Avian and mammalian habitat-value classes used in the wildlife habitat evaluation.

Wildlife Group	Ranking Score	Value Class	Description
Birds	3	High	Known to be frequently used for nesting and/or foraging/hunting during the breeding season, these habitats also are often used during migration and in winter for resident species
	2	Moderate	Moderate-value habitats may be regularly used during the breeding, migration, or wintering seasons for foraging/hunting, but less so than high-value habitats
	1	Low	Low-value habitats would see little use by the species under consideration and in very low numbers
	0	Negligible	The species is not expected to occur, or will occur very rarely, in negligible-value habitats
Mammals	3	High	Known to be frequently used for breeding, shelter, denning, overwintering, and/or foraging/hunting during some portion of the year
	2	Moderate	Moderate-value habitats may be regularly used for foraging/hunting and as travel corridors, but less so than high-value habitats
	1	Low	Low-value habitats would see little use by the species under consideration and in very low numbers
	0	Negligible	The species is not expected to occur, or will occur very rarely, in negligible-value habitats

Habitat-value rankings were derived in different ways for different species, depending on the level of Project-specific observation data available to assess habitat use in each mapped habitat type. Except for nesting Golden Eagles (ABR 2026a), actual observations of habitat use were primarily restricted to miscellaneous observations due to the lack of current field survey data tied to habitat types for most species. In this case, we relied heavily on habitat-use information from studies conducted for the original Bradley Lake Project license application and the Battle Creek Diversion license application (Alaska Power Authority [APA] 1984; AEA 2015); ADF&G species management reports; the scientific literature assessing habitat use in Alaska and throughout the species range;

and/or professional judgment based on extensive field observations in southcentral Alaska of the bird and mammal species in question. To compare wildlife habitats from the literature with those identified in the study area, the study team cross-walked habitat classifications in the literature to the wildlife habitat types mapped in the Project area.

4.2 Assessment of Future Habitat Values

Future habitat values for the wildlife species of concern in the study area were assessed to estimate how suitable habitats for wildlife may change from current conditions over a 60-year period after Project operations begin. This effort involved both an evaluation of the potential construction and operations impacts of the proposed Project and the expected changes in habitats as a result of plant succession, which will be influenced by climate change over the 60-year post-construction period. Habitat values for wildlife under future conditions were based on the mapping of expected future habitats in the study area described in the *Vegetation and Wildlife Habitat Mapping Study Report* (ABR 2026b) and the habitat evaluation matrix described in Section 4.1. A brief summary of how habitats are expected to change in the future in the two separate portions of the study area is presented below; more details can be found in ABR (2026b).

Overall, no new habitats are expected to develop under future conditions, but the extent of some of the currently mapped habitats is likely to change substantially over the 60-year post-construction period (ABR 2026b). Some habitats may be lost completely as plant succession under climate change transitions barren and herbaceous habitats into scrub habitats and scrub habitats into forest habitats, for example. These habitat changes would be coupled with habitat loss from Project impacts. At the same time, some habitats (e.g., mixed forests) are expected to increase substantially as a result of plant succession.

4.2.1 Habitat Changes in the Study Area Outside the Martin River

Construction impacts from development of the proposed Project infrastructure outside of the Martin River floodplain are expected to result in losses in the extents of common wildlife habitats, especially Upland and Subalpine Tall Alder Scrub, Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex, and Upland Mixed Lutz Spruce-Black Cottonwood Forest (see Table 5.1-4 in ABR 2026b). As a result of the proposed Project construction, the expansion of Artificial Fill, encompassing both cleared and disturbed areas and areas of gravel fill, is expected to impact an additional 163.0 acres of wildlife habitats in the study area (ABR 2026b).

Overall, the Project will require development of a total 200.2 acres of existing wildlife habitats within the proposed construction footprint, although 37.2 acres of that total have been previously disturbed and are already classified as Artificial Fill (see Table 5.1-4 in ABR 2026b). The Project will impact 72.7 acres of Upland and Subalpine Tall Alder Scrub, 38.8 acres of Upland Mixed Lutz Spruce-Black Cottonwood Forest, 35.2 acres of Glaciated Subalpine Rock-Shrub-Scrub-Meadow Complex, and 5.5 acres of existing Human Modified Reservoir (from reconstruction of the Bradley Lake Dam). Less than 2.5 acres of each of nine other habitats would be impacted during Project construction.

Additionally, there would be pool rise impacts at Bradley Lake from the proposed increase in the maximum pool elevation of the lake. The water level fluctuation zone (WLFZ) at Bradley Lake is expected to range approximately from El. 1,080 or 1,090 feet to near the maximum pool elevation of El. 1,196 feet (ABR 2026b). There are wildlife habitat types that currently exist in the upper portion of the projected future WLFZ, between 1,153 and the current maximum pool elevation of El. 1,180 feet; these habitats experience inundation annually but are exposed during the growing season. These existing habitats along the shoreline of Bradley Lake are expected to persist during Project operations. However, because they would be inundated annually, habitats in the future WLFZ would likely have reduced plant species diversity and reduced vegetation cover and would be of lower quality for wildlife (ABR 2026b). In contrast, habitats in the lower regions of the future WLFZ would be inundated for a much longer period each year and likely would transition to partially vegetated habitats dominated by graminoid species that can better survive inundation, or barren cobble and rock. When they are inundated, all habitats in the future WLFZ would function as seasonally flooded freshwater lacustrine habitats (ABR 2026b).

Outside of the proposed construction footprint, large changes to wildlife habitats would likely occur in the 60-year post-construction period in the area outside the Martin River due to climate change effects and natural plant succession (ABR 2026b). There is expected to be a complete loss of Riverine Barrens (90.1 acres), Coastal Saline Wet Sedge Marsh (0.7 acre), Estuarine Brackish Wet Sedge-Forb Meadow (20.2 acres), Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex (203.9 acres), and Upland and Subalpine Herb Meadow (13.4 acres) from climate change-driven plant succession (Table 4.2-1).

All occurrences of Upland and Subalpine Herb Meadow are expected to transition to Upland and Subalpine Tall Alder Scrub due to plant succession. Similarly, most occurrences of Glaciated Subalpine Rock-Shrub-Scrub-Meadow Complex (outside of

areas impacted by the Project and except for areas of bare rock) are expected to transition to Upland and Subalpine Tall Alder Scrub, and the existing areas of Upland and Subalpine Tall Alder Scrub are expected to transition to Upland Mixed Lutz Spruce-Black Cottonwood Forest (ABR 2026b).

Table 4.2-1 Predicted wildlife habitat acreage gains and losses due to climate change and plant succession in the study area outside the Martin River.

Habitat Type	Current Area (acres)	Future Area (acres)	Gains/ Losses (acres)
Tidal Gut	0.4	0.4	0.0
Coastal Saline Wet Sedge Marsh	0.7	0.0	-0.7
Coastal Saline Wet Sedge Meadow	24.3	24.3	0.0
Estuarine Brackish Wet Sedge-Forb Meadow	20.2	0.0	-20.2
Freshwater Lakes and Ponds	41.1	41.1	0.0
Rocky Shore and Cobble Beach	<0.1	<0.1	0.0
Rivers and Streams (High Gradient-High Flow)	3.7	3.7	0.0
Rivers and Streams (Low Gradient-High Flow)	15.8	15.8	0.0
Rivers and Streams (Mixed Gradient-Low Flow)	2.5	2.5	0.0
Riverine Barrens	90.1	0.0	-90.1
Riverine Dryas Dwarf Shrub	6.1	6.1	0.0
Riverine Low and Tall Willow	144.7	144.7	0.0
Riverine Mixed Spruce-Black Cottonwood Forest	3.0	16.7	13.7
Riverine Tall Alder	13.7	110.2	96.5
Upland and Subalpine Herb Meadow	13.4	0.0	-13.4
Upland and Subalpine Tall Alder Scrub	1,806.8	222.3	-1,584.5
Upland and Subalpine Tall Willow Scrub	1.3	1.3	0.0
Upland and Subalpine Wet Graminoid Moss Bog	4.3	4.3	0.0
Upland Mixed Lutz Spruce-Black Cottonwood Forest	619.0	2,420.7	1,801.7
Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex	203.9	0.0	-203.9
Subalpine and Alpine Barrens	24.7	24.7	0.0
Subalpine and Alpine Dwarf Ericaceous Scrub	203.9	203.9	0.0
Rocky Cliffs	81.0	81.0	0.0
Artificial Fill	49.0	49.0	0.0

4.2.2 Habitat Changes in the Martin River Floodplain Study Area

Only 25.8 acres of existing wildlife habitat occur within the proposed Project construction footprint in the Martin River floodplain, for construction of the Dixon Diversion dam, the diversion pond, and the diversion tunnel intake in the upper Martin River (ABR 2026b). There are no pre-existing developed areas in the Martin River floodplain except for the runway near the mouth of the river. At the Dixon Diversion site, Subalpine and Alpine Barrens would be the primary habitat impacted (17.5 acres), followed by Rocky Cliffs (4.3 acres). Only three other habitat types (Riverine Barrens, Rivers and Streams [High Gradient-High Flow], and Upland and Subalpine Tall Alder Scrub) occur in the footprint for the Dixon Diversion site; less than 2.0 acres of each of those three habitats would be lost to development.

Within the Martin River floodplain, there are several current habitats that do not occur in the study area outside the Martin River. These include Coastal Barren Mud Flat, Glacier, Human Modified Ponds, Lacustrine Freshwater Isolated Off-channel Pond, Lacustrine Freshwater Tapped Off-channel Pond, Lacustrine Fringe Fresh Grass-Sedge Marsh, Riverine Active Braided Floodplain, Riverine Flooded Black Cottonwood Scrub, and Riverine Mature Black Cottonwood Forest. This area also lacks Upland and Subalpine Tall Willow Scrub and Rocky Shores and Beach habitat types.

Within the 60-year post-construction period in the Martin River floodplain, there is expected to be a complete loss of the Riverine Barrens (32.6 acres), Coastal Saline Wet Sedge Marsh (2.5 acres), Coastal Saline Wet Sedge Meadow (83.1 acres), Estuarine Brackish Wet Sedge-Forb Meadow (43.9 acres), Glacier (4.2 acres at the terminus of the Dixon Glacier), Human Modified Ponds (2.8 acres), Lacustrine Fringe Fresh Grass-Sedge Marsh (47.2 acres), Riverine Active Braided Floodplain (373.9 acres), Riverine Flooded Black Cottonwood Scrub (150.0 acres), Upland and Subalpine Herb Meadow (1.0 acre), and Upland and Subalpine Tall Alder Scrub (385.4 acres) from climate change-driven plant succession (Table 4.2-2). There would also be major increases in Riverine Dryas Dwarf Shrub (99.3 to 419.1 acres), Riverine Tall Alder (26.8 to 286.9 acres), Low Gradient-high flow Rivers and Streams (17.8 to 61.4 acres), and Upland Mixed Lutz Spruce-Black Cottonwood Forest (755.3 to 1,140.7 acres) from river flow reductions, stream channel changes, and climate change-driven plant succession in the Martin River floodplain (Table 4.2-2). Much smaller or no changes in total acreages would occur for all other habitats.

Table 4.2-2 Predicted wildlife habitat gains and losses due to river flow reductions, climate change, and plant succession in the Martin River floodplain study area.

Habitat Type	Current Area (acres)	Future Area (acres)	Percentage Change (%)
Tidal Gut	19.5	19.5	0
Coastal Barren Mud Flat	711.8	797.4	12
Coastal Saline Wet Sedge Marsh	2.5	0.0	-100
Coastal Saline Wet Sedge Meadow	83.1	0.0	-100
Estuarine Brackish Wet Sedge-Forb Meadow	43.9	0.0	-100
Human Modified Ponds	2.8	0.0	-100
Lacustrine Freshwater Isolated Off-channel Pond	12.8	46.0	259
Lacustrine Freshwater Tapped Off-channel Pond	33.2	0.0	-100
Lacustrine Fringe Fresh Grass-Sedge Marsh	47.2	0.0	-100
Freshwater Lakes and Ponds	30.6	30.6	0
Rivers and Streams (High Gradient-High Flow)	23.1	23.1	0
Rivers and Streams (Low Gradient-High Flow)	17.8	61.4	245
Rivers and Streams (Mixed Gradient-Low Flow)	12.3	12.3	0
Riverine Barrens	32.6	0.0	-100
Riverine Active Braided Floodplain	373.9	0.0	-100
Riverine Mature Black Cottonwood Forest	4.3	4.3	0
Riverine Dryas Dwarf Shrub	99.3	419.1	322
Riverine Flooded Black Cottonwood Scrub	150.0	0.0	-100
Riverine Mixed Spruce-Black Cottonwood Forest	364.7	391.5	7
Riverine Tall Alder	26.8	286.9	971
Upland and Subalpine Herb Meadow	1.0	0.0	-100
Upland and Subalpine Tall Alder Scrub	385.4	1.0	-100
Upland and Subalpine Wet Graminoid Moss Bog	0.3	0.3	0
Upland Mixed Lutz Spruce-Black Cottonwood Forest	755.3	1,140.7	51
Subalpine and Alpine Barrens	82.2	86.5	5
Subalpine and Alpine Dwarf Ericaceous Scrub	0.3	0.3	0
Glacier	4.2	0.0	-100
Rocky Cliffs	230.0	230.0	0
Artificial Fill	2.8	2.8	0
Total	**3,553.7**	**3,553.7**	

5.0 RESULTS

5.1 Summary of Habitat Associations for Wildlife Species of Concern

5.1.1 Terrestrial Mammal Species

With agency input during the study planning process, 15 terrestrial mammal species of concern were originally identified for analysis in the Wildlife Habitat Evaluation Study (Table 4.1-1). The western long-eared bat, however, was excluded because the single occurrence of this species in the Kachemak Bay area was accidental (see Section 4.1). The known habitat associations for the 14 mammal species evaluated are summarized below by species group (Sections 5.2.1.1 and 5.2.2.1).

5.1.1.1 Large Mammals

Black bears are the most abundant and well distributed of the three bear species in North America (ADF&G 2025). In Alaska, they are largely associated with forested habitats but range from sea level to alpine regions, depending on the season (ADF&G 2025). They forage predominantly on berries (e.g., devil's club [*Oplopanax horridus*], blueberry, currants), as well as salmon and herbaceous plant shoots and roots (Schwartz and Franzmann 1991; McLellan 2011). Population estimation surveys have never been conducted on the Kenai Peninsula for black bears (Herreman 2022a), but the species was common in the Bradley Lake Project area during studies in the early 1980s and during studies for the Battle Creek Diversion project around 2012, and black bears continue to be common today (APA 1984; AEA 2015; personal communication between J. Herreman, ADF&G, and Joseph Welch, Senior Scientist, ABR, September 24, 2025). Assuming black bear densities along the southern Kenai Peninsula coast are at least 53 per 100 square miles (Schwartz and Franzmann 1991), ADF&G estimates 3,000–4,000 black bears occur in Game Management Units (GMUs) 7 and 15, with higher densities along the coast (Selinger 2008), likely due to the availability of salmon and low densities of competing brown bears (Selinger 2008).

Brown bears have a broad diet that includes grasses, sedges, cow parsnip (*Heracleum maximum*), moose calves, salmon, berries, carrion, and roots, with salmon being a particularly important food source for Kenai Peninsula bears (Farley et al. 2001; ADF&G 2025). They typically den on high-elevation steep slopes (averaging El. 2,120 feet above mean sea level; Goldstein et al. 2010). The brown bear population on the Kenai Peninsula is considered relatively small, and they are only common in certain areas, making the

population vulnerable to impacts from development (Schoen 2011; Jackson et al. 2008). On the east side of Kachemak Bay where the Project is located, brown bears are very rare (Selinger 2015). Although tracks were observed near Battle Creek in early May during the 1980s studies (APA 1985), little evidence of brown bears was found during other studies (United States Army Corps of Engineers 1982). Brown bear tracks were observed along the Martin River during 2024 and 2025 field studies.

Moose are a very important big game species in GMU 15C (Herreman 2022b). They are most abundant in areas with dense stands of willow, aspen, and/or birch shrubs, which commonly occur in alpine shrub communities and riparian habitats (ADF&G 2025). Moose browse on birch, aspen, and willow twigs in the fall and winter but diversify their diet in the summer to include the leaves of other trees and shrubs, aquatic vegetation, and herbaceous plants (Risenhoover 1989; Welch et al. 2015; ADF&G 2025). Moose and signs of moose were common in the Bradley Lake Project area in the early 1980s (APA 1984) and in lower Battle Creek around 2012 (AEA 2015). However, lowland habitat quality in the Kenai Peninsula region may be declining in some locations due to plant succession, spruce beetle (*Dendroctonus rufipennis*) infestations, and logging activities (Herreman 2022b). Moose densities in the downstream Bradley River study area in the early 1980s ranged from 1.6 to 1.98 moose per square mile (APA 1985), but the current intensive management goal for all of GMU 15C is 1.0 to 1.4 moose per square mile (Herreman 2022b). In the Project area, some moose may concentrate at higher latitudes during the fall rutting season, but they generally avoid higher elevations during the winter when deep snow restricts movements and covers browse (AEA 2015; Herreman 2022b).

Mountain goats inhabit rugged, mountainous terrain, typically below 5,000 feet (ADF&G 2025). They spend summers grazing on grasses, sedges, forbs, lichen, moss, and shrubs in high alpine meadows and move to winter ranges at or below the treeline in forested habitats where they predominantly forage on trees, shrubs, and lichen (Fox et al. 1989; White et al. 2012; Westing 2022; ADF&G 2025). Regardless of season, they are usually not far from rugged cliffs, which provide escape habitat from predators (Fox et al. 1989; White et al. 2012; White and Gregovich 2017). The United States Forest Service (USFS) considers mountain goats a management indicator species in the Chugach National Forest (USFS 2008). Goat populations in coastal Alaska are limited principally by winter severity (mainly snow depth) and the availability of suitable habitat (Fox et al. 1989; White et al. 2012). The Kenai Peninsula is home to a healthy mountain goat population of around 3,300 to 4,750 animals (ADF&G 2025). The population had gone through a prior decline in the 1990s and

early 2000s, but populations have largely recovered due to adaptive management (Herreman 2025). In the Bradley Lake Goat Management Unit 359, the latest available aerial survey count located 170 goats, including 43 kids, indicating the population had recently increased (Herreman 2025). Project staff reported observing numerous mountain goats in cliff habitats adjacent to Bradley Lake and the East Fork Martin River during aerial Golden Eagle surveys in May just prior to kidding, but very few were observed in the Project area during a July survey (ABR 2026a).

5.1.1.2 Furbearers

Wolverines have large home ranges and require large expanses of wilderness (ADF&G 2025). In the Kenai Mountains and other nearby mountains in southcentral Alaska, the density of wolverines is typically low (4.5 to 5.2 per 1,000 square kilometers; Becker and Gardner 1992; Golden 1996; ADF&G 2025). They are found in a variety of habitats and elevations but are more common in alpine and subalpine habitats in the summer and often move to lower elevations in the winter where they can also use forest habitats (USFWS 2018). Wolverines are shy and avoid human activity (Gardner et al. 2010). Their diet is opportunistic. They often scavenge in the winter, but throughout the year they also feed on small and medium-sized animals such as voles, squirrels, snowshoe hares (*Lepus americanus*), and birds, and are known to occasionally kill moose, caribou, sheep, and other large mammals (ADF&G 2025). Although wolverines are likely present in the area, they are expected to be infrequent due to their wide dispersal and large home ranges.

Hoary marmots (*Marmota caligata*) are the largest members of the squirrel family in North America, weighing up to 10 pounds (ADF&G 2025). They hibernate during the winter but are active in the summer, especially during the twilight hours (ADF&G 2025). They build burrows under large rocks in talus slopes, boulder fields, rock outcrops, and cliffs, and they forage on nearby herbs, forbs, berries, roots, mosses, and lichen (ADF&G 2025). They are common in the Project area (AEA 2015) and were observed numerous times in cliff habitat during aerial Golden Eagle surveys for the current Project (ABR 2026a).

American beavers (*Castor canadensis*), North America's largest rodents, are managed by ADF&G as furbearers and are generally considered common and abundant, especially throughout the forested portions of Alaska (ADF&G 2025). Beavers usually dam small streams and springs to create deep, stable ponds that stay open in winter; they also use bank dens on fast rivers and build lodges in existing ponds and lakes (ADF&G 2025). They

are known to occur in the Project area, though aquatic mammals were not commonly observed during the Battle Creek Diversion studies (AEA 2015).

