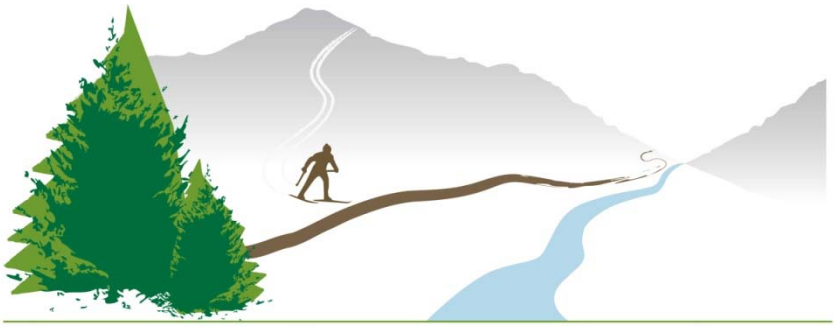

HATCHER PASS RECREATIONAL AREA ACCESS, TRAILS, AND TRANSIT FACILITIES

Preliminary Wetlands Delineation and Functions and Services Assessment, Vegetation Classification, and Habitat Assessment

November 2009

FTA United States Department of Transportation Federal Transit Administration

DOWL HKM

PRELIMINARY WETLANDS DELINEATION
AND
FUNCTIONS AND SERVICES ASSESSMENT, VEGETATION CLASSIFICATION, AND HABITAT ASSESSMENT

HATCHER PASS RECREATIONAL AREA ACCESS, TRAILS, AND TRANSIT FACILITIES

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APPENDICES

LIST OF ACRONYMS

ABR....ABR, Inc.-Environmental Research & Services
ABR Report....Baseline Fish and Aquatics Assessment for the Matanuska-Susitna Borough's Proposed Hatcher Pass Recreational Area Access, Trails, and Transit Facilities, 2008
ADF&G....Alaska Department of Fish and Game
bgs....below ground surface
CWA....Clean Water Act
DOWL HKM....Previously doing business as DOWL Engineers
GIS....Geographic Information Systems
H&H Report....Hydrologic and Hydraulic Report
Hatcher Pass Transit....Hatcher Pass Recreational Area Access, Trails, and Transit Facilities
JD....Jurisdictional Determination
LIDAR....Light Detection and Ranging
MSB....Matanuska-Susitna Borough
NRCS....Natural Resources Conservation Service
NWI....National Wetlands Inventory
PWD....Preliminary Wetlands Delineation
U.S....United States
USACE....United States Army Corps of Engineers
USFWS....United States Fish and Wildlife Service
USGS....United States Geological Survey
WDOT....State of Washington Department of Transportation
WRR....Wetland Reconnaissance Report

EXECUTIVE SUMMARY

DOWL HKM was contracted by the Matanuska-Susitna Borough to perform a wetland reconnaissance of the proposed Hatcher Pass Recreational Area Access, Trails, and Transit Facilities project. The Wetland Reconnaissance Report served as a planning-level assessment to aid in the development of a preferred transit alternative for the project.

Since a preferred transit alternative has been identified, additional fieldwork was completed within the preferred transit alternative corridor. This report includes the additional information and serves as a Preliminary Wetlands Delineation for the proposed Hatcher Pass Recreational Area Access, Trails, and Transit Facilities project. In addition to a Preliminary Wetlands Delineation, this report describes the classification and mapping of each wetlands habitat and an evaluation of the functions and services of each wetlands habitat. The Preliminary Wetlands Delineation in conjunction with the Wetland Reconnaissance Report can be used to understand the overall proposed Hatcher Pass Recreational Area Access, Trails, and Transit Facilities project area.

The 1,755-acre Preliminary Wetlands Delineation study area is located within Hatcher Pass, northwest of Palmer. For the purposes of this analysis, the project area was divided into two separate areas; the Northern Area and the Southern Area. The Northern Area consists of approximately 1,349 acres; the Matanuska-Susitna Borough is seeking a jurisdictional determination by the United States Army Corps of Engineers for the entire acreage. The Southern Area is approximately 406 acres, but Matanuska-Susitna Borough is only seeking a jurisdictional determination by the United States Army Corps of Engineers on approximately 255 acres.

For both the Northern and Southern Jurisdictional Determination study areas, jurisdictional wetlands comprise approximately 25.39 acres, of which approximately 10.77 acres are problematic wetlands, and non-jurisdictional uplands comprise approximately 1,573 acres (includes upland portions of traditional and problematic mosaic wetlands). In both the Northern and Southern Jurisdictional Determination study areas, Other Waters of the United States comprise approximately 5.49 acres (approximately 68,917.08 linear feet).

All wetlands identified in this report have a clear and direct surface water or groundwater connection to the Little Susitna River a Traditionally Navigable Waters as defined by the United States Army Corps of Engineers. DOWL HKM expects that these are jurisdictional wetlands, and no “significant nexus analysis” is necessary.

1.0 INTRODUCTION

DOWL HKM was contracted by the Matanuska-Susitna Borough (MSB) to perform a wetland reconnaissance of the proposed Hatcher Pass Recreational Area Access, Trails, and Transit Facilities (Hatcher Pass Transit) project. The Wetlands Reconnaissance Report (WRR) served as a planning-level assessment to aid in the development of a preferred transit alternative for the project.

Since a preferred transit alternative has been identified, additional fieldwork was completed within the preferred transit alternative corridor. This report includes the additional information and serves as a Preliminary Wetlands Delineation (PWD) for the Hatcher Pass Transit project. In addition to a PWD, this report describes the classification and mapping of each wetlands habitat and an evaluation of the functions and services of each wetlands habitat. The PWD in conjunction with the WRR can be used to understand the overall Hatcher Pass Transit project area.

Wetlands are defined by the United States Army Corps of Engineers (USACE) as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (USACE, 1987)."

This PWD serves to support a jurisdictional determination (JD) by the USACE under authority granted by the Clean Water Act (CWA) Section 404.

1.1 Project Description

The purpose of this report was to delineate potentially jurisdictional areas based on CWA 404 authority in approximately 1,604 acres of Hatcher Pass.

The Hatcher Pass Transit project consists of two distinct study areas located in the foothills of the Talkeetna Mountains, the Northern Area (1,349 acres) and the Southern Area (406 acres) (Figure 1). The Southern Area is divided into two areas; the Southern Alignment Study Area (151 acres) and the Southern JD Area (255 acres) (Figure 2). During the discussion of the habitats in Section 3.2, Southern Area will be used to refer to both the Southern Alignment Study Area and the Southern JD Area. As the MSB is seeking a JD on only the Northern Area and Southern JD Area, all acreages and percentages pertain to only those areas that are also referred to as the JD study area.

1.2 Project Location

The Hatcher Pass Transit project is located northwest of Palmer, Alaska, within Hatcher Pass. The Northern Area lies south of Willow-Fishhook Road and west of Palmer-Fishhook Road, and the Southern Area lies north of Edgerton Parks Road and west of Palmer-Fishhook Road (Figure 1, Appendix A). The Hatcher Pass Transit project includes portions of Sections 2-5, 8-11, 14-22, and 26-30 of T19N, R1E, Seward Meridian (United States Geological Survey [USGS] Quadrangle Anchorage C6, C7, and D7 1:63,360 Scale).

