



United States Department of the Interior

NATIONAL PARK SERVICE
423 Forest Resources Building
University Park, PA 16802

February 2018

Memorandum

To: Kevin Doniere, Landscape Architect, Alaska Regional Office
From: Peter Sharpe Ph.D., PWS, Hydrologist, Northeast Region
Subject: Wetland Delineation Report for Travel, Ghiglione Bridge Replacement, Denali National Park & Preserve

Report Summary

The objective of this investigation was to respond to a request for regional assistance for a comprehensive delineation of wetland habitats subject to jurisdiction under Section 404 of the Clean Water Act and all wetlands subject to National Park Service (NPS) procedures for implementing *Director's Order #77-1: Wetland Protection* within the proposed Ghiglione Bridge replacement site within Denali National Park & Preserve (DNA) lands. This work utilized the U.S Army Corps of Engineers (USACE) Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Alaska Region Version 2.0 (September 2007) as the primary methodology for making wetland determinations in the field and was conducted during non-growing season conditions. A total of two palustrine wetlands encompassing 0.05 acres and one riverine wetland (stream) totaling 0.12 acres were identified and delineated from 27 -28 September 2017 within the 5.07 acre Ghiglione Bridge study area (Fig. 1). The observed palustrine wetland habitats were classified as palustrine, scrub-shrub, broad leaved deciduous, seasonally flooded/saturated (PSS1E) habitats that exhibited soil saturation within the upper part of the soil profile (0-12 inches) at the time of the investigation. All of the identified and mapped wetland systems meet the U.S. Army Corps of Engineers criteria and the Cowardin et al. (1979) definitions of wetland and waterway habitats. The location and extent of an unnamed tributary to the East Fork Toklat River was verified and top of bank points were collected during this investigation to more accurately depict its morphology within the study area. Basic field assessments of its potential flow regime were made and this waterway was classified as a riverine, intermittent, stream bed system (R4SB). The field team noted a riparian (non-wetland gap) between the active channel and Wetlands 1 and 2. A 2-inch soil auger was used in the field to make observations of non-hydric conditions within this depositional area of the floodplain to verify drier riparian conditions on the smaller berms between the channel (R4SB habitat) and the observed palustrine wetlands. A digital copy of this report and associated spatial data can be found on the NPS IRMA site: <https://irma.nps.gov/DataStore/Reference/Profile/2250290>.

