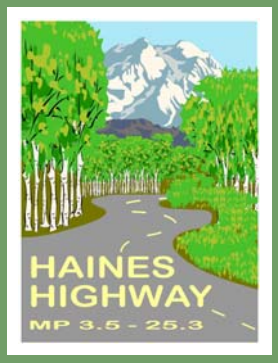

HAINES HIGHWAY
MILEPOST 3.5-25.3

WETLAND DELINEATION REPORT

WETLAND DELINEATION
AND
WETLAND FUNCTIONAL ASSESSMENT,
VEGETATION CLASSIFICATION,
WILDLIFE HABITAT ASSESSMENT

SEPTEMBER 2006

DOT&PF PROJECT NO. 68606
HAINES, ALASKA

WETLAND DELINEATION REPORT

WETLAND DELINEATION
AND
WETLAND FUNCTIONAL ASSESSMENT,
VEGETATION CLASSIFICATION,
WILDLIFE HABITAT ASSESSMENT

DOT&PF Project No. 68606

HAINES HIGHWAY – MP 3.5 TO MP 25.3
HAINES, ALASKA

Prepared for:

State of Alaska
Department of Transportation and Public Facilities, Southeast Region
6860 Glacier Highway
Juneau, Alaska 99801-7999

Prepared by:

DOWL Engineers
4041 B Street
Anchorage, Alaska 99503
(907) 562-2000

W.O. D59119B

September 2006

TABLE OF CONTENTS

Page

TABLE OF CONTENTS (cont'd)

Page

FIGURES

TABLES

APPENDICES

LIST OF ACRONYMS

DF&G ..... State of Alaska Department of Fish and Game
DOT&PF ..... State of Alaska Department of Transportation and Public Facilities
DOWL ..... DOWL Engineering
FAA ..... Federal Aviation Administration
LIDAR ..... Light Detection and Ranging
MP ..... milepost
NWI ..... National Wetland Inventory
USACE ..... U.S. Army Corps of Engineers
USFWS ..... U.S. Fish and Wildlife Service
USGS ..... U.S. Geological Survey

1.0 INTRODUCTION

1.1 Assessment Location

Haines is located on the western shore of Lynn Canal between the Chilkoot and Chilkat Rivers. It is 80 air miles northwest of Juneau, just south of the Canadian border at British Columbia, and 600 air miles southeast of Anchorage and Fairbanks. By road, it is 775 miles from Anchorage. The community lies at approximately 59.23° North Latitude and 135.44° West Longitude. The project area is a short distance past the airport and the end of the project is just beyond the Chilkat River Bridge. The project is encompassed within Township 30 South Range 59 East Section 19; Township 30 South Range 58 East Sections 6, 7, 8, 14, 15, 16, 17, 23, 24; Township 29 South Range 58 East Section 31; Township 29 South Range 57 East Sections 5, 6, 8, 9,14, 15, 16, 23, 26, 25, 36; and Township 28 South Range 56 East Sections 29, 32, 33, 34 (Cooper River Meridian), U.S. Geological Survey (USGS) Map Skagway A-2, B-2, and B-3 (Figure 1).

1.2 Assessment Description

As part of the improvements to the Haines Highway, between Milepost (MP) 3.5 and MP 25.3, the State of Alaska Department of Transportation and Public Facilities (DOT&PF) has contracted DOWL Engineers (DOWL) to conduct wetland, habitat, and vegetation delineations within an approximate 898-acre area that encompasses the proposed project area. The study area is offset 150 feet from the centerline of the Haines Highway from MP 3.5 to MP 25.3 with the exception near proposed realignments, including near the Chilkat River Bridge, where the study area is wider (of varying width) on the south side of the highway. This report describes the classification and mapping of wetlands using aerial photography, a field survey verifying wetland and upland boundaries, functional assessments of each wetland type, mapping vegetation and habitats, and an evaluation of values for selected wildlife species of the study area.

