41. TERRESTRIAL WILDLIFE AND HABITAT

41.1 Habitat Mapping and Habitat-value Assessments

41.1.1 Introduction

Wildlife habitats in the Cook Inlet drainages study area (Figure 1-4 in Chapter 1) were mapped to provide a baseline inventory of the availability of terrestrial, freshwater, and marine wildlife habitats and were evaluated for use by wildlife to assess the value of those mapped habitats to a selected set of bird and mammal species of concern.

Field surveys to collect information on vegetation, physiography, landforms, and surface forms in the Cook Inlet drainages study area were conducted in August of 2004 and 2005. Physiography was mapped by interpretation of true-color aerial photographs acquired for the study area in October 2004 and September 2008. Multivariate terrestrial and freshwater wildlife habitats were derived by adding physiographic information (and landform and surface-form information, as needed) to the mapping polygons prepared for the study area as part of the vegetation study by HDR Alaska, Inc.

Marine wildlife habitats in the Cook Inlet drainages study area were mapped using publicly available bathymetry and shoreline mapping data from the National Oceanic and Atmospheric Administration. Several variables from the National Oceanic and Atmospheric Administration data set, which were derived from low-altitude aerial digital imagery, were combined to produce a simplified set of map polygons representing supratidal, intertidal, and subtidal marine wildlife habitats in the study area.

To assess use of the mapped habitat types by important species of wildlife, 61 bird and mammal species of concern (45 birds and 16 mammals) that are known or have the potential to occur in the Cook Inlet drainages study area were selected for their conservation, cultural, and/or ecological importance. Habitat use for each species in each mapped habitat was qualitatively categorized into one of four value classes—high, moderate, low, or negligible—based primarily on wildlife survey data specific to the Cook Inlet drainages and Cook Inlet marine study areas and habitat-use information from the scientific literature.

41.1.2 Results and Discussion

Twenty terrestrial and freshwater wildlife habitat types were mapped in the Cook Inlet drainages study area. Tall-scrub habitats strongly dominated in the study area, and one habitat (Upland Moist Tall Alder Scrub[1]) covered 80 percent of the study area. Three other habitats (Upland Dry Barrens, Upland Moist Dwarf Scrub, and Alpine Dry Barrens) covered another 14 percent of the

1. The names of habitat types that were mapped in this study are capitalized, while the names of general habitat types that were not mapped, such as forest, scrub, meadow, etc., are not capitalized.

study area. The remaining 16 habitat types, including forest, scrub, scrub-bog, meadow, marsh, and freshwater aquatic habitats, were uncommon, each covering less than one percent of the study area.

Prominent streams in the study area, all of which drain into Cook Inlet, include Williams Creek and the unnamed stream that drains the Y Valley area north of Knoll Head. The Y Valley stream supports anadromous fish populations and provides foraging opportunities for wildlife.

Seventeen marine wildlife habitat types were mapped in the study area. Only one vegetated marine habitat type (Protected Estuary) occurred in the study area; most of this type was supratidal saltmarsh that occurred above the mean higher high water level. Another prominent habitat type occurring in supratidal areas was Supratidal Cliff. The study area, as mapped at mean lower low water, was dominated by nearshore marine waters, and two habitats (Shallow and Deep Subtidal Waters) comprised 50 percent of the study area. Three soft-sediment intertidal habitats (Protected Mud Flat, Protected Sand Flat, and Exposed Sand Flat) also were prominent and together comprised 39 percent of the study area. Other marine habitats in the study included gravel/sand beaches, rocky ramps and platforms, rocky cliffs, and various combinations of these habitats (e.g., rocky ramp–platform with gravel/sand beach) in both protected and exposed locations.

Results of the wildlife habitat-value assessments for the Cook Inlet drainages study area indicate that the most species-rich terrestrial and freshwater habitats in the Cook Inlet drainages study area are the forest types, which have the greatest numbers (17–18 species) of bird and mammal species with moderate- or high-value rankings. These forested habitats, however, are uncommon in the study area. The most common terrestrial or freshwater habitat in the study area (Upland Moist Tall Alder Scrub) has 10 species with moderate- or high-value habitat rankings.