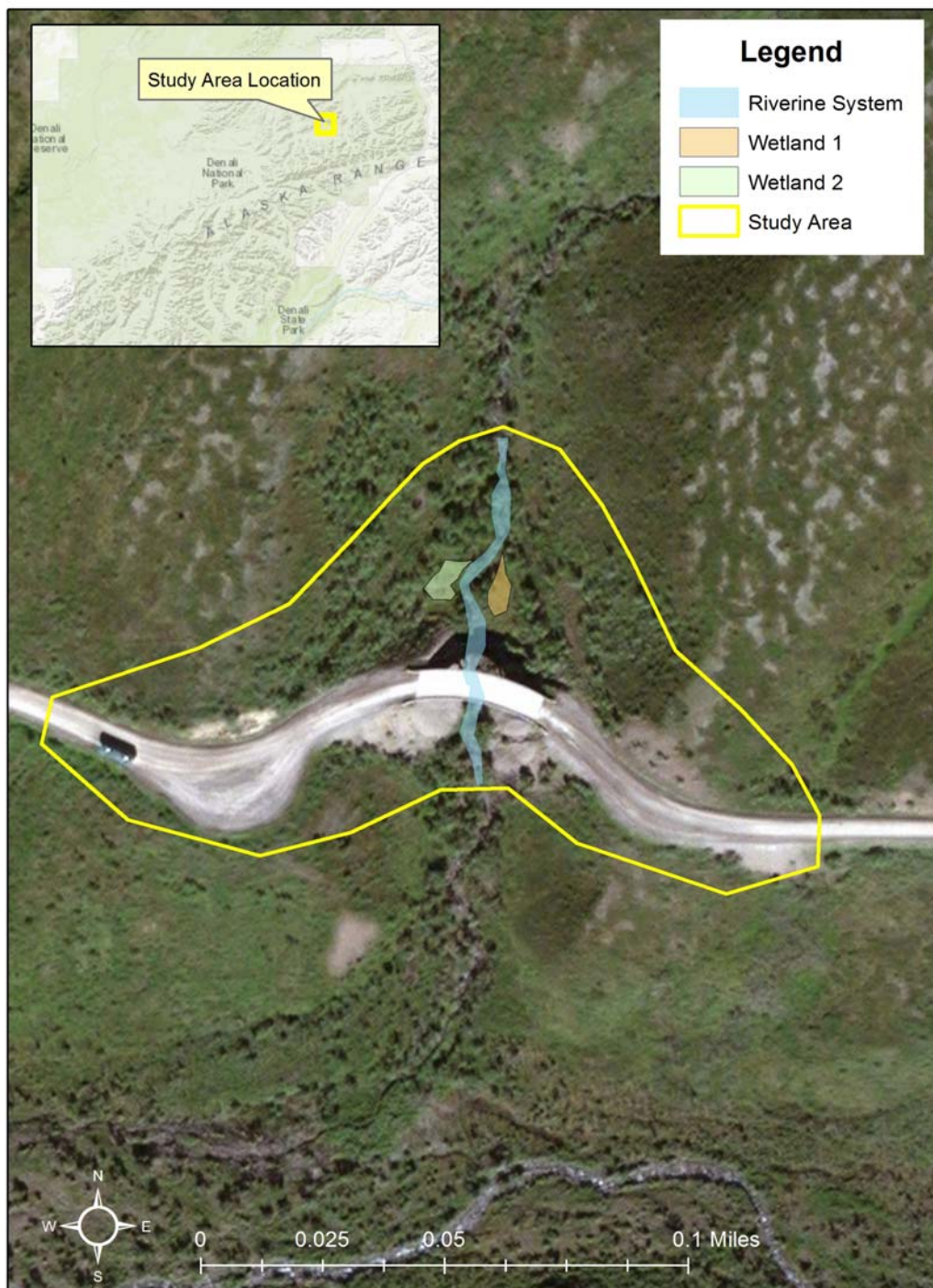


Figure 1. DENA, Ghiglione Bridge Replacement study area map and palustrine/riverine wetland features map overview.

Study Objectives

The purpose of this investigation was to provide detailed wetland/aquatic resource identification and boundary information in support of the Ghiglione Bridge Replacement project within DENA (see Fig. 1). A second objective of this effort was to provide NPS staff from the Alaska Region with a real world wetland delineation field experience as part of an NPS-Water Resources Division wetland delineation training course. The information obtained from this effort may be utilized for park compliance purposes if they proceed with plans to rehabilitate/replace the Ghiglione Bridge located along Denali National Park Road.



Photograph 1. Photo looking south at the mapped riverine wetland feature and a pair of the existing bridge supports of the Ghiglione Bridge at DENA. September 2017

Field Participants

Dr. Peter J. Sharpe, NPS (Delineation Course Instructor)
Buck Mangipane, NPS
Kevin Doniere, NPS
James Walton, NPS
Sarah Stehn, NPS
Jami Belt, NPS

Paul Burger, NPS
Wendy Mahovlic, NPS
Linda Hasselbach, NPS

Introduction

It is the mission of the National Park Service to preserve and maintain the natural and cultural resources of Denali National Park & Preserve and to interpret those same resources to the visiting public and the scientific and scholarly community. Following a traverse of the 5.07 ac study area, wetlands and associated aquatic resources were delineated in the field by the NPS staff listed within this report and located using a GPS system capable of obtaining sub-meter accurate readings (Trimble Geo 7X) for purposes of accurately mapping these aquatic resources. The information contained here-in can be used for external (Section 404 Clean Water Act, and NEPA Compliance), as well as, internal D.O. #77.1 wetlands protection compliance in support of the proposed Ghiglione Bridge replacement project.

The NPS through Director's Order #77-1 requires mapping of wetlands and all other "waters of the United States" via a slightly different criteria than the USACE 1987 manual and associated regional supplements, thus the two types of wetland determination methods employed at DENA were: (1) the Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual Alaska Region (Version 2.0) and (2) the 1979 USFWS *Classification of Wetlands and Deepwater Habitats of the United States*.

The NPS recognizes that most wetlands on NPS lands will have all three parameters required by the 1987 Corps Manual and its associated regional supplement. Therefore, D.O. #77-1 provides procedures for field biologists to follow so that that wetland delineation and mapping projects on NPS lands will satisfy both the Clean Water Act wetland definition (1987 Corps Manual) and the NPS standard for identifying wetlands (Cowardin et al. 1979), for brevity, only the standard applicable for DENA is described below for a more detailed treatment of the other standards the reader is directed to D.O #77-1:

1. For sites with vegetation and soils, use the most recent version (and any approved Regional supplements) of the 1987 Corps Manual, including "problem area" and "atypical situation" procedures (this procedure was utilized at DENA)

Interim Regional Supplement USACE Method (1987 Corps Manual) (Routine Onsite Determination, 3-Parameter Approach)

The USACE method for identifying the wetland / upland boundary uses the definition as outlined in the U.S. Army Corps of Engineers *Wetlands Delineation Manual, 1987*, which defines a wetland as:

"Those areas that are inundated or saturated by surface or ground water 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. Wetlands generally include swamps, marshes, bogs, and similar areas."