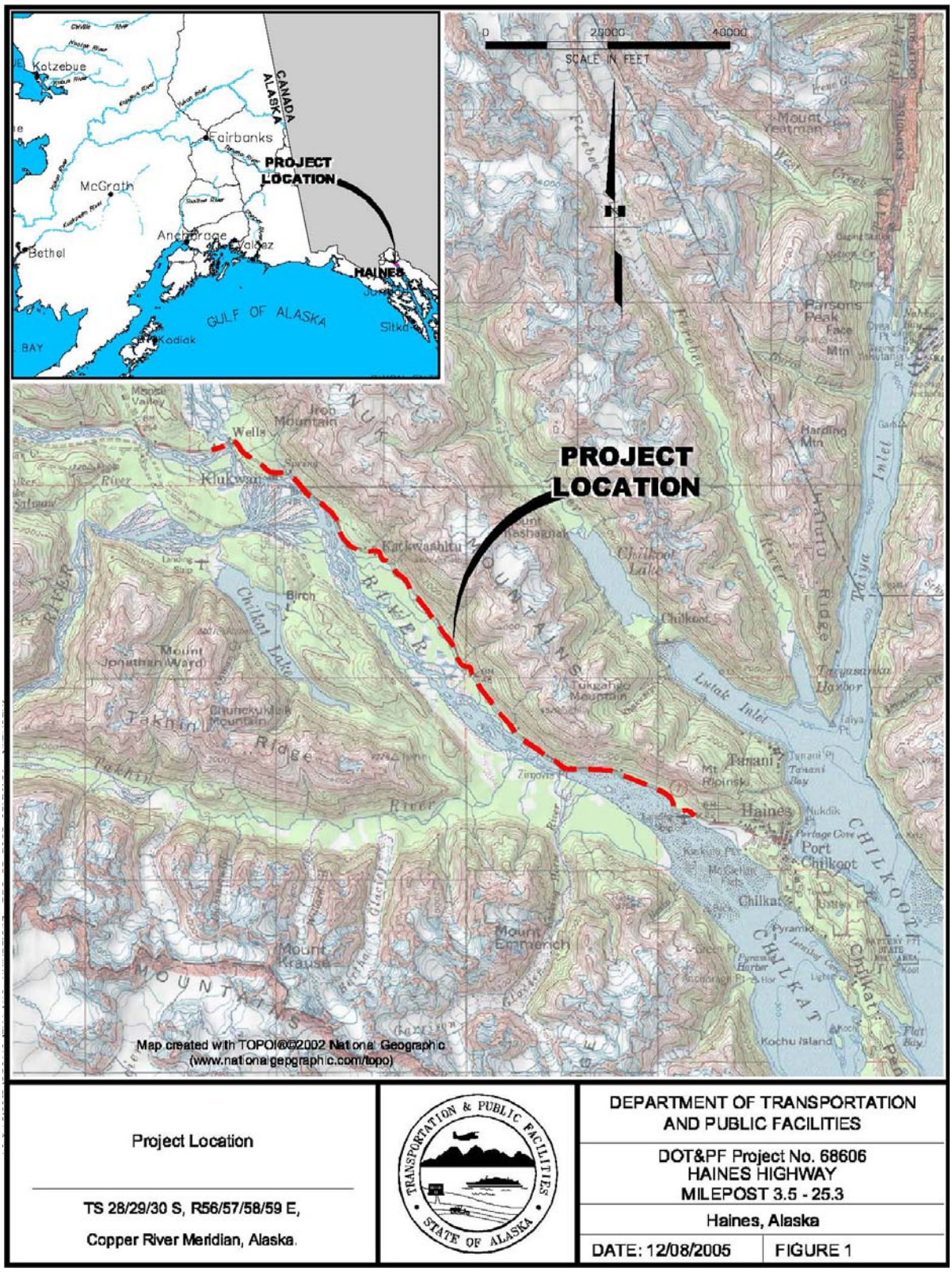

Figure 1: Project Location

2.0 BACKGROUND INFORMATION

2.1 General Overview

Haines has a maritime climate, with average summer temperatures of 46 to 66 degrees Fahrenheit (°F) and the average winter temperature of 17 to 36°F. Haines receives an average precipitation of 60 inches a year, with 133 inches of snow.

The following is a summary of the vegetation, mammal, bird, fish, and reptile and amphibian species that have the potential to be encountered in the assessment area.

2.1.1 Vegetation

Plant communities within the project area vary from forests and shrubs to herbaceous communities. Black cottonwood (*Populus balsamifera*), Sitka spruce (*Picea sitchensis*), and paper birch (*Betula papyrifera*) dominate the different forest habitats. Common forest understory vegetation includes alder (*Alnus* sp.), willow (*Salix* sp.), red osier dogwood (*Cornus stolonifera*), highbush cranberry (*Virburnum edule*), nootka rose (*Rosa nutkana*), and meadow horsetail (*Equisetum pratense*).

The shrub habitats vary from shrub swamps to upland shrub habitats that are dominated by alder and variety of willow species. Common understory vegetation within the shrub swamp community includes skunk cabbage (*Lysichiton americanum*), swamp horsetail (*Equisetum fluviatile*), and marsh violet (*Viola palustris*). The upland shrub habitat consists of nootka rose, willow species, black cottonwood shrubs, and meadow horsetail.

The herbaceous communities consist of fresh sedge meadow, bluejoint meadow, and fireweed bluejoint meadow. Common vegetation found in these communities includes swamp horsetail, yellow pond lily (*Nuphar luteum*), sedges (*Carex* sp.), bluejoint (*Calamagrostis canadensis*), and fireweed (*Epilobium angustifolium*).

A complete list of the vegetation that may be encountered in the study area is located in Appendix D.

2.1.2 Mammals

The Haines area provides habitat to large populations of moose (*Alces alces*), mountain goat (*Oreamnus americanus*), brown (*Ursus arctos*) and black bears (*Ursus Euarctos americanus*), and other furbearers. Mink (*Mustela vison*), beaver (*Castor canadensis*), river otter (*Lontra canadensis*), and muskrat (*Ondatra zibethicus*) are known use wetland habitats, while marten (*Martes americana*), red (*Tamiasciurus hudsonicus*) and flying (*Glaucomys sabrinus*) squirrels, lynx (*Lynx canadensis*), red fox (*Vulpes vulpes*), Sitka deer (*Odocoileus hemionus sitchensis*), and ermine (*Mustela erminea*) inhabit forested and shrubby habitat. Wolves (*Canis Lupis*), coyotes (*Canis latran*), and wolverines (*Gulo gulo*) range throughout the area, and use many diverse habitats.

During the winter, moose (*Alces alces*) are present in major river valleys and in lower elevations. Important moose (*Alces alces*) winter range habitat is the riparian willow communities and mixed deciduous-coniferous forests that are found along the Chilkat River. Prime black bear (*Ursus Euarctos americanus*) habitat consists of dense and semi-open mature forest with an understory that produces many berries. Seasonal concentrations of black bear (*Ursus Euarctos americanus*) occur on beaches and tidal areas during the spring and along salmon streams in the fall. Over 17,000 black bears (*Ursus Euarctos americanus*) are estimated to live in the Southeast (O'Clair et al., 1992). Brown bear (*Ursus arctos*) prefer more open grassland or tundra habitats. They concentrate in beach and sedge flats in the spring, while in the late summer and fall they concentrate along salmon streams. Brown bears (*Ursus arctos*) consume a wide variety of berry producing plants, insect larvae, mammals, and carrion (Federal Aviation Administration [FAA], 2002).

A complete list of the mammals that may be encountered in the study area is located in Appendix F.

2.1.3 Birds

The Lynn Canal and the Chilkat and Klehine valleys are a major waterfowl migration route to and from the interior of Alaska and Canada. Major nesting and molting areas are in the Chilkat River basin. The estuaries and wetlands are critical resting and feeding areas for whistling swans (*Olor columbianus),* pintails (*Anas acuta*), green-winged teal (*Anas crecca),*

sandhill cranes (*Grus canadensis*), lesser yellowlegs (*Tringa flavipes)*, northern phalaropes (*Tringa flavipes)*, sandpipers (*Scolopacidae)*, common mergansers (*Mergus merganser)*, Canada geese (*Branta canadensis*), trumpeter swans (*Cygnus buccinator*), and mallards (*Anas platyrhynchos)*. Willow ptarmigan (*Lagopus lagopus)*, blue and ruffed grouse (*Dendragapus obscurus* and *Bonasa umbellus*), ravens (*Corvus corax*), magpies (*Pica pica*), jays, crossbills, chickadees (*Parus* sp.*)*, juncos (*Junco* sp.), and numerous other songbirds either nest or migrate through the Haines area (FAA, 2002).

The project corridor is adjacent to the Alaska Chilkat Bald Eagle Preserve, which was created by the State of Alaska in 1982 to protect and perpetuate Chilkat bald eagles (*Haliaeetus leucocephalus*) and their essential habitats within the preserve. Each fall the largest concentration of bald eagles roosts along the lower Klehini River and the Chilkat River near its confluence with the Tsirku River (about 20 miles northwest of Haines near the village of Klukwan). This area has been designated as State critical habitat. The late chum and silver salmon runs in the rivers attract the eagles. Bald eagles nest and roost in large, old trees, usually Sitka spruce and cottonwood, near the shoreline in the summer (FAA, 2002).

A complete list of the birds that may be encountered in the study area is located in Appendix F.

2.1.4 Fish

The Haines Highway is adjacent to the Chilkat River (Stream #115-32-10250), which is catalogued as an anadromous fish stream. The State of Alaska Department of Fish and Game (DF&G) Catalog of Waters Important For Spawning, Rearing or Migration of Anadromous Fishes states that king (*Oncorhynchus tshawytscha*), coho (*O. kisutch)*, chum (*O. keta)*, sockeye *(O. nerka*), and pink salmon *(O. gorbuscha)*, steelhead trout *(O. mykiss)*, Dolly Varden *(Salvelinus malma walbaum)*, whitefish (*Stenodus* sp.*)*, and cutthroat trout *(O. clarkii)* are present.