1.3 Study Areas

Both the Northern and Southern Areas are west of the Hatcher Pass Public Use Area located along the Little Susitna River.

- The Southern Area consists of approximately 406 acres north of Edgerton Parks Road and south of Government Peak. This area contains a highly complex landscape of forested uplands crossed by dozens of streams and is interspersed with varying types of wetlands. This is due primarily to the surficial geology of the area that is characterized by glacial tills of varying permeability resulting in a highly unpredictable water table. This mix of permeable and non-permeable soils produces seep areas that are not easily denoted by vegetative changes or topography. Additionally, complex topography and soils made the identification of surface flow extremely difficult.

  For these reasons, this PWD documents conditions within the entire Southern Area, but seeks to have a JD by the USACE of the more focused "Southern JD Area," totaling approximately 255 acres. The Southern JD Area reflects the final selected alignment alternative.

- The Northern Area consists of approximately 1,349 acres east of Bald Mountain Ridge and north of the Southern Area and Government Peak. Surface flow consists of streams that flow southeast toward the Little Susitna River. The Northern Area consists of a landscape in which vegetation communities and topography reflect changes between wetlands and uplands. Additionally, the presence and location of watercourses is consistent with local topography. This PWD covers the entire Northern Area and is the area being pursued for a JD by the USACE.

2.0 METHODS

DOWL HKM conducted a PWD in accordance with Part IV, Section D, Subsection 3, of the *Corps of Engineers Wetlands Delineation Manual* (USACE, 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Alaska Region* (Version 2.0) (USACE, September 2007). This effort included preliminary data gathering and analysis, a field investigation, post-field data review, and mapping utilizing Geographic Information Systems (GIS) tools. This PWD was completed entirely by DOWL HKM personnel who have completed USACE wetlands delineation training course(s).

2.1 Existing Data for Project Area

Preliminary data gathering referenced the following data sources for potential information and provided a basis for synthesizing data for this JD.

- Aerial Photography: High-resolution color aerial photographs of the Hatcher Pass Transit project area (2007)
- Light Detection and Ranging (LIDAR) Topographic Data: Derived from McClintock Land Associates, Inc: 2007 two-foot contour elevation data
- Natural Resources Conservation Service (NRCS) Matanuska-Susitna Soil Survey (2000)
- DOWL HKM: Final Subsurface Investigation-Hatcher Pass Southside (2003)
- United States Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) Maps: Anchorage C-7 and D-7
- USGS Quadrangle Maps: Anchorage C-7 and D-7
- Alaska Department of Fish and Game (ADF&G) Fish Distribution Database, reviewed on May 1, 2009.
- MSB's hydrologic GIS layer
- Inventory of Fish Distribution in Matanuska-Susitna Basin Streams, Southcentral Alaska (2007)
- DOWL HKM: WRR (2009)

- ABR, Inc.-Environmental Research & Services (ABR): Baseline Fish and Aquatics Assessment for the Matanuska-Susitna Borough's Proposed Hatcher Pass Recreational Area Access, Trails, and Transit Facilities, 2008 (ABR Report, 2009)
- DOWL HKM: 2009 Hydrologic and Hydraulic Report (H&H Report)

2.2 Wetlands Jurisdictional Determination

2.2.1 Preliminary Mapping and Classification

Information gathered from the preliminary data review and synthesis as well as from the WRR was used to develop an initial sampling plan for the field investigation. An aerial photograph contact print (2007), WRR mapping, and LIDAR-generated contours were studied to classify and map potential habitat types within the Northern and Southern Areas.

2.2.2 Field Methods

Teams of two wetlands scientists from DOWL HKM conducted field investigations of the Southern Area from May through October 1, 2009, with the exception of one day spent in the Northern Area. Refer to the WRR for information regarding dates of field investigations during 2008.

First, maps generated for the WRR along with LIDAR-generated contours were reviewed to determine potential wetland areas. Due to the large area and the non-uniform nature of the Southern Area, each field day was unique and sample points were generally selected based on the location of proposed alignments. Additionally, each successive field day built a foundation by which patterns could be discerned and applied. For instance, after several days, it appeared that areas containing alders at the bottom of slopes tended to contain streams and/or seep areas.

Field delineation of wetlands were performed according to the three-parameter approach using vegetative, pedologic, and hydrologic characteristics, as described in the USACE Wetlands Delineation Manuals (USACE, 1987; USACE, 2007). For the wetlands delineation, a USACE routine wetlands delineation data sheet was completed to document observed vegetation, soil, and hydrology characteristics at each sample site (Appendix B). Percent aerial cover for each species was estimated, and the type of vegetation stratum (tree, shrub, and herbaceous layers) for each species was recorded.

Hydrophytic vegetation was identified through a Prevalence Index or the Dominance Test, as defined by the 2007 *Regional Supplement to the Corps of Engineers Wetlands Delineation Manual: Alaska Region*. The Prevalence Index was applied in communities with moderate aerial cover for several species, or where one stratum contains much less plant cover than another stratum. The Dominance Test was applied in communities where a few plant species were more abundant than the other species in the community.

The taxonomic nomenclature for each recorded plant species followed Hultén (1968). The indicator status of each recorded plant species was noted from the *National List of Plant Species That Occur in Wetlands: Alaska (Region A)* (Reed, 1988).

The following references were used to assist with the field identification of dominant plant species:

- Alaskan Wildflowers (Pratt, 1989)
- Flora of Alaska and Neighboring Territories: A Manual of the Vascular Plants (Hultén, 1968)
- Plants of the Pacific Northwest Cost (Pojar and MacKinnon, 1994)
- *Wetland Sedges of Alaska* (Tande and Lipkin, 2003)
- Willows of Southcentral Alaska (Collet, 2004)

At each sampling site where standing water or complete saturation of the ground was not observed, a soil pit was excavated to a depth of at least 20 inches to determine soil saturation and to describe soil characteristics. Soil color was determined using Munsell Soil Color Charts (2000). Photographs were taken at each sampling site to document vegetation and soil profiles (where applicable).

Photographic sample points were taken to document site conditions and confirm the dominant plant species. Photographic sample points were used to extrapolate data to similar habitat areas. Additionally, GPS without accompanying data were taken occasionally to aid in mapping. At the end of each field day, the data sheets were reviewed for completeness, collected plant samples were identified and noted, and boundaries were preliminarily mapped.