River otters (*Lontra canadensis*) inhabit aquatic and marine shoreline habitats where they primarily consume fish and invertebrates, and they also occasionally eat insects, frogs, birds, mammals, and vegetation (Larsen 1983; ADF&G 2025). While otters use terrestrial habitats for hunting, travel, and denning, they often use habitats in proportion to their availability and within 30 meters (32.8 yards) of shore (Larsen 1983; Woolington 1984). Natal dens may be 1.0 kilometer (0.6 mile) inland but are located in proximity to inland waterbodies for safe access (Woolington 1984). They often den in cavities under large stumps in old growth forests or in rock piles (Woolington 1984). They are present in the Project area from the ocean to the alpine (personal communication between J. Herreman, ADF&G, and Joseph Welch, Senior Scientist, ABR, September 24, 2025). Project staff for the Battle Creek Diversion project around 2012 (AEA 2015) noted less frequent sightings of aquatic mammals than in the early 1980s (APA 1984), and that species group would include river otters.

5.1.1.3 Small Mammals

Snowshoe hares are distributed throughout most of Alaska and primarily inhabit mixed spruce forests, wooded swamps, shrublands, and riparian communities (Banfield 1974; Wolff 1980; ADF&G 2025). Their diet includes grasses, buds, twigs, and leaves in the summer, and spruce twigs/needles, bark, and buds of hardwood species like aspen and willow in the winter (ADF&G 2025). Snowshoe hares are a primary food source for many predators.

The singing vole (*Microtus miurus*) is found throughout much of Alaska, including the Kenai Peninsula (Fuller 1981; Alaska Center for Conservation Science 2018). Singing voles typically inhabit willow thickets, spruce forests, and woody riparian communities in arctic and alpine tundra (Bee and Hall 1956; Manville and Young 1965; Babcock 1984; Douglass 1984; Batzli and Lesieutre 1991). They prefer mesic habitats near or above the treeline with ample cover and food sources such as horsetails, palatable forbs, or deciduous shrubs (Batzli and Lesieutre 1991; MacDonald and Cook 2009).

The tundra vole (also known as root vole; *M. oeconomus*) is widely distributed throughout Alaska, including the southern coast (Douglass 1984; Batzli and Henttonen 1990; MacDonald and Cook 2009). They inhabit tundra and taiga biomes at various elevations,

preferring mesic herbaceous meadows with abundant cover, especially along the edges of streams and lakes (Bieberich 2007; MacDonald and Cook 2009). Their primary food is sedges (Bieberich 2007). The tundra vole is an important prey species for various carnivores, especially during vole population eruptions (Bieberich 2007).

The dusky shrew (*Sorex monticolus*) is one of the most common species of shrew in North America and occupies a wide range of habitats, including tundra, alpine meadows, forests, and prairies (Forsyth 1985; Banasiak 2001; MacDonald and Cook 2009). They are often found in forest floor litter, typically within 100 meters (328 feet) of streams or rivers, and they prefer moist or wet habitats with dense ground cover, acidic soils, and nearby coniferous forest (Forsyth 1985; Smith and Belk 1996; MacDonald and Cook 2009).

Western water shrews (*S. navigator*) are amphibious, rarely found more than a few meters from the water's edge, and prefer banks offering adequate cover such as thick vegetation or rock crevices (Conaway 1952; Beneski and Stinson 1987; Lehmkuhl et al. 2008; MacDonald and Cook 2009).

5.1.1.4 Bats

The only bat likely to inhabit the Project area is the little brown myotis (*M. lucifugus*). The little brown myotis is a small, insectivorous bat found widely throughout most of Alaska, except for the Arctic and the Aleutian Islands (ADF&G 2025). It has been documented in various habitats, including temperate rainforests and spruce/birch forests and is even known to use coastal, marine-influenced habitats in nearby Kenai Fjords National Park (Mullet et al. 2021; ADF&G 2025). These bats commonly roost in human-made structures or natural sites like snags of mature trees (Loeb et al. 2014; Tessler and Snively 2014). They typically feed on insects aerially over water and in riparian areas near forests (Parker et al. 1997; Loeb et al. 2014; Snively et al. 2021). In Alaska, the size and status of the little brown myotis population(s) is unknown, but they appear to be widespread in low numbers (ADF&G 2025). As with other bats, mortality risk from white-nose syndrome is a significant global threat to the species (ADF&G 2025).

5.1.2 Avian Species

With agency input during the study planning process, 49 bird species of concern were identified for analysis in the Wildlife Habitat Evaluation Study (see Section 4.1). The known habitat associations for the 49 bird species evaluated are summarized below by species group.

5.1.2.1 Waterbirds

Waterbirds, which include waterfowl, loons, grebes, and cranes, may use the area during migration or for breeding. They require open water and wetlands for feeding and nesting and generally will be found on lakes, marshes, ponds, rivers, wetlands, and coastal estuaries. Most waterbirds frequent rivers, river outlets, and coastal freshwater or brackish wetlands during migration because they are rich in food and because they are the first areas to become ice-free in spring. Waterbirds breed in a variety of aquatic and palustrine wetland habitats. Some species specialize in using primarily one habitat type (e.g., Common [*Gavia immer*] and Pacific [*Gavia pacifica*] loons prefer large lakes), while other species use many different habitat types (e.g., Mallards [*Anas platyrhynchos*] use lakes, ponds, bogs, rivers, and palustrine wetlands). Stable water levels, irregular shorelines, emergent vegetation, organic content, and water clarity, acidity, and depth are some of the important features that determine whether a waterbody is used during the breeding season by waterfowl for foraging, nesting, and/or brood-rearing (Billerman et al. 2025). Use of meadow and forest habitats for nesting by waterbirds depends on their proximity to a waterbody that serves as foraging and/or brood-rearing habitat. Distance of a nest from water depends on each species' habitat preferences and requirements and can even vary widely within a species. Meadow and forest-edge habitats adjacent to waterbodies are most frequently used for nesting and for protective cover during brood-rearing. In the early 1980s, waterfowl numbers in the Bradley Lake Project area peaked during spring and fall migration, with the greatest numbers recorded in spring (APA 1984).

Ten waterbird species of concern were assessed, including nine species of waterfowl and one loon. Steller's Eiders are listed as threatened under the ESA.

5.1.2.2 Raptors

Raptors, which include eagles, hawks, falcons, and owls, use a wide variety of habitats and potentially breed in, or migrate through, the Project area (Figure 3.1-1). Many species expected to occur in the study area (Northern Harrier [*Circus hudsonius*], Bald Eagle [*Haliaeetus leucocephalus*], Red-tailed Hawk [*Buteo jamaicensis*], Short-eared Owl [*Asio flammeus*], Peregrine Falcon [*Falco peregrinus*]) prefer hunting for fish, small mammals, and/or birds in open habitats (Billerman et al. 2025). These habitats can include open graminoid- and shrub-dominated meadows, riverine and lacustrine areas, and coastal saltmarshes and mudflats. Bald Eagles commonly breed in Kachemak Bay, typically in large Sitka spruce (*Picea sitchensis*) or black cottonwood (*Populus trichocarpa*) trees along the

coast where fish are present, and they overwinter in congregations where open water with fish and waterbird prey occur (Billerman et al. 2025). Golden Eagles are generally considered rare breeders along the southern Alaska coast, but several active breeding territories were found in suitable cliff habitats in the Project area and surrounding terrain in summer 2025 (ABR 2026a). Studies conducted in the Bradley Lake Project area in the early 1980s found that raptor numbers peaked during spring and fall migration (APA 1984).

Six raptor species, including owls, were assessed for habitat values. These species will use a diversity of terrestrial and aquatic habitat types in the Project area for hunting and breeding. Golden Eagle habitat values were informed by surveys detailed in ABR (2026a), which provided Project-specific information on habitat values.

5.1.2.3 Seabirds

Seabirds, which include gulls and terns, are most commonly found in marine and coastal environments and are common in upper Kachemak Bay. They may use the Project area both during breeding and non-breeding time periods. There are two murrelet species of concern that may occur in the Project area: Kittlitz's (*Brachyramphus brevirostris*) and Marbled (*B. marmoratus*) murrelets (Table 4.1-1). In Alaska, Kittlitz's Murrelets and Marbled Murrelets are considered Birds of Conservation Concern by the USFWS (Marbled Murrelet populations in Washington, Oregon, and California are listed as threatened under the ESA). Additionally, Bonaparte's (*Chroicocephalus philadelphia*) and American Herring (*Larus smithsonianus*) gulls and Arctic Terns (*Sterna paradisaea*) are of concern in the Project area.

5.1.2.4 Shorebirds

Shorebirds are most commonly found on mudflats, beaches, estuaries, and wetlands, but some species breed in drier areas including upland tundra and forested ecosystems. Breeding shorebirds in southcentral Alaska generally are adapted to utilize open scrub forests, forest openings in the lowlands (e.g., scrub bogs and graminoid-dominated wetlands), lacustrine waterbodies, gravel river bar and coastal habitats, and dwarf-scrub habitats in upland and alpine areas. Upper Kachemak Bay is used by a variety of migrant shorebird species during spring and fall (APA 1984). Many species are long-distance migrants, and high-quality stopover sites, such as productive mudflats, can be vital to refueling prior to long flights. There are nine shorebird species of concern (Table 4.1-1).

5.1.2.5 Landbirds

Landbirds, which include passerines, upland game birds, kingfishers, hummingbirds, and others, are a group of species generally adapted to terrestrial habitats, although they can also use freshwater and brackish water aquatic habitats. Many of the passerines in Alaska are migrants that either breed in the area or pass through on migration, including flycatchers, swallows, thrushes, finches, longspurs, sparrows, and warblers. Most upland game birds (e.g., Willow [*Lagopus lagopus*] and Rock [*Lagopus muta*] ptarmigan) are residents, as are woodpeckers, many finches, chickadees, and corvids (jays, magpies, and crows).

Seventeen landbird species of concern, including passerines, upland game birds, hummingbirds, and kingfishers, were assessed for habitat values (Table 4.1-1). These species use a diversity of terrestrial and freshwater aquatic habitat types in the Project area. The 13 passerines assessed are all migratory species.

5.2 Wildlife Habitat Evaluation

5.2.1 Current Habitat Values – Outside the Martin River

5.2.1.1 Large Mammals

Both black and brown bears in Alaska are well known to make use of a wide variety of forest, scrub, meadow, marsh, and tundra habitats across a broad elevation range, with black bears tending to be more closely associated with forest types. Outside the Martin River, habitats considered moderate or high value for black bears include all the coastal marsh and meadow types, Tidal Gut, freshwater lakes and ponds, the riverine scrub and forest types, upland mixed forests, meadow and low and tall scrub habitats in upland and subalpine areas, and Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex (Table 5.2-1). Habitats ranked as moderate or high value for brown bears were very similar, with the addition of Subalpine and Alpine Dwarf Ericaceous Scrub ranked as moderate value. In contrast to black bears, upland and riverine forests were considered low value to brown bears (Table 5.2-1).

Moose can use an array of scrub and forest habitats when their preferred forage of willow, aspen, and birch shrubs are present. In the summer months, they are also known to forage for aquatic plants in shallow ponds. Outside the Martin River, habitats considered moderate or high value for moose include Freshwater Lakes and Ponds, the riverine low

and tall scrub and forest types, upland mixed forests, and tall scrub habitats in upland and subalpine terrain (Table 5.2-1).

Never far from cliffs, mountain goats are generally restricted to high elevation rocky cliff habitats but descend to forest habitats adjacent to escape cover at or below treeline during the winter. Outside the Martin River, a limited number of rocky and forest habitats were considered moderate or high value for goats, including Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex, which is a mosaic of forage habitat and small cliffs and outcrops, large Rocky Cliffs, barren and dwarf scrub habitats in subalpine and alpine areas, Upland and Subalpine Herb Meadow, and Upland Mixed Lutz Spruce-Black Cottonwood Forest (Table 5.2-1).

Table 5.2-1 Suitable habitat types for wildlife species of concern in the area outside the Martin River, with predicted acres of change due to climate change and plant succession.

	Artificial Fill	Coastal Saline Wet Sedge Marsh	Coastal Saline Wet Sedge Meadow	Estuarine Brackish Wet Sedge-Forb Meadow	Freshwater Lakes and Ponds	Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex	Riverine Barrens	Riverine Dryas Dwarf Shrub	Riverine Low and Tall Willow	Riverine Mixed Spruce-Black Cottonwood Forest	Riverine Tall Alder	Rivers and Streams (High Gradient-High Flow)	Rivers and Streams (Low Gradient-High Flow)	Rivers and Streams (Mixed Gradient-Low Flow)	Rocky Cliffs	Rocky Shore and Cobble Beach	Subalpine and Alpine Barrens	Subalpine and Alpine Dwarf Ericaceous Scrub	Tidal Gut	Upland and Subalpine Herb Meadow	Upland and Subalpine Tall Alder Scrub	Upland and Subalpine Tall Willow Scrub	Upland and Subalpine Wet Graminoid Moss Bog	Upland Mixed Lutz Spruce-Black Cottonwood Forest
Predicted future change in habitat area (acres) from climate change and plant succession	0.0	-0.7	0.0	-20.2	0.0	-203.7	-90.1	0.0	-0.1	13.7	96.5	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	-13.4	-1,584.5	0.0	0.0	1,801.6
Birds																								
Northern Pintail		X	X	X	X														X					
Steller's Eider																								
Harlequin Duck							X		X			X	X	X										
Black Scoter																								
Long-tailed Duck																								
Common Goldeneye					X					X									X					
Barrow's Goldeneye					X					X									X					
Common Merganser					X					X		X	X						X					
Red-breasted Merganser				X	X														X					
Willow Ptarmigan						X			X												X	X		
Rock Ptarmigan															X		X	X						
Rufous Hummingbird										X	X													X
Semipalmated Plover		X	X	X			X																	
Rock Sandpiper																								
Semipalmated Sandpiper		X	X	X																				
Western Sandpiper		X	X	X																				
Short-billed Dowitcher		X	X	X																				
Spotted Sandpiper			X		X		X		X				X			X								
Wandering Tattler							X		X			X	X			X								
Lesser Yellowlegs		X	X	X																				
Greater Yellowlegs		X	X	X																				

	Artificial Fill	Coastal Saline Wet Sedge Marsh	Coastal Saline Wet Sedge Meadow	Estuarine Brackish Wet Sedge-Forb Meadow	Freshwater Lakes and Ponds	Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex	Riverine Barrens	Riverine Dryas Dwarf Shrub	Riverine Low and Tall Willow	Riverine Mixed Spruce-Black Cottonwood Forest	Riverine Tall Alder	Rivers and Streams (High Gradient-High Flow)	Rivers and Streams (Low Gradient-High Flow)	Rivers and Streams (Mixed Gradient-Low Flow)	Rocky Cliffs	Rocky Shore and Cobble Beach	Subalpine and Alpine Barrens	Subalpine and Alpine Dwarf Ericaceous Scrub	Tidal Gut	Upland and Subalpine Herb Meadow	Upland and Subalpine Tall Alder Scrub	Upland and Subalpine Tall Willow Scrub	Upland and Subalpine Wet Graminoid Moss Bog	Upland Mixed Lutz Spruce-Black Cottonwood Forest
Predicted future change in habitat area (acres) from climate change and plant succession	0.0	-0.7	0.0	-20.2	0.0	-203.7	-90.1	0.0	-0.1	13.7	96.5	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	-13.4	-1,584.5	0.0	0.0	1,801.6
Marbled Murrelet																								
Kittlitz's Murrelet																								
Black-legged Kittiwake																								
Bonaparte's Gull		X	X	X	X					X														
American Herring Gull		X	X	X																				
Arctic Tern		X	X	X	X														X					
Red-throated Loon																								
Pelagic Cormorant																								
Golden Eagle						X									X		X	X						
Northern Harrier				X		X											X	X						
Bald Eagle										X														X
Red-tailed Hawk										X										X				X
Short-eared Owl				X																				
Belted Kingfisher					X					X			X						X					
Peregrine Falcon		X	X	X		X									X				X					
Olive-sided Flycatcher										X										X			X	X
Alder Flycatcher									X	X	X										X	X		X
Horned Lark																	X	X						
Bank Swallow				X	X								X											
American Pipit				X													X	X						
Lapland Longspur				X													X	X						
Fox Sparrow									X												X	X		
Savannah Sparrow				X		X		X									X	X		X	X	X	X	

	Artificial Fill	Coastal Saline Wet Sedge Marsh	Coastal Saline Wet Sedge Meadow	Estuarine Brackish Wet Sedge-Forb Meadow	Freshwater Lakes and Ponds	Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex	Riverine Barrens	Riverine Dryas Dwarf Shrub	Riverine Low and Tall Willow	Riverine Mixed Spruce-Black Cottonwood Forest	Riverine Tall Alder	Rivers and Streams (High Gradient-High Flow)	Rivers and Streams (Low Gradient-High Flow)	Rivers and Streams (Mixed Gradient-Low Flow)	Rocky Cliffs	Rocky Shore and Cobble Beach	Subalpine and Alpine Barrens	Subalpine and Alpine Dwarf Ericaceous Scrub	Tidal Gut	Upland and Subalpine Herb Meadow	Upland and Subalpine Tall Alder Scrub	Upland and Subalpine Tall Willow Scrub	Upland and Subalpine Wet Graminoid Moss Bog	Upland Mixed Lutz Spruce-Black Cottonwood Forest
Predicted future change in habitat area (acres) from climate change and plant succession	0.0	-0.7	0.0	-20.2	0.0	-203.7	-90.1	0.0	-0.1	13.7	96.5	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	-13.4	-1,584.5	0.0	0.0	1,801.6
Song Sparrow										X	X													
Orange-crowned Warbler									X	X	X										X	X		X
Northern Yellow Warbler									X	X	X										X	X		X
Blackpoll Warbler									X	X	X													
Wilson's Warbler									X		X										X	X		
Mammals																								
Little brown myotis		X	X	X	X			X	X	X	X	X	X	X	X					X			X	X
American beaver					X				X	X	X			X										
River otter					X		X		X			X	X	X					X					
Hoary marmot						X									X		X							
Wolverine						X												X		X	X	X		X
Black bear		X	X	X	X	X		X	X	X	X								X	X	X	X		X
Brown bear		X	X	X	X	X		X	X		X							X	X	X	X	X		
Moose					X				X	X	X										X	X		X
Mountain goat						X									X		X	X		X				X
Snowshoe hare									X	X	X										X	X		X
Singing vole						X												X		X	X	X		
Tundra (root) vole					X			X		X	X							X		X	X	X	X	X
Dusky shrew									X	X	X									X	X	X		X
Western water shrew		X	X	X	X								X	X									X	

Note: Habitats ranked as moderate or high value are indicated with an *X*. Blank cells indicate unsuitable habitats, ranked as low or negligible value.

5.2.1.2 Furbearers

Wolverines typically can use a broad array of habitats across a range in elevation; they tend to be more common in alpine and subalpine terrain in the snow-free seasons and move to lower elevations in winter (see Section 5.1.1.2). The habitats considered moderate or high value for wolverines in the area outside the Martin River include many of the higher elevation types: Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex, and the meadow, dwarf scrub, and tall scrub habitats in upland, subalpine, and alpine areas, as well as upland conifer forests, which can be important particularly during the winter (Gardner 1985; Table 5.2-1).

Hoary marmots are common at higher elevations in the area outside the Martin River and were observed numerous times in cliff habitat during Golden Eagle surveys in summer 2025 (ABR 2026a). Habitats ranked as high value for this species include Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex, Rocky Cliffs, and Subalpine and Alpine Barrens (Table 5.2-1).

American beavers rely on aquatic habitats with sources of wood along the shores of lacustrine and riverine water bodies for building dams and lodges (see Section 5.1.1.2). The habitats ranked as moderate or high value for beavers in the area outside the Martin River include all the freshwater lake and pond types, with the exception of Bradley Lake; all of the riverine low and tall scrub and forest habitats; and the rivers and streams with low flow (Table 5.2-1).

River otters regularly use both freshwater and marine shoreline habitats, especially when fish and invertebrates are present, and they also use riparian habitats when very near water for hunting, travel, and denning. In the area outside the Martin River, the habitats considered moderate or high value for river otters include Freshwater Lakes and Ponds, the lacustrine off-channel ponds along the Martin River, Riverine Flooded Black Cottonwood Scrub, Riverine Barrens, Riverine Low and Tall Willow, all of the rivers and stream types, and Tidal Gut at the coast (Table 5.2-1).