The Chilkat River adjacent to the Haines Highway provides the diverse aquatic habitat necessary for the sustainable production of many species of fish. Juvenile salmon, trout, and char rear in the river, dependent on the complex shoreline environment created by large woody debris and rocky outcroppings. The overhanging vegetation common along the

shoreline provides cover for the fish, slows the flow of the water, and contributes woody debris. Many species of juvenile fish migrate along the shoreline of the river on their way to the open ocean. For adult fish, the river provides migration, spawning, and holding areas. The river is constantly changing, providing ideal spawning habitat in some areas, creating and then abandoning side channels that become spring-fed clear-water streams utilized for rearing and spawning, or flooding, and excavating deep pools that serve as essential holding areas for migrating fish. The river level fluctuates widely, and this fluctuation often influences the lower sections of many of the small tributaries that cross or flow along the Haines Highway.

These streams are usually mountain or spring fed, often a combination of both. When the river is high, some of the streams become backwatered sloughs of the Chilkat River, and the flooded margins of the stream channels become prime rearing habitat for juvenile fish. While some streams cross the highway and immediately flow into the river, other streams meander parallel with the river, providing both spawning and rearing habitat. It is common for the streams banks to be densely vegetated, and many of the streams are almost as deep as they are wide, flow slowly, and function primarily as rearing areas. Other streams transport gravels or clear river deposits of silt to create spawning habitat for salmon, trout, and char. The spring fed systems often originate in the swamps found along the valley wall, and these warm-water upwellings provide over-wintering habitat for juvenile fish.

A complete list of the fish that may be encountered in the study area is located in Appendix F.

2.1.5 Reptiles and Amphibians

Most amphibians found in the southeast occur within or near the major river valleys and include the spotted frog (*Rana pretiosa*), the wood frog (*Rana sylvatica*), and the long-toed salamander (*Ambystoma macrodactylum*). Alaska's only reptile, the garter snake (*Thamnophis sirtalis*), has been sighted only along the banks of the Taku and Stikine rivers.

A complete list of the reptiles and amphibians that may be encountered in the study area is located in Appendix E.

2.2 Wetland Functions and Values

The Southeast Alaska Freshwater Wetland Assessment Method (USACE, 1998) was used to evaluate the functions and values of the wetlands encountered within the study area. The following seven descriptions of wetland functions, taken directly from the aforementioned document, were considered during the determination of the function and value assessment for each wetland habitat type.

Floodflow Alteration (storage and desynchronization): Evaluation of the effectiveness of a wetland in reducing flood damages and retaining water over prolonged periods, thereby adding to the stability of the wetland ecological system or buffering features of social or economic value situated in flood prone areas. The source of the water is usually over-bank flow from stream channels in the wetland, but may also be from tributary or overland flow form uplands. Duration of dynamic surface water storage extends from the time over-bank flow begins until the floodwaters have retreated back to the channel (Brinson, 1995b, as cited in USACE, 1998). Considering the generally small size of most watersheds within southeast Alaskan communities (due to abruptly steep topography and limited waterway lengths), floodflow alteration may not be an appreciable wetland function. In developed areas where floodflow alteration does occur, benefits include safe dry sites for homes and commercial development, recreation/open space, and savings in flood insurance and damage costs.

Groundwater Interchange (discharge/recharge): Evaluation of the potential for a wetland to serve as a groundwater recharge/discharge area. In southeast Alaska, groundwater discharge occurs as instream upwellings or springs, and at the base of slopes because of steep topography, saturated shallow soils, and the abundant precipitation (including snow melt). Groundwater recharge typically occurs higher in the watershed, and is generally associated with wetlands near topographic divides, such as bogs and fens located at upper elevations (Adamus, 1987, as cited in USACE, 1998). Benefits include providing dependable water supplies, savings on wells and transportation of water and maintenance of stream flows.

Sediment/Toxicant Retention: Evaluation of the effectiveness of a wetland to act as a trap for sediment in runoff water from surrounding uplands, or upstream eroding wetland areas. Sediment retention is more likely to occur in flat vegetated terrain, and can be an important

function in wetlands associated down slope of forestry-related or other landscape-disturbing activities. Toxicant retention (removal of potentially toxic metals or hydrocarbons from solution) in southeast Alaska wetland s may be low due to limited import opportunity; however, diagnosis of the potential of this function would follow the sediment retention predictive criteria. Benefits include maintenance of stable fish habitat and other aquatic resources.

Sediment/Shoreline Stabilization: Evaluation of the potential and the effectiveness of a wetland in preventing stream bank or shoreline erosion. In southeast Alaska, heavy precipitation during October, November, and early December causes numerous floods that produce a highly fluctuating discharge hydrograph (USDA Forest Service, 1974(a), as cited in USACE, 1998). In coastal areas, storm events coupled with high tidal stages can result in shoreline erosion in erosion prone areas. Dense vegetation associated with wetland fringes provide benefits including avoidance of high cost of hard erosion control structures and the prevention of property damage.

Nutrient Removal/Retention/Transformation: Wetlands have been shown to trap, store, transform, and release nutrients that enter the system through runoff water from surrounding uplands or contiguous wetlands. Nitrogen and phosphorous are the most crucial nutrients in this respect because they can have strongly negative impacts on water quality and may limit plant growth in wetland ecosystems (Verhoevan and Whigham, 1994, as cited in USACE, 1998). Benefits of this function include the purification of polluted water, less expensive treatment of pollutants, energy cycling and increased primary productivity. One study of Juneau wetlands states that in southeast Alaska, no adverse economic effects of over-enrichment have been documented, and some of the highest densities of wintering coho reported from southeast Alaska occurred in the Juneau study area's most nitrogen-enriched and phosphorous-retentive stream. Also, that nutrient removal per se is not viewed as a necessarily positive function for southeast Alaska wetlands, based on fisheries support (Adamus, 1987, as cited in USACE, 1998). However, a number of streams in southeast Alaska have been placed on the list of Alaskan Waterbodies Suspected of Being Affected by Point and Nonpoint Sources.

Production Export: Evaluation of the suitability of ability of a wetland to flush relatively large amounts of organic material (specifically carbon from net annual primary and secondary productivity) to downstream or adjacent deeper water for use by other living organisms. In southeast Alaska, salmon may be the major nutrient linkage between freshwater and saltwater wetlands (Adamus, 1987, as cited in USACE, 1998). Benefits include input of aquatic food chains and resultant support for aquatic and terrestrial species.