Wetland boundaries were primarily determined by establishing a series of transects from a known wetland into known upland locations surrounding the area under examination. At suspected boundary locations along the transect investigators looked for evidence of hydric soils, hydrophytic vegetation, and wetland hydrology. The wetland/upland boundary line was thus delineated and any obvious topographic changes (e.g. abrupt toe-of-slope line) along the wetland/upland perimeter that might occur.

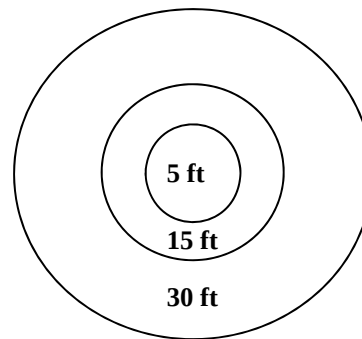


Figure 2. Typical wetland vegetation survey plot utilized within the Ghiglione Bridge site.

Parameter 1- Hydrophytic Vegetation Criteria

For determining the presence of hydrophytic vegetation, plant species within each community were visually identified by strata (e.g. trees, saplings/shrubs, herbs/bryophytes and woody vines) and listed in descending order of dominance. The USACE defined sampling stratum has 5 percent or more total plant cover. If a stratum had less than 5 percent cover during the growing season, then those species and their cover values were recorded on the data form, assuming application of Indicator 2 (Prevalence Test) was necessary. However, these species were not generally included on the data sheets if the wetland determination could be made via Indicator 1 (Dominance Test). For Indicator 1 only those species that comprised 5% or more of a given strata were assessed (See Alaska Region (September 2007)).

Vegetation survey plots conformed to current USACE supplement guidelines and involved the use of a series of nested circular plots radiating outward from the soil/hydrology test pit (Fig. 2). Plot sizes were as follows:

1. Tree stratum – 30 ft (9.1 m) radius
2. Woody vines (if present) – 30 ft (9.1 m) radius
3. Herb/Bryophytes stratum – 5 ft (1.5 m) radius
4. Sapling/shrub stratum – 15 ft (4.6 m) radius

The wetland indicator status of observed dominant plant species was determined using the 2016 National Wetland Plant List for the State of Alaska:

- **OBL** (Obligate Wetland Plants) occur greater than 99 percent of the time in wetlands under natural conditions.
- **FACW** (Facultative Wetland Plants) occur between 67 and 99 percent of the time in wetlands under natural conditions.
- **FAC** (Facultative Plants) occur between 33 and 67 percent of the time in wetlands under

natural conditions.

- **FACU** (Facultative Upland Plants) occur between 1 and 33 percent of the time in wetlands under natural conditions.
- **UPL** (Obligate Upland Plants) occur less than 1 percent of the time in wetlands under natural conditions.

Plant species dominance was determined as the most abundant species that individually or collectively accounted for more than 50 percent of the total absolute coverage of vegetation in the stratum, plus any other species that, by itself, accounts for at least 20 percent of the total (i.e. the 50/20 Rule).

The Alaska regional supplement to the original 1987 USACE manual identifies 3 primary indicators of hydrophytic vegetation, any of which, when met, signifies that the community indicates a wetland plant community. For purposes of brevity this section will only cover the most commonly encountered indicator at DENA (e.g. Indicator 1). For a complete description of all of the indicators the reader is directed to view the U.S Army Corps of Engineers (USACE) Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Alaska Region (Version 2.0), September 2007.

For a plant community to meet the vegetation criteria under Indicator 1 (a commonly employed indicator at DENA) more than 50 percent of the dominant plant species across all strata must be rated OBL, FACW, or FAC.

Parameter 2 - Hydrology Criteria

Wetland hydrology indicators provide evidence that episodes of inundation or soil saturation lasting more than a few days during the growing season have occurred repeatedly over a period of years and that the timing, duration, and frequency of wet conditions have been sufficient to produce a characteristic wetland plant community and hydric soil morphology. As stated in the Alaska Regional Supplement (Version 2.0) the growing season begins when two or more non-evergreen vascular plant species growing within the study area exhibit one or more of the following biological indicators:

1. Emergence of herbaceous plants from the ground
2. Appearance of new growth from vegetative crowns (e.g., in graminoids, bulbs, and corms)
3. Coleoptile/cotyledon emergence from seed
4. Bud burst on woody plants (i.e., some green foliage is visible between
5. spreading bud scales)
6. Emergence or elongation of leaves of woody plants
7. Emergence or opening of flowers

A general estimate of growing season conditions can also be determined based on a determination of survey dates taken from the ecoregions of interest in Alaska and comparing that against the median annual values reported for that specific ecoregion (see Figure 20 and Table 5 of the Alaska Regional Supplement, version 2.0).