5.2.1.3 Small Mammals

As noted in Section 5.1.1.3, snowshoe hares use a variety of scrub and forest habitats in Alaska, which typically are found at lower elevations. In the area outside the Martin River, all the riverine, upland, and subalpine scrub and forest habitats were considered moderate or high value for this species (Table 5.2-1).

As noted in Section 5.1.1.3, singing voles in Alaska typically have been found in higher elevation habitats at or above the treeline. In the area outside the Martin River, habitats ranked as moderate or high value for this vole species include Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex, and each of the subalpine and alpine scrub habitats (Table 5.2-1).

In contrast, the tundra vole occurs in a variety of different habitats in both boreal forest and tundra regions. In the area outside the Martin River, habitats considered moderate or high value for tundra vole include each of the lake and pond habitats, the riverine scrub and forest habitats with extensive ground cover, and each of the upland forest and upland, subalpine, and alpine bog, meadow, and scrub habitats (Table 5.2-1).

Dusky shrews inhabit a wide range of habitats, typically near streams and rivers. In the area outside the Martin River, lacustrine marshes, most of the riverine low and tall scrub and forest types, and the upland forest and upland and subalpine meadow and tall scrub habitats were ranked as moderate or high value for this shrew species (Table 5.2-1).

Western water shrews are amphibious and are rarely found far from the edges of water bodies. In the area outside the Martin River, a broad array of habitats were considered moderate or high value for this species including all of the coastal meadow and marsh habitats, all of the freshwater lake and pond and associated marsh habitats, the lower gradient rivers and streams, and Upland and Subalpine Wet Graminoid Moss Bog (Table 5.2-1).

5.2.1.4 Bats

Little brown myotis is the only bat species known to occur regularly north of southeast Alaska. ADF&G requested that Keen's myotis, now known as western long-eared bat in Alaska, also be assessed in the habitat evaluation for the Project, but as described above, there is only a single record of that western long-eared bat outside of southeast Alaska, a dead specimen on the Homer Spit. This record is akin to vagrant birds that show up as single individuals outside their normal migratory and breeding range. In these cases, there is no likelihood that the Project could have population effects on such species. For these reasons, western long-eared bat was not assessed in the habitat evaluation.

Little brown myotis has been documented using a variety of forest, riparian, and coastal habitats in southern Alaska and, in addition to mature trees, can use human-made structures as roost sites. The habitats ranked as moderate or high value for little brown

myotis in the area outside the Martin River include Coastal Barren Mud Flat, all of the coastal marsh and meadow habitats, all of the lake and pond and fringe marsh types except for Bradley Lake, Riverine Active Braided Floodplain, all of the riverine dwarf scrub, low and tall scrub, and forest habitats, all of the rivers and streams types, Rocky Cliffs, upland mixed forests, and the upland and subalpine bog and meadow habitats (Table 5.2-1).

5.2.1.5 Waterbirds

Within the area outside the Martin River, both species of goldeneye have very similar habitat-use preferences, with habitats ranked as moderate and high value including Freshwater Lakes and Ponds, Tidal Gut, Human Modified Reservoir (Bradley Lake), and the riverine forest habitat types with black cottonwood present (Table 5.2-1). Common Merganser (*Mergus merganser*) habitat values are similar, but they are not expected to use Bradley Lake regularly because of the lack of fish prey. These three waterfowl species are typically tree cavity nesters that may breed in the upper Kachemak Bay area, and black cottonwoods can provide suitable nest sites (Eadie et al. 2020a, 2020b; Pearce et al. 2020). Although goldeneyes may winter in the vicinity of the Project area, they usually use marine habitat types with rocky shores and are less likely to be found in the Project area. Common Mergansers do winter in freshwater environments such as the river and stream habitat in the Project area (Table 5.2-1). Red-breasted Mergansers (*Mergus serrator*), in contrast, are ground-nesters (Craik et al. 2020), and habitats ranked as moderate and high value in the Project area for this species include Estuarine Brackish Wet Sedge-Forb Meadow, Tidal Gut, and Freshwater Lakes and Ponds (Table 5.2-1).

The only non-seaduck waterfowl species of concern assessed, Northern Pintail (*Anas acuta*), is expected to use a wide variety of habitats within the area outside the Martin River. Habitats considered moderate or high value for Northern Pintails include the coastal and estuarine habitats, Tidal Gut, and freshwater ponds (Table 5.2-1).

Red-throated Loons (*Gavia stellata*) may breed in the upper Kachemak Bay area, although this is outside their usual breeding range. They generally nest in low-laying wetlands on the margins of shallow ponds (Rizzolo et al. 2020). They winter in marine waters, and no habitats in the Project area were ranked as moderate or high value for this species (Table 5.2-1).

Harlequin Ducks (*Histrionicus histrionicus*) may breed along streams in the upper Kachemak Bay area and are present in marine habitats in the winter. They generally nest on the ground near riverine waters but can also be found on small cliff ledges and in tree cavities (Robertson and Goudie 2020). Habitats ranked as moderate to high value for Harlequin Ducks in the Project area include Riverine Barrens, Riverine Low and Tall Willow, and the three rivers and streams types (Table 5.2-1).

None of the waterbirds of concern assessed in the habitat evaluation are likely to use the subalpine, upland, cliff, or glacially modified habitats.

5.2.1.6 Raptors

Golden Eagles are primarily a montane species on the Kenai Peninsula, and several higher elevation tundra and partially vegetated rocky habitats were considered moderate or high value for this species (Table 5.2-1). Rocky Cliffs in particular were noted as high value, as several active breeding territories were found in suitable cliff habitats in the Project area and surrounding terrain in 2025 (ABR 2026a). Bald Eagles in contrast are usually found at lower elevations and are a tree-nesting species typically associated with fish-bearing waters. Habitats considered moderate or high value for Bald Eagles within the area outside the Martin River include the Tidal Gut, as well as Riverine Mixed Spruce-Black Cottonwood Forest and Upland Mixed Lutz Spruce-Black Cottonwood Forest, as large black cottonwoods are available as potential nest sites (Table 5.2-1).

Northern Harriers are open-country raptors that may breed in and migrate through the area outside the Martin River. A wide range of open marsh, meadow, and higher elevation tundra and partially vegetated habitats were considered moderate or high value for harriers (Table 5.2-1). Short-eared Owls are also an open-country species, but they are typically more restricted to large expanses of lower elevation coastal meadow habitats in southcentral Alaska. One habitat in the area outside the Martin River, Estuarine Brackish Wet Sedge-Forb Meadow, was ranked as high value for Short-eared Owls (Table 5.2-1).

Red-tailed Hawk is a tree-nesting raptor that frequently soars and hunts from high perches. They are most often associated with forest and inland meadow habitats in Alaska. In the Project area, habitats ranked as moderate or high value for Red-tailed Hawks in the area outside Martin River include both riverine and upland forests of black cottonwood and spruce and Upland and Subalpine Herb Meadow (Table 5.2-1).

Peregrine Falcons may breed in cliff habitats in the Project area and surrounding terrain, though none were located during the nesting raptor surveys in 2025 (ABR 2026a). This species also is likely to pass through the area during migration when they often hunt flocks of waterbirds and shorebirds in coastal habitats. Coastal and estuarine meadow habitats, Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex, Tidal Gut, and Rocky Cliffs were considered moderate or high value for Peregrine Falcons in the area outside the Martin River (Table 5.2-1).

5.2.1.7 Seabirds

Both species of murrelets can nest in rocky subalpine and cliff habitats, though Marbled Murrelets nest much more commonly in mature forest habitats. Suitable large Sitka spruce trees in the Project area for Marbled Murrelets have suffered extensive mortality from a spruce bark beetle outbreak, and the higher elevation rocky habitats generally do not have the scree slopes that Kittlitz's Murrelets prefer for nesting. For these reasons, no habitats within the Project area were ranked as moderate or high value for Marbled or Kittlitz's murrelets (Table 5.2-1). Because of the lack of coastal cliffs or other elevated infrastructure near the coast to support a nesting colony, there are no habitats within the Project area ranked as moderate or high value for Black-legged Kittiwakes (*Rissa tridactyla*; Table 5.2-1).

The American Herring Gull prefers nesting sites on dry, well-drained substrates (e.g., rock, sand, or grass). Outside the breeding season, they are generally concentrated in coastal areas (Weseloh et al. 2024). Within the area outside the Martin River, moderate- and high-value habitat for all three gull species is primarily the coastal vegetated habitats including Coastal Saline Wet Sedge Meadow, and Estuarine Brackish Wet Sedge-Forb Meadow; (Table 5.2-1). For Bonaparte's Gull and Arctic Tern, the Freshwater Lakes and Ponds, when fish are present, were ranked moderate value. Riverine Mixed Spruce-Black Cottonwood Forest was also ranked as moderate value for nesting Bonaparte's Gulls (Table 5.2-1).

5.2.1.8 Shorebirds

The coastal vegetated habitats (Coastal Saline Wet Sedge Meadow, and Estuarine Brackish Wet Sedge-Forb Meadow) in the area outside the Martin River were ranked as moderate or high value for the majority (six to seven) of the nine shorebird species of concern (Table 5.2-1), as these areas are likely to be regularly used during spring and fall migration.

Riverine Barrens and active riverine floodplains were considered moderate or high value to Spotted Sandpipers (*Actitis macularius*), Wandering Tattlers (*Tringa incana*), and Semipalmated Plovers (*Charadrius semipalmatus*; Table 5.2-1); these habitats are not expected to be used by the other six shorebird species. Similarly, Riverine Low and Tall Willow, rivers and streams, and Rocky Shore and Cobble Beach (at Bradley Lake) were variably ranked as moderate or high value for Semipalmated Plovers, Spotted Sandpipers, and Wandering Tattlers, with the greatest use of these habitats expected by Spotted Sandpipers. The subalpine and upland habitats, Rocky Cliffs, Artificial Fill, Human Modified Reservoir (Bradley Lake), and Tidal Gut were not ranked as moderate or high value for any of the shorebird species of concern assessed.

5.2.1.9 Landbirds

Upland habitats in the area outside the Martin River were ranked as moderate to high value for eight of the 13 migratory passerines, and unglaciated subalpine habitats were ranked as moderate to high value for four species (Horned Lark [*Eremophila alpestris*], American Pipit [*Anthus rubescens*], Lapland Longspur [*Calcarius lapponicus*], and Savannah Sparrow [*Passerculus sandwichensis*]; Table 5.2-1). Savannah Sparrows will also regularly use Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex and Riverine Dryas Dwarf Shrub, which are of low value to the other migratory passerines of concern (Table 5.2-1). Forest and riverine scrub habitats were ranked as moderate to high value for nine of the 13 migratory passerines.

The Freshwater Lakes and Ponds habitat was ranked as moderate value for Bank Swallows (*Riparia riparia*), which often feed on aerial insects over open water (Garrison et al. 2020; Table 5.2-1). At the coast, Estuarine Brackish Wet Sedge-Forb Meadow was considered moderate or high value for four species (Bank Swallow, American Pipit, Lapland Longspur, and Savannah Sparrow).

Most of the primarily unvegetated habitats (e.g., Artificial Fill, Rocky Cliffs, Riverine Barrens, Bradley Lake, Tidal Gut, Rocky Shore and Cobble Beach) were ranked as low value for the migratory passerines assessed. With the exception of Estuarine Brackish Wet Sedge-Forb Meadow noted above, the coastal meadow habitats were also ranked as low value for the migratory passerines.

The two upland gamebirds of concern in the Project area, Willow and Rock ptarmigan, have different habitat requirements. Willow Ptarmigan prefer low, somewhat moist shrub

habitats with willow or dwarf birch (Hannon et al. 2024). Habitats ranked as moderate to high value for this species primarily include those dominated by shrub species, particularly birch and willow in riverine, upland, and subalpine areas (Table 5.2-1). In contrast, Rock Ptarmigan, as the name suggests, prefer rocky tundra and alpine summits and are generally found in habitats that are drier and have fewer low and tall shrubs than Willow Ptarmigan (Montgomerie and Holder 2020). Habitats ranked as moderate to high value for Rock Ptarmigan primarily include the rocky cliff and subalpine and alpine habitats (Table 5.2-1).

The single migratory hummingbird species of concern assessed, Rufous Hummingbird (*Selasphorus rufus*), generally uses regenerating and mature forest habitats during the breeding season (Healy and Calder 2020). Each of the riverine and upland tall scrub and forest types in the Project area were ranked as moderate value for this species (Table 5.2-1).

The single kingfisher of concern assessed, Belted Kingfisher (*Megaceryle alcyon*), feeds primarily on small fish in streams, rivers, ponds and lakes, and digs nesting burrows in vertical earth banks (Kelly et al. 2020). Habitats ranked as moderate or high value in the Project area for this species include Freshwater Lakes and Ponds, Riverine Mixed Spruce-Black Cottonwood Forest, low-gradient rivers and streams, and Tidal Gut at the coast (Table 5.2-1).

5.2.2 Future Habitat Values – Outside the Martin River

5.2.2.1 Large Mammals

In the area outside the Martin River over the 60-year post-construction period, changes in the availability of habitats for large mammals are expected due to climate change and natural plant succession. These changes are expected to occur independently of, and outside of, the areas affected by the proposed Project. In these areas, brown bears are expected to see significant habitat losses, black bears are expected to see little change, moose could see moderate increases, and mountain goats could see large increases.

Brown bears are expected to see a decline from 13 to nine suitable habitat types and an overall net loss of 1,726 acres of high- and moderate-value habitat (Table 5.2-1). Brown bears are likely to see a complete loss of Coastal Saline Wet Sedge Marsh, Estuarine Brackish Wet Sedge-Forb Meadow, Glaciated Subalpine Complex, and Riverine Barrens, though only two of these habitats constitute a loss greater than 25 acres each (Table 4.2-1

and Table 5.2-1). The largest loss of suitable habitat is expected from the transition of Upland and Subalpine Tall Alder Scrub to forest. Three habitats are expected to be largely unchanged while one habitat type, Riverine Tall Alder, is likely to increase.

Black bears are expected to see a decline from 14 to 10 suitable habitat types and an overall net increase of 89.2 acres of suitable habitat (Table 5.2-1). Black bears are likely to see a complete loss of Coastal Saline Wet Sedge Marsh, Estuarine Brackish Wet Sedge-Forb Meadow, Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex, and Upland and Subalpine Herb Meadow, though only one of these habitats is expected to entail a loss greater than 25 acres (Table 4.2-1 and Table 5.2-1). The largest loss of suitable habitat is expected from the transition of Upland and Subalpine Tall Alder Scrub to forest. The expected gains in suitable Riverine Mixed Spruce-Black Cottonwood Forest, Upland Mixed Lutz Spruce-Black Cottonwood Forest, and Riverine Tall Alder would counteract the loss of acreage of other suitable habitats.

Moose are not expected to see a decline in the number of suitable habitat types but are likely to see an overall net increase of 327.2 acres of suitable habitat (Table 5.2-1). Moose are expected to see a major loss of suitable habitat from declines in Upland and Subalpine Tall Alder Scrub. However, these losses are likely to be offset by major gains in Upland Mixed Lutz Spruce-Black Cottonwood Forest and modest gains in Riverine Tall Alder.

Mountain goats are expected to see a decline in suitable habitat types, from six to four, but an overall net increase of 1,584.5 acres of total suitable habitat (Table 5.2-1). There are some caveats to consider, however, as goats are likely to see a complete loss of Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex and Upland and Subalpine Herb Meadow (Table 4.2-1and Table 5.2-1). The former habitat contains numerous small cliffs and outcrops that goats can use as escape and resting habitat; these small cliffs would still exist in the future, though they may be more vegetated. Large gains in suitable habitat are attributed to increases in Upland Mixed Lutz Spruce-Black Cottonwood Forest, a habitat that is used for winter foraging and relief from deep snow, though only when it is in proximity to cliffs. Therefore, only a small proportion of the total acreage of this habitat is likely to be utilized by goats in the future.

Considering direct Project effects, small amounts of moderate- and high-value large mammal habitat would be lost to Artificial Fill within the Project footprint in the area outside the Martin River. Large mammals would lose up to 162.2 acres of suitable habitat, primarily from Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex (35.2 acres),

Upland and Subalpine Tall Alder Scrub (74.7 acres), and Upland Mixed Lutz Spruce-Black Cottonwood Forest (41.5 acres; Table 5.2-2). These habitats are important to all the large mammal species, except for the forested habitat for brown bears and Glaciated Subalpine Rock-Shrub Scrub Meadow Complex, which is not suitable habitat for moose. However, the loss in acreage of these habitats is small relative to the amount of available, undisturbed habitat in the vicinity of the Project. Also, Glaciated Subalpine Rock-Shrub Scrub Meadow Complex is expected to gradually transition to tall scrub due to climate change and plant succession and would be unavailable to large mammals. Similarly, Upland Mixed Lutz Spruce-Black Cottonwood Forest is expected to increase in extent in 60 years as Upland and Subalpine Tall Alder Scrub gradually transitions to forest.

Table 5.2-2 Suitable habitat types for wildlife species of concern in the area outside the Martin River, with acres expected to be directly lost to Project construction and acres expected to be affected by future water level fluctuations at Bradley Lake.

	Freshwater Lakes and Ponds	Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex	Human Modified Reservoir	Riverine Barrens	Riverine Dryas Dwarf Shrub	Riverine Low and Tall Willow	Riverine Tall Alder	Rivers and Streams (High Gradient-High Flow)	Rivers and Streams (Low Gradient-High Flow)	Rivers and Streams (Mixed Gradient-Low Flow)	Rocky Cliffs	Rocky Shore and Cobble Beach	Subalpine and Alpine Barrens	Subalpine and Alpine Dwarf Ericaceous Scrub	Upland and Subalpine Tall Alder Scrub	Upland and Subalpine Tall Willow Scrub	Upland and Subalpine Wet Graminoid Moss Bog	Upland Mixed Lutz Spruce-Black Cottonwood Forest
Habitats lost to Artificial Fill in Project footprint (acres)	2.1	35.2	5.5	N/A	N/A	1.5	N/A	0.5	0.6	N/A	1.9	1.5	2.2	N/A	72.7	<0.1	0.6	38.8
Habitats in water level fluctuation zone, El. 1,180 to 1,196 feet (acres)[a]	N/A	0.7	N/A	59.8	2.0	65.9	1.8	0.1	5.1	0.4	0.3	4.8	0.1	16.2	69.9	N/A	1.2	N/A
Habitats in water level fluctuation zone, El. 1,153 to 1,180 feet (acres)[b]	0.5	1.0	N/A	211.0	N/A	53.4	N/A	0.1	7.4	1.2	0.1	93.8	2.7	36.0	43.5	N/A	0.2	N/A
Birds																		
Northern Pintail	X																	
Steller's Eider																		
Harlequin Duck				X		X		X	X	X								
Black Scoter																		
Long-tailed Duck																		
Common Goldeneye	X		X															
Barrow's Goldeneye	X		X															
Common Merganser	X							X	X									
Red-breasted Merganser	X																	
Willow Ptarmigan		X				X									X	X		
Rock Ptarmigan											X		X	X				
Rufous Hummingbird							X											X
Semipalmated Plover				X														
Rock Sandpiper																		
Semipalmated Sandpiper																		
Western Sandpiper																		
Short-billed Dowitcher																		
Spotted Sandpiper	X			X		X			X			X						
Wandering Tattler				X		X		X	X			X						
Lesser Yellowlegs																		
Greater Yellowlegs																		