Wildlife Habitat: Evaluation of the suitability of a wetland as habitat for those animals typically associated with wetlands and the wetland edge. Also, the use of the wetland as habitat for migrating species and species dependent on the wetland as some time in their life style. Common species of wildlife using southeast Alaska wetlands include Sitka black-tailed deer, brown bears, and furbearers such as minks, martens, and land otters (USDA Forest Service, L-159, as cited in USACE, 1998). Wildlife-related benefits include hunting for food and recreation, trapping, wildlife photography, wildlife viewing/enjoyment, scientific study, guiding industry support, tourism, and recreational equipment industry support.

Fish Habitat: Evaluation of the suitability of watercourses associated with a wetland for fish habitat. In southeast Alaska, the importance of wetlands for fish is well established for coastal wetlands and along rivers and streams. Many fish species feed in wetlands or on food produced by wetlands. Wetlands and streamside marshes are used as nursery grounds, and other wetland types adjacent to rivers maintain and regulate stream flow in channels used by fish. Species (e.g., salmon) that move between fresh and saltwater are dependent on both coastal and riparian wetlands. Benefits include food, recreation, scientific study, guiding industry support, commercial fishing industry, tourism, and recreational equipment industry support.

Rare, Threatened, Species of Concern or Endangered Species Habitat: Evaluation of the suitability of the wetland to support threatened or species of concern because of specialized habitat requirements. The primary benefit associated with wetlands critical to sensitive species is the maintenance of threatened plant/animal populations and habitats, which are in jeopardy for future generations.

3.0 METHODOLOGY

3.1 Mapping and Classification

3.1.1 Field Survey

Initially, aerial photograph contact prints (September 2004, color) were studied to classify and map the various plant community types within the study area. Next, field reconnaissance was conducted on September 12-16, 2005, to verify the preliminary maps, and to identify and characterize all major plant community types within the study area.

The entire study area was surveyed to determine which general community types occurred. These general community types, such as mixed forest and shrub and sedge dominated wet areas, were identified on the aerial photo. Each area observed for that type was then labeled on the aerial photo. The initial survey resulted in 15 different communities, which were described by their general characteristics. After resurveying the study area based on these communities, the 15 communities were re-grouped into 11 communities and tallied based on their occurrence.

Table 1: Sampling Methodology Based On Community Groups

Aerial Photo Identified Communities	Field Sampling Communities	Occurrence (number of observed areas)	Assigned Percentage (to determine the frequency of sampling points)*	Range of Sample Points Required
Tall Willow Shrub	Tall Shrub	6	30%	2
Wet Sedge	Wet Sedge	24	20%	5
Fern areas in footprint				
Cottonwood Forest	Cottonwood Forest	29	20%	6
Complex Bog	Complex Bog	40	20%	8
Wet Sedge/Scrub				
Open Water/Sedge				
Fireweed/Alder Scrub	Road Shoulder	2	50%	1
Shrub/Dead Trees	Shrub/Dead Trees, Sedge/Dead Trees	15	20%	3
Sedge/Dead Trees				
Alder Thicket	Alder Thicket	3	50%	2
Open Water/Pond Lily	Open Water/Pond-Lily	1	50%	1
Stagnant Water	Stagnant Water	1	50%	1
True Mixed Forest	True Mixed Forest	4	50%	2
Creek in Disturbed Areas	Creek in Disturbed Area	3	50%	2

* For communities observed in 1-5 locations, a sample point was assigned to 50% of these locations. For communities observed in 5-10 locations, a sample point was assigned to 30% of these locations. For communities observed in 10-25 areas, a sample point was assigned to 20% of these locations.

An initial plan for 33 sample locations was determined. After reviewing the aerials once more, areas that would be sampled were identified, based on their representativeness and to ensure a large spatial scale.

Field delineation of wetlands was performed according to the three-parameter approach using vegetative, pedologic, and hydrologic characteristics, as described in the U.S. Army Corps of Engineers (USACE) Wetlands Delineation Manual (USACE, 1987). The wetland scientists conducting the wetland delineation completed the USACE wetland delineation course. Additionally, at each location where standing water or complete saturation of the ground was not observed, a soil pit was excavated to a depth of at least 18 inches to determine soil saturation and to describe soil characteristics. Soil color was determined using Munsell Soil Color Charts (2000) and soil composition was determined using a field determination of soil texture chart. Photos were taken at each sampling site to document vegetation and soil profiles (where applicable).

In addition to the wetland determination plots, field verification plots were used to improve the accuracy of the overall mapping effort. The dominant plant species were recorded, and the National Wetland Inventory (NWI) code and Level III of the Alaska Vegetation Classification Code (Viereck code) were determined. These field verification plots were done in areas where wetland or upland status was already determined at a plot elsewhere in the study area. These plots provided additional field data to assist in the habitat classifications and overall vegetation mapping.

For the wetlands delineation, a USACE routine wetland delineation data sheet was completed to document observed vegetation, soil, and hydrology characteristics at each sample site (Appendix A). Percent aerial cover for each species was estimated, and dominant plant species were recorded for each vegetation layer (tree, shrub, and herbaceous layers). In upland areas, sample points were established in a similar manner to the wetland areas for each different plant community that was encountered. Dominant plant species were recorded for each vegetation layer (tree, shrub, and herbaceous layers), and percent cover for each dominant species was estimated. Photos were taken at each sampling site to document the vegetation (Appendix B).

After data from the initial 26 sample locations were taken, communities were reviewed to determine whether the original 11 communities were the same. Generally, the communities remained the same, but as more of the study area was documented, communities were refined resulting in a total of 37 points necessary to adequately quantify the study area. After the 37 points were completed, nearly all the areas that weren't visited during sampling were walked to verify correct correlation between sampled sites and non-sampled sites.

Using the "50/20 rule," absolute percent cover for each dominant species was estimated. The "50/20 rule" is the recommended method for selecting dominant species from a plant community when quantitative data are not available. The rule states that for each stratum in the plant community, dominant species are the most abundant plant species (when ranked in descending order of abundance and cumulatively totaled) that immediately exceed 50 percent of the total dominance measure for the stratum, plus any additional species that individually comprise 20 percent or more of the total dominance measure for the stratum. The list of

dominant species is then combined across strata. Vegetation within an approximately 30-foot radius was included in the estimations.

Taxonomic nomenclature for plant species followed Hultén (1968). Due to the season that the fieldwork was completed, willow and sedge species that were keyed out depended heavily on known habitats and other indicators rather than inflorescence and flowering parts. Some plants were only keyed out to the genus level (because of a lack of species-defining characteristics) and not to the species level. However, for the majority of these plants, a genus-level identification was sufficient to assign a wetland indicator status (i.e., facultative [fac], facultative upland [facu], facultative wetland [facw], etc.). When there were two different indicators for a species, the indicator assigned erred on being conservative with regards to wetland status. Essentially, the indicator that suggested the plant was more likely to exist in drier areas (i.e., fac vs. facw) was chosen. For example, the Juncus plant in point 1 was identified to the genus level. Juncus are either facw or obligate (obl). Erring on the side of the plant occurring in drier areas, the Juncus that was not keyed out to species was assigned the facw wetland indicator status. Sedge species that were not keyed out to the species were assigned the fac wetland indicator status (after the upland sedge species were eliminated). All species of alder (*Alnus* sp.) are fac; therefore a species of alder that was not keyed to species was assigned the fac wetland indicator status. Genera that have multiple wetland indicator statuses (e.g., grass) were not given a wetland indicator status.