Hydrologic indicators of wetland conditions are based on the direct observation of surface water or groundwater during a site visit (Group A indicators), evidence that the site is subject to flooding or ponding, although the inundation need not be directly observed at the time of the investigation (Group B indicators). The inundation (Group B) indicators include water marks, drift deposits, sediment deposits, and similar features. Other hydrologic indicators consist of evidence that the soil is saturated currently or was saturated recently such as oxidized rhizospheres and the presence of reduced iron or sulfur in the soil profile (Group C indicators), which indicate that the soil has been saturated for an extended period. The final group of hydrologic indicators (Group D) consists of landscape, vegetation, soil features, and evidence from other sources of data that indicate contemporary rather than historical wet conditions. Wetland hydrology indicators are intended as one-time observations of site conditions that are sufficient evidence of wetland hydrology in areas where hydric soils and hydrophytic vegetation are present. For a site to meet the wetland hydrologic criteria it need only possess one primary indicator or two secondary indicators from one of the aforementioned groups.

Parameter 3 - Hydric Soil Criteria

The National Technical Committee for Hydric Soils defines a hydric soil as a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (USDA Soil Conservation Service 1994). One of the most significant changes to the original 1987 USACE manual with regards to wetland boundary determinations is in the area of hydric soil recognition and characterization. The Alaska regional supplement still requires low chroma color soils and the presence of redoximorphic features, however, the revised indicators are much more specific and cover a broader range of potential wetland types than the original 1987 manual criteria.

Soil pits were excavated to a maximum depth of 21 inches (45.72 cm) using a sharp shooter shovel, unless on-site conditions such as shallow bedrock or buried alluvial cobbles prohibited excavation or one or more of the hydric soil indicators were met. The data sheets for each mapped wetland include information on the soil profile colors, presence/absence of redoximorphic features, texture, and presence/absence of any shallow confining layers and their depths on-site. A 2-inch diameter Dutch auger was utilized to make soil determinations along the wetland boundaries along with the vegetation and hydrology assessments.

GPS Survey of Wetland Boundaries

Pink wetland delineation flags were marked with a unique alpha numeric code and hung at regular intervals around the perimeter of each identified wetland habitat and located using a sub-meter accurate GPS system. Representative wetland test pits were also similarly flagged and located. GPS-based coordinates were collected for wetland test pit and boundary flags between 27-28 September 2017, using a Trimble Geo7X receiver with an external Hurricane antenna in the WGS 1984 datum, in meter coordinate. A minimum of 4 satellite vehicles were tracked and where possible a maximum Position Dilution of Precision (PDOP) of 6 was maintained for each set and a minimum of 50 positions were taken at each point feature. The data were post-processed and differentially corrected using Pathfinder Office 5.85 and base data were downloaded from the CORS, GRNX_AKDA_AK2004 (GRNX), ALASKA (ITRF00 (1997)-derived from IGS08 site. The corrected data were then exported to shapefile format for polygon creation in ARCMAP 10.5. Following this procedure over 90% of our collected GPS data has accuracies ranging from 0 – 1.0 ft, using the above standards. No tests were done to confirm the X/Y direction accuracy during this investigation. Table 1 below shows a more complete breakdown the GPS data's horizontal precision.

Table 1. Estimated accuracies for the 3099 corrected GPS positions for the Ghiglione Bridge Rehabilitation project

Horizontal Precision	Percentage of GPS Positions within Range
0 - 2 in	0%
2 - 6 in	64.76%
6 - 12 in	26.88%
12 - 20 in	8.20%
20 - 40 in	0.16%
40 - 79 in	0%
79- 197 in	0%