	Freshwater Lakes and Ponds	Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex	Human Modified Reservoir	Riverine Barrens	Riverine Dryas Dwarf Shrub	Riverine Low and Tall Willow	Riverine Tall Alder	Rivers and Streams (High Gradient-High Flow)	Rivers and Streams (Low Gradient-High Flow)	Rivers and Streams (Mixed Gradient-Low Flow)	Rocky Cliffs	Rocky Shore and Cobble Beach	Subalpine and Alpine Barrens	Subalpine and Alpine Dwarf Ericaceous Scrub	Upland and Subalpine Tall Alder Scrub	Upland and Subalpine Tall Willow Scrub	Upland and Subalpine Wet Graminoid Moss Bog	Upland Mixed Lutz Spruce-Black Cottonwood Forest
Habitats lost to Artificial Fill in Project footprint (acres)	2.1	35.2	5.5	N/A	N/A	1.5	N/A	0.5	0.6	N/A	1.9	1.5	2.2	N/A	72.7	<0.1	0.6	38.8
Habitats in water level fluctuation zone, El. 1,180 to 1,196 feet (acres)[a]	N/A	0.7	N/A	59.8	2.0	65.9	1.8	0.1	5.1	0.4	0.3	4.8	0.1	16.2	69.9	N/A	1.2	N/A
Habitats in water level fluctuation zone, El. 1,153 to 1,180 feet (acres)[b]	0.5	1.0	N/A	211.0	N/A	53.4	N/A	0.1	7.4	1.2	0.1	93.8	2.7	36.0	43.5	N/A	0.2	N/A
Marbled Murrelet																		
Kittlitz's Murrelet																		
Black-legged Kittiwake																		
Bonaparte's Gull	X																	
American Herring Gull																		
Arctic Tern	X																	
Red-throated Loon																		
Pelagic Cormorant																		
Golden Eagle		X									X		X	X				
Northern Harrier		X											X	X				
Bald Eagle																		X
Red-tailed Hawk																		X
Short-eared Owl																		
Belted Kingfisher	X								X									
Peregrine Falcon		X									X							
Olive-sided Flycatcher																	X	X
Alder Flycatcher						X	X								X	X		X
Horned Lark													X	X				
Bank Swallow	X								X									
American Pipit													X	X				
Lapland Longspur													X	X				
Fox Sparrow						X									X	X		
Savannah Sparrow		X			X								X	X	X	X	X	

	Freshwater Lakes and Ponds	Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex	Human Modified Reservoir	Riverine Barrens	Riverine Dryas Dwarf Shrub	Riverine Low and Tall Willow	Riverine Tall Alder	Rivers and Streams (High Gradient-High Flow)	Rivers and Streams (Low Gradient-High Flow)	Rivers and Streams (Mixed Gradient-Low Flow)	Rocky Cliffs	Rocky Shore and Cobble Beach	Subalpine and Alpine Barrens	Subalpine and Alpine Dwarf Ericaceous Scrub	Upland and Subalpine Tall Alder Scrub	Upland and Subalpine Tall Willow Scrub	Upland and Subalpine Wet Graminoid Moss Bog	Upland Mixed Lutz Spruce-Black Cottonwood Forest
Habitats lost to Artificial Fill in Project footprint (acres)	2.1	35.2	5.5	N/A	N/A	1.5	N/A	0.5	0.6	N/A	1.9	1.5	2.2	N/A	72.7	<0.1	0.6	38.8
Habitats in water level fluctuation zone, El. 1,180 to 1,196 feet (acres)[a]	N/A	0.7	N/A	59.8	2.0	65.9	1.8	0.1	5.1	0.4	0.3	4.8	0.1	16.2	69.9	N/A	1.2	N/A
Habitats in water level fluctuation zone, El. 1,153 to 1,180 feet (acres)[b]	0.5	1.0	N/A	211.0	N/A	53.4	N/A	0.1	7.4	1.2	0.1	93.8	2.7	36.0	43.5	N/A	0.2	N/A
Song Sparrow							X											
Orange-crowned Warbler						X	X								X	X		X
Northern Yellow Warbler						X	X								X	X		X
Blackpoll Warbler						X	X											
Wilson's Warbler						X	X								X	X		
Mammals																		
Little brown myotis	X				X	X	X	X	X	X	X						X	X
American beaver	X					X	X			X								
River otter	X			X		X		X	X	X								
Hoary Marmot		X									X		X					
Wolverine		X												X	X	X		X
Black bear	X	X			X	X	X								X	X		X
Brown bear	X	X			X	X	X							X	X	X		
Moose	X					X	X								X	X		X
Mountain goat		X									X		X	X				X
Snowshoe hare						X	X								X	X		X
Singing vole		X												X	X	X		
Tundra (root) vole	X				X		X							X	X	X	X	X
Dusky shrew						X	X								X	X		X
Western water shrew	X		X						X	X							X	

N/A = not applicable.
Note: Habitats ranked as moderate or high value are indicated with an *X*. Blank cells indicate unsuitable habitats, ranked as low or negligible value.
[a] Acres of wildlife habitats present in the expected upper water level fluctuation zone between the current and future operational maximum pool elevations of El. 1,180 feet and El. 1,196 feet.
[b] Acres of wildlife habitats present in the existing upper water level fluctuation zone between El. 1,153 feet (the lake level on the imagery used to map habitats in ABR 2026b) and the current operational maximum pool elevation of El. 1,180 feet.

Large mammals would have a total of up to 294.0 acres of suitable habitat altered by inundation and seasonal water level fluctuations at Bradley Lake, with the majority of that acreage accounted for by Upland and Subalpine Tall Alder Scrub (113.4 acres) and Riverine Low and Tall Willow (119.3 acres; Table 5.2-2). All the large mammal species, except mountain goats, use the potentially affected habitat types.

5.2.2.2 Furbearers

In the area outside the Martin River over the 60-year post-construction period, changes in the availability of habitats for furbearers are expected due to climate change and natural plant succession. These changes are expected to occur independently of, and outside of, the areas affected by the proposed Project. In these areas, hoary marmots and river otters are expected to see significant habitat losses, wolverines are expected to have no change, and beavers are expected to see large gains in suitable habitat.

Hoary marmots are expected to see a decline from three to two suitable habitat types and an overall net loss of up to 203.7 acres of suitable habitat (Table 5.2-1). The anticipated complete loss of Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex accounts for 100 percent of the loss in suitable marmot habitat (Table 4.2-1 and Table 5.2-1); the other two suitable habitats, Rocky Cliffs and Subalpine and Alpine Barrens, are not common and are not anticipated to change in abundance.

River otters are expected to see a decline from seven to six suitable habitats and an overall net loss of 90.2 acres of available suitable habitat (Table 5.2-1). The anticipated complete loss of Riverine Barrens accounts for 100 percent of the total loss in suitable habitat for river otters (Table 4.2-1 and Table 5.2-1).

Wolverines are expected to see a decline from six to four suitable habitat types but no overall loss in acreage of available suitable habitat (Table 5.2-1). Wolverines are likely to see a complete loss of Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex (203.7 acres) and Upland and Subalpine Herb Meadow (13.4 acres; Table 4.2-1and Table 5.2-1). Large losses in Upland and Subalpine Tall Alder Scrub (1,584.5 acres) and Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex (203.7 acres) are expected to be overcome by gains in Upland Mixed Lutz Spruce-Black Cottonwood Forest (1,801.6 acres).

American beavers are expected to have the same five suitable habitat types available in 60 years and are likely to see an increase in 110.1 acres of available suitable habitat (Table 5.2-1). Beavers are expected to see only a very small reduction in Riverine Low and Tall

Willow and gains in Riverine Mixed Spruce-Black Cottonwood Forest (13.7 acres) and Riverine Tall Alder (96.5 acres).

Considering direct Project effects, small to moderate amounts of moderate- and high-value furbearer habitat would be lost to Artificial Fill within the Project footprint in the area outside the Martin River. Furbearers would lose 162.0 acres of suitable habitat, mainly from Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex (35.2 acres), Upland and Subalpine Tall Alder Scrub (74.7 acres), and Upland Mixed Lutz Spruce-Black Cottonwood Forest (41.5 acres; Table 5.2-2). Most of the acreage lost would impact wolverines, but Upland Mixed Lutz Spruce-Black Cottonwood Forest is expected to increase in extent due to the natural conversion of Upland and Subalpine Tall Alder Scrub to forest over 60 years. Glaciated Subalpine Rock-Shrub Scrub Meadow Complex is important to both hoary marmots and wolverines but is expected to transition to tall scrub as a result of climate change and plant succession. At that point, the changed habitat would be unavailable to marmots, though wolverines can still use Upland and Subalpine Tall Alder Scrub.

Furbearers would have a total of up to 577.2 acres of suitable habitat altered by inundation and seasonal water level fluctuations at Bradley Lake, with most of that acreage accounted for by Riverine Barrens (270.8 acres), Upland and Subalpine Tall Alder Scrub (113.4 acres), Riverine Low and Tall Willow (119.3 acres), and Subalpine and Alpine Dwarf Ericaceous Scrub (52.2 acres; Table 5.2-2). These habitats are primarily used by river otters and wolverines.

5.2.2.3 Small Mammals

In the area outside the Martin River over the 60-year post-construction period, changes in the availability of habitats for small mammals are expected due to climate change and natural plant succession. These changes are expected to occur independently of, and outside of, the areas affected by the proposed Project. In these areas, singing voles are expected to see significant losses in habitat; western water shrews could see modest losses; and tundra voles, dusky shrews, and snowshoe hares could all see small increases in suitable habitat acreage.

Singing voles are expected to see a major decline from five to three suitable habitat types and an overall net loss of 1,801.6 acres of total suitable habitat (Table 5.2-1). Singing voles are likely to see a complete loss of Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex and Upland and Subalpine Herb Meadow, though these two habitats represent

only 217.1 acres of the lost suitable habitat (Table 4.2-1 and Table 5.2-1). The largest loss of suitable habitat would be from losses to Upland and Subalpine Tall Alder Scrub (1,584.5 acres).

Tundra voles are expected to see a decline from 10 to nine suitable habitat types but an overall net increase of 313.9 acres of total suitable habitat acreage (Table 5.2-1). Tundra voles are likely to see a complete loss of Upland and Subalpine Herb Meadow, though this represents only 13.4 acres of suitable habitat loss (Table 4.2-1 and Table 5.2-1). The largest loss of suitable habitat is expected to be from Upland and Subalpine Tall Alder Scrub. The expected gains in suitable Riverine Mixed Spruce-Black Cottonwood Forest, Riverine Tall Alder, and Upland Mixed Lutz Spruce-Black Cottonwood Forest would offset the losses of other suitable habitats. Additional suitable habitats for tundra voles are either rare or would only undergo modest changes in acreage.

Dusky shrews are expected to see a decline from seven to six suitable habitat types but an overall net increase of 313.8 acres of total suitable habitat (Table 5.2-1). Dusky shrews are likely to see a complete loss of Upland and Subalpine Herb Meadow, but this is a rare habitat in the study area (Table 4.2-1 and Table 5.2-1). Large losses in Upland and Subalpine Tall Alder Scrub are expected to be offset by gains in Upland Mixed Lutz Spruce-Black Cottonwood Forest.

Snowshoe hares have similar habitat preferences as dusky shrews, though Upland and Subalpine Herb Meadow (without shrub cover) is not a high- or moderate-value habitat for hares. Snowshoe hares are not expected to see any suitable habitats disappear and are expected to see an overall net increase of 327.2 acres of total suitable habitat (Table 5.2-1). Losses in Upland and Subalpine Tall Alder Scrub are expected to be offset by gains in Upland Mixed Lutz Spruce-Black Cottonwood Forest.

Western water shrews are expected to see a decline from eight to six suitable habitat types and a small overall net decrease of 20.9 acres of total suitable habitat acreage (Table 5.2-1). Western water shrews are likely to see a complete loss of Coastal Saline Wet Sedge Marsh and Estuarine Brackish Wet Sedge-Forb Meadow (Table 4.2-1 and Table 5.2-1). There are currently only 108.9 acres of suitable habitat for western water shrews, so this anticipated reduction would represent a large proportion of their habitat.

Considering direct Project effects, small to moderate amounts of moderate- and high-value small mammal habitat would be lost to Artificial Fill within the Project footprint in

the area outside the Martin River. Small mammals would lose a total of up to 164.6 acres of suitable habitat, mainly from Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex (35.2 acres), Upland and Subalpine Tall Alder Scrub (74.7 acres), and Upland Mixed Lutz Spruce-Black Cottonwood Forest (41.5 acres; Table 5.2-2). Most acreage lost would impact all the small mammals except western water shrews, but Upland Mixed Lutz Spruce-Black Cottonwood Forest is expected to increase in extent due to the natural conversion of Upland and Subalpine Tall Alder Scrub over 60 years. Glaciated Subalpine Rock-Shrub Scrub Meadow Complex is important to singing voles, but it is expected to transition to low and tall scrub as a result of climate change and plant succession and would be unavailable to singing voles.

Small mammals would have a total of up to 292.3 acres of suitable habitat altered by inundation and seasonal water level fluctuations at Bradley Lake, with most of that acreage coming from Upland and Subalpine Tall Alder Scrub (113.4 acres), Riverine Low and Tall Willow (119.3 acres), and Subalpine and Alpine Dwarf Ericaceous Scrub (52.2 acres; Table 5.2-2). All the small mammal species, except western water shrews, would be affected by these habitat alterations. With the increase in the extent of lake waters at Bradley Lake (classified as Human Modified Reservoir), western water shrews would see an expansion of suitable aquatic lacustrine habitat (Table 5.2-2).

5.2.2.4 Bats

In the area outside the Martin River over the 60-year post-construction period, changes in the availability of habitats for bats are expected due to climate change and natural plant succession. These changes are expected to occur independently of, and outside of, the areas affected by the proposed Project. In these areas, little brown myotis could see large increases in suitable habitat. They are expected to see a decline in the number of suitable habitat types, from 15 to 12, but a large overall net increase of 1,877.4 acres of total suitable habitat (Table 5.2-1). Little brown myotis is likely to see a complete loss of Coastal Saline Wet Sedge Marsh, Estuarine Brackish Wet Sedge-Forb Meadow, and Upland and Subalpine Herb Meadow, though none of these habitats constitute a loss greater than 25 acres each (Table 4.2-1 and Table 5.2-1). Other suitable habitats are expected to remain relatively unchanged though there are likely to be small gains in Riverine Mixed Spruce-Black Cottonwood Forest and Riverine Tall Alder, and large gains in Upland Mixed Lutz Spruce-Black Cottonwood Forest.

Considering direct Project effects, small amounts of moderate- and high-value bat habitat would be lost to Artificial Fill within the Project footprint in the area outside the Martin River. Bats would lose 49.8 acres of suitable habitat, mainly from Upland Mixed Lutz Spruce-Black Cottonwood Forest (41.5 acres; Table 5.2-2). However, Upland Mixed Lutz Spruce-Black Cottonwood Forest is expected to increase in extent due to the natural conversion of Upland and Subalpine Tall Alder Scrub over 60 years, so impacts to bats due to the loss of that forest habitat will likely be negligible over the long term.

Bats would have a total of 139.7 acres of suitable habitat altered by inundation and seasonal water level fluctuations at Bradley Lake, with most of that acreage accounted for by Riverine Low and Tall Willow (119.3 acres; Table 5.2-2).

5.2.2.5 Waterbirds

Waterbirds are expected to see changes in the availability of suitable habitats in the area outside the Martin River over the 60-year post-construction period due to climate change and natural plant succession. These changes are expected to occur independently of, and outside of, the areas that would be affected by the proposed Project. In these areas, the changes are expected to result in a total loss of 111.1 acres and a total gain of 13.7 acres, for an overall net loss of 97.4 acres of high- and moderate-value waterbird habitat (Table 5.2-1). Waterbirds are likely to see a complete loss of 90.1 acres of Riverine Barrens, which is a habitat of high value to Harlequin Ducks, and a complete loss of 20.2 acres of Estuarine Brackish Wet Sedge-Forb Meadow, which is used by Northern Pintail and Red-breasted Mergansers (Table 4.2-1 and Table 5.2-1). However, waterbirds are also predicted to see a gain in suitable habitat acreage over the same time period, due entirely to an increase of 13.7 acres of Riverine Mixed Spruce-Black Cottonwood Forest, which is of moderate to high value for both goldeneye species and Common Mergansers.

Considering direct Project effects, relatively small amounts of moderate- and high-value waterbird habitat would be lost to Artificial Fill within the Project footprint. Waterbirds would lose 1.2 acres of Estuarine Brackish Wet Sedge-Forb Meadow, 2.1 acres of Freshwater Lakes and Ponds, 5.5 acres of Human Modified Reservoir, and 1.5 acres of Riverine Low and Tall Willow; all other suitable habitat types occur at less than 1 acre within the Artificial Fill footprint. Combining the acres of each habitat type that would be disturbed yields a total of 11.5 acres of suitable waterbird habitat that would be lost to Artificial Fill (Table 5.2-2). This includes suitable habitats for six species: Northern Pintail, Harlequin Duck, Common Goldeneye (*Bucephala clangula*), Barrow's Goldeneye (*B.*

islandica), Common Merganser, and Red-breasted Merganser. No suitable habitats in the area outside the Martin River were identified for the marine-oriented species: Steller's Eider, Black Scoter (*Melanitta americana*), Long-tailed Duck (*Clangula hyemalis*), and Red-throated Loon.

At Bradley Lake, suitable waterbird habitat altered by lake-level rise and seasonal water level fluctuations would total 404.9 acres, which includes adjacent Freshwater Lakes and Ponds, Riverine Barrens, Riverine Low and Tall Willow, and rivers and streams (Table 5.2-2). The same six species noted above would be affected, but Harlequin Ducks would experience the greatest levels of habitat alteration (404.4 acres of riverine habitats). However, with the increase in the extent of lake waters at Bradley Lake (classified as Human Modified Reservoir), Barrow's and Common goldeneye would see an expansion of suitable aquatic lacustrine habitat (Table 5.2-2).

5.2.2.6 Raptors

Raptors are expected to see changes in the availability of suitable habitats in the area outside the Martin River over the 60-year post-construction period due to climate change and plant succession. These changes are expected to occur independently of, and outside of, the areas that would be affected by the proposed Project. In these areas, the changes are expected to result in a total loss of 238.5 acres and a total gain of 1,815.3 acres for an overall net increase of 1,576.8 acres of high- and moderate-value raptor habitat (Table 5.2-1). Raptors are likely to see a complete loss of Estuarine Brackish Wet Sedge-Forb Meadow (20.2 acres, used by Northern Harriers, Short-eared Owls, and Peregrine Falcons), as well as Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex (203.7 acres, used by Golden Eagles, Northern Harriers, and Peregrine Falcons), and a complete loss of Upland and Subalpine Herb Meadow (13.4 acres, used by Red-tailed Hawks; Table 4.2-1 and Table 5.2-1). However, raptors are also predicted to see offsetting gains in suitable habitat acreage over the same time period, largely due to the expected increase in Upland Mixed Lutz Spruce-Black Cottonwood Forest (1,801.6 acres), which is of moderate value to Bald Eagles and Red-tailed Hawks. Riverine Mixed Spruce-Black Cottonwood Forest is also expected to increase by 13.7 acres and is of moderate to high value for Bald Eagles and Red-tailed Hawks.

Considering direct Project effects, moderate amounts of moderate- and high-value raptor habitat would be lost to Artificial Fill within the Project footprint. Raptors would lose 1.2 acres of Estuarine Brackish Wet Sedge-Forb Meadow, 35.2 acres of Glaciated Subalpine

Rock-Shrub Scrub-Meadow Complex, 1.9 acres of Rocky Cliffs, 2.2 acres of Subalpine and Alpine Barrens, and 41.5 acres of Upland Mixed Lutz Spruce-Black Cottonwood Forest, yielding a total of 82.0 acres of suitable raptor habitat that would be lost to Artificial Fill (Table 5.2-2). This includes suitable habitats for all six raptor species assessed in this study (Golden Eagle, Northern Harrier, Bald Eagle, Red-tailed Hawk, Short-eared Owl, and Peregrine Falcon).

At Bradley Lake, Golden Eagles, Northern Harriers, and Peregrine Falcons would have 57.1 acres of suitable Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex, Rocky Cliffs, Subalpine and Alpine Barrens, and Subalpine and Alpine Dwarf Ericaceous Scrub habitat altered by inundation and seasonal water level fluctuations (Table 5.2-2).

5.2.2.7 Seabirds

Seabirds are expected to see changes in the availability of suitable habitats in the area outside the Martin River over the 60-year post-construction period due to climate change and plant succession. These changes are expected to occur independently of, and outside of, the areas that would be affected by the proposed Project. In these areas, the changes are expected to result in a total loss of 20.9 acres and a total gain of 13.7 acres for an overall net loss of 7.2 acres of high- and moderate-value seabird habitat (Table 5.2-1). This includes the complete loss of Estuarine Brackish Wet Sedge-Forb Meadow (20.2 acres) and Coastal Saline Wet Sedge Marsh (less than 1 acre; Table 4.2-1); both these habitats can be regularly used by Bonaparte's and American Herring gulls and Arctic Terns (Table 5.2-1). However, seabirds are also predicted to see a gain in suitable habitat acreage over the same time period, due entirely to the increase of 13.7 acres of Riverine Mixed Spruce-Black Cottonwood Forest, which is of moderate value to Bonaparte's Gulls.