For marine habitats, the most species-rich are the soft-sediment habitats. Two habitats (Protected Mud Flat and Protected Sand Flat) have the greatest numbers (26–27 species) of bird and mammal species of concern with moderate- or high-value habitat rankings. These soft-sediment intertidal habitats are common in the study area and occur most prominently in the upper portions of Iliamna and Iniskin bays and, to a lesser extent, at Knoll Head.

The Cook Inlet drainages study area provides at least some suitable habitat (moderate- and/or high-value habitat rankings) for 13 terrestrial mammal species of concern—wolf, red fox, river otter, wolverine, black bear, brown bear, moose, arctic ground squirrel, red squirrel, beaver, northern red-backed vole, tundra vole, and snowshoe hare—and for three marine mammal species of concern—sea otter, harbor seal, and harbor porpoise.

Habitats suitable for black and brown bears are common and widespread in the study area. Black bears favor habitats that provide cover, and in the Cook Inlet drainages study area, most forest and tall-scrub habitats were considered to be of high value for black bears. Other forest, scrub, scrub-bog, meadow, and marsh habitats, and Rivers and Streams (Anadromous) were considered to be of moderate value for black bears. None of the marine habitats in the study area were considered to be of high or moderate value for black bears. In contrast, brown bears are known to use a broader array of habitats than black bears and 15 terrestrial and freshwater

habitats in the study area were considered to be of moderate value for brown bears. One habitat (Rivers and Streams [Anadromous]) was considered to be of high value for brown bears, because salmon streams are heavily used by foraging brown bears in late summer. Five marine habitats, including beaches, cliffs with beaches, and supratidal estuarine habitats (the latter providing important plant foods for brown bears during early spring), were considered to be of moderate value for brown bears. For moose, low and/or tall willow-scrub habitats, and Lakes and Ponds were considered to be of high value, primarily for forage. These high-value moose habitats, however, are uncommon in the study area. Other scrub, scrub-bog, forest, meadow, and marsh habitats were considered to be of moderate value for moose, also for forage. None of the marine habitats in the study area were considered to be of high or moderate value for moose.

For marine mammals, a single marine habitat type (Deep Subtidal Waters) was considered to be of moderate value for harbor porpoises for foraging. Two habitat types (Shallow and Deep Subtidal Waters) were considered to be of moderate value for sea otters for foraging. No marine habitat in the study area was considered to be of high value for these two species. For harbor seals, two marine habitats (Shallow and Deep Subtidal Waters) were considered to be of high value for foraging, and one habitat (Protected Sand Flat) was categorized as of moderate value.

For birds, the Cook Inlet drainages study area provides at least some suitable habitat (moderate- and/or high-value habitat rankings) for 38 species of concern: six raptors (Bald Eagle, Northern Goshawk, Golden Eagle, Merlin, Peregrine Falcon, Great Horned Owl), 16 waterbirds (Trumpeter Swan, American Wigeon, Mallard, Northern Pintail, Green-winged Teal, Greater Scaup, Harlequin Duck, Surf Scoter, American Scoter, Long-tailed Duck, Red-throated Loon, Horned Grebe, Red-faced Cormorant, Pelagic Cormorant, Arctic Tern, Marbled Murrelet), nine shorebirds (American Golden-Plover, Black Oystercatcher, Lesser Yellowlegs, Whimbrel, Hudsonian Godwit, Surfbird, Rock Sandpiper, Dunlin, Short-billed Dowitcher), and seven landbirds (Spruce Grouse, Willow Ptarmigan, Rock Ptarmigan, Olive-sided Flycatcher, Gray-cheeked Thrush, Varied Thrush, and Blackpoll Warbler).

Terrestrial and freshwater habitats considered suitable for nesting and/or foraging by tree-nesting raptors (forests, some scrub and barren habitats, meadows, marshes, and lacustrine and riverine waterbodies) are uncommon in the study area. In contrast, marine habitats considered suitable for foraging by tree-nesting raptors (estuaries, mud and sand flats, gravel/sand beaches, rocky cliffs, and subtidal waters) are common and widespread in the study area. For cliff-nesting raptors, a set of higher-elevation, open dwarf-scrub and barren habitats, and some forest, scrub, scrub-bog, meadow, marsh, and aquatic habitats were considered suitable for nesting and/or foraging. These terrestrial and freshwater habitats are uncommon in the study area. Marine habitats considered suitable for foraging by cliff-nesting raptors, however, are common and occur throughout the study area. These habitats include estuaries, mud and sand flats, rocky cliffs, and subtidal waters.