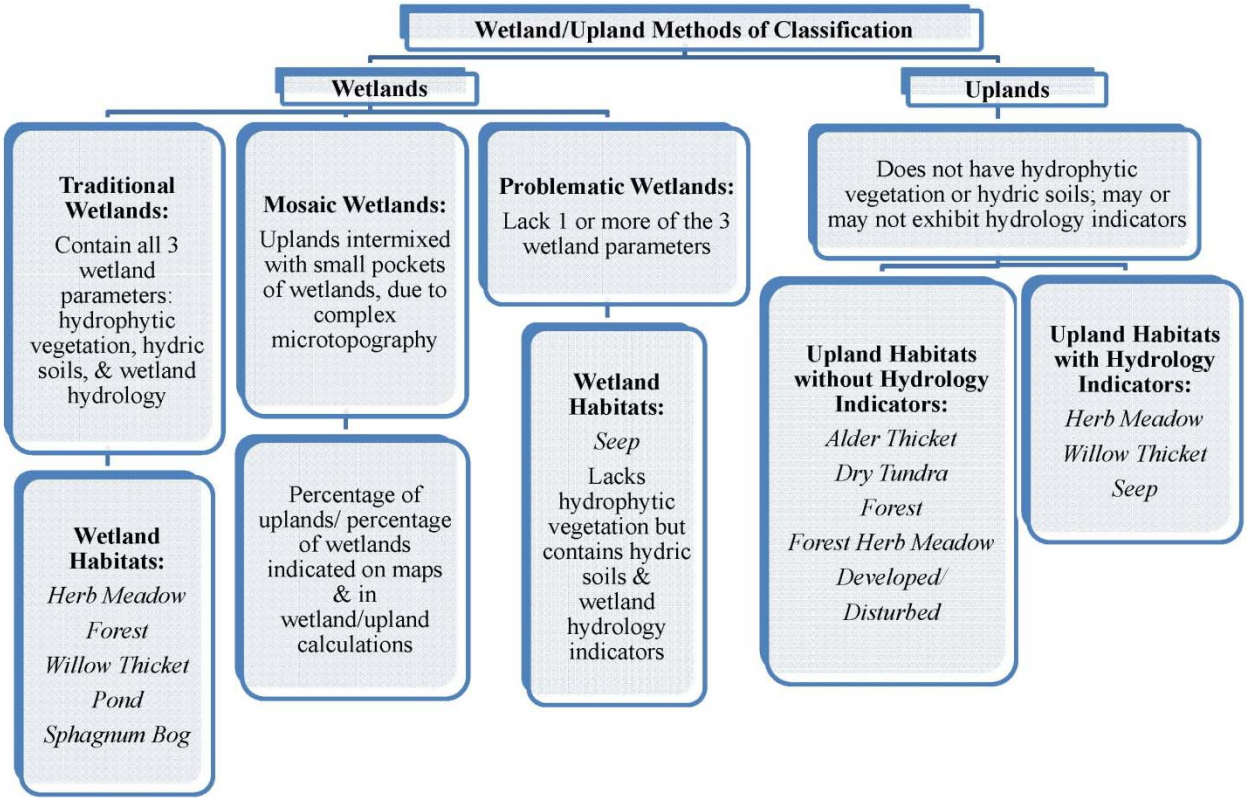
2.2.3 Wetlands Classification

Wetland areas were classified to the class level, according to the system guidelines outlined in the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al., 1979). Hydrologic modifiers were added to each wetlands class.

Wetland habitats were determined by evaluating landscape position, (e.g., upland, lowland, riparian), plant community structure cohesion, and characteristics that form habitat functional units.

All Other Waters of the U.S. (flowing water) were classified according to the same guidelines.

For the purposes of this PWD, Waters of the U.S. within the Northern and Southern Areas have been divided into four categories; the method for the classification of wetlands and uplands is displayed in the following graphic:



1. Traditional wetlands that are dominated by *hydrophytic* ("water-loving") vegetation and exhibit hydric soil and hydrologic indicators;

2. Problematic wetlands (i.e., groundwater seeps) found only in the Southern Area that are dominated by non-wetland plant species, but still fall within the USACE jurisdiction;
3. Mosaic wetlands found only in the Southern Area that are dominated by uplands, but have numerous small pockets of wetlands too small-scale to be easily delineated or mapped separately; and
4. Other Waters of the U.S. (i.e., streams).

2.2.3.1.1 Problematic Wetlands in the Southern Area

Problematic wetlands are defined by the USACE as naturally occurring wetland types that periodically lack indicators of hydrophytic vegetation, hydric soil, or wetland hydrology due to normal seasonal or annual variability. Some problematic area wetlands may permanently lack certain indicators due to the nature of the soils or plant species on the site (USACE, 2007).

The surficial geology that contributes to the hydrology of the Southern Area is a complex mix of permeable and non-permeable soils that produces seep areas that are not easily denoted by vegetative changes or topography. The USACE directed the Hatcher Pass Transit project wetland investigators to provide further soil sampling in the seep areas to determine whether they exhibit hydric soils, in which case they should be classified as "problematic wetlands," as defined by the 2007 USACE supplemental manual for Alaska. Based on this direction from the USACE, a substantial amount of additional fieldwork was conducted in the area of the preferred alignment to further differentiate between jurisdictional seeps ("problematic wetlands") and non-jurisdictional seeps.

Approximately 10.77 acres of the Southern JD Area were determined to be seeps that potentially meet the criteria outlined in the 2007 USACE supplemental manual for Alaska for "problematic wetlands" lacking hydrophytic vegetation (Figure 6). If the USACE concurs with DOWL HKM's mapping of these areas, the "problematic wetlands" will be regulated in the same way as traditional wetlands that exhibit all three of the normal wetland characteristics: hydrophytic vegetation, hydric soils, and wetland hydrological indicators.

2.2.3.1.2 Mosaic Wetlands in the Southern Area

Mosaic wetlands are defined in the 2007 USACE supplemental manual for Alaska as a landscape where wetland and non-wetland components are too closely associated to be easily delineated or mapped separately. These areas often have complex microtopography, with repeated small changes in elevation occurring over short distances. Wetland components of a mosaic are often not difficult to identify. The problem for the wetlands delineator is that microtopographic features are too small and intermingled, and there are too many such features per acre, to delineate and map them accurately. Instead, the 2007 USACE supplemental manual for Alaska recommends a sampling approach that estimates the percentage of wetland in the mosaic. From this, the acreage of wetlands on the site can be calculated for purposes of wetland impact assessment and mitigation. For example, if a mosaic area is determined to be 5% wetlands and 95% uplands, the USACE would only require mitigation equivalent to 5% of the overall impact to that area.

Eleven areas contained within the Southern JD Area (totaling approximately 29.48 acres) were found to be primarily uplands, with very small pockets of wetlands (Figure 4-15). There are both traditional (totaling approximately 2.89 acres) and problematic wetlands (totaling approximately 26.59 acres) that are mosaic wetlands. Those areas have been mapped, per the 2007 USACE supplemental manual for Alaska, as Mosaic Wetlands containing various percentages of wetlands (5% to 80% wetlands), and the mitigation requirements will be calculated accordingly.

2.2.3.2 Stream Mapping

To map the large amount of streams in the Southern Area, maps from the WRR, H&H Report, and ABR Report were referenced. Additional field verification was completed and integrated into existing WRR mapping.

Information on the streams' substrate and flows were recorded as well as the possibility of fish presence.

2.2.4 Functions and Services Assessment

Wetland functions are self-sustaining properties of a wetlands ecosystem that exist in the absence of society. Functions result from both biotic and abiotic components of specific wetlands and

include all processes necessary for the self-maintenance of the wetlands ecosystem, such as primary production and nutrient cycling. Functions relate to the ecological significance of wetland properties without regard to subjective human values. Wetland values (now referred to as services) are benefits to society that derive from one or more wetland functions. The value of a particular wetlands function is based on human use or human judgment of the worth, merit, quality, or importance attributed to those functions (USACE, 1999).