Eleven communities (five wetland communities and six upland communities) were ultimately identified. For a comparison of the first 11 communities and the final 11 communities, see Section 4.0.

3.1.2 Final Mapping

Both wetland and upland plant communities were classified using Level III of the Alaska Vegetation Classification system (Viereck et al., 1992), which is a hierarchical system based on dominant growth forms (tree, shrub, herb), canopy height and closure, general soil moisture and salinity, and dominant plant species. Classification to Level III of the Viereck system provides the detail necessary to characterize the plant communities for the purpose of

assessing the habitat in the study area. The Viereck classifications were then used to produce a vegetation map (Figures 2a-2m).

Wetlands were classified according to the system guidelines outlined in the Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al., 1979). The mapping codes for each wetland type follow the U.S. Fish and Wildlife Service (USFWS) NWI mapping convention, which is a modified version of the Cowardin System for use in producing a wetland map (Figures 3a-3m). In addition, the vegetation types were classified into habitat based on landscape position, (e.g., upland, lowland, riparian), plant community structure cohesion, and characteristics that form habitat functional units. The habitat types were then used to produce a habitat map (Figures 4a-4m).

3.2 Wetland Function and Values Assessment

The functional importance of wetlands at each site was evaluated using criteria outlined in the Southeast Alaska Freshwater Wetland Assessment Method, USACE Alaska District (USACE, 1998). The field data were recorded on forms from the aforementioned wetland assessment method. The relative importance of 10 processes or attributes that encompass hydrological, water quality, ecological, and social functions was evaluated for each wetland type (Table 5).

3.3 Habitat Evaluation

Existing literature was evaluated prior to the field investigation to identify wildlife-habitat relationships in the region of Haines, Alaska. During the field study, evidence of animal activity (i.e., animal dens, birds' nest, animal tracks, droppings/scat) and species observed in the field was correlated with information from the office-based research. Wildlife values that were considered in this assessment include important foraging habitats, nesting or denning areas, escape cover from predators, and seasonal food sources, such as berry patches.

4.0 RESULTS AND DISCUSSION

4.1 Mapping and Classifications

The Haines Highway study area includes approximately 898 acres. Wetlands and riverine habitat comprise 248 acres (27 percent) of the study area. A total of seven NWI wetland

classifications were documented in the study area. To simplify the number of wetland types evaluated, these classifications were grouped into six wetland habitat types based on similar function and vegetation composition. Riverine was the most common wetland type, comprising approximately 11.0 percent of the study area.

4.2 Palustrine Wetland Habitat Types

The Palustrine System includes all wetland dominated by trees, shrubs, persistent emergent, emergent mosses, and lichens that are not influenced by ocean-derived salinity. Wetland types commonly referred to as bogs, muskegs, fens, marshes, and swamps are grouped in the Palustrine System. Lakes and ponds less than 20 acres in size are also a part of the Palustrine System (NWI, no date).

4.2.1 Herbaceous Swamp

4.2.1.1 Mapping Classification and Description

The Herbaceous Swamp wetland habitat comprises 40.6 acres (4.5 percent) of the study area. The NWI classification for the Herbaceous Swamp is PEM1H (Palustrine, Emergent, Persistent, Permanently Inundated) and the Alaska Vegetation code is Haf (Herbaceous, aquatic, freshwater). Vegetation in this wetland habitat type is characterized by swamp horsetail (*Equisetum fluviatile*), yellow pond lily (*Nuphar luteum*), beaked sedge (*Carex rostrata*), and marsh cinquefoil (*Potentilla palustris*). Areas of open water (including ponds and sloughs), with herbaceous species growing on the edge, are common in this wetland habitat. Black cottonwood (*Populus balsamifera*) is typically growing around the outskirts of the Herbaceous Swamp wetland habitat. This wetland habitat type was frequently encountered near culverts or in ditches along the roadside; however, the scale of these wetlands is too small to map. Sample Sites 17, 20, 21, 23, and 27 are located within this wetland community type.

4.2.1.2 Wetland Functional Assessment

The Herbaceous Swamp wetland provides good floodflow alteration, sediment/toxicant retention, nutrient cycling, and wildlife habitat. The ability of the wetland to store runoff from the mountainside allows it to provide floodflow alteration during high periods of precipitation. Because the wetland retains water for prolonged periods of time, and contains

herbaceous vegetation, the wetland has the ability to retain sediments and toxicants from the adjacent roadway and provide nutrient cycling. The herbaceous vegetation along the edge of the watercourse also provides bank stabilization. Culverts that are placed near the Herbaceous Swamp wetland may allow for production export into the Chilkat River. The wetland also provides habitat for a variety of species, which is described below.

4.2.1.3 Wildlife Habitat Evaluation

The Herbaceous Swamp wetland habitat provides excellent habitat for waterfowl for foraging, nesting, and rearing. In the Southeast, mallards, green-winged teal, and other dabbling ducks that stay to breed, prefer to nest in freshwater wetlands where high tides can't reach their eggs. The birds with strong ties to this wetland habitat type include great blue heron, belted kingfisher, common snipe, and several small breeding songbirds such as the common yellowthroat, northern waterthrush, and alder flycatcher. Other birds from adjacent forests and shrub habitats come to feed in this habitat type; these include insect-eating swallows, warblers, thrushes, and flycatchers (O'Clair et al., 1992).

Freshwater wetlands bordering the Chilkat River host mouser birds such as northern harriers, American kestrels, northern shrikes, and short-eared owls that use this habitat type to hunt prey such as the meadow vole or muskrat. Other small mammals that inhabit the Herbaceous Swamp include bog lemmings, and meadow, tundra, and long-tailed voles. Large mammals such as moose use this habitat to graze on the floating and submerged vegetation. They may also use this habitat to seek refuge from biting insects. Freshwater marshes are also the breeding grounds of the boreal toad, spotted frog, and wood frog (O'Clair et al., 1992).

Wildlife observations during the delineation include a sandhill crane (*Grus canadensis*) that appeared to be swimming and feeding.

4.2.2 Fresh Sedge Meadow

4.2.2.1 Mapping Classification and Description

The Fresh Sedge Meadow wetland habitat comprises 8.9 acres (0.9 percent) of the study area. The NWI classification for the Fresh Sedge Meadow is PEM1B (Palustrine, Emergent, Persistent, Saturated) and the Alaska Vegetation code is Hgm (Herbaceous, graminoid,

moist). Dominant vegetation in the Fresh Sedge Meadow habitat includes a variety of sedges such as beaked sedge, Sitka sedge (*Carex sitchensis*), and two other sedge species that could not be identified at the time of year the sampling was conducted. This habitat lacked hydrology during the site visit; however, the presence of hydrophytic vegetation and hydric soils indicate that this habitat is likely saturated for at least two weeks during the growing season (April 1 - October 30). Sites 1, 2, 36, and 37 were sampled within this wetland habitat type.