For breeding and migrant waterbirds, several terrestrial and freshwater habitats, including anadromous fish streams and associated riverine habitats, were considered to be of high value, and lacustrine waterbodies were considered to be of moderate value. These suitable habitats for breeding and migrant waterbirds are uncommon in the study area. In contrast, a wide variety

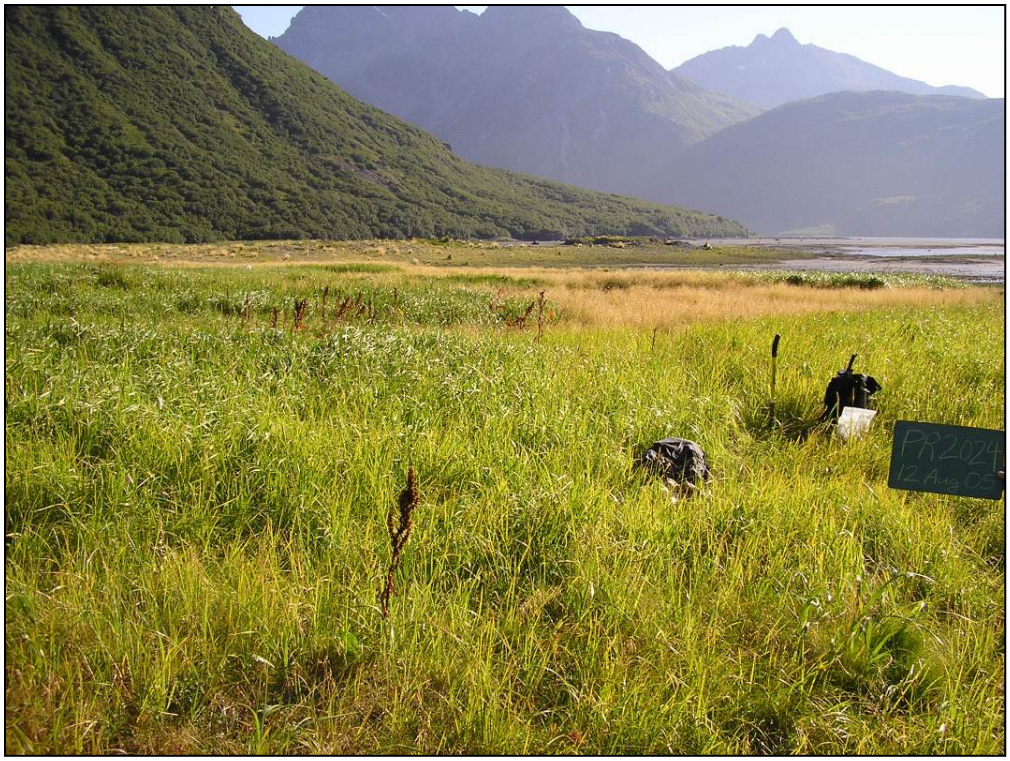
of marine habitats is available and considered suitable for migrant and overwintering waterbirds. These suitable marine habitats include estuaries, mud and sand flats, beaches, rocky ramps, rocky platforms, rocky cliffs, and subtidal waters.

Open terrestrial habitats considered suitable for breeding shorebirds in the study area are limited in occurrence and include many of the higher-elevation, dwarf-scrub and barren habitats. However, marine habitats that were considered suitable for migrant shorebirds and for a few species of overwintering and breeding shorebirds are common and widespread in the study area. The marine habitats considered suitable for shorebirds include estuaries, mud and sand flats, beaches, rocky ramps, rocky platforms, and rocky cliffs.

Habitats in the study area suitable for breeding landbirds include forests and tall-scrub, low-scrub, dwarf-scrub, and barren types in a variety of physiographic settings. Tall-scrub habitats suitable for some breeding landbird species are common and widespread across the study area. Forested and open habitats suitable for other breeding landbirds are uncommon. None of the marine habitats mapped in the study area was evaluated for use by landbirds because the landbird species addressed in this study do not occur in marine habitats.