The functional importance of wetlands at each site was recorded on data sheets using criteria outlined in the State of Washington Department of Transportation's (WDOT) *Wetland Functions Characterization Tool for Linear Projects* (WDOT, 2000). The relative importance of eleven processes or attributes that encompass hydrological, water quality, ecological, and social functions was evaluated for each wetlands type. Wetland habitats were then ranked into categories of low, medium, and high importance. The rankings were based on comparisons among assessment areas within the Northern and Southern Areas. Additionally, any evidence of animal activity (i.e., animal dens, birds' nest, animal tracks, droppings/scat) was recorded.

For a more thorough explanation of the criteria used to evaluate wetlands for their functions and services, see Appendix C.

2.3 Vegetation Classification

Plant communities were classified using Level III of the Alaska Vegetation Classification System (Viereck et al., 1972), which is a hierarchical system based on dominant growth forms (tree, shrub, or herb), canopy height and closure, general soil moisture and salinity, and dominant plants.

2.4 Habitat Assessment

Classification to the level III of the Viereck system provides the detail necessary to characterize the plant communities for the purpose of assessing the habitat in the Northern and Southern Areas. Determination and classification of habitat types were made based on vegetation classifications, landscape position (e.g., upland, lowland, riparian), plant community structure cohesion, and characteristics that form habitat functional units.

During the field investigation, evidence of animal activity (e.g., animal dens, bird nests, animal tracks, and droppings/scat) and species observed in the field was correlated with the information from the office-based research. Wildlife values that were considered in this assessment include foraging habitats, nesting or denning areas, escape cover from predators, and seasonal food sources.

2.5 Final Mapping

Using ArcMap GIS, a georeferenced aerial photograph from 2007 was used as a base map to digitally map wetlands and vegetation community boundaries and to calculate areas.

It should be noted that when necessary, Cowardin classifications for the Riverine system were inferred for those parts of the streams not directly observed in the field. Changes in flow regime and bottom type do occur as a stream flows through varying soil types and slope; however it would be impossible to delineate such changes without a full survey of each stream from one end of the study areas to the other.

Final mapping was performed at DOWL HKM's Anchorage office based on aerial photograph interpretation, site photographs, and field observations. Nine maps were produced and are appended to this report:

- Wetlands and Uplands by Habitat type (Figures 3a and b),
- Wetlands and Other Waters of the U.S. by Cowardin classification (Figures 4a and b),
- Vegetation types described by the Alaska Vegetation Classification System (Figures 5a and b),
- Problematic Wetlands (Figure 6)
- NWI Wetlands (Figures 7a and b)

3.0 RESULTS

3.1 Study Area Results

The entire PWD study area, that includes the Northern Area, Southern Alignment Study Area, and Southern JD Area, encompasses approximately 1,755 acres. The area being sought for a JD (Northern Area and Southern JD Area) contains approximately 1,604 acres.

Jurisdictional wetland areas comprise approximately 10.09 acres in the Northern Area. In the Southern JD Area jurisdictional wetlands comprise approximately 15.30 acres, of which approximately 10.77 acres are problematic wetlands (i.e., groundwater seeps). Other Waters of the U.S. comprise approximately 3.99 acres (approximately 47,387.98 linear feet) in the Northern Area and approximately 1.5 acres (approximately 21,529.10 linear feet) in the Southern JD Area. Non-jurisdictional uplands comprise approximately 1,335 acres in the Northern Area. The Southern JD Area non-jurisdictional uplands comprise approximately 239.13 acres, of which approximately 18.77 acres are the upland portions of traditional and problematic mosaic wetlands.

Table 1 presents all habitats and their associated acreage and sampling points. Table 1 includes acreages only for the area being sought for a JD, namely the Northern Area and Southern JD Area, however, all sample points within the Northern and Southern Areas are included.

The discussion of the habitat types in Section 3.2 includes information within the Northern Area, Southern Alignment Study Area and the Southern JD Area.

Table 1: Wetlands, Other Waters of the U.S. and Non-Jurisdictional Uplands by Acreage within the Northern Area and Southern Area

Habitat	Acres (Northern Area)	Acres (Southern JD Area)	Associated Sample Points	Associated Photo Points
Wetlands				
Traditional Wetlands				
Forest	-	0.46	231	
Forest (approximately 5% wetlands)	-	*0.14	70	71, 226, 236
Herb Meadow	5.08	-	52, 55, 57, 80	
Sphagnum Bog	-	3.92	13, 14, 68	99
Pond	1.32	-	-	-
Willow Thicket	3.69	-	56, 81, 82	88

Habitat	Acres (Northern Area)	Acres (Southern JD Area)	Associated Sample Points	Associated Photo Points
Problematic Wetlands				
Common Seep	-	0.21	186	185, 189
Mosaic Seep	-	*10.56	114, 117, 125, 137, 140, 192, 215, 221	38, 100, 103, 107, 123, 127, 131, 141, 144, 146, 147, 162, 182, 211, 212, 213, 214, 217, 222, 249
Other Waters of the U.S.				
Intermittent Stream	1.39	-	-	58, 60- 62, 67, 78, 79, 119
Perennial Stream	1.7	0.44	-	63, 65, 66, 101, 104-106, 108, 109, 116, 120-122, 128, 132, 133, 136, 145, 154, 166, 168, 170, 191, 224. 225, 248
Perennial Stream - Anadromous	0.90	1.06	-	26, 39-43, 64, 110-113, 126, 130, 134, 135, 138, 148, 178, 183, 184,
Non-Jurisdictional Upland				
Alder Thicket	367.2	-	72	-
Developed/disturbed	6.56	-	-	-
Dry Tundra	49.61	-	-	-
Forest	4.03	*131.86	15, 70, 73, 129, 153, 157, 179, 188, 190, 209, 210, 227, 235, 237, 239, 240, 241, 246,	37, 71, 102, 115, 142, 143, 149, 150, 152, 164, 167, 171, 176, 187, 193, 194, 196, 201, 208, 218, 220, 223, 228, 230, 234, 238, 242,
Forest Herb Meadow	-	87.40	-	161, 165, 177, 243-245, 247, 250, 251
Herb Meadow	665.4	-	51, 53, 54, 76, 77, 83, 86, 89, 155, 163, 197, 199	59, 84, 85, 87, 118, 151, 174, 203, 206
Seep**	-	18.92	124, 139, 156, 172, 180, 181, 200, 216,	158
Willow Thicket	241.82	-	82	88

***** Acreage is adjusted to account for the mosaic nature of the wetland area. Actual wetlands accounted for approximately 5% of the acreage. Uplands consist of approximately 2.75 acres; this acreage was included in the Forest upland calculation.

****** Acreage is adjusted to account for the mosaic nature of these seeps. The upland portions of these areas are approximately 16.03 acres; this acreage was included in the seep upland calculation. See Table 4 for in-depth accounting of individual polygons of seep habitat.