4.2.2.2 Wetland Functional Assessment

The Fresh Sedge Meadow wetland has the ability to retain water in high precipitation periods and thus provide floodflow alteration, and possibly provide sediment/toxicant retention as well. The Fresh Sedge Meadow wetlands that are located adjacent to culverts may also provide production export.

4.2.2.3 Wildlife Habitat Evaluation

With the species richness of sedges in this wetland habitat, many small mammals such as voles and shrews likely inhabit the area, taking advantage of the abundance of seeds. Voles and shrews may also feed on the many small black snails that were observed on stems of the sedges and grasses at Site 1. Hawks and other mouser birds likely visit this habitat to hunt the small mammals. Brown and black bear may use the Fresh Sedge Habitat during spring months for nutrients from the newly emerged sedges. Moose may also frequent this habitat to feed on the tall sedges.

4.2.3 Bluejoint Meadow

4.2.3.1 Mapping Classification and Description

The Bluejoint Meadow wetland habitat comprises 15.4 acre (1.7 percent) of the study area. The NWI classification for the Bluejoint Meadow is PEM1B (Palustrine, Emergent, Persistent, Saturated) and the Alaska Vegetation Classification code Hgm. Dominant vegetation in this habitat includes bluejoint and common horsetail (*Equisetum arvense*). Sample Site 14 is located within this wetland habitat. This is site was saturated at a depth of 10 inches and the soils were low in chroma.

4.2.3.2 Wetland Functional Assessment

Relative to other wetlands within the study area, the Bluejoint Meadow has the lowest value for wetland functions. This wetland habitat was encountered within a ditch and therefore it may provide some sediment/toxicant retention.

4.2.3.3 Wildlife Habitat Evaluation

The Bluejoint Meadow wetland provides lower quality habitat relative to adjacent communities. Due to the low species richness, this habitat provides limited food availability and shelter. Small mammals such as meadow jumping mouse (*Zapus hudsonius*), long-tailed vole (*Microtus longicaudus*), tundra vole (*M. oeconomus*), meadow vole (*M. pennsylvanicus*), and muskrat (*Ondatra zibethicus*) use grassy wetlands for foraging and breeding habitat (Post, 1996).

4.2.4 Shrub Swamp

4.2.4.1 Mapping Classification and Description

The Shrub Swamp wetland habitat comprises 72.5 acres (8.0 percent) of the study area. The NWI classifications for Shrub Swamp are PSS1H (Palustrine, Scrub-shrub, Broadleaved Deciduous, Permanently Inundated) and PSS1E (Palustrine, Scrub-shrub, Broadleaved Deciduous, Seasonally Flooded/Saturated). The Alaska Vegetation Classification code for Shrub Swamp is Sto (Shrub, tall, open) and Slo (Shrub, low, open). Dominant vegetation in this wetland habitat includes alder, mountain willow (*Salix monticola*), and swamp horsetail. Other species that are present include skunk cabbage and marsh violet. The depth of inundation varies in this habitat, from extreme saturation to approximately five inches. Areas that were very saturated, and not inundated, were associated with a nearby stream. The streams appeared to drain from the mountainside and meander through the Shrub Swamp wetland habitat, and possibly run through culverts under the Haines Highway and drain into the Chilkat River. Sample Sites 8, 11, 13, 18, 31, 34, and 35 are located within this habitat type.

4.2.4.2 Wetland Functional Assessment

The Shrub Swamp wetland provides floodflow alteration, sediment/toxicant retention, nutrient cycling, shoreline stabilization, production export, wildlife habitat, and potential fish

habitat. This wetland habitat collects runoff from the mountainside and stream overflow. The long water retention time may allow this wetland to provide water quality treatment. During periods of stream overflow, fish may use this wetland habitat if there is connectivity from the Chilkat River via culverts. Areas that to do connect to the Chilkat River via culverts may also transport of organics. The woody vegetation also provides some degree of stream bank stabilization in areas where streams are present.

4.2.4.3 Wildlife Habitat Evaluation

Early vegetational succession communities such as the Shrub Swamp wetland habitat provide good habitat mainly because they green up quickly in the spring and die back fast in the fall. This dramatic flux of the deciduous trees' leaves corresponds to an increase in insects, and therefore many songbirds such as warblers, flycatchers, and swallows inhabit this wetland habitat (O'Clair et al., 1992).

Moose also likely inhabit this habitat due to the high forage biomass available from the willows and the security of the dense shrubs (Peek, 1998 as cited in USFWS no date). Sitka black-tailed deer (*Odocoileus hemionus sitchensis*) may frequent this habitat in mid summer to consume the leaves of the skunk cabbage. Bear likely frequent Shrub Swamp wetland habitat that is adjacent fish streams, such as Site 8. Small mammals that may inhabit this wetland habitat include the meadow vole, masked shrew, and the water shrew.

4.2.5 Seasonally Flooded Black Cottonwood Forest

4.2.5.1 Mapping Classification and Description

The Seasonally Flooded Black Cottonwood Forest wetland habitat comprises 11.8 acres (1.3 percent) of the study area. The NWI classification for this wetland habitat is PFO1C (Palustrine, Forest, Broad-leaf Deciduous, Seasonally Flooded) and the Alaska Vegetation Classification code is Fbc (Forest, broadleaf, closed). Dominant vegetation in this habitat includes Black cottonwood, alder, nootka rose, and meadow horsetail. The structure of this wetland habitat type is similar the upland Black Cottonwood Forest (described in Section 4.4.3); however, it sits at a lower elevation along the Chilkat River. This wetland habitat type was mapped based on sample Site 12 and extrapolated to other Black Cottonwood Forests at the same elevation using October 2004 Light Detection and Ranging

(LIDAR) topography lines. LIDAR is a sensory system that uses light and laser light to measure distances. The sampled site within this wetland habitat did not have saturated soils at the time of sampling; however, drainage patterns were present and the soils were low in chroma. It is likely that due to the low elevation of this wetland habitat that it experiences saturated soils for at least two weeks of the growing season either from flooding from the Chilkat River or from fluctuation of the groundwater table.

4.2.5.2 Wetland Functional Assessment

The primary functions that this wetland provides are shoreline stabilization and floodflow control. This wetland habitat is located along the Chilkat River and is effective at preventing stream bank or shoreline erosion. This habitat also acts as a buffer during periods of overbank flow by altering floodflow.