Ground-truth sampling, Upland Moist Dwarf Scrub, August 2005

Ground-truth sampling, Riverine Low Willow Scrub (foreground), and Upland Tall Alder Scrub (on upland slopes in background), August 2005



Ground-truth sampling, Protected Estuary (in the supratidal zone), August 2005

Exposed Rocky Cliff with Gravel/Sand Beach, August 2005

41.2 Terrestrial Mammals

41.2.1 Introduction

Based on historical reports and recent field inventories, 40 species of mammals are known (or are strongly suspected) to occur in the geographic region of the Pebble Project. Information on terrestrial mammals in the Cook Inlet drainages study area (Figure 1-4 in Chapter 1) was compiled to determine the general pattern of use, relative abundance, and spatial distribution.

The terrestrial mammal study had five objectives:

- Collect and review relevant literature and harvest records on all species of mammals inhabiting the region.
- Conduct multiple aerial surveys to estimate seasonal abundance and location of large mammals in the study area.
- Conduct aerial survey of brown bears along salmon-spawning streams and examine bear dens.
- Summarize observations recorded by other researchers in the study area.
- Acquire and analyze radio-telemetry data for caribou from the Mulchatna Caribou Herd Technical Working Group.

A small fixed-wing airplane was used for most aerial surveys, although a helicopter was used for several surveys. Five large-mammal surveys and one stream survey were flown in 2004 and nine large-mammal surveys were flown in 2005. Additional observations of large mammals were recorded during other wildlife surveys for waterfowl and raptors in 2004 and 2005, harbor seals in 2005 and 2007, and marine wildlife in 2006 and 2007.

41.2.2 Results and Discussion

Brown bears are common in the Cook Inlet drainages and were found in high densities in sedge meadows at the heads of Iniskin and Chinitna bays in early summer. During late summer and autumn, brown bears concentrated along salmon spawning streams, including the Iniskin River and Portage Creek on Iniskin Bay and the stream in the Y Valley between Iliamna and Iniskin bays. The maximum numbers of brown bears observed during single surveys were 38 in 2004, 75 in 2005, and 104 in 2007. The increase in numbers during those years was due to increased survey effort and differences in seasonal timing of surveys, rather than to an increase in the bear population.

Black bears are found in lower densities than brown bears in the Cook Inlet drainages study area, and were observed most frequently on the Iniskin Peninsula between Iniskin and Chinitna bays. Black bears generally are found in forested areas with thick vegetation and, therefore, were less visible during aerial surveys than were brown bears.

Suitable habitat for moose in the Cook Inlet drainages study area was restricted mostly to the Y Valley and the Iniskin Peninsula. Most of the few moose seen on surveys were on the Iniskin Peninsula.

No caribou were observed in the study area, which is almost completely out of the range of the Mulchatna Caribou Herd; the steep coastal mountains and intertidal areas that dominate the study area are not preferred caribou habitats. In the 29 years of caribou telemetry data analyzed for the Pebble Project studies, only one radio-collared caribou was found in the Cook Inlet drainages study area.

Red foxes and river otters were observed occasionally in the study area during aerial surveys.

Brown bear feeding in the salmon-spawning stream at the mouth of the Y Valley, August 2005.

41.3 Raptors

41.3.1 Introduction

Studies were undertaken in the Cook Inlet drainages study area (Figure 1-4 in Chapter 1) in 2004 and 2005 to collect baseline data on the distribution, abundance, nesting status, and habitat use of large tree- and cliff-nesting birds of prey (raptors). Records of all raptors and Common Ravens were recorded, but special emphasis was placed on species of conservation concern, protected species, and species potentially sensitivity to disturbance (Bald and Golden eagles, Gyrfalcon, Peregrine Falcon, Rough-legged Hawk, Northern Goshawk, Osprey, and Great Horned Owl). In addition, researchers developed aircraft guidelines to avoid disturbance of wildlife, including nesting raptors.

Field work was conducted primarily during April and May 2004, May through August 2005, and late fall and mid-winter 2005 and 2006. Aerial surveys were conducted by helicopter for all nest occupancy and productivity surveys.