Southern Area

At lower elevations the Southern Area is dominated by forested habitat with incised watercourses in the areas with shallow slopes. At higher elevations the Southern Area is dominated by steep slopes with highly interspersed areas of herb meadows and shrub thickets. The herb meadows are primarily composed of cow parsnip and various wildflowers, whereas the thickets are a combination of thinleaf alder (*Alnus tenuifolia*), elderberry (*Sambucus racemosa*) and Devil's club (*Oplopanax horridus*). Vegetation in the entire Southern Area is incredibly dense and the understory of herbs and/or shrubs is dense. Only the forested areas with closed mixed canopy had a relatively clear understory. Bear scat and moose droppings were frequently observed in every habitat and game trails were common.

The complexity of the hydrology of the Southern Area is due mostly to the surficial geology and associated soils. According to the 1995 NRCS Soil Survey, the Southern Area contains both 135-Estelle, hilly-Disappoint complex, and 136-Estelle, undulating-Disappoint complex, soil types. The Estelle portions of both soil types are classified as well drained, while the Disappoint is poorly to very poorly drained. Additionally, the textures were similar for both soil types; the Estelle has a silt loam and sandy loam in the upper layers followed by cobble gravel loam, and the Disappoint has a mucky silt loam and cobble silt loam followed by gravelly silt loam and sandy loam. The dynamic nature between the Estelle and Disappoint textures and drainage capacities within even one of the soil types indicates that one area could be a well drained upland while right next to it lays a poorly drained area.

A subsurface investigation of the area found the soils that were encountered varied considerably across the entire Southern Area. The origin of the soils was probably due to glacial runoff. The soils are predominantly sands and gravels with varying amounts of silt. No deep deposits of peat were encountered. The depth and thickness of the various deposits were not consistent nor were these deposits present in every test boring or test pit dug (DOWL HKM, 2003).

The study also found the presence of areas of poorly drained benches and steep slopes. The groundwater elevation was highly variable across the study area. It was also found that areas where the vegetation consists of alders a high water table was also present, which is consistent with the wetlands scientists experience in the field. The subsurface investigation also found that

the water level will tend to fluctuate several feet seasonally, especially during periods of heavy precipitation and spring "breakup." Groundwater will typically flow through the colluviums/alluvium (sand and gravel), on top of the glacial till surface, and along the soil/bedrock interface (DOWL HKM, 2003).

Both studies show that the area contains highly variable soils and hydrology that often belies what would be expected due to the topography.

Northern Area

The Northern Area is dominated by two distinct areas, upper elevation herbaceous meadows and lower elevation slopes covered in alder. Shrub thickets in the Northern Area are composed of dwarf ericaceous shrubs and low willows and are highly interspersed with forbs. The alder areas have some open areas filled with forbs but for the most part the alders are tall with a lower percentage of herb understory. A moose was observed in the alder thickets and numerous game trails and droppings from mountain goats, bear, and moose were encountered.

3.2 Habitat Types

For a full description of all Cowardin and Viereck classifications used, reference Table 2. All wetlands and their respective Cowardin and Viereck codes, and overall rating for functions and services have been cross-referenced in Table 3.

The evaluation of each habitat's function and values are described in Appendix C.

Table 2: Vegetation and Wetland Types Found Within the Northern and Southern Areas

Wetlands Classification (Cowardin)	Description
PEM1C	Palustrine, emergent, persistent, seasonally flooded
PFO1B	Palustrine, forested, broad-leaved deciduous, saturated
PFO4B	Palustrine, forested, needle-leaved evergreen, saturated
PFO1C	Palustrine, forested, broad-leaved deciduous, seasonally flooded
PFO4C	Palustrine, forested, needle-leafed evergreen, seasonally flooded
PSS1B	Palustrine, scrub-shrub, broad-leaved deciduous, saturated
PSS1C	Palustrine, scrub-shrub, broad-leaved deciduous, seasonally flooded
POW	Palustrine, open water
R3UB1	Riverine, upper perennial, unconsolidated bottom, cobble-gravel
R3UB2	Riverine, upper perennial, unconsolidated bottom, sand
R3UB3	Riverine, upper perennial, unconsolidated bottom, mud
R3RB2	Riverine, upper perennial, rock bottom, rubble
R4RB2	Riverine, intermittent, rock bottom, rubble
R4SB1	Riverine, intermittent, streambed, bedrock

Vegetation Classification (Viereck Code)	Description
Bb	Barren
Fbo	Forested, broadleaf, open
Fbc	Forested, broadleaf, closed
Fbw	Forested, broadleaf, woodland
Fmo	Forested, mixed, open
Fmc	Forested, mixed, closed
Fmw	Forested, mixed, woodland
Fnc	Forested, needleleaf, closed
Fno	Forested, needleleaf, open
Fnw	Forested, needleleaf, woodland
Slo	Shrub, low, open
Slc	Shrub, low, closed
Sto	Shrub, tall, open
Stc	Shrub, tall, closed
Sdw	Shrub, dwarf, willow
Hfw	Herbaceous, forb
Hfm	Herbaceous, forb
Hgm	Herbaceous, graminoid, mesic
Hgw	Herbaceous, graminoid, wet
W	Water

Table 3: Wetlands, Other Waters of the U.S. and Non-Jurisdictional Uplands with Cowardin and Viereck Classifications; and Functions/Value

Habitat	Cowardin	Viereck	Functions/Value
Wetlands			
Forest	PEM1C, PFO4B, PFO1/4B	Fbw, Fmw, Fmo, Fnw	Low
Herb Meadow	PEM1C,	Hfw, Hfm, Hgm, Slc	Moderate
Seep	PFO1/4C, PEM1C, PSS1C	Fbo, Fbw, Fmc, Fno, Fnw, Fmo, Hfm, Stc, Sto	Moderate
Sphagnum Bog	PEM1C, PSS1C	Hgw, Sto	High
Pond	POW	W	High
Willow Thicket	PSS/EM1C	Sdw	Moderate
Other Waters of the U.S.			
Intermittent Streams	R4RB2, R4SB1	W	High
Perennial Streams	R3RB2, R3UB1, R3UB2, R3UB3	W	High
Perennial Stream-Anadromous	R3RB2, R3UB1, R3UB2, R3UB3, R4RB2	W	High
Non-Jurisdictional Upland Habitats			
Alder Thicket	Upland	Stc, Hfm	N/A
Developed/Disturbed	Upland	Bb	N/A
Dry Tundra	Upland	Bb	N/A
Forest	Upland	Fbo, Fbc, Fbw, Fmc, Fmo, Fmw, Fnc, Fno, Fnw, Hfm	N/A
Forest Herb Meadow	Upland	Fbo, Hfm	N/A
Herb Meadow	Upland	Hfm, Hgm, Slc, Slo	N/A
Seep	Upland	Fbo, Hfm, Stc	N/A
Willow Thicket	Upland	Hfm, Slc	N/A

3.2.1 Wetlands

Although a total of six wetland habitats representing seven Cowardin classifications were documented in the Northern and Southern Areas, the overall percentage of wetlands in both the areas was small, comprising approximately 1.6% of the total JD study area. Seep is the most common wetlands habitat, comprising approximately 42% of the wetlands area.

3.2.1.1 Herb Meadow Wetlands

Northern Area Only

The herb meadow habitat type is dominated by bluejoint (*Calamagrostis canadensis*), Canadian burnet (*Sanguisorba canadensis*), arctic sweet coltsfoot (*Petasites frigidus*), Enander's sedge (*Carex enanderi*), American false hellebore (*Veratrum viride*), and starry false-Solomon's-seal *(Smilacina stellata*).