Considering direct Project effects, relatively little moderate- and high-value seabird habitat would be lost to Artificial Fill within the Project footprint. Seabirds would lose 1.2 acres of Estuarine Brackish Wet Sedge-Forb Meadow and 2.1 acres of Freshwater Lakes and Ponds; all other suitable habitat types occur at less than 1 acre within the Artificial Fill footprint. Combining the acres of each habitat type that would be disturbed yields a total of 3.5 acres of suitable seabird habitat that would be lost to Artificial Fill (Table 5.2-2). This includes suitable habitats for Bonaparte's and American Herring gulls and Arctic Terns. No suitable habitats in the area outside the Martin River were identified for Marbled Murrelets, Kittlitz's Murrelets, Black-legged Kittiwakes, and Pelagic Cormorants (*Urile pelagicus*).

At Bradley Lake, seabirds would have only 0.5 acre of suitable habitat altered by inundation and seasonal water level fluctuations; a single habitat, Freshwater Lakes and Ponds, would be affected (Table 5.2-2). The species affected would be Bonaparte's Gull and Arctic Tern.

5.2.2.8 Shorebirds

Shorebirds are expected to see changes in the availability of suitable habitats in the area outside the Martin River over the 60-year post-construction period due to climate change and plant succession. These changes are expected to occur independently of, and outside of, the areas that would be affected by the proposed Project. In these areas, the changes are expected to result in a loss of 111.1 acres and a total gain of 0.2 acre for an overall net loss of 110.9 acres of high- and moderate-value shorebird habitat (Table 5.2-1). This includes the complete loss of Estuarine Brackish Wet Sedge-Forb Meadow (20.2 acres) and Coastal Saline Wet Sedge Marsh (less than 1 acre; Table 4.2-1); both these habitats are used by the same six shorebird species (Table 5.2-1). In addition, there are predicted to be substantial declines in Riverine Barrens (90.1 acres, used by three shorebird species), and a small reduction in Riverine Low and Tall Willow (less than 1 acre, used by two shorebird species). Shorebirds are likely to see only a small increase in suitable habitats over the same time period, due entirely to a projected increase of 0.2 acre of Rocky Shore and Cobble Beach at Bradley Lake, which is suitable habitat for two shorebird species.

Considering direct Project effects, there is relatively little moderate- and high-value shorebird habitat that would be lost to Artificial Fill within the Project footprint. Shorebirds would lose 1.2 acres of Estuarine Brackish Wet Sedge-Forb Meadow, 2.1 acres of Freshwater Lakes and Ponds, 1.5 acres of Riverine Low and Tall Willow, and 1.5 acres of Rocky Shore and Cobble Beach; all other suitable habitat types occur at less than 1 acre within the Artificial Fill footprint. Combining the acres of each habitat type that would be disturbed yields a total of 7.3 acres of suitable shorebird habitat that would be lost to Artificial Fill (Table 5.2-2). This includes suitable habitats for eight shorebird species (Semipalmated Plover, Semipalmated Sandpiper [*Calidris pusilla*], Western Sandpiper [*C. mauri*], Short-billed Dowitcher [*Limnodromus griseus*], Spotted Sandpiper, Wandering Tattler, Lesser Yellowlegs [*Tringa flavipes*], and Greater Yellowlegs [*T. melanoleuca*]). No suitable habitats in the area outside the Martin River were identified for wintering Rock Sandpipers (*C. ptilocnemis*) because of the lack of Coastal Barren Mud Flats that this species relies on.

At Bradley Lake, shorebirds would have a total of 501.9 acres of suitable habitat altered by inundation and seasonal water level fluctuations (Table 5.2-2). Affected habitat types would include Riverine Barrens (270.8 acres), Riverine Low and Tall Willow (119.3 acres), and Rocky Shore and Cobble Beach (98.6 acres), with smaller acreages of Freshwater Lakes and Ponds and rivers and streams. Three shorebird species (Semipalmated Plover, Spotted Sandpiper, and Wandering Tattler) could be affected.

5.2.2.9 Landbirds

Landbirds are a diverse group of ecologically different species and use a wide variety of habitats. Because of this, some species will be negatively impacted by predicted future conditions, while others will benefit. In the area outside the Martin River, landbirds are expected to see changes in the availability of suitable habitats over the 60-year post-construction period due to climate change and plant succession. These changes are expected to occur independently of, and outside of, the areas that would be affected by the proposed Project. In these areas, the changes are expected to result in a total loss of 1,821.9 acres and a total gain of 1,911.8 acres for an overall net increase of 89.9 acres of high- and moderate-value landbird habitat (Table 5.2-1). This includes a substantial reduction in Upland and Subalpine Tall Alder Scrub (a decline of 1,584.5 acres as these areas are expected to transition to forest habitats); this scrub habitat is used by seven landbird species. The habitat reductions also include the complete loss of Estuarine Brackish Wet Sedge-Forb Meadow (20.2 acres, used by four landbird species), Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex (203.7 acres, used by two landbird species), and Upland and Subalpine Herb Meadow (13.4 acres, used by two landbird species; Table 4.2-1 and Table 5.2-1). However, landbirds are also predicted to see offsetting gains in suitable habitat acreage over the same time period, primarily due to the expected increase in Upland Mixed Lutz Spruce-Black Cottonwood Forest (1,801.6 acres), which provides suitable habitat for five species of landbirds. Additional habitat gains include increases in Riverine Tall Alder (96.5 acres, used by seven species of landbirds) and Riverine Mixed Spruce-Black Cottonwood Forest (13.7 acres, used by eight species of landbirds).

Species that are likely to be heavily impacted by these changes include ptarmigan. Willow Ptarmigan may be negatively impacted by predicted future conditions as habitats of moderate and high value for them (Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex, Riverine Low and Tall Willow, and Upland and Subalpine Tall Alder Scrub combined) are predicted to decrease by a total of 1,788.3 acres in the area outside the

Martin River (Table 5.2-1). Unfortunately, there are no predicted increases in habitat types of high value for Willow Ptarmigan. Rock Ptarmigan may not be impacted as severely, as habitats they use (Rocky Cliffs and Subalpine and Alpine Dwarf Ericaceous Scrub) are not predicted to decrease in extent. As with Willow Ptarmigan, there are no predicted increases in habitat types of high or moderate value for Rock Ptarmigan.

A number of warblers, sparrows, and flycatchers could be negatively impacted by future habitat change, but many of these species also use habitats that are predicted to increase in acreage (see below). As noted above, Upland and Subalpine Tall Alder Scrub is expected to decrease by 1,584.5 acres and provides suitable habitat for Alder Flycatcher (*Empidonax alnorum*), Fox Sparrow (*Passerella iliaca*), Savannah Sparrow, Orange-crowned Warbler (*Leiothlypis celata*), Northern Yellow Warbler (*Setophaga aestiva*), and Wilson's Warbler (*Cardellina pusilla*; Table 5.2-1). Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex is expected to decrease by 203.7 acres and provides suitable habitat for Savannah Sparrow.

In contrast, several habitat types are expected to increase in extent by a significant amount and provide suitable habitat for several landbird species. In particular, an increase of 1,801.6 acres is predicted for Upland Mixed Lutz Spruce-Black Cottonwood Forest, which is of moderate to high value for Olive-sided Flycatcher (*Contopus cooperi*), Alder Flycatcher, Orange-crowned Warbler, Northern Yellow Warbler, and Rufous Hummingbird (Table 5.2-1). Additionally, an increase of 96.5 acres is predicted for Riverine Tall Alder, which is considered high- or moderate-value habitat for Alder Flycatcher, Song Sparrow (*Melospiza melodia*), Orange-crowned Warbler, Northern Yellow Warbler, Blackpoll Warbler (*Setophaga striata*), Wilson's Warbler, and Rufous Hummingbird. Lastly, a relatively small increase of 13.7 acres is predicted for Riverine Mixed Spruce-Black Cottonwood Forest, which can be regularly used by Belted Kingfisher, Olive-sided Flycatcher, Alder Flycatcher, Song Sparrow, Orange-crowned Warbler, Northern Yellow Warbler, Blackpoll Warbler, and Rufous Hummingbird.

Considering direct Project effects, a total of 163.4 acres of suitable landbird habitat is expected to be lost to Artificial Fill in the Project footprint (Table 5.2-2). This includes substantial losses of Upland and Subalpine Tall Alder Scrub (74.7 acres), Upland Mixed Lutz Spruce-Black Cottonwood Forest (41.5 acres), and Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex (35.2 acres), with smaller acreage losses of nine other habitat

types. These habitat losses include suitable habitats for all 17 landbird species assessed in this study (Table 5.2-2).

At Bradley Lake, landbirds would have a total of 308.0 acres of suitable habitat altered by inundation and lake level fluctuations (Table 5.2-2). This includes Riverine Low and Tall Willow (119.3 acres), Upland and Subalpine Tall Alder Scrub (113.4 acres), and Subalpine and Alpine Dwarf Ericaceous Scrub (52.2 acres), with smaller acreages of seven other habitat types. These habitats are suitable for all 17 landbird species assessed in this study (Table 5.2-2).

5.2.3 Current Habitat Values – Martin River Floodplain

5.2.3.1 Large Mammals

Black bears are likely to be more common in the forested river drainage and canyon areas relative to brown bears, though both brown and black bears will use coastal habitats for their resources. Suitable habitats in the Martin River floodplain are the same as in the area outside the Martin River but also include Lacustrine tapped ponds and fringe marshes and Riverine Mature Black Cottonwood Forests (Table 5.2-3). Habitats ranked as moderate or high value for brown bears were the same as in the area outside the Martin River but also included lacustrine tapped ponds and marshes and Riverine Active Braided Floodplain (Table 5.2-3). Suitable habitat for moose include the Riverine Mature Black Cottonwood Forest and all suitable habitats common with the area outside the Martin River (Table 5.2-3). Mountain goats will also select the same habitats between both portions of the study area, though Rocky Cliffs are much more abundant within the East Fork Martin River canyon than anywhere else in the study area (see Section 5.2.1.1). In the Project area, a limited number of rocky and forest habitats were considered moderate or high value for mountain goats, including Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex, Rocky Cliffs, barren and dwarf scrub habitats in subalpine and alpine areas, Upland and Subalpine Herb Meadow, and Upland Mixed Lutz Spruce-Black Cottonwood Forest (Table 5.2-3).

Table 5.2-3 Suitable habitat types for wildlife species of concern in the Martin River floodplain, with predicted acres of change due to river flow reductions, climate change, and plant succession.

	Riverine Barrens	Artificial Fill	Coastal Barren Mud Flat	Coastal Saline Wet Sedge Marsh	Coastal Saline Wet Sedge Meadow	Estuarine Brackish Wet Sedge-Forb Meadow	Freshwater Lakes and Ponds	Glacier	Human Modified Ponds	Lacustrine Freshwater Isolated Off-channel Pond	Lacustrine Freshwater Tapped Off-channel Pond	Lacustrine Fringe Fresh Grass-Sedge Marsh	Riverine Active Braided Floodplain	Riverine Dryas Dwarf Shrub	Riverine Flooded Black Cottonwood Scrub	Riverine Mature Black Cottonwood Forest	Riverine Mixed Spruce-Black Cottonwood Forest	Riverine Tall Alder	Rivers and Streams (High Gradient-High Flow)	Rivers and Streams (Low Gradient-High Flow)	Rivers and Streams (Mixed Gradient-Low Flow)	Rocky Cliffs	Subalpine and Alpine Barrens	Subalpine and Alpine Dwarf Ericaceous Scrub	Tidal Gut	Upland and Subalpine Herb Meadow	Upland and Subalpine Tall Alder Scrub	Upland and Subalpine Wet Graminoid Moss Bog	Upland Mixed Lutz Spruce-Black Cottonwood Forest
Predicted future change in habitat area (acres)[a]	-32.6	25.8	85.6	-2.5	-83.1	-43.9	0.0	-4.2	-2.8	0.0	0.0	-47.2	-373.9	319.8	-150.0	0.0	26.8	260.1	0.0	43.6	0.0	0.0	4.3	0.0	0.0	-1.0	-384.3	0.0	385.4
Birds																													
Northern Pintail			X	X	X	X	X		X	X	X														X				
Steller's Eider																													
Harlequin Duck	X												X						X	X	X								
Black Scoter																													
Long-tailed Duck																													
Common Goldeneye							X		X	X	X				X	X	X												
Barrow's Goldeneye							X		X	X	X				X	X	X								X				
Common Merganser							X		X	X	X				X	X	X		X	X					X				
Red-breasted Merganser						X	X																		X				
Willow Ptarmigan																											X		
Rock Ptarmigan																						X	X	X					
Rufous Hummingbird															X	X	X	X											X
Semipalmated Plover	X		X	X	X	X			X				X																

	Riverine Barrens	Artificial Fill	Coastal Barren Mud Flat	Coastal Saline Wet Sedge Marsh	Coastal Saline Wet Sedge Meadow	Estuarine Brackish Wet Sedge-Forb Meadow	Freshwater Lakes and Ponds	Glacier	Human Modified Ponds	Lacustrine Freshwater Isolated Off-channel Pond	Lacustrine Freshwater Tapped Off-channel Pond	Lacustrine Fringe Fresh Grass-Sedge Marsh	Riverine Active Braided Floodplain	Riverine Dryas Dwarf Shrub	Riverine Flooded Black Cottonwood Scrub	Riverine Mature Black Cottonwood Forest	Riverine Mixed Spruce-Black Cottonwood Forest	Riverine Tall Alder	Rivers and Streams (High Gradient-High Flow)	Rivers and Streams (Low Gradient-High Flow)	Rivers and Streams (Mixed Gradient-Low Flow)	Rocky Cliffs	Subalpine and Alpine Barrens	Subalpine and Alpine Dwarf Ericaceous Scrub	Tidal Gut	Upland and Subalpine Herb Meadow	Upland and Subalpine Tall Alder Scrub	Upland and Subalpine Wet Graminoid Moss Bog	Upland Mixed Lutz Spruce-Black Cottonwood Forest
Predicted future change in habitat area (acres)[a]	-32.6	25.8	85.6	-2.5	-83.1	-43.9	0.0	-4.2	-2.8	0.0	0.0	-47.2	-373.9	319.8	-150.0	0.0	26.8	260.1	0.0	43.6	0.0	0.0	4.3	0.0	0.0	-1.0	-384.3	0.0	385.4
Rock Sandpiper			X																										
Semipalmated Sandpiper			X	X	X	X																							
Western Sandpiper			X	X	X	X																							
Short-billed Dowitcher			X	X	X	X																							
Spotted Sandpiper	X		X		X		X		X	X	X		X							X									
Wandering Tattler	X												X						X	X									
Lesser Yellowlegs			X	X	X	X				X		X																	
Greater Yellowlegs			X	X	X	X				X																			
Marbled Murrelet																													
Kittlitz's Murrelet																													
Black-legged Kittiwake																													
Bonaparte's Gull			X	X	X	X	X			X	X				X		X												
American Herring Gull			X	X	X	X																							
Arctic Tern			X	X	X	X	X			X	X														X				

	Riverine Barrens	Artificial Fill	Coastal Barren Mud Flat	Coastal Saline Wet Sedge Marsh	Coastal Saline Wet Sedge Meadow	Estuarine Brackish Wet Sedge-Forb Meadow	Freshwater Lakes and Ponds	Glacier	Human Modified Ponds	Lacustrine Freshwater Isolated Off-channel Pond	Lacustrine Freshwater Tapped Off-channel Pond	Lacustrine Fringe Fresh Grass-Sedge Marsh	Riverine Active Braided Floodplain	Riverine Dryas Dwarf Shrub	Riverine Flooded Black Cottonwood Scrub	Riverine Mature Black Cottonwood Forest	Riverine Mixed Spruce-Black Cottonwood Forest	Riverine Tall Alder	Rivers and Streams (High Gradient-High Flow)	Rivers and Streams (Low Gradient-High Flow)	Rivers and Streams (Mixed Gradient-Low Flow)	Rocky Cliffs	Subalpine and Alpine Barrens	Subalpine and Alpine Dwarf Ericaceous Scrub	Tidal Gut	Upland and Subalpine Herb Meadow	Upland and Subalpine Tall Alder Scrub	Upland and Subalpine Wet Graminoid Moss Bog	Upland Mixed Lutz Spruce-Black Cottonwood Forest
Predicted future change in habitat area (acres)[a]	-32.6	25.8	85.6	-2.5	-83.1	-43.9	0.0	-4.2	-2.8	0.0	0.0	-47.2	-373.9	319.8	-150.0	0.0	26.8	260.1	0.0	43.6	0.0	0.0	4.3	0.0	0.0	-1.0	-384.3	0.0	385.4
Red-throated Loon																													
Pelagic Cormorant																													
Golden Eagle																						X	X	X					
Northern Harrier						X						X											X	X					
Bald Eagle			X						X						X	X	X								X				X
Red-tailed Hawk																X	X									X			X
Short-eared Owl						X																							
Belted Kingfisher							X		X	X	X				X	X	X			X					X				
Olive-sided Flycatcher															X		X									X		X	X
Alder Flycatcher															X	X	X	X									X		X
Horned Lark																							X	X					
Bank Swallow						X	X		X	X	X									X									
American Pipit						X																	X	X					
Lapland Longspur						X																	X	X					
Fox Sparrow																		X									X		
Savannah Sparrow						X						X		X									X	X		X	X	X	
Song Sparrow															X		X	X											

	Riverine Barrens	Artificial Fill	Coastal Barren Mud Flat	Coastal Saline Wet Sedge Marsh	Coastal Saline Wet Sedge Meadow	Estuarine Brackish Wet Sedge-Forb Meadow	Freshwater Lakes and Ponds	Glacier	Human Modified Ponds	Lacustrine Freshwater Isolated Off-channel Pond	Lacustrine Freshwater Tapped Off-channel Pond	Lacustrine Fringe Fresh Grass-Sedge Marsh	Riverine Active Braided Floodplain	Riverine Dryas Dwarf Shrub	Riverine Flooded Black Cottonwood Scrub	Riverine Mature Black Cottonwood Forest	Riverine Mixed Spruce-Black Cottonwood Forest	Riverine Tall Alder	Rivers and Streams (High Gradient-High Flow)	Rivers and Streams (Low Gradient-High Flow)	Rivers and Streams (Mixed Gradient-Low Flow)	Rocky Cliffs	Subalpine and Alpine Barrens	Subalpine and Alpine Dwarf Ericaceous Scrub	Tidal Gut	Upland and Subalpine Herb Meadow	Upland and Subalpine Tall Alder Scrub	Upland and Subalpine Wet Graminoid Moss Bog	Upland Mixed Lutz Spruce-Black Cottonwood Forest
Predicted future change in habitat area (acres)[a]	-32.6	25.8	85.6	-2.5	-83.1	-43.9	0.0	-4.2	-2.8	0.0	0.0	-47.2	-373.9	319.8	-150.0	0.0	26.8	260.1	0.0	43.6	0.0	0.0	4.3	0.0	0.0	-1.0	-384.3	0.0	385.4
Orange-crowned Warbler															X	X	X	X									X		X
Northern Yellow Warbler															X	X	X	X									X		X
Blackpoll Warbler																	X	X											
Wilson's Warbler																		X									X		
Mammals																													
Hoary marmot																						X	X						
American beaver							X		X	X	X				X	X	X	X			X								
Singing vole																										X		X	X		
Tundra (root) vole							X		X	X	X			X	X	X	X							X		X	X	X	X
Snowshoe hare																X	X	X									X		X
Dusky shrew												X				X	X	X								X	X		X
Western water shrew				X	X	X	X		X	X	X	X								X	X							X	
Little brown myotis			X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X				X		X	X
Black bear				X	X	X	X				X	X		X		X	X	X							X	X	X		X
Brown bear				X	X	X	X				X	X	X	X				X						X	X	X	X		
River otter	X						X			X	X				X				X	X	X				X				
Wolverine																								X		X	X		X

	Riverine Barrens	Artificial Fill	Coastal Barren Mud Flat	Coastal Saline Wet Sedge Marsh	Coastal Saline Wet Sedge Meadow	Estuarine Brackish Wet Sedge-Forb Meadow	Freshwater Lakes and Ponds	Glacier	Human Modified Ponds	Lacustrine Freshwater Isolated Off-channel Pond	Lacustrine Freshwater Tapped Off-channel Pond	Lacustrine Fringe Fresh Grass-Sedge Marsh	Riverine Active Braided Floodplain	Riverine Dryas Dwarf Shrub	Riverine Flooded Black Cottonwood Scrub	Riverine Mature Black Cottonwood Forest	Riverine Mixed Spruce-Black Cottonwood Forest	Riverine Tall Alder	Rivers and Streams (High Gradient-High Flow)	Rivers and Streams (Low Gradient-High Flow)	Rivers and Streams (Mixed Gradient-Low Flow)	Rocky Cliffs	Subalpine and Alpine Barrens	Subalpine and Alpine Dwarf Ericaceous Scrub	Tidal Gut	Upland and Subalpine Herb Meadow	Upland and Subalpine Tall Alder Scrub	Upland and Subalpine Wet Graminoid Moss Bog	Upland Mixed Lutz Spruce-Black Cottonwood Forest
Predicted future change in habitat area (acres)[a]	-32.6	25.8	85.6	-2.5	-83.1	-43.9	0.0	-4.2	-2.8	0.0	0.0	-47.2	-373.9	319.8	-150.0	0.0	26.8	260.1	0.0	43.6	0.0	0.0	4.3	0.0	0.0	-1.0	-384.3	0.0	385.4
Moose							X									X	X	X									X		X
Mountain goat																						X	X	X		X			X

Note: Habitats ranked as moderate or high value are indicated with an *X*. Blank cells indicate unsuitable habitats, ranked as low or negligible value.