41.3.2 Results and Discussion

During aerial surveys, researchers recorded five raptor species and Common Ravens in the Cook Inlet drainages study area, but as many as 18 species of raptors may occur in the region. Twenty-three nests of four species (Bald and Golden eagles, Peregrine Falcon, and Common Raven) were located in the study area. The behavior of sighted birds and suitable habitats for two other species (Rough-legged Hawk and Merlin) suggested these species may nest in the area as well, and during ground-based surveys for landbirds and shorebirds in the study area in 2005, an active Merlin nest in fact was found. Additional species, such as woodland raptors (e.g., Northern Goshawks, Great Horned Owls), may nest in this area but were not found during aerial surveys.

Bald Eagles were the most abundant nesting species (70 percent of total nests), and 55 percent of occupied nests were successful. Golden Eagles were the next most common nesting raptor (17 percent of nests); 100 percent of occupied nests were successful. Peregrine Falcons were also recorded nesting in both years, at one coastal cliff location. Nesting success and productivity for these species fit within the range of statistics for other subpopulations of these species in southern Alaska.

The best woodland habitats suitable for tree-nesting raptors (including large cottonwoods) occur in the lower to middle reaches of the major drainages entering the bays in the Cook Inlet drainages study area. In addition, scattered cottonwood and spruce trees are found along the shoreline from Cottonwood Bay to outer Iniskin Bay and are more abundant from the east side of Iniskin Bay to the south shoreline of Chinitna Bay. Finally, most of the Iniskin Peninsula is covered by large, homogenous stands of spruce and riparian stands of cottonwood, which offer potential substrates for many tree-nesting raptors.

Habitat for cliff-nesting species is abundant along the coast at low elevations fronting the ocean from Cottonwood Bay to Chinitna Bay and at higher elevations in the same coastal area, as well as inland in Y Valley and along Mt. Pomeroy, the Tilted Hills, and in the northern portions of the

Iniskin Peninsula. Use of these habitats, however, seems spotty and might be constrained by other factors (e.g., weather, food supply, density).

Fledged Peregrine Falcon near Diamond Point nest site, Cottonwood Bay, August 2005.

Cliff-nesting raptor habitat, Tilted Hills, August 2005.

Cliff Habitat, western Iniskin Bay coastline, May 2004 (Bald Eagles nested on the top of these cliffs in 2004).

Looking north into Iliamna Bay (Diamond Point in left center showing cliffs used by nesting Peregrine Falcons), August 2005

41.4 Waterbirds

41.4.1 Introduction

The waterbird study was conducted in the Cook Inlet drainages study area (Figure 1-4 in Chapter 1) to collect baseline data on the distribution, abundance, and species composition of, and use of riverine habitats by waterbirds during spring and fall migration, as well as the occurrence of breeding Harlequin Ducks. (Waterbird surveys of the marine environment [bays and mudflats] in the study area during spring and fall migration are summarized in Chapter 44.) Waterbirds included geese, swans, ducks, loons, grebes, cormorants, cranes, shorebirds, gulls, terns, and jaegers. Species-specific surveys were conducted during the breeding season for Harlequin Ducks, because they are a key indicator species for the environmental health of rivers.

Field work was conducted during April through October 2004 and 2005. Surveys were conducted using helicopter or fixed-wing aircraft and followed standard survey techniques.

41.4.2 Results and Discussion

Rivers in the western part of the Cook Inlet drainages study area have a steep gradient and are fast flowing, whereas rivers in the eastern part are slow and meandering. The Iniskin River is slow and meandering and was a popular staging location for dabbling ducks during spring and fall migration in 2004 and 2005. Hundreds of dabblers were recorded near the lower section of the river, with the peak in spring occurring in late April/early May and the peak in fall occurring in mid-September. Diving ducks were observed all along the surveyed section of the Iniskin River. Glaucous-winged Gulls were found feeding on salmon carcasses in the middle section of the river during fall.

Small numbers of dabbling and diving ducks were observed using Bowser and Fitz creeks during the breeding season and in fall. Both creeks were not used during spring migration because they did not thaw until mid-May, after most ducks had already migrated through the area. One Trumpeter Swan nest was found adjacent to Bowser Creek, and a brood was observed later in the same area.