Several sample sites for herb meadow habitat were classified by Viereck as being dominated by shrubs, although the shrub layers had a smaller total percentage of cover than the herb layer. Viereck classifications are limiting in describing these herb meadows as they are biased toward shrub layers because the key only allows a description of the area as herb if shrub cover is 25% or less. In many cases, the total cover for shrubs was greater than 30%, yet the overall structure of the community was herb.

The herb meadow habitat type had saturated soils ranging from 0 to 10 inches below ground surface (bgs) and silt, silty loam, silty gravelly sand, or gravelly sand with Munsell colors of 10 YR 3/2 or 7.5 2.5/1 from 6 to 20 inches bgs. Soil could not be sampled from below 9 to 12 in some sample areas because of hard packed rock, gravel, or cobbles. At site 57 there was a hydrogen sulfide smell while taking soils. Wetland hydrology indicators encountered were surface water and saturation.

3.2.1.2 Forest Wetlands

Southern Area Only

The forested wetlands habitat was observed in three areas within the Southern Area. The first area is along the road and is denoted by black spruce and surface water.

The second area is mapped as forested wetlands (PFO4B) by the NWI maps, the extent of wetlands mapped by NWI is slightly smaller than what fieldwork supported however, fieldwork determined that this area is a mosaic of approximately 5% forested/sphagnum bog wetland and 95% forested upland. Sample points 70, 71, and 237 are representative of the upland areas, while point 236 was representative of the wetland areas. For mapping purposes, the entire area is mapped as wetland although most of it was actually upland. Forested wetlands were sampled at point 236 that is dominated by black spruce (*Picea mariana*), bluejoint, and sphagnum. Because of the presence of surface water and sphagnum, hydric soils were assumed. Upland sample points were dominated by black spruce, prickly rose (*Rosa acicularis*), ladyfern (*Athyrium filix-femina*), and bluejoint. The soils encountered at the upland sites consisted of an organic layer 0 to 6 inches bgs and 4 to 20 silty sand with cobbles, dry organic material mixed with silty loam, and silt loam with a Munsell colors of 10YR 4/3, 10YR 5/1, 10YR 4/6. No hydrology was observed at point 70 or 71, but point 237 had some saturation at 20 inches bgs that is out of the 12-inch active zone.

The third area was observed at point 231 and is dominated by alder (*Alnus sp.*), sedge (*Carex sp.*, seed head was not present so it could not be identified to species) and bluejoint. Although the immediate area consisted of tall shrubs, the overall surrounding area was forested; therefore it was included in the forested wetlands habitat. Soils encountered at point 231 consisted of saturated organic material from 0 to 15 inches bgs and 50% saturated organic material, 50% sandy loam from 15 to 20 inches bgs with a Munsell color of Gley 1 4/10Y. There was also a strong hydrogen sulfide smell. The high water table and saturation at the surface indicate wetland hydrology.

3.2.1.3 Willow Thicket Wetlands

Northern Area Only

The willow thicket wetlands habitat is dominated by diamondleaf willow (*Salix planifolia*), Enander's sedge, bluejoint, and Canadian burnet. The soils encountered at point 81 consisted of saturated organic material from 0 to 8 inches bgs and gravelly sand with a Munsell color of 2.5Y 5/2 from 8 to 10 inches bgs; at 10 inches bgs, hard-packed rock was encountered that could not be excavated. Flowing surface water and soil saturation was encountered at site 56, so soils were

not taken; a hydric situation is assumed. Wetland indicators, such as saturation, were present in both sample locations.

Both locations of this wetland were small and sloped. Point 81 was taken in an area between the seepage from a break in the slope and a watercourse. Point 56 was taken at the base of a small bench where water perches out and flows near the surface before becoming two watercourses.

3.2.1.4 Pond

Northern Area Only

Pond habitat is an area consisting of open water with dense vegetation surrounding it. It appears that the some of the ponded areas along the stream may have been made by beavers. The ponded areas are not contained in a channel and are less than 20 acres and have a depth of less than 2 meters at low water.

3.2.1.5 Seeps

Southern Area Only

Seeps are generally areas where shallow groundwater flows within the active layer (0 to 20 inches) and/or breaches the ground surface and pools for extended periods of time. The complexity of shallow soils creates a hydrologic flow that is directed down from the interruption of random pockets of sands and gravels. Conversely, flow is occasionally ponded from encountering pockets of silty materials. It is thought that these areas do not contain hydrophytic vegetation, as subsurface flow remains sufficiently oxygenated to prevent anaerobic conditions from developing.

For the most part, “seep areas” are micro-mosaics of hummocky uplands and saturated silty soils that contain ponded water. In the area where these two landscapes meet, some hydrophytic vegetation will be present; most commonly Sitka burnet and/or Stream violet (*Viola glabella*).

Seeps are specialized habitats and are considered to be problematic wetlands, per the 2007 USACE supplemental manual for Alaska as they lack hydrophytic vegetation. For nearly all areas identified as seeps, hydric soils were present and hydrophytic vegetation was lacking, thus allowing staff to follow procedures outlines in pages 84 through 87.

All seeps have been classified as being seasonally flooded, as surface water is present for extended periods, and when surface water is absent, the water table is often near the land surface.

Nearly all of the seep areas' vegetation is classified as forest, while canopy cover ranges from nearly 100% to just over 5%; the high interspersion of forest cover with the herbaceous and shrub layer prevents mapping it separately.

There are four types of seeps identified in the Southern Area:

- Common Seeps

  These have hydric soils and hydrology and are connected to a traditionally navigable waterway by either being directly adjacent to a stream or assumed groundwater connection. Also these areas do not contain upland areas as is the case with the Mosaic Seeps. Seep Habitats L (sample points 185 and 186) and M (sample point 189).

- Upland Seeps

  These lack both hydrophytic vegetation and hydric soils and are discussed in Section 3.2.3.6.

- Mosaic Seeps

  These are a mixture of both upland and wetland areas that could not be mapped separately because of their interspersion. Most seep areas identified are mosaic to some extent. Seep mosaic areas typically associated with a stream and vary from containing either a high upland (80%) content to low wetland (20%) content versus a high wetland (80%) content to low upland (20%) content. As these areas are a mixture of upland and wetland often the mapping in Figure 4b could not differentiate between upland and wetland therefore the wetland variety was mapped, refer to the point summary table in Appendix B for the actual Cowardin classification of individual sample points with a Seep habitat. Additionally Table 4 indicates the upland to wetland ratio within a specific polygon.