[a] Habitat change predicted as a result of Project-induced river flow reductions, climate change, and natural plant succession.

5.2.3.2 Furbearers

Besides the habitats mentioned in the area outside the Martin River, no additional suitable habitats are located within the Martin River floodplain for wolverines or hoary marmots (Gardner 1985; Table 5.2-3). American beavers have a few more suitable habitat types available to them in the Martin River floodplain compared to the area outside the Martin River (see Section 5.2.1.2). The additional suitable habitats for beavers include Human Modified Ponds, Lacustrine Freshwater Isolated Off-channel Pond, Lacustrine Freshwater Tapped Off-channel Pond, Riverine Flooded Black Cottonwood Scrub, and Riverine Mature Black Cottonwood Forest (Table 5.2-3). River otters also have a few more suitable habitat types available to them in the Martin River floodplain compared to the area outside the Martin River (see Section 5.2.1.2). The additional suitable habitats for otters include Lacustrine Freshwater Isolated Off-channel Pond, Lacustrine Freshwater Tapped Off-channel Pond, and Riverine Flooded Black Cottonwood Scrub (Table 5.2-3).

5.2.3.3 Small Mammals

Besides the habitats mentioned in the area outside the Martin River, no additional suitable habitats are located within the Martin River floodplain for singing voles (Gardner 1985; Table 5.2-3). Snowshoe hares have a single additional suitable habitat available to them, Riverine Mature Black Cottonwood Forest (Table 5.2-3). Tundra voles also have a few more suitable habitat types available to them in the Martin River floodplain compared to the area outside the Martin River (see Section 5.2.1.3 above). The additional suitable habitats for tundra voles include Human Modified Ponds, Lacustrine Freshwater Isolated Off-channel Pond, Lacustrine Freshwater Tapped Off-channel Pond, Riverine Flooded Black Cottonwood Scrub, and Riverine Mature Black Cottonwood Forest (Table 5.2-3). Additional suitable habitats for dusky shews include Lacustrine Freshwater Tapped Off-channel Pond and Riverine Flooded Black Cottonwood Scrub, and additional suitable habitats for western water shrews include Human Modified Ponds, Lacustrine Freshwater Isolated Off-channel Pond, Lacustrine Freshwater Tapped Off-channel Pond, and Lacustrine Fringe Fresh Grass-Sedge Marsh (Table 5.2-3).

5.2.3.4 Bats

Besides the habitats mentioned in the area outside the Martin River, little brown myotis have several more suitable habitat types available to them in the Martin River floodplain (see Section 5.2.1.4). The additional suitable habitats include Coastal, Barren Mudflats,

Human Modified Ponds, Lacustrine Freshwater Isolated Off-channel Pond, Lacustrine Freshwater Tapped Off-channel Pond, Lacustrine Fringe Fresh Grass-Sedge Marsh, Riverine Active Braided Floodplain, Riverine Flooded Black Cottonwood Scrub, and Riverine Mature Black Cottonwood Forest (Table 5.2-3).

5.2.3.5 Waterbirds

Within the Martin River floodplain, both species of goldeneye have very similar habitat-use preferences, with habitats ranked as moderate and high value including Freshwater Lakes and Ponds, Tidal Gut, and the riverine forest habitat types with black cottonwood present (Table 5.2-3). Both species of goldeneyes and Common Mergansers have similar habitat-use preferences, with habitats ranked as moderate and high value including Lacustrine Freshwater Isolated Off-channel Ponds, Lacustrine Freshwater Tapped Off-channel Ponds, and Riverine Flooded Black Cottonwood Scrub (Table 5.2-3). These three waterfowl species are typically tree cavity nesters that may breed in the upper Kachemak Bay area, and black cottonwoods can provide suitable nest sites (Eadie et al. 2020a, 2020b; Pearce et al. 2020). Although goldeneyes may winter in the vicinity of the Project area, they usually use marine habitat types with rocky shores and are less likely to be found in the Project area. Common Mergansers do winter in freshwater environments such as the river and stream habitat in the Project area (Table 5.2-3). Red-breasted Mergansers, in contrast, are ground-nesters (Craik et al. 2020), and habitats ranked as moderate and high value in the Project area for this species include Estuarine Brackish Wet Sedge-Forb Meadow, Tidal Gut, and Freshwater Lakes and Ponds (Table 5.2-3).

The only non-seaduck waterfowl species of concern assessed, Northern Pintail, is expected to use a wide variety of habitats within the Martin River floodplain. Habitats considered moderate to high value for Northern Pintails include the coastal and estuarine habitats, Tidal Gut, and freshwater ponds (Table 5.2-3).

Red-throated Loons may breed in the upper Kachemak Bay area, although this is outside their usual breeding range. They generally nest in low-laying wetlands on the margins of shallow ponds (Rizzolo et al. 2020). They winter in marine waters and no habitats in the Project area were ranked as moderate or high value for this species (Table 5.2-3).

Harlequin Ducks may breed along streams in the upper Kachemak Bay area and are present in marine habitats in the winter. They generally nest on the ground near riverine waters but can also be found on small cliff ledges and in tree cavities (Robertson and

Goudie 2020). Habitats ranked as moderate to high value for Harlequin Ducks in the Project area include Riverine Barrens and the three rivers and streams types (Table 5.2-3).

The threatened Steller's Eider may rarely use Coastal Barren Mud Flats (ranked low value) during the winter months in upper Kachemak Bay. Similarly, two other seaduck species, Black Scoters and Long-tailed Ducks, may rarely use Coastal Barren Mud Flats during the non-breeding seasons, but there are no habitats within the Project area ranked as moderate or high value for these species (Table 5.2-3). Habitats considered moderate to high value for Northern Pintails include the Coastal Barren Mud Flat, Lacustrine Freshwater Isolated Off-channel Ponds, and Lacustrine Freshwater Tapped Off-channel Ponds (Table 5.2-3). Habitats ranked as moderate to high value for Harlequin Ducks and present only in the Martin River floodplain include the Riverine Active Braided Floodplain (Table 5.2-3). None of the waterbirds of concern assessed in the habitat evaluation are likely to use the subalpine, upland, cliff, or glacier habitats (Table 5.2-3).

5.2.3.6 Raptors

Golden Eagles are primarily a montane species on the Kenai Peninsula, and several higher elevation tundra and partially vegetated rocky habitats were considered moderate or high value for this species (Table 5.2-3). Rocky Cliffs in particular were noted as high value, as several active breeding territories were found in suitable cliff habitats in the Project area and surrounding terrain in 2025 (ABR 2026a). Golden Eagles may also use Subalpine and Alpine Barrens and Subalpine and Alpine Dwarf Ericaceous Scrub. Bald Eagles in contrast are usually found at lower elevations and are a tree-nesting species typically associated with fish-bearing waters. Habitats considered moderate or high value for Bald Eagles include Coastal Barren Mud Flat, Tidal Gut, Human Modified Ponds, and various riverine and upland forest and tall scrub habitats, especially when large black cottonwoods are present as potential nest sites (Table 5.2-3).

Northern Harriers are open-country raptors that may breed in and migrate through the Project area. A wide range of open marsh, meadow, and higher elevation tundra and partially vegetated habitats were considered moderate or high value for harriers (Table 5.2-3). Short-eared Owls are also an open-country species, but they are typically more restricted to large expanses of lower elevation coastal meadow habitats in southcentral Alaska. One habitat in the Project area, Estuarine Brackish Wet Sedge-Forb Meadow, was ranked as high value for Short-eared Owls (Table 5.2-3).

Red-tailed Hawk is a tree-nesting raptor that frequently soars and hunts from high perches. They are most often associated with forest and inland meadow habitats in Alaska. In the Project area, habitats ranked as moderate or high value for Red-tailed Hawks include both riverine and upland forests of black cottonwood and spruce and Upland and Subalpine Herb Meadow (Table 5.2-3).

Peregrine Falcons may breed in cliff habitats in the Project area and surrounding terrain, though none were located during the nesting raptor surveys in 2025 (ABR 2026a). This species also is likely to pass through the area during migration when they often hunt flocks of waterbirds and shorebirds in coastal habitats. A variety of coastal mudflat, marsh, and meadow habitats, Tidal Gut, freshwater ponds, and Rocky Cliffs were considered moderate or high value for Peregrine Falcons (Table 5.2-3).

5.2.3.7 Seabirds

Murrelets generally nest in rocky subalpine and cliff habitats, though Marbled Murrelets nest much more commonly in mature forest habitats. Suitable large Sitka spruce trees in the Project area for Marbled Murrelets have suffered extensive mortality from a spruce bark beetle outbreak, and the higher elevation rocky habitats generally do not have the scree slopes that Kittlitz's Murrelets prefer for nesting. For these reasons, no habitats within the Project area were ranked as moderate or high value for Marbled or Kittlitz's murrelets (Table 5.2-3). No habitats within the Project area ranked were as moderate or high value for Black-legged Kittiwakes (Table 5.2-3), as there are no coastal cliffs or other elevated infrastructure near the coast to support a nesting colony. However, Coastal Barren Mud Flat was considered to provide low-value foraging habitat for kittiwakes in upper Kachemak Bay.

Within the Project area, moderate- and high-value habitat for all three gull species includes Coastal Barren Mudflat and the coastal vegetated habitats (Coastal Saline Wet Sedge Marsh, Coastal Saline Wet Sedge Meadow, and Estuarine Brackish Wet Sedge-Forb Meadow; Table 5.2-3). For Bonaparte's Gull and Arctic Tern, the off-channel ponds and Freshwater Lakes and Ponds, when fish are present, were ranked as moderate value. Several riverine forest and scrub habitats were also ranked as moderate value for nesting Bonaparte's Gulls (Table 5.2-3).

5.2.3.8 Shorebirds

The coastal vegetated habitats (Coastal Saline Wet Sedge Marsh, Coastal Saline Wet Sedge Meadow, and Estuarine Brackish Wet Sedge-Forb Meadow) were ranked as moderate or high value for the majority (six to seven) of the nine shorebird species of concern (Table 5.2-3), as these areas are likely to be regularly used during spring and fall migration. Coastal Barren Mud Flats, which can also be heavily used during migration, was considered moderate or high value for eight of the nine shorebird species. Riverine Barrens and Riverine Active Braided Floodplain were considered moderate or high value to Spotted Sandpipers, Wandering Tattlers, and Semipalmated Plovers (Table 5.2-3); these habitats are not expected to be used by the other six shorebird species. Similarly, Human Modified Ponds and Rivers and Streams, were variably ranked as moderate or high value for Spotted Sandpipers and Wandering Tattlers, with the greatest use of these habitats expected by Spotted Sandpipers. The lacustrine off-channel ponds and grass-sedge marshes along their margins were ranked as moderate or high value for only Spotted Sandpipers, Lesser Yellowlegs, and Greater Yellowlegs. The subalpine and upland habitats, Rocky Cliffs, Artificial Fill, Human Modified Reservoir (Bradley Lake), and Tidal Gut were not ranked as moderate or high value for any of the shorebird species of concern assessed.

5.2.3.9 Landbirds

The 13 passerines assessed are all migratory species and will use a wide variety of vegetated habitats within the Project area. Upland habitats were ranked as moderate to high value for seven of the 13 migratory passerines, and unglaciated subalpine habitats were ranked as moderate to high value for four species (Horned Lark, American Pipit, Lapland Longspur, and Savannah Sparrow; Table 5.2-3). Savannah Sparrows will also regularly use Lacustrine Fringe Fresh Grass-Sedge Marsh, and Riverine Dryas Dwarf Shrub, which are of low value to the other migratory passerines of concern (Table 5.2-3). Forest and riverine scrub habitats were ranked as moderate to high value for nine of the 13 migratory passerines.

The pond habitats were ranked as moderate value for Bank Swallows, which often feed on aerial insects over open water (Garrison et al. 2020; Table 5.2-3). At the coast, Estuarine Brackish Wet Sedge-Forb Meadow was considered moderate or high value for four species (Bank Swallow, American Pipit, Lapland Longspur, and Savannah Sparrow).

Most of the primarily unvegetated habitats (e.g., Artificial Fill, Rocky Cliffs, Glacier, Riverine Barrens, Riverine Active Braided Floodplain, Tidal Gut, and Coastal Barren Mud Flat) were ranked as low value for the migratory passerines assessed. Except for Estuarine Brackish Wet Sedge-Forb Meadow noted above, the coastal marsh and meadow habitats were also ranked as low value for the migratory passerines.

The two upland gamebirds of concern in the Project area, Willow and Rock ptarmigan, have different habitat requirements. Willow Ptarmigan prefer low, somewhat moist shrub habitats with willow or dwarf birch (Hannon et al. 2024). Habitats ranked as moderate to high value for this species primarily include those dominated by shrub species, particularly birch and willow in riverine, upland, and subalpine areas (Table 5.2-3). In contrast, Rock Ptarmigan, as the name suggests, prefer rocky tundra and alpine summits and are generally found in habitats that are drier and have fewer low and tall shrubs than Willow Ptarmigan (Montgomerie and Holder 2020). Habitats ranked as moderate to high value for Rock Ptarmigan primarily include the rocky cliff and subalpine and alpine habitats (Table 5.2-3).

The single migratory hummingbird species of concern assessed, Rufous Hummingbird, generally uses regenerating and mature forest habitats during the breeding season (Healy and Calder 2020). Each of the riverine and upland tall scrub and forest types in the Project area were ranked as moderate value for this species (Table 5.2-3).

The single kingfisher of concern assessed, Belted Kingfisher, feeds primarily on small fish in streams, rivers, ponds and lakes, and digs nesting burrows in vertical earth banks (Kelly et al. 2020). Habitats ranked as moderate or high value in the Project area for this species include various lake and pond types, riverine forest habitats (providing fishing perches), low-gradient rivers and streams, and Tidal Gut at the coast (Table 5.2-3).

5.2.4 Future Habitat Values – Martin River Floodplain

5.2.4.1 Large Mammals

Within the Martin River floodplain, habitat changes for large mammals are expected due to river flow reductions and climate change-driven plant succession over the 60-year post-construction period. These changes would occur outside the footprint of the proposed Dixon Diversion facility. In these areas, brown bears are expected to see modest

losses in habitat, and black bears, moose, and mountain goats could see modest increases in available suitable habitat.

Brown bears are expected to see a decline from 13 to six suitable habitat types and an overall net loss of 389.2 acres of available suitable habitat (Table 5.2-3). Brown bears are likely to see a complete loss of Coastal Saline Wet Sedge Marsh, Coastal Saline Wet Sedge Meadow, Estuarine Brackish Wet Sedge-Forb Meadow, Lacustrine Freshwater Tapped Off-channel Pond, Lacustrine Fringe Fresh Grass-Sedge Marsh, Riverine Active Braided Floodplain, and Upland and Subalpine Herb Meadow, though two of these habitats comprise less than 3 acres (Table 4.2-2 and Table 5.2-3). Substantial declines are expected in Upland and Subalpine Tall Alder Scrub (-384.3 acres) and Riverine Active Braided Floodplain (-373.9 acres). Four habitats will likely be largely unchanged, while two habitat types (Riverine Dryas Dwarf Shrub and Riverine Tall Alder) are expected to increase (+319.8 and +260.1 acres, respectively).

Black bears are expected to see a decline from 14 to eight suitable habitat types but an overall net increase of 396.9 acres of available suitable habitat (Table 5.2-3). Black bears are likely to see a complete loss of Coastal Saline Wet Sedge Marsh, Coastal Saline Wet Sedge Meadow, Estuarine Brackish Wet Sedge-Forb Meadow, Lacustrine Freshwater Tapped Off-channel Pond, Lacustrine Fringe Fresh Grass-Sedge Marsh, and Upland and Subalpine Herb Meadow (Table 4.2-2 and Table 5.2-3). The largest losses of high- or moderate-value habitat are expected to be from Upland and Subalpine Tall Alder Scrub (-384.3 acres) and Coastal Saline Wet Sedge Meadow (-83.1 acres). The largest gains in suitable habitat are expected to be from Upland Mixed Lutz Spruce-Black Cottonwood Forest (+385.4 acres), Riverine Dryas Dwarf Shrub (+319.8 acres), and Riverine Tall Alder (+260.1 acres). The remaining five suitable habitats will likely be largely unchanged.

Moose are expected to see no change in the number of suitable habitat types but an overall net increase of 288.0 acres of suitable habitat (Table 5.2-3). Moose are likely to see a major loss of suitable habitat from declines in Upland and Subalpine Tall Alder Scrub (-384.3 acres). However, there are expected to be large gains in suitable Upland Mixed Lutz Spruce-Black Cottonwood Forest (+385.4 acres) and Riverine Tall Alder (+260.1 acres), and small or no anticipated changes in the remaining suitable habitats.

Mountain goats are expected to see a decline from five to four suitable habitat types but an overall net increase of 388.6 acres of suitable habitat. There is one caveat, however.

Modest gains in suitable habitat are attributed to increases in Upland Mixed Lutz Spruce-Black Cottonwood Forest, a habitat that is used for winter foraging and relief from deep snow, though only when it is in proximity to cliffs. Therefore, only a small proportion of the total acreage of this habitat is likely to be utilized by mountain goats in the future. The other suitable habitats are either rare on the landscape or are not expected to see substantial change.

Considering direct Project effects, very little suitable large mammal habitat occurs within the proposed Dixon Diversion infrastructure footprint in the upper (East Fork) Martin River floodplain. As a direct result of construction of the diversion facility, large mammals are expected to lose a total of 22.6 acres of suitable habitat. This includes 4.3 acres of Rocky Cliffs, 17.5 acres of Subalpine and Alpine Barrens, and 0.8 acre of Upland and Subalpine Tall Alder Scrub (Table 5.2-4).

Table 5.2-4 Suitable habitat types for wildlife species of concern in the Martin River floodplain, with acres expected to be directly lost to Project development.

	Riverine Barrens	Rivers and Streams (High Gradient-High Flow)	Rocky Cliffs	Subalpine and Alpine Barrens	Upland and Subalpine Tall Alder Scrub
Dixon Diversion infrastructure footprint (acres)	1.8	1.4	4.3	17.6	0.8
Birds					
Northern Pintail					
Steller's Eider					
Harlequin Duck		X			
Black Scoter					
Long-tailed Duck					
Common Goldeneye					
Barrow's Goldeneye					
Common Merganser		X			
Red-breasted Merganser					
Willow Ptarmigan					X
Rock Ptarmigan			X	X	

	Riverine Barrens	Rivers and Streams (High Gradient-High Flow)	Rocky Cliffs	Subalpine and Alpine Barrens	Upland and Subalpine Tall Alder Scrub
Dixon Diversion infrastructure footprint (acres)	1.8	1.4	4.3	17.6	0.8
Rufous Hummingbird					
Semipalmated Plover	X				
Rock Sandpiper					
Semipalmated Sandpiper					
Western Sandpiper					
Short-billed Dowitcher					
Spotted Sandpiper	X				
Wandering Tattler	X	X			
Lesser Yellowlegs					
Greater Yellowlegs					
Marbled Murrelet					
Kittlitz's Murrelet					
Black-legged Kittiwake					
Bonaparte's Gull					
American Herring Gull					
Arctic Tern					
Red-throated Loon					
Pelagic Cormorant					
Golden Eagle			X	X	
Northern Harrier				X	
Bald Eagle					
Red-tailed Hawk					
Short-eared Owl					
Belted Kingfisher					
Olive-sided Flycatcher					

	Riverine Barrens	Rivers and Streams (High Gradient-High Flow)	Rocky Cliffs	Subalpine and Alpine Barrens	Upland and Subalpine Tall Alder Scrub
Dixon Diversion infrastructure footprint (acres)	1.8	1.4	4.3	17.6	0.8
Alder Flycatcher					X
Horned Lark				X	
Bank Swallow					
American Pipit				X	
Lapland Longspur				X	
Fox Sparrow					X
Savannah Sparrow				X	X
Song Sparrow					
Orange-crowned Warbler					X
Northern Yellow Warbler					X
Blackpoll Warbler					
Wilson's Warbler					X
Mammals					
Hoary Marmot			X	X	
American beaver					
Singing vole					X
Tundra (root) vole					X
Snowshoe hare					X
Dusky shrew					X
Western water shrew					
Little brown myotis		X	X		
Black bear					X
Brown bear					X
River otter	X	X			
Wolverine					X
Moose					X
Mountain goat			X	X	

Note: Habitats ranked as moderate or high value are indicated with an *X*. Blank cells indicate unsuitable habitats, ranked as low or negligible value.