4.2.5.3 Wildlife Habitat Evaluation

In comparison to the upland Black Cottonwood Forest, the Seasonally Flooded Black Cottonwood Forests are small in scale, typically not connected to other habitats, and therefore are lower habitat value. Furbearers that use this habitat include coyote, lynx, marten, mink, ermine, red fox, beaver, and muskrat. Small mammals include snowshoe hare, northern flying squirrel, red squirrel, porcupine, mice, shrews, and voles. Raptors may visit this habitat to feed on the small mammals. Most importantly, bald eagles use this habitat to perch on the black cottonwoods, especially during the months of October to February when they congregate to feed on the late salmon run.

4.3 Riverine Habitat

The USFWS NWI wetland classification system divides wetlands into five major Systems including Marine, Estuarine, Riverine, Lacustrine, and Palustrine. For this reason, rivers are treated as wetlands in this report. However, it is important to note that the USACE does not define rivers as wetlands. Under USACE regulations, rivers are defined as Waters of the U.S.

The USFWS defines the riverine system as all wetlands and deepwater habitats contained within a channel, with two exceptions: (1) wetlands dominated by trees, shrubs, persistent

emergents, emergent mosses, or lichens; and (2) habitats with water containing ocean-derived salts in excess of 0.5 percent (Cowardin, 1979).

4.3.1 Rivers and Streams

4.3.1.1 Mapping Classification and Description

The River habitat comprises 99.2 acres (11.0 percent) of the study area and includes the Chilkat River and its tributaries. The NWI classification for the River habitat is R3OW (Riverine, Upper Perennial, Open Water (unknown bottom)).

Interfluve Inc. conducted a stream survey of the project area that included mapping the streams. Their stream data has been incorporated into Figures 2a-l through 4a-l. The stream data does not have an associated area, and therefore the Interfluve mapped streams are not included in the area of River habitat mentioned above.

4.3.1.2 Wetland Functional Assessment

The River wetland provides many functions such as floodflow alteration, groundwater interchange, sediment/toxicant retention, nutrient cycling, production export, wildlife habitat, and fish habitat. The River has the ability to store water during runoff, snowmelt, and high periods of precipitation. With the abundance of salmon that use Chilkat River and its tributaries, this wetland system provides excellent production export. Wildlife and fish habitat is also an important function of this wetland, and is described below.

4.3.1.3 Wildlife Habitat Evaluation

The lower Chilkat River (#115-32-10250) is catalogued as an anadromous fish stream. The DF&G Catalog of Waters Important to Anadromous Fishes states that all five salmon species (sockeye, king, coho, pink, chum) are present. Many tributaries of the Chilkat River are also catalogued as anadromous for spawning and rearing habitat.

The river flats of the Chilkat River, along the Haines Highway between Miles 18 and 24, is considered critical habitat in the Alaska Chilkat Bald Eagle Preserve. Bald eagles are attracted to the area by the availability of spawned-out salmon and open waters in late fall and winter. This combination of open water and large amounts of food bring large concentrations of eagles into the Chilkat Valley beginning by early October and lasting

through February. Bear also visit the Chilkat River to feed on spawning salmon during the summer months.

4.4 Upland Habitat Types

4.4.1 Fireweed-Bluejoint Meadow

4.4.1.1 Mapping Classification and Description

The Fireweed-Bluejoint habitat comprises 7.3 acres (0.8 percent) of the study area. The Alaska Vegetation Classification code for this habitat type is Hgd (Herbaceous, graminoid, dry). Dominant species in this habitat include fireweed, bluejoint, and nootka rose. The soils in this habitat type are dry and sandy. Sample Site 7 is located within this habitat. This habitat was frequently observed adjacent to the Haines Highway.

4.4.1.2 Wildlife Habitat Assessment

The low species richness of this habitat results in low overall habitat value. This habitat is likely utilized mostly by small mammals such as mice, shrews, and voles.

4.4.2 Mixed Shrub

4.4.2.1 Mapping Classification and Description

The Mixed Shrub habitat comprises 49.5 acres (5.5 percent) of the study area. The Alaska Vegetation Classification code for this habitat type is Stc (Shrub tall closed) and Slo. Dominant vegetation in this habitat includes nootka rose, feltleaf willow (*Salix alaxensis*), mountain willow, black cottonwood, common horsetail, and common dandelion (*Taraxacum officinale*). This habitat was most commonly observed along the roadside in disturbed areas. Sample sites within this habitat are 3, 9, and 16.

4.4.2.2 Wildlife Habitat Assessment

Similar to the Shrub Swamp wetland habitat, the Mixed Shrub habitat is preferred by many avian species due to the diverse habitat structure. Moose also use this habitat for forage and shelter. Smaller mammal species such as mice, shrews, and voles are also abundant in the Mixed Shrub habitat.

4.4.3 Black Cottonwood Forest

4.4.3.1 Mapping Classification and Description

The Black Cottonwood Forest habitat comprises 315.5 acres (35.1 percent) of the study area. The Alaska Vegetation Classification code for this habitat type is Fbc (Forest broadleaf closed) and Fbo (Forest, broadleaf, open). Vegetation in this habitat includes black cottonwood, soapberry (*Shepherdia Canadensis*), nootka rose, alder, red osier dogwood, highbush cranberry, and meadow horsetail. The soils are dry and generally sandy. Sample sites within this habitat include 6, 15, 19, and 33.

4.4.3.2 Wildlife Habitat Assessment

The Black Cottonwood Forest provides habitat for large mammals such as Sitka black-tailed deer, brown and black bears, and wolves. Furbearers that use this habitat include coyote, lynx, marten, mink, ermine, red fox, beaver, and muskrat. Small mammals include snowshore hare, northern flying squirrel, red squirrel, porcupine, mice, shrews, and voles. Raptors that are found in this habitat are sharp-shinned hawk, goshawk, great-horned owl, boreal owl, red-tailed hawk, osprey, and great gray owl. Numerous bird species also use this habitat including Canada goose, common goldeneye, mergansers, gulls, woodpeckers, and numerous species of songbirds. In addition, extremely large concentrations of bald eagles use the Black Cottonwood Forests near Haines (Natural Resources Conservation Service, 1999).

4.4.4 Birch Forest

4.4.4.1 Mapping Classification and Description

The Birch Forest habitat comprises 0.85 acre (<0.0 percent) of the study area. The Alaska Vegetation Classification code for this habitat type is Fbc. Dominant vegetation in the Birch Forest consists of paper birch, feltleaf willow, highbush cranberry, nootka rose, meadow horsetail, and oak fern (*Gymnocarpium dryopteris*). The soils are sandy and cobbles increase with depth. Sample Site 22 is located within this habitat.

4.4.4.2 Wildlife Habitat Assessment

Similar to other forests in the study area, Birch Forest habitat provides cover for moose and deer and also provides a winter food source for them. Snowshoe hare and porcupine also feed on paper birch. Birds that use paper birch as a food source include redpoll, pine siskin, and chickadee. Many birds also nest in paper birch trees such as woodpeckers, sapsucker, and vireos.