Table 4: Seep Habitat Wetlands to Upland Ratio

Seep Habitat	Seep Habitat Type	Wetland Percentage	Upland Percentage	Southern JD Area		Southern Alignment Study Area	
				Raw Wetland Acreage	Actual Wetland Acreage within Seep	Acreage	Actual Wetland Acreage within Seep
A	Mosaic	80	20	3.47	2.78	0.16	0.13
B	Mosaic	80	20	1.94	1.55	1.27	1.02
C	Mosaic	20	80	-	-	2.72	0.54
D	Mosaic	60	40	0.99	0.59	10.76	6.46
E	Mosaic	50	50	5.34	2.67	0.62	0.31
F	Mosaic	20	80	1.96	0.39	-	-
G	Mosaic	20	80	2.09	0.42	0.77	0.15
H	Mosaic	20	80	9.19	1.84	0.95	0.19
I	Upland	-	100	0.06	0	-	0
J	Mosaic	20	80	1.02	0.20	-	-
K	Mosaic	20	80	0.59	0.12	-	-
L	Common	100	-	0.07	0.07	-	-
M	Common	100	-	0.14	0.14	-	-
N	Upland	-	100	0.33	0	-	0
			Total	**27.19**	**10.77**	**17.25**	**8.80**

The seep mosaic K in the northwest corner of the area, associated with points 191 and 192, displays an area of high upland content with few widely spread out seep areas; while the seep mosaic E centrally located within the JD area, associated with points 131, 216, 217, and 218, displays an area of high seep content interspersed with a lower upland content.

3.2.1.6 Sphagnum Bog

Southern Area Only

Sphagnum bog is dominated by thinleaf alder, marsh cinquefoil (*Potentilla palustris*), bluejoint, water sedge (*Carex aquatilis*), and northern grass-of-parnassus (*Parnassia palustris*). The soils encountered in site 13 consisted of saturated organics from 0 to 10 inches bgs; below 10 inches could not be excavated because the pit was collapsing and filling with water. For site 14, hydric soil is assumed to be present due to the surface water and soil saturation. Wetland hydrology indicators observed at both sites were surface water, high water table, and saturation.

3.2.2 Other Waters of the United States

Habitats identified in this report as Other Waters of the U.S. are flowing water bodies per Code of Federal Regulations 33 CFR Part 328 Definition of Waters of the U.S. Habitats within this section have a Cowardin classification of a riverine system that includes all wetlands and deepwater habitats contained within a channel with two exceptions: wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens; and habitats with water containing ocean derived salts in excess of 0.5% (Cowardin, et al., 1979). In the Viereck classification system, all streams are considered to be open water.

Riverine habitats were not assessed by a method designated for wetlands and are assumed to provide an inherently high function and service within the Northern and Southern Areas. Although the location of streams described in this section were mapped based on field data and GIS data interpolation (explained in Section 2.1.2.2), the ADF&G anadromous streams dataset, ABR Report, and H&H Report were consulted to classify streams for an accurate assessment of streams for their habitat type. A more thorough discussion of this comparison is in Section 4.1.

3.2.2.1 Intermittent Streams

Northern Area Only

Intermittent streams are channels that contain flowing water for only part of the year. When the water is not flowing, it may remain in isolated pools or surface water may be absent (Cowardin, et al., 1979).

3.2.2.2 Perennial Streams

Perennial streams are channels with water flowing throughout the year with a low to high gradient and a slow to fast flow velocity. The substrate varies but consists of sand, mud, gravel, cobbles, or rock.

Southern Area

All streams in the Southern Area have been classified as perennial. Although some streams are quite small with minor flows, their main source of water is by snowmelt and groundwater flow, the latter of which appears to remain fairly consistent throughout the summer. An intermittent stream tends to be dependent on seasonal flows or large storm events.

Although there are several upper reaches of perennial streams that disappear in the middle of their channels and then reappear downstream. These streams are still classified as perennial as their flow is consistent; as they may flow just under their streambeds for varying lengths (i.e., site 154). All perennial streams are those identified as not providing fish habitat, either because of gaps between channels or sections of underground water flow.

Northern Area

All perennial streams segments identified in the Northern Area do not provide fish habitat, because of barriers to fish passage already in place.

3.2.2.3 Perennial Streams - Anadromous

Northern Area and Southern Area

Perennial streams - anadromous have been identified by ADF&G, the ABR Report, or fieldwork as being anadromous because they contain anadromous fish that use the stream for spawning and/or rearing. Their only difference from perennial streams is that they are used for anadromous fish spawning and/or rearing. In both the Northern and Southern Areas sometimes only portions of streams were considered anadromous because an obstruction prevented further fish passage upstream.

3.2.3 Non-Jurisdictional Uplands

Upland areas comprise approximately 98% of the JD study area. Eight upland habitats were documented in the Northern and Southern Areas. Herb Meadow is the most common upland type, comprising 43% of the uplands in the JD study area.

Additionally, developed/disturbed areas and trails were classified as uplands, but do not provide true habitat. Areas identified as “trails,” were approximately 15 feet wide and were created and are maintained for Nordic skiing. Although soils are undisturbed, all vegetation has been cleared and the areas are bare, with the exception of small forbs and non-native grasses. For this reason, these two developed/disturbed areas are not discussed.

3.2.3.1 Herb Meadow

Northern Area Only

Herb meadow is dominated by fireweed (*Epilobium angustifolium*), spreading woodfern (*Dryopteris dilatata*), oak fern (*Gymnocarpum dryopteris*), Sitka valerian (*Valeriana sitchensis*), field horsetail (*Equisetum arvense*), subarctic ladyfern (*Athyrium felix-femina*), western bellheather (*Cassiope mertensiana*), Canadian burnet, Alaska bellheather (*Cassiope stelleriana*), bluejoint, and least willow (*Salix rotundifolia*).

Soils encountered at sites within this habitat consisted of rootwad or organic material ranging from 0 to 5 inches bgs and sandy loam or gravelly sand with a Munsell color of 10 YR 3/3, 10 YR 3/4, 10 YR 3/2, or 7.5 YR 2.5/1 from 4 to 18 inches bgs. Site 76 was a silty loam with a Munsell color of 2.5Y 3/2 from 6 to 20 inches bgs. The rest of the sites hit cobbles or hard packed rock ranging from 8 to 12 inches bgs.

3.2.3.2 Forest

Southern Area Only

Forest is dominated by paper birch (*Betula papyrifera*), European red alder, thinleaf alder, alder, black spruce, white spruce (*Picea glauca*), woodland horsetail, oak fern, mountain woodfern, Canada bunchberry (*Cornus canadensis*), bluejoint, fireweed, and Devil's club.

Soils encountered at sites consisted of rootwad or organic material ranging from 0 to 6 inches bgs and a silty loam or sandy silt loam with a Munsell color of 7.5YR 3/1, 10 YR 3/4, 10 YR 3/3, 5Y 4/2, 10 YR 4/4, 10 YR 3/2, 10YR 4/2, or from 5 to 20 inches bgs. At site 246, boulders and rocks were hit at 14 bgs preventing further excavation.

Site 129 soils consisted of dry organic material from 0 to 3 inches bgs and silty loam with Munsell color of 60% 2.5Y 5/1 with 40% 10YR 4/6 from 3 to 6 inches bgs; however, the general grey and red contrast is within the soil itself, so less than 10% of the red is accounted for by the pore linings. From 6 to 20 inches bgs, Munsell color is 25% 2.5Y 5/1 with 74% 10YR 4/6. No hydrologic indicators and non-hydrophytic vegetation were present.