5.2.4.2 Furbearers

Within the Martin River floodplain, habitat changes for furbearers are expected due to river flow reductions and climate change-driven plant succession over the 60-year post-construction period. These changes would occur outside the footprint of the proposed Dixon Diversion facility. In these areas, river otters are expected to see significant losses in suitable habitat, hoary marmot and wolverines are expected to see almost no change, and beavers could see moderate increases.

River otters are expected to see a decline from nine to six suitable habitat types and an overall net loss of 139 acres of available suitable habitat (Table 5.2-3). River otters are likely to see a complete loss in Riverine Barrens (32.6 acres), Lacustrine Freshwater Tapped Off-channel Pond (33.2 acres), and Riverine Flooded Black Cottonwood Scrub (150.0 acres; Table 4.2-2 and Table 5.2-3). The low-gradient high-flow rivers and streams habitat is expected to increase by 43.6 acres as this habitat replaces Riverine Active Braided Floodplain in the lower river and there is also an anticipated increase of 33.2 acres of Lacustrine Freshwater Isolated Off-channel Ponds, both of which are suitable habitats for river otters.

Hoary marmots are expected to see no change in the number of suitable habitat types available (two) but an overall small net increase of 4.2 acres of suitable Subalpine and Alpine Barrens (Table 5.2-3). Another suitable habitat for marmots, Rocky Cliffs, is not expected to change.

Wolverines are expected to see a decline from four to three suitable habitat types but no overall loss in suitable habitat (Table 5.2-3). Wolverines are likely to see a complete loss of Upland and Subalpine Herb Meadow, though this habitat currently occupies only 1.0 acre of the study area (Table 4.2-2 and Table 5.2-3), and a near complete loss in Upland and Subalpine Tall Alder Scrub (-384.3 acres). The loss in these habitats is offset by a 385.4-acre increase in Upland Mixed Lutz Spruce-Black Cottonwood Forest. The other suitable wolverine habitat, Subalpine and Alpine Dwarf Ericaceous Scrub, is not expected to change but is very rare in the study area.

American beavers are expected to see a decline from nine to six suitable habitat types but an overall net increase of 134.1 acres of suitable habitat (Table 5.2-3). The loss of Human Modified Ponds, Lacustrine Freshwater Tapped Off-channel Pond, and Riverine Flooded

Black Cottonwood Scrub accounts for 100 percent of the total loss in suitable beaver habitat (Table 4.2-2 and Table 5.2-3). There is expected to be a large increase in the amount of suitable Riverine Tall Alder habitat (260.1 acres) as various floodplain habitats transition to alder scrub in the future with the reduced river flows. Lacustrine Freshwater Isolated Off-channel Pond (33.2 acres) and Riverine Mixed Spruce-Black Cottonwood Forest (26.8 acres), both suitable habitats for beavers, are expected to increase in extent and all other suitable beaver habitats are expected to remain unchanged.

Considering direct Project effects, very little suitable furbearer habitat occurs within the proposed Dixon Diversion infrastructure footprint in the upper (East Fork) Martin River floodplain. As a direct result of construction of the diversion facility, furbearers are expected to lose a total of 25.8 acres of suitable habitat. This includes 1.8 acres of Riverine Barrens, 1.4 acres of Rivers and Streams (High gradient-high flow), 4.3 acres of Rocky Cliffs, 17.5 acres of Subalpine and Alpine Barrens, and 0.8 acre of Upland and Subalpine Tall Alder Scrub (Table 5.2-4).

5.2.4.3 Small Mammals

Within the Martin River floodplain, habitat changes for small mammals are expected due to river flow reductions and climate change-driven plant succession over the 60-year post-construction period. These changes would occur outside the footprint of the proposed Dixon Diversion facility. In these areas, singing voles and western water shrews are expected to see a large decrease in suitable habitat acreage, and all other species of small mammals are likely to see small to modest increases in suitable habitat acreage.

Singing voles are expected to lose nearly all their current suitable habitat with the projected near-complete loss of Upland and Subalpine Tall Alder Scrub (385.4 acres to 1.1 acres) accounting for nearly 100 percent of the total loss in suitable habitat (Table 5.2-3). The other two suitable habitats for singing voles, Upland and Subalpine Herb Meadow and Subalpine and Alpine Dwarf Ericaceous Scrub, are very limited in availability (1.3 acres total) and are expected to remain the same or be lost (Table 4.2-2 and Table 5.2-3).

Western water shrews are expected to see a decline from 11 to five suitable habitat types and an overall net loss of 135.9 acres of suitable habitat (Table 5.2-3). Water shrews are likely to see a complete loss of Coastal Saline Wet Sedge Marsh, Coastal Saline Wet Sedge Meadow, Estuarine Brackish Wet Sedge-Forb Meadow, Human Modified Ponds, Lacustrine Freshwater Tapped Off-channel Pond, and Lacustrine Fringe Fresh Grass-Sedge

Marsh (Table 4.2-2 and Table 5.2-3). All the suitable habitats for western water shrews are relatively rare on the landscape (less than 100 acres each), so any loss in habitat is noteworthy. All other suitable habitats for this species are expected to remain the same and or have small increases in extent.

Tundra voles are expected to see a decline from 13 to nine suitable habitat types but an overall net increase of 193.9 acres of suitable habitat (Table 5.2-3). Tundra voles are likely to see a complete loss of Human Modified Ponds, Lacustrine Freshwater Tapped Off-channel Pond, Riverine Flooded Black Cottonwood Scrub, Upland and Subalpine Herb Meadow. though two of these habitats are very rare on the landscape (Table 4.2-2 and Table 5.2-3). Large gains in the acreage of Upland Mixed Lutz Spruce-Black Cottonwood Forest and Riverine Dryas Dwarf Shrub more than make up for the other habitat losses, and all other suitable habitats for tundra voles are expected to stay roughly the same in extent.

Dusky shrews are expected to see a decline from seven to five suitable habitat types but an overall net increase of 239.8 acres of suitable habitat (Table 5.2-3). Dusky shrews are likely to see a complete loss of Lacustrine Fringe Fresh Grass-Sedge Marsh, Upland and Subalpine Herb Meadow, though the latter is very rare on the landscape (Table 4.2-2 and Table 5.2-3). However, dusky shrews are likely to benefit from a small expansion of Riverine Mixed Spruce-Black Cottonwood Forest and a large expansion of Riverine Tall Alder and Upland Mixed Lutz Spruce-Black Cottonwood Forest. The extents of all other suitable habitats for dusky shrews are expected to remain largely unchanged.

Snowshoe hares are expected to see no decline in the number of suitable habitat types but an overall increase of 288 acres of suitable habitat (Table 5.2-3). There is likely to be, however, an almost complete loss of Upland and Subalpine Tall Alder Scrub. The loss of this habitat may be offset by gains in Upland Mixed Lutz Spruce-Black Cottonwood. Additionally, there are expected to be gains in Riverine Tall Alder and Riverine Mixed Spruce-Black Cottonwood Forests and no change in rare Riverine Mature Black Cottonwood Forest.

Considering direct Project effects, very little suitable small mammal habitat occurs within the proposed Dixon Diversion infrastructure footprint in the upper (East Fork) Martin River floodplain. Small mammal habitat loss from construction of the diversion facility would

be restricted to 0.8 acre of Upland and Subalpine Tall Alder Scrub, a habitat suitable for all small mammal species except western water shrews (Table 5.2-4).

5.2.4.4 Bats

Within the Martin River floodplain, habitat changes for bats are expected due to river flow reductions and climate change-driven plant succession over the 60-year post-construction period. These changes would occur outside the footprint of the proposed Dixon Diversion facility. In these areas, little brown myotis are expected to see a decline from 22 to 13 suitable habitat types but an overall net increase of 416.9 acres of suitable habitat. Little brown myotis would see a complete loss of Coastal Saline Wet Sedge Marsh, Coastal Saline Wet Sedge Meadow, Estuarine Brackish Wet Sedge-Forb Meadow, Human Modified Ponds, Lacustrine Freshwater Tapped Off-channel Pond, Lacustrine Fringe Fresh Grass-Sedge Marsh, Riverine Active Braided Floodplain, Riverine Flooded Black Cottonwood Scrub, and Upland and Subalpine Herb Meadow, though three of these habitats constitute a loss of less than 3.0 acres each (Table 4.2-2 and Table 5.2-3). The largest loss of suitable habitat would be from Riverine Active Braided Floodplain (-373.9 acres) and Riverine Flooded Black Cottonwood Scrub (-150.0 acres). In contrast, there would be modest to large gains in Upland Mixed Lutz Spruce-Black Cottonwood Forest (+385.4 acres), Riverine Dryas Dwarf Shrub (+319.8 acres), Riverine Tall Alder (+260.1 acres), and Coastal Barren Mud Flats (+85.6 acres); the remaining suitable habitats for little brown myotis are expected to undergo changes of less than 50 acres.

Considering direct Project effects, very little suitable bat habitat occurs within the proposed Dixon Diversion infrastructure footprint in the upper (East Fork) Martin River floodplain. As a direct result of construction of the diversion facility, little brown myotis are expected to lose a total of only 5.7 acres of suitable habitat. This includes 1.4 acres of Rivers and Streams (High gradient-high flow) and 4.3 acres of Rocky Cliffs (Table 5.2-4).

5.2.4.5 Waterbirds

In the Martin River floodplain, waterbirds are expected to see changes in the availability of moderate- and high-value habitats over the 60-year post-construction period due to river flow reductions and climate change-driven plant succession. These changes would occur outside the footprint of the proposed Dixon Diversion infrastructure. In these areas, there is expected to be a total loss of 722.0 acres and a total gain of 189.2 acres for an overall net loss of 532.8 acres of suitable waterbird habitat (Table 5.2-3). There is expected

to be a complete loss of Coastal Saline Wet Sedge Meadow (83.1 acres), which is used by Northern Pintails and Red-breasted Mergansers, and a complete loss of Lacustrine Freshwater Tapped Off-channel Pond (33.2 acres), which is used by Northern Pintails, both goldeneye species, and Common Mergansers (Table 4.2-2 and Table 5.2-3). Harlequin Ducks would be impacted by the complete loss of suitable habitat in Riverine Active Braided Floodplain (373.9 acres) and Riverine Barrens (32.6 acres). Both goldeneye species and Common Mergansers could lose nesting habitat with a 150-acre decline in Riverine Flooded Black Cottonwood Scrub, and Harlequin Ducks would see a loss of 373.9 acres of suitable habitat in Riverine Active Braided Floodplain. However, waterbirds are also predicted to see gains in suitable habitat acreage due to an increase in Coastal Barren Mud Flat (85.6 acres), which is used by Northern Pintails, an increase in low gradient and high flow rivers and streams (43.6 acres), which are of moderate value to Harlequin Ducks and Common Mergansers, and an increase in Riverine Mixed Spruce-Black Cottonwood Forest (26.8 acres), which can be used for nesting by both goldeneye species and Common Mergansers (Table 5.2-3).

Considering direct Project effects, very little suitable waterbird habitat occurs within the proposed Dixon Diversion infrastructure footprint in the upper (East Fork) Martin River floodplain. As a direct result of construction of the diversion facility, waterbirds are expected to lose a total of only 3.2 acres of suitable habitat. This includes 1.4 acres of Rivers and Streams (High gradient-high flow), which provides suitable habitat for Harlequin Ducks and Common Mergansers, and 1.8 acres of Riverine Barrens, which can be regularly used by Harlequin Ducks (Table 5.2-4).

5.2.4.6 Raptors

In the Martin River floodplain, raptors are expected to see changes in the availability of moderate- and high-value habitats over the 60-year post-construction period due to river flow reductions and climate change-driven plant succession. These changes would occur outside the footprint of the proposed Dixon Diversion infrastructure. In these areas, there is expected to be a total loss of 363.7 acres and a total gain of 535.2 acres for an overall net increase of 171.5 acres of suitable raptor habitat (Table 5.2-3). Raptors are likely to see a complete loss of Coastal Saline Wet Sedge Meadow (83.1 acres, used by Peregrine Falcons), Estuarine Brackish Wet Sedge-Forb Meadow (43.9 acres, used by Northern Harriers, Short-eared Owls, and Peregrine Falcons), Lacustrine Fringe Fresh Grass-Sedge Marsh (47.2 acres, used by Northern Harriers), and Riverine Flooded Black Cottonwood

Scrub (150 acres, used by Bald Eagles; Table 4.2-2 and Table 5.2-3). However, raptors are also predicted to see offsetting gains in suitable habitat acreage over this same time period, largely due to the increase in Upland Mixed Lutz Spruce-Black Cottonwood Forest (385.4 acres), which is of moderate value to Bald Eagles and Red-tailed Hawks. Coastal Barren Mud Flat is also expected to increase by 85.6 acres and is suitable habitat for Bald Eagles and Peregrine Falcons, Lacustrine Freshwater Isolated Off-channel Pond is expected to increase by 33.2 acres and provides suitable hunting habitat for Peregrine Falcons, and Riverine Mixed Spruce-Black Cottonwood Forest is expected to increase by 26.8 acres and is of moderate to high value for Bald Eagles and Red-tailed Hawks.

Considering direct Project effects, relatively little suitable raptor habitat occurs within the proposed Dixon Diversion infrastructure footprint in the upper (East Fork) Martin River floodplain. As a direct result of construction of the diversion facility, raptors are expected to lose a total of only 21.8 acres of suitable habitat. This includes 4.3 acres of potential nesting habitat for Golden Eagles and Peregrine Falcons in Rocky Cliffs, and 17.5 acres of Northern Harrier and Golden Eagle hunting habitat in Subalpine and Alpine Barrens (Table 5.2-4).

5.2.4.7 Seabirds

In the Martin River floodplain, seabirds are expected to see changes in the availability of moderate- and high-value habitats over the 60-year post-construction period due to river flow reductions and climate change-driven plant succession. These changes would occur outside the footprint of the proposed Dixon Diversion infrastructure. In these areas, there is expected to be a total loss of 312.7 acres and a total gain of 145.6 acres for an overall net loss of 167.1 acres of suitable seabird habitat (Table 5.2-3). This includes the complete loss of Estuarine Brackish Wet Sedge-Forb Meadow (43.9 acres), Coastal Saline Wet Sedge Meadow (83.1 acres), and Coastal Saline Wet Sedge Marsh (2.5 acres); each of these habitats is used by Bonaparte's and American Herring gulls and Arctic Terns (Table 4.2-2 and Table 5.2-3). Additionally, Bonaparte's Gulls would lose Riverine Flooded Black Cottonwood Scrub habitat (150 acres). However, seabirds are also predicted to see habitat increases in Riverine Mixed Spruce-Black Cottonwood Forest (26.8 acres), which is of moderate value to Bonaparte's Gulls; Lacustrine Freshwater Isolated Off-channel Pond (33.2 acres), which is suitable habitat for Bonaparte's Gulls and Arctic Terns; and Coastal Barren Mud Flat (85.6 acres), which is used by Bonaparte's and American Herring gulls and Arctic Terns.

Considering direct Project effects, there is no suitable seabird habitat within the footprint of the proposed Dixon Diversion dam and associated infrastructure in the upper (East Fork) Martin River (Table 5.2-4).

5.2.4.8 Shorebirds

In the Martin River floodplain, shorebirds are expected to see changes in the availability of moderate- and high-value habitats over the 60-year post-construction period due to river flow reductions and climate change-driven plant succession. These changes would occur outside the footprint of the proposed Dixon Diversion infrastructure. In these areas, there is expected to be a total loss of 619.2 acres and a total gain of 162.4 acres for an overall net loss of 456.8 acres of suitable shorebird habitat (Table 5.2-3). This includes the complete loss of Riverine Barrens (32.6 acres, used by three shorebird species) and Estuarine Brackish Wet Sedge-Forb Meadow 43.9 acres, used by six shorebird species; Table 4.2-2 and Table 5.2-3). Additionally, there would be a complete loss of Coastal Saline Wet Sedge Marsh (2.5 acres, used by six shorebird species), Coastal Saline Wet Sedge Meadow (83.1 acres, used by seven shorebird species), and Riverine Active Braided Floodplain (373.9 acres, used by three shorebird species). However, shorebirds are also predicted to see gains in suitable habitat acreage due to increases in the extent of Coastal Barren Mudflats (85.6 acres, used by eight shorebird species), increases low-gradient high-flow rivers and streams (43.6 acres, used by two shorebird species), and increases in Lacustrine Freshwater Isolated Off-channel Ponds (33.2 acres, used by three shorebird species).

Considering direct Project effects, relatively little suitable shorebird habitat occurs within the proposed Dixon Diversion infrastructure footprint in the upper (East Fork) Martin River floodplain. As a direct result of construction of the diversion facility, shorebirds are expected to lose a total of only 3.2 acres of suitable habitat. This includes 1.8 acres of Riverine Barrens, used by Semipalmated Plovers, Spotted Sandpipers, and Wandering Tattlers, and 1.4 acres of Rivers and Streams (High gradient-high flow), the littoral zones of which are used by Wandering Tattlers (Table 5.2-4).

5.2.4.9 Landbirds

Landbirds are a diverse group of ecologically different species and use a wide variety of habitats. Because of this, some species will be negatively impacted by predicted future conditions, while others will benefit. In the Martin River floodplain, landbirds are expected

to see changes in the availability of moderate- and high-value habitats over the 60-year post-construction period due to river flow reductions and climate change-driven plant succession. These changes would occur outside the footprint of the proposed Dixon Diversion infrastructure. In these areas, there is expected to be a total loss of 662.4 acres and a total gain of 1,073.1 acres for an overall net increase of 410.7 acres of suitable landbird habitat (Table 5.2-3). This includes the complete loss of Estuarine Brackish Wet Sedge-Forb Meadow (43.9 acres, used by four landbird species), Lacustrine Fringe Fresh Grass-Sedge Marsh (47.2, acres used by one landbird species), Riverine Flooded Black Cottonwood Scrub (150.0, acres used by seven landbird species), and Upland and Subalpine Tall Alder Scrub (384.3, acres used by seven landbird species; Table 4.2-2 and Table 5.2-3). However, landbirds are also predicted to see offsetting gains in suitable habitat acreage over this same time period due to increases in the extent of Upland Mixed Lutz Spruce-Black Cottonwood Forest (385.4 acres, used by five landbird species), Riverine Dryas Dwarf Shrub (319.8 acres, used by one landbird species), Riverine Tall Alder (260.1 acres, used by eight landbird species), low-gradient high-flow rivers and streams (43.6 acres, used by two landbird species), Lacustrine Freshwater Isolated Off-channel Pond (33.2 acres, used by two landbird species), Riverine Mixed Spruce-Black Cottonwood Forest (26.8 acres, used by eight landbird species), and Subalpine and Alpine Barrens (4.2 acres, used by five landbird species).

Species that are likely to be heavily impacted by these changes include ptarmigan. Willow Ptarmigan may be negatively impacted by predicted future conditions as habitats of importance to them (Upland and Subalpine Tall Alder Scrub) are predicted to decrease by 384.3 acres (Table 5.2-3). Unfortunately, there are no predicted increases to habitat types of high value to Willow Ptarmigan. Rock Ptarmigan may not be impacted as severely, as habitats they use (Rocky Cliffs, Subalpine and Alpine Barrens, and Subalpine and Alpine Dwarf Ericaceous Scrub) are predicted to only decrease by 4.2 acres. As with Willow Ptarmigan, there are no predicted increases in suitable habitat types for Rock Ptarmigan.