Harlequin Ducks prefer fast-flowing rivers for nesting and brood-rearing. Ten rivers were surveyed, and Harlequin Ducks were found as pairs and with broods on the creeks of the Y Valley. Other waterfowl species using fast-flowing rivers for brood-rearing included Mallard, Green-winged Teal, and Common and Red-breasted mergansers.

Glaucous-winged Gulls feeding on salmon carcasses at the mouth of Cottonwood Creek during a fall migration survey, September 2004.

Surveying the lower section of the Iniskin River for waterbirds during a fall migration survey, September 2004.

Surveying Cottonwood Creek for Harlequin Duck broods, August 2005.

Aerial view of the creek in the Y Valley that supports breeding Harlequin Ducks, November 2009.

41.5 Breeding Landbirds and Shorebirds

41.5.1 Introduction

Field surveys for breeding landbirds and shorebirds were conducted to collect baseline data on the distribution, abundance, and habitat use of these species during the nesting season in the Cook Inlet drainages study area (Figure 1-4 in Chapter 1). Researchers recorded all bird species observed in the field, paying special attention to species of conservation concern. Only observations of landbirds and shorebirds, however, are discussed in this summary. Observations of raptors and waterbirds made during this study in the Cook Inlet drainages study area are summarized in Sections 41.3 and 41.4, respectively.

The ground-based field work for this study was conducted during June 2005, using standard point-count survey methods. All birds seen or heard were recorded and, as is typical in point-count surveys, most observations were made by sound (songs and calls of breeding birds).

41.5.2 Results and Discussion

The only landbirds recorded in the Cook Inlet drainages study area were passerines (songbirds), and only two shorebird species were recorded. Including observations recorded outside the point-count periods, researchers identified 30 landbird species and two shorebird species in the Cook Inlet drainages study area. In addition to a greater number of species, landbirds also were numerically more abundant than shorebirds in the study area.

Six of the 30 landbird species (Wilson's Warbler, Golden-crowned Sparrow, Yellow Warbler, Hermit Thrush, Orange-crowned Warbler, and Savannah Sparrow) were considered to be abundant breeders in the Cook Inlet drainages study area. Four of these species (Wilson's Warbler, Golden-crowned Sparrow, Yellow Warbler, and Hermit Thrush) were especially abundant and accounted for 67 percent of the point-count observations. Two additional landbird species (Fox Sparrow and Gray-cheeked Thrush) occurred less frequently and were considered to be common in the Cook Inlet drainages study area. The two shorebird species observed (Black Oystercatcher and Short-billed Dowitcher) were considered to be uncommon in the study area, but both were recorded in intertidal habitats, which were not directly sampled during point-count surveys. Black Oystercatchers, in particular, occur nearly exclusively in intertidal and supratidal habitats and were recorded more commonly during focused surveys for marine birds and mammals (Chapter 44). Of the landbird and shorebird species-groups observed, warblers were by far the most abundant breeders, and Wilson's Warblers, in particular, were very abundant and accounted for more than 20 percent of the bird observations in the Cook Inlet drainages study area. Sparrows and thrushes also were common bird species-groups. The remainder of the landbird species-groups were much less common in the study area.

Landbirds were recorded in 10 of the 13 wildlife habitat types sampled in the study area, while shorebirds were recorded only in marine intertidal areas (not directly sampled with point-counts). One scrub habitat (Upland Moist Tall Alder Scrub) had the greatest number of breeding landbird species. In terms of bird abundance, four forest and scrub habitats (Upland and Lowland Spruce Forest, Upland and Lowland Moist Mixed Forest, Upland Moist Tall Alder

Scrub, and Riverine Tall Alder or Willow Scrub) were the most productive and supported five or more birds per point-count. Individual landbird species often used a range of different forest, scrub, bog, and meadow habitats, with the more common species using a larger set of habitats than uncommon species. Shorebirds were observed only near the coast and were not observed to be breeding in terrestrial habitats in the study area.

Point-count surveys start near dawn, June 2005.

Point-count sampling in Lowland Ericaceous Scrub Bog, June 2005.

Point-count sampling in Upland Moist Dwarf Scrub (transitioning to Upland Moist Tall Alder Scrub), June 2005.

Moving between point-count locations, Lowland Ericaceous Scrub Bog, June 2005.