Site 227 contained saturation at 3 inches bgs; however, the pit was dug in a low area and also contained tightly woven cobbles at 11 inches bgs that impeded thick dark surface confirmation,

but suggests a well-drained soil that would not produce hydric soils. Vegetation at site 227 was strongly non-hydrophytic. Considering the landscape position, soil components and vegetation site 227 was determined to be upland. No other sites contained wetland hydrology indicators within the forest habitat.

3.2.3.3 Forest Herb Meadow

Southern Area Only

The interspersion of the forest habitat and herb meadow habitat is so high in areas that they area mapped as a joint habitat. This is an artifact of mapping at a scale that prevents the distinction of areas that are largely herb meadow, but have islands of trees contained within them. For sample points in such areas, the table in Appendix B will indicate whether the sample point is actually a forest or herb meadow area. Forest habitat within the Southern Area was described above; below is the description of herb meadow habitat in the Southern Area.

Herb meadow habitat within this regime is dominated by fireweed, subarctic ladyfern, bluejoint, and field horsetail. Soils consist of dry organic material from 0 to 4 inches bgs, ashy silty sand, sandy clay loam with ash layer mixed with organic material, sandy clay loam with Munsell color of 5Y 5/1, 2.5Y 3/3, 10YR 3/3 from 2 to 5 inches bgs followed by dry organics, sandy loam, sandy silt loam with Munsell color of 5YR 2.5/2, 10YR 4/4, 10YR 3/6, 10YR 4/4 from 4 to 20 inches bgs. Cobbles were encountered at site 197 from 9.5 to 20 inches bgs that had the organics in the 5 to 9.5 inches bgs layer. No wetland hydrology indicators were observed.

3.2.3.4 Willow Thicket

Northern Area Only

Willow thicket is dominated by diamondleaf willow or grayleaf willow (*Salix glauca*), Canada bunchberry, Canada burnet, black crowberry (*Empetrum nigrum*), bog blueberry (*Vaccinium uliginosum*), American false hellebore, bluejoint, and fireweed. Willow thickets are dominant in the transition area between alpine tundra and alder thicket.

Soils encountered at sites consisted of rootwad ranging from 0 to 4 inches bgs with a silty loam from 2 to 20 inches bgs with a Munsell color of 2.5 YR 5/1 or 10 YR 3/2. No wetland hydrology

indicators were observed in the scrub shrub habitat. In site 30, some surface water was observed but area vegetation was upland.

3.2.3.5 Alder Thicket

Northern Area Only

A large portion of the Northern Area is composed of the alder thicket habitat that occurred mostly on moderately sloped non-forested areas. It was sampled at point 72 and aside from alder; the understory was Devil's club and subarctic ladyfern. Alder thicket soils were underlain at a relatively shallow depth by cobbles.

3.2.3.6 Seeps Uplands

Seeps are generally areas where shallow groundwater flows below 12 inches bgs and/or may breaches the ground surface and pool for extended periods of time. The complexity of shallow soils creates a hydrologic flow that is directed down from the interruption of random pockets of sands and gravels. Conversely, flow is occasionally ponded from encountering pockets of silty materials. These areas lack hydrophytic vegetation. Upland seeps also lack hydric soil that is the defining characteristic between a wetland seep and an upland seep. An example of this was observed in seep N (sites 156 and 158).

3.2.3.7 Dry Tundra

Northern Area Only

Dry tundra is characterized by steep inaccessible areas within the alpine bowl at higher elevations. These areas are bare of any vegetation, with the exception of small patches, that are assumed to be Dryas species.

4.0 DISCUSSION

4.1 Comparisons with Previous Mapping

NWI Mapping

Areas mapped as wetlands by NWI are generally consistent with mapping and observations contained in this report. The small wetlands identified by sites 13 and 14 are mapped by NWI as PSS1/4B and are mapped in this report as two separate polygons (PSS1C and PEM1C). Additionally, NWI mapped this wetland area to be somewhat larger to the south than the wetland boundaries contained in this report; however, fieldwork extended the wetland area to the east.

Other areas mapped as wetlands by NWI are in the very southern portion of the Southern Area and are identified at sites 68, 70, 71, and 236. These were mapped as "freshwater forested/shrub wetlands" by the NWI maps; however, the extent of wetlands mapped by NWI is larger than what fieldwork supported. The area described by site 68 is mapped by NWI as PSS1B, and it is mapped in this report as PSS1C and was decreased in size. The area described by sites 70, 71, and 236 is mapped by NWI and this report as PFO4B; however, fieldwork showed that this area consisted of a largely upland area with a small portion of wetlands interspersed within it. Because of the small portions of interspersions throughout the area, it was mapped as PFO4B although it is actually a mosaic of approximately 95% uplands and 5% wetlands.

NWI mapped only one area as wetlands (PUBH) in the Northern Area. The NWI wetland is located near site 85 that was mapped by DOWL HKM as POW. Although site 85 is showing the thick herb meadow common to the area, the pond can be seen in the picture. Its presence on the NWI map suggests that perhaps this pond is permanent rather than beaver-caused as indicated by field observations.

Overall, the differences in boundaries and Cowardin classifications of wetlands mapped by NWI and DOWL HKM can be attributed to the lack of ground truthing by NWI to support their determinations.

Previous Stream Mapping

The final mapping in this report differs from stream locations identified by ADF&G. ADF&G does not identify any anadromous streams within the Northern Area.

Since both the ADF&G and MSB data is generated at a small scale, the purpose of both datasets is to give general visual reference to the attributes of particular water bodies and not to precisely map the locations of these streams. Therefore, the precision of these stream locations is coarser than streams mapped in this report. However, the larger streams identified in this report can be inferred to be anadromous based on proximity to streams mapped by ADF&G.

Although the ADF&G and USFWS maps describe the general extent of fish usage, ABR and DOWL HKM studied various streams in both areas to confirm presence and the extent of fish within the streams. For several streams, only certain stream segments were considered anadromous because an obstruction prevented further fish passage upstream. Entire streams were designated anadromous if ABR caught an anadromous fish, even if they were unable to sample the entire stream, or until they encountered a fish passage barrier.

4.2 Effects of Precipitation

Hatcher Pass was less saturated than usual according to precipitation records that were reviewed for each date of fieldwork performed. Data collected from a weather station located approximately 6 miles southeast of Hatcher Pass, reported that 0.44 inches fell as of July 21 and 3.3 inches as of August 26. The average rainfall for July is 2.06 inches and 2.29 inches for August. For precipitation information regarding fieldwork accomplished during 2008, please refer to the WRR.

Additionally, during fieldwork it did not rain, with the exception of two days in August, and there was very little rain preceding fieldwork days. This, in combination with the below average precipitation, may have affected the characteristics of the area's drainage system, including the lack of continuously flowing above ground stream segments within the Southern Area that otherwise would have been continuously flowing above ground. Trail segments that conducted water were marked as Waters of the U.S. as channelization appeared to be the result of water and not from single-track bicycles or foot traffic. While this distinction is hard to produce, other evidence from the surrounding area was used to make this decision.

4.3 Jurisdictional Analysis

All wetlands identified in this report have a clear and direct surface water or groundwater connection to the Little Susitna River a Traditionally Navigable Waters as defined by the USACE. DOWL HKM expects that these are jurisdictional wetlands and no "significant nexus analysis" is necessary.

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