Several warblers, sparrows, and flycatchers could be negatively impacted by future habitat change, but many of these species also use habitats that are predicted to increase in acreage. Upland and Subalpine Tall Alder Scrub is expected to decrease by 384.3 acres and is of value to Alder Flycatcher, Fox Sparrow, Savannah Sparrow, Orange-crowned Warbler, Northern Yellow Warbler, and Wilson's Warbler (Table 5.2-3). Riverine Flooded Black Cottonwood Scrub is predicted to decrease by 150.0 acres and is of value to Rufous

Hummingbird, Belted Kingfisher, Olive-sided Flycatcher, Alder Flycatcher, Song Sparrow, Orange-crowned Warbler, and Northern Yellow Warbler.

Several habitat types are expected to increase in extent by a significant amount and are of value to several landbirds. In particular, an increase of 385.4 acres is predicted for Upland Mixed Lutz Spruce-Black Cottonwood Forest, which is of value to Olive-sided Flycatcher, Alder Flycatcher, Orange-crowned Sparrow, Northern Yellow Warbler, and Rufous Hummingbirds (Table 5.2-3). Additionally, an increase of 260.1 acres is predicted for Riverine Tall Alder, which is used by Alder Flycatcher, Fox Sparrow, Song Sparrow, Orange-crowned Sparrow, Northern Yellow Warbler, Blackpoll Warbler, Wilson's Warbler, and Rufous Hummingbird. Lastly, an increase of 26.8 acres is predicted for Riverine Mixed Spruce-Black Cottonwood Forest, which is used by Olive-sided Flycatcher, Alder Flycatcher, Song Sparrow, Orange-crowned Sparrow, Northern Yellow Warbler, Blackpoll Warbler, and Rufous Hummingbird.

Considering direct Project effects, relatively little suitable landbird habitat occurs within the proposed Dixon Diversion infrastructure footprint in the upper (East Fork) Martin River floodplain. As a direct result of construction of the diversion facility, landbirds are expected to lose a total of 22.6 acres of suitable habitat. This includes 17.5 acres of Subalpine and Alpine Barrens (used by five landbird species), 4.3 acres of Rocky Cliffs (used by Rock Ptarmigan), and 0.8 acre of Upland and Subalpine Tall Alder Scrub (used by seven landbird species; Table 5.2-4).

5.2.5 Habitat Values in Blasting Area Buffer Zones

To help assess the likelihood that blasting impacts on wildlife species could occur during Project construction, in the Vegetation and Wildlife Habitat Mapping Study the current availability of suitable (high and moderate value) habitat was mapped for six disturbance-sensitive species: black bears, brown bears, Golden Eagles, moose, mountain goats, and wolverine (see Figure 5.3-1 and Table 5.3-1 in ABR 2026b). The mapping was conducted within 2-kilometer (1.2-mile) buffer zones surrounding the two areas where blasting is planned to occur during Project construction; these areas encompass the site for the proposed Dixon Diversion facility and the diversion tunnel inlet in the headwaters of the East Fork Martin River, and at Bradley Lake, the diversion tunnel outlet, the new proposed access road alignment, and the existing Bradley Lake Dam (Figure 3.1-1).

In the two blasting area buffer zones combined, there are 10 suitable habitat types that provide high- or moderate-value habitat for two or more of the six disturbance-sensitive wildlife species (Table 5.2-5). Of these types, nine habitats provide one or more acres of suitable habitat, and seven of the 10 habitats are common, each comprising 100 acres or more of the total area in the buffer zones. These types are Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex, Rocky Cliffs, Subalpine and Alpine Dwarf Ericaceous Scrub, Subalpine and Alpine Barrens, Upland and Subalpine Tall Alder Scrub, Upland Mixed Lutz Spruce-Black Cottonwood Forest, and Freshwater Lakes and Ponds. Of these seven common habitat types, five provide high- or moderate-value habitat for mountain goats. For black bears, brown bears, Golden Eagles, and wolverines, four of the seven types provide suitable habitat, and three of the seven provide suitable habitat for moose. For each of the six wildlife species assessed, the total area of suitable habitat available in the two buffer zones combined is: mountain goat (5,336.7 acres), wolverine (4,959.2 acres), Golden Eagle (4,306.2 acres), black bear (4,276.8 acres), brown bear (4.043.3 acres), and moose (2,671.3 acres).

Given the broad availability of suitable habitats for black bear and moose in the blasting area buffer zones (Table 5.2-5), it is possible the two species could occur in these areas when blasting is planned, as both species are relatively common in the Project area in upper Kachemak Bay (see Section 5.1.1.1). Although moose are known to use the Riverine Low and Tall Willow habitats at the upper end of Bradley Lake and may concentrate at higher elevations during the fall rut, moose and black bears are generally more prevalent at lower elevations for much of the year. While some portions of the blasting area buffer zones occur at intermediate and lower elevations, with suitable upland forests and lakes and ponds for moose and black bears, most of the buffer zones span intermediate and higher elevations. This elevational mismatch, albeit with some overlap, may help to minimize impacts to these species from blasting. Moose and black bears may also temporarily relocate further away from noise and vibration impacts and move deeper into forest areas to increase the disturbance buffer. This will not be possible, however, for denning black bears if blasting is conducted during the winter months.

As with black bears and moose, suitable habitats for brown bears and wolverines are widely available in the blasting area buffer zones (Table 5.2-5). Although brown bears are considered very rare on the east side of Kachemak Bay and wolverines are widely dispersed and occur at low densities (see Section 5.1.1.1), it is possible these two rare to

uncommon species could occur in small numbers in the blasting area buffer zones during blasting activities. If affected by blasting, these animals should be able to relocate to adjacent areas where ample suitable habitat is available. This will not be possible, however, for denning brown bears during the winter or for maternal denning wolverines during the kit birthing period in late winter to early spring (ADF&G 2025) if blasting is conducted during those periods.

Table 5.2-5 Suitable habitats for disturbance-sensitive wildlife species and acres of each habitat in the two blasting area buffer zones.

Habitat Type	Dixon Diversion (acres)	Bradley Lake (acres)	Total (acres)	Black Bear	Brown Bear	Golden Eagle	Moose	Mountain Goat	Wolverine
Glaciated Subalpine Rock-Shrub Scrub-Meadow Complex	218.8	1375.4	1594.2	X	X	X		X	X
Upland and Subalpine Tall Alder Scrub	384.5	1161.3	1545.8	X	X		X		X
Rocky Cliffs	796.3	668.6	1464.9			X		X	
Upland Mixed Lutz Spruce-Black Cottonwood Forest	668.1	351.1	1019.2	X			X	X	X
Subalpine and Alpine Dwarf Ericaceous Scrub	110.8	674.9	785.7		X	X		X	X
Subalpine and Alpine Barrens	397.5	63.9	461.4			X		X	
Freshwater Lakes and Ponds	10.0	93.2	103.2	X	X		X		
Upland and Subalpine Herb Meadow	-	11.3	11.3	X	X			X	X
Upland and Subalpine Tall Willow Scrub	-	3.0	3.0	X	X		X		X
Riverine Low and Tall Willow	-	0.1	0.1	X	X		X		
Totals	2,586.0	4,402.8	6,988.8						

Note: Habitats ranked as moderate or high value are indicated with an *X*. Blank cells indicate unsuitable habitats, ranked as low or negligible value.

In contrast to the four mammal species discussed above, Golden Eagles and mountain goats are generally restricted to rugged, higher elevation terrain. Non-breeding, migratory Golden Eagles are highly mobile and can readily vacate a disturbed area. However, the primary concern is potential disturbance of an active nest located near blasting operations. The disturbance of an active nest would constitute a violation of the BGEPA. During the Raptor Nesting Study conducted in summer 2025 (ABR 2026a), no Golden Eagle nests were identified within 2.0 kilometers (1.2 miles) of the site proposed for the Dixon Diversion facility, though an unoccupied nest and a nest of unknown occupancy were located 2.4 kilometers (1.5 miles) and 2.3 kilometers (1.4 miles), respectively, from the Dixon Diversion site. Those nests were located downstream in the Martin River canyon where cliff habitat is of better quality for nesting Golden Eagles. In contrast, much of the cliff habitat in the blasting area buffer zone surrounding the Dixon Diversion site was rated as low or moderate quality for nesting Golden Eagles (ABR 2026a). In the blasting area buffer zone surrounding the Bradley Lake Dam, the alignment for the proposed Project access road, and the tunnel outlet area, one unoccupied Golden Eagle nest was found inside the 2.0-kilometer (1.2-mile) buffer zone. A significant portion of the Bradley River canyon downstream of the Bradley Lake Dam, where another unoccupied nest was located, appeared highly suitable for Golden Eagle nesting, but the area was surveyed only briefly during the aerial survey in 2025 due to high winds. It is possible that additional nests exist in the Bradley River canyon and within the blasting area buffer zone. Two other nests in the Bradley Lake area, one active with young in the nest and one unoccupied, were found 2.3 kilometers (1.4 miles) from the nearest location of planned blasting activity. This may be far enough away to avoid disturbing nesting eagles.

Mountain goats have lower mobility than eagles and are confined to areas of, or in proximity to, escape terrain (cliffs). However, their white pelage against dark backgrounds makes them relatively conspicuous, which may facilitate locating any nearby goats prior to planned blasting and allow for the rescheduling of blasts if goats are present. PM&E measures designed to avoid and minimize blasting impacts to the six disturbance-sensitive wildlife species discussed in this report are described in Section 6.4 below and in Exhibit E of the FERC License Amendment Application.

6.0 DISCUSSION

6.1 Direct Project Effects on Wildlife Habitats

Of the wildlife species groups evaluated in this study, some are expected to see greater impacts to suitable habitats from Project development than others. Across all components of the Project footprint in the area outside the Martin River, excluding the lake-level rise effects (see below) and including the footprint of the Dixon Diversion facility in the Martin River headwaters, large mammals would see a total loss of suitable habitat of 184.8 acres. The total acres that would be lost for furbearers is similar (187.8). Small mammals would see somewhat less suitable habitat lost (165.4 acres), and the single bat species, little brown myotis, would see substantially less habitat lost (55.5 acres).

For the bird species groups that have a greater reliance on aquatic habitats, the habitat impacts that are expected in the Project footprint are notably less than for mammals. Waterbirds would see a total loss of suitable habitat of 14.7 acres, seabirds would see a loss of 3.5 acres, and shorebirds would see a loss of 10.5 acres. For the more terrestrial-oriented bird species groups, the extent of habitat impacts expected in the Project footprint are more similar to the mammals. Landbirds would see a total loss of suitable habitat of 186.0 acres, and raptors would see a loss of 103.8 acres.

Considering lake-level rise and inundation effects in the future WLFZ at Bradley Lake, of the four mammal species groups, furbearers would be expected to have the greatest amount of suitable habitat altered by inundation and lake level fluctuations (577.2 acres). The area of altered suitable habitat for large mammals and small mammals would be very similar (294.0 and 292.3 acres, respectively). Again, little brown myotis would see substantially less altered suitable habitat (139.7 acres) than the other mammal species groups.

For the bird species groups, there is a wide range in the acreages of suitable habitat that would be altered by inundation and lake level fluctuation effects at Bradley Lake. Shorebirds, which focus much of their foraging in littoral zones in the margins of lacustrine and riverine habitats, would be expected to see the greatest amount of suitable habitat area annually altered by inundation in the WLFZ (501.9 acres). Waterbirds would have lower acreages of suitable habitat altered (404.9 acres), followed by landbirds (308.0

acres). Raptors and seabirds would see substantially lower acreages of suitable habitat altered by lake-level rise and water level fluctuations (57.1 and 0.5 acres, respectively).

These lake-level rise effects would vary across the WLFZ (ABR 2026b). Habitats in the upper portions of the WLFZ that are exposed during the early growing season but are expected to be annually inundated in mid-summer, fall, and winter would likely have reduced plant species diversity and reduced vegetation cover and be of lower quality for wildlife. In contrast, habitats in the lower regions of the future WLFZ would be inundated for a much longer period each year and likely would transition to partially vegetated habitats dominated by graminoid species that can better survive inundation or barren cobble and rock. When inundated, all areas in the future WLFZ would function as seasonally flooded lacustrine waters.

6.2 Non-Project Habitat Changes Outside the Martin River

In the area outside the Martin River, there are expected to be changes in the extent of wildlife habitat types due to climate change and plant succession that are independent of, and will occur outside of, the areas affected by Project development. These future changes were projected to occur over a 60-year Project operations period (ABR 2026b). As with the impacts predicted from Project construction and operations, there is substantial variability in the increases and decreases in availability of suitable habitat that are expected among the wildlife species groups assessed in this study over the 60-year future period.

For large mammals, there is expected to be an overall net increase in the extent of suitable habitat available under future conditions (+109.4 acres). For furbearers and small mammals under future conditions, there is also expected to be an overall net increase in the extent of suitable habitat available (+20 and +89.2 acres, respectively). For little brown myotis, there is projected to be a substantially greater overall net increase in the availability of suitable habitat under future conditions (+1,877.4 acres). All these increases in the availability of suitable habitats for the mammal species groups assessed will be driven largely by the expected substantial increase in the extent of Upland Mixed Lutz Spruce-Black Cottonwood Forest as plant succession transitions current tall scrub habitats to forest. Overall, this transition to forest habitats is projected to be more extensive in the study area than the transition of the less common herbaceous habitats to tall scrub.

Note, however, that at the individual species level, some species that do not rely heavily on forest habitats (e.g., brown bear, river otter, singing vole, western water shrew) are expected to see overall net decreases in the availability of suitable habitat under future conditions. Additionally, the increase in Upland Mixed Lutz Spruce-Black Cottonwood Forest will benefit mountain goats but only for escape from deep snow at higher elevations and winter foraging, and only when those forests are in proximity to cliffs.

For waterbirds, there is expected to be an overall net loss in the availability of suitable habitat under future conditions (-97.4 acres). For seabirds and shorebirds under future conditions, an overall net loss in suitable habitat availability is also expected (-7.2 and -110.9 acres, respectively). For the species groups that rely more heavily on terrestrial habitats, raptors and landbirds, there are projected to be overall net increases in suitable habitat availability under future conditions (+1,576.8 and +89.9 acres, respectively).

6.3 Project-Induced Habitat Changes in Martin River Floodplain

In the Martin River floodplain over a 60-year Project operations period, there are expected to be changes in the extent of wildlife habitat types due to Project-induced river flow reductions and climate change-driven plant succession (ABR 2026b). These changes cannot be entirely separated from each other, but much of the expected landscape change, especially in currently barren riverine habitats in the braided-channel floodplain, would be stimulated by the planned seasonal reductions in flow in the Martin River. Similar to the long-term habitat changes predicted from climate change and plant succession in the area outside the Martin River, there is substantial variability in the increases and decreases in availability of suitable habitats that are predicted for the wildlife species groups assessed within the Martin River floodplain.

For large mammals, there is expected to be an overall net increase in the extent of suitable habitat available in the Martin River floodplain under future conditions, but the projected increase is relatively small (+28.1 acres). For furbearers, small mammals, and little brown myotis, there are also predicted to be overall net increases in the availability of suitable habitat under future conditions. The increases are substantially greater than for large mammals and are progressively greater for furbearers (+150.4), small mammals (+320.9), and little brown myotis (+416.9 acres).

For waterbirds, there is projected to be an overall net loss in the availability of suitable habitat over a 60-year Project operations period in the Martin River floodplain (-532.8 acres). For the other two bird species groups that have strong associations with aquatic habitats, seabirds and shorebirds, there are also expected to be overall net losses in suitable habitat availability under future conditions (-167.1 and -456.8 acres, respectively). In contrast, for the two bird species groups that rely more on terrestrial habitats, raptors and landbirds, there are projected to be overall net increases in the availability of suitable habitat (+171.5 and +410.7 acres, respectively). These changes in the predicted extents of high- and moderate-value habitat availability for the bird species groups reflect the overall expected changes in acreage of vegetation and wildlife habitats in the Martin River floodplain as described in ABR (2026b). Over a 60-year Project operations period, aquatic and riverine-influenced habitats in the Martin River floodplain are expected to decline in extent, and more well-drained terrestrial habitats are expected to increase as river flows and channel braiding is reduced (Watershed GeoDynamics 2025) and plant succession results in the expansion of terrestrial scrub and forest habitats.

6.4 Applicant-proposed Wildlife Mitigation Measures

The PM&E measures proposed below are provisionary; discussion of the efficacy and feasibility of implementing these measures with the agency licensing participants has not yet occurred. Those discussions for terrestrial resources will occur in early March 2026, and the final set of applicant-proposed PM&E measures agreed upon for the Project will be included in Exhibit E of the FERC Final License Amendment Application.

The proposed draft PM&E measures for wildlife include the following:

- Meet with USFWS personnel to discuss and settle on a blasting-specific disturbance buffer distance to be used to avoid disturbance to nesting Golden Eagles from blasting activities at the Dixon Diversion site and the Bradley Lake Dam and associated borrow sites. Golden Eagles are more sensitive than Bald Eagles, for which the USFWS guidelines use a 0.5-mile buffer to avoid blasting disturbance.
- Conduct aerial Golden Eagle nesting surveys twice each spring during all construction years to determine nest occupancy. These should be conducted in April and/or early May, prior to mountain goat parturition to avoid helicopter disturbances to goats. Surveys should be conducted twice per year because it is challenging to detect all eagle nests in a single survey. Because blasting may

need to occur during low-water conditions in May at the Dixon Diversion site, these spring surveys will provide the information needed to assess the presence or absence of nesting Golden Eagles within the agreed-upon disturbance buffer distance prior to blasting activities.

- If nests are located within the set buffer distance of blasting locations (determined through consultation with USFWS; see item above), all blasting ideally would occur outside the Golden Eagle nesting period (approximately April 1–August 31). Currently, the closest active Golden Eagle nest is 0.8 mile away from the Bradley Lake Dam, and another is approximately 1.5 miles away from the Dixon Diversion site (ABR 2026b).
- Establish an avoidance window of April 1–August 31 for Golden Eagles that would also protect mountain goats, which are particularly sensitive to disturbance during kidding/rearing in spring and summer and in the winter. The goat kidding/rearing period is not well known for this area but is likely to occur from mid- or late May to July 15 (personal communication between J. Herreman, ADF&G, and Joseph Welch, Senior Scientist, ABR, September 24, 2025).
- If there is no active Golden Eagle nesting occurring within the blasting buffer distances at the Dixon Diversion site and the Bradley Lake Dam and borrow sites, blasting would occur outside the sensitive kidding period for mountain goats (see above) to the extent practicable. This is more important at the diversion site, as goats are well known to use the area near the terminus of the Dixon Glacier.
- If blasting at the Dixon Diversion site must occur during the low flow period in May and no nesting Golden Eagles are nearby (as described above), observers would be employed to confirm that no goats or other sensitive mammal species are present within the mammal disturbance buffer distance prior to starting blasting activities. Currently, ADF&G has recommended an avoidance buffer of 2 kilometers (1.2 miles) for five sensitive mammal species based on observations of abandonment of bear dens and disturbance to goats within that distance. The list of sensitive mammal species developed by ADF&G for the Project includes mountain goat, black bear, brown bear, moose, and wolverine.
- For helicopter overflights, maintain a minimum altitude of 1,000 feet above ground level and avoid flying over cliffs and rugged terrain to minimize potential disturbance of Golden Eagles and mountain goats. Additionally, all wildlife would be avoided by 1,000 vertical feet whenever possible.

- Conduct vegetation clearing before or after the migratory bird nesting window (May 1–July 15 for Southcentral Alaska). USFWS does not recommend nest searches to identify active nests because of the difficulty of confirming that no active nests are present in any given search area.
- Consider field surveys to ensure that furbearer dens (ground-based surveys) or bear dens (aerial surveys) would not be impacted during construction. It would be challenging to avoid these features during construction, but if most construction activities occur in late summer and fall (i.e., prior to denning), the Project might avoid impacting occupied winter dens of mammal species.

7.0 STUDY STATUS AND SCHEDULE

AEA initiated and completed the Wildlife Habitat Evaluation Study in 2025 following completion of the habitat mapping prepared for the Project area in the Vegetation and Wildlife Habitat Mapping Study (ABR 2026b). This report describes the modifications to the study plan and the methods and results of the Wildlife Habitat Evaluation Study. This information will be used to evaluate the potential effects of the Bradley Lake Expansion Project and develop PM&E measures.

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