4.4.5 Sitka Spruce Forest

4.4.5.1 Mapping Classification and Description

The Sitka Spruce Forest habitat comprises 57.5 acres (6.5 percent) of the study area. The Alaska Vegetation Classification code for this habitat type is Fnc (Forest needle-leaf closed). The Sitka Spruce Forest is dominated by Sitka spruce, alder, highbush cranberry, nootka rose, northern gooseberry (*Ribes oxyanthoides*), arctic starflower (*Trientalis europaea*), and fireweed. Sample Sites 26 and 28 are located within the Sitka Spruce Forest habitat.

4.4.5.2 Wildlife Habitat Assessment

Moose will not likely use this habitat because their browse preference (willow or birch) is not represented well. Bear may frequent the area during berry season or for down time during the day. A resident indicated bears rest in the Spruce Forest during the day, next to sample Site 25, and feed on a salmon in the evening. Red squirrels are abundant in the Spruce Forest, as well as mice, shrew, and voles.

4.4.6 Mixed Forest

4.4.6.1 Mapping Classification and Description

The Mixed Forest habitat comprises 102.3 acres (11.4 percent) of the study area. The Alaska Vegetation Classification code for this habitat type is Fmc (Forest mixed closed). Vegetation in this habitat are black cottonwood, Sitka spruce, paper birch, nootka rose, red osier dogwood, highbush cranberry, meadow horsetail, one-sided wintergreen (*Pyrola secunda*), and common pink wintergreen (*Pyrola asarifolia*). The soils are dry and large rock was encountered less than 18 inches in depth. Samples Sites 5 and 24 are located within this habitat.

4.4.6.2 Wildlife Habitat Assessment

The Mixed Forest habitat provides diverse habitat structure. The presence or absence of most shrub and forest bird species depends on the tree species present (coniferous or deciduous), density of woody plants, and density of taller trees (Kessel, 1998; as cited in USFWS, no date). A variety of mammals are known to use this habitat as well, such as shrews, voles, mice, lemmings, bats, squirrels, moose, porcupine, marten, mink, wolverine, lynx, wolves, coyotes, red foxes, and bears (Magoun and Dean, 2000; as cited in USFWS, no date).

Table 2: Haines Highway Study Area National Wetland Inventory (NWI) Types

NWI Types	Sample Site	System	Class	Subclass	Water Regime	Wetland Type
PEM1B	1, 2, 13, 36, 37	Palustrine	Emergent	Persistent	Saturated	Fresh Sedge Meadow, Bluejoint Meadow
PEM1H	10, 11, 17, 32	Palustrine	Emergent	Persistent	Permanently Inundated	Herbaceous Swamp
PSS1H	18, 20, 21, 23, 27, 29, 30, 31,	Palustrine	Scrub-Shrub	Broad-leaved Deciduous	Permanently Inundated	Shrub Swamp
PSS1E	8, 13, 34, 35	Palustrine	Scrub-Shrub	Broad-leaved Deciduous	Seasonally Flooded/Saturated	Shrub Swamp
PFO1C	12	Palustrine	Forest	Broad-leaved Deciduous	Seasonally Flooded	Seasonally Flooded Cottonwood Forest
R3OW	4	River	Upper Perennial	Open Water	Unknown Bottom	River

Table 3: Haines Highway Study Area Alaska Vegetation Classification

Mapping Code	Viereck Code	Level 1	Level 2	Level 3	Habitat
Hgd	III.A.1	Herbaceous	Graminoid	Dry	Fireweed Bluejoint Meadow
Hgm	III.A.3	Herbaceous	Graminoid	Moist	Bluejoint Meadow, Fresh Sedge Meadow
Haf	III.B.3	Herbaceous	Aquatic	Freshwater	Herbaceous Swamp
Sto	II.B.2	Shrub	Tall	Open	Shrub Swamp, Mixed Shrub
Stc	II.B.1	Shrub	Tall	Closed	Mixed Shrub
Slo	II.C.2	Shrub	Low	Open	Shrub Swamp, Mixed Shrub
Fmc	I.C.3	Forest	Mixed	Closed	Mixed Forest
Fmo	I.C.2	Forest	Mixed	Open	Mixed Forest
Fbc	I.B.1	Forest	Broad-leaved	Closed	Birch Forest, Black Cottonwood Forest, Seasonally Flooded Black Cottonwood Forest
Fbo	I.B.2	Forest	Broad-leaved	Open	Black Cottonwood Forest
Fnc	I.A.1	Forest	Needle-leaved	Closed	Sitka Spruce Forest
Bb	- -	Barren	- -	- -	River

Table 4: Haines Highway Study Area Habitat Types

Wetland Habitat Type	Sample Sites	NWI Code	Alaska Vegetation Class Code
Fresh Sedge Meadow	1, 2, 36, 37	PEM1B	Hgm
Bluejoint Meadow	14	PEM1B	Hgm
Herbaceous Swamp	10, 17, 20, 21, 23, 27, 29, 32	PEM1H	Haf
Shrub Swamp	8, 11, 13, 18, 31, 34, 35	PSS1H, PSS1E	Sto, Slo
Seasonally Flooded Black Cottonwood Forest	12	PFO1C	Fbc
River	4	R3OW	Bb
Upland Habitat Types			
Fireweed Bluejoint Meadow	7	Upland	Hgd
Mixed Shrub	3, 9, 16	Upland	Stc, Slo
Black Cottonwood Forest	6, 15, 19, 25, 33	Upland	Fbc, Fbo
Birch Forest	22	Upland	Fbc
Sitka Spruce Forest	26, 28	Upland	Fnc
Mixed Forest	5, 24	Upland	Fmc, Fmo

Table 5: Functions and Values of Wetlands in the Haines Highway Study Area

Habitat Type	Fresh Sedge Meadow	Bluejoint Meadow	Herbaceous Swamp	Shrub Swamp	Seasonally Flooded Black Cottonwood Forest	River
Wetland Type	**PEM1B**	**PEM1B**	**PEM1H**	**PSS1H, PSS1E**	**PFO1C**	**R3OW**
Vegetation Type	**Hgm**	**Hgm**	**Haf**	**Sto, Slo**	**Fbc**	**Bb**
Functions and Values						
Floodflow Alteration	Low	Low	Moderate	Moderate	High	Low
Groundwater Interchange	Low	Low	Moderate	Moderate	Moderate	Low
Sediment/Toxicant Retention	Low	Low	Moderate	Moderate	Low	Low
Sediment/Shoreline Stabilization	Moderate	Low	Moderate	Moderate	High	Low
Nutrient Cycling	Moderate	Low	Moderate	Moderate	Moderate	High
Production/Detrital Export	Moderate	Low	Moderate	Moderate	Low	High
Wildlife Habitat	Moderate	Low	High	High	Moderate	High
Fish Habitat	Low	Low	Moderate	Low	Low	High
Sensitive, Rare, Threatened, Species of Concern or Endangered Species Habitat	Low	Low	Low	Low	Low	Low
Percentage of Wetland Type in Study Area	0.9	1.7	4.5	8.0	1.3	11.0