Wetland Descriptions

Wetland 1 (Size – 0.02 ac): This wetland ecosystem lies within the eastern floodplain of the mapped riverine (waterway) system which flows beneath the Ghiglione Bridge on its southwesterly path to the East Fork of the Toklat River. Site soils were extremely stony and appeared to be generally consistent with the USDA soil survey mapping data which listed this area as having Alpine Lower Mountain Slopes and Fans with Discontinuous Permafrost (7V1). The sites overall plant community also generally conformed to the Boggs et al. (2001) vegetation classification of the Low Shrub-Sedge Landcover Class. Within the Cowardin et al. (1979) classification scheme this wetland is considered characteristic of a scrub-shrub, broad leaved deciduous, seasonally flooded/saturated (PSS1E) habitat. Groundwater within the upper 12 inches of the wetland test pit was observed and appeared from field observations to be comprised of subsurface stream flow from the adjacent riverine feature. Wetland soils were low value/chroma (10YR 2/1) but problematic and determined to be indicative of low organic-carbon content based on the USACE Alaska Regional Supplement protocol. Given the

proximity of this site to the adjacent riverine system (Photo 2), as well as, it's topographic position within the landscape this wetland likely receives the bulk of its hydrology from a combination of flooding, subsurface water exchanges from the adjacent waterway, and some groundwater interception from the adjacent hill side. The dominant plant species observed within the wetland at the time of the investigation were *Salix alaxensis*, *Salix barclayi*, and *Equisetum arvense*.



Photograph 2 – Wetland 1 (PSS1E) view facing north. Photo September 2017 – P. Sharpe.

Wetland 1 Functions and Values

A qualitative function and value analysis utilizing the US Army Corps of Engineers – New England District (*The Highway Methodology Workbook Supplement*, September 1999) was conducted. This supplement is very similar to the Alaska Army Corps of Engineers qualitative function and value methodology and was preferred by NPS staff during this assessment as it included all of the Alaska F/V categories along with some additional indicators. Assessed principal function and values associated with Wetland 1 included groundwater discharge, floodflow alteration, sediment toxicant/ retention, nutrient removal, shoreline stabilization, production export, wildlife habitat, recreation (e.g. bird watching) and educational/scientific value.

Wetland 2 (Size – 0.03 ac): Wetland 2 was almost the mirror image of wetland 1 in terms of size, plant community, and geomorphic position. As shown on Fig.1 this site lies within the western floodplain of the mapped riverine tributary to the East Fork of the Toklat River. Wetland 2 soils were less stony compared to wetland 1 with textures ranging from sandy loams to sandy clay at deeper depths (6-16 inches). Like wetland 1 - the sites overall plant community also generally conformed to the Boggs et al. (2001) vegetation classification of the Low Shrub-Sedge Landcover Class and shared the same Cowardin et al. (1979) class (PSS1E). Saturation and a high groundwater table were also observed within the wetland test pit, however, it appeared that the source of water was primarily from groundwater sources rather shallow sub-surface flows from the adjacent riverine system as in wetland 1. Soils within the 6-16 inch layer were gleyed (GLEY 1 3/N) but deemed problematic due to low organic-carbon content based on the USACE Alaska Regional Supplement protocol. The dominant plant species observed within the wetland at the time of the investigation were *Salix alaxensis*, *Salix barclayi*, and *Equisetum scirpoides*.



Photograph 3 – Wetland 2 (PSS1E) view is northeast looking at the wetland and its primary survey team. Photo Date September 2017 – P. Sharpe.

Wetland 2 Functions and Values

Wetland 2 function and values included groundwater discharge, floodflow alteration, sediment/toxicant retention, production export, and wildlife habitat. The field data sheets attached under separate cover to this report includes several specific rationale references along with the group assessment by the field participants regarding which of those rationale references constituted the principle function or value.

Riverine Wetland (Size – 0.12 ac):

Riverine wetlands as defined in Cowardin et al. (1979) includes all wetlands and deepwater habitats contained within a channel unless that wetland is dominated by trees, shrubs, or persistent emergents, emergent mosses, or lichens or is contained within water possessing ocean derived salts in excess of 0.50 ppt. Cowardin et al. (1979) further defines the definition of a channel as “an open conduit either naturally or artificially created which periodically or continuously contains moving water, or which forms a connecting link between two bodies of standing water. “The mapped riverine feature within the Ghiglione Bridge study area was an unnamed tributary to the East Fork Toklat River.

This feature exhibited characteristics of a riverine, intermittent, stream bed system (R4SB). The flow regime of the waterway was determined based off of the presence of a defined bed and banks, natural channel substrates, and the lack of two or more obligate aquatic taxa at the time of our survey. Additional support for an intermittent stream flow determination came from NWI data which also listed this system as intermittent. The waterway is a first order stream originating approximately 0.93 miles north of the project area. This aquatic feature displays evidence of a high gradient system with substrates primarily comprised of cobble, gravels, and smaller boulders. This waterway appears to be generally stable with little or no signs of incision or anthropogenically driven erosion except within the vicinity of the existing bridge where it appeared as if periodic depositions of bridge embankment fill materials erode into the floodplain and stream system (see Photos 1 and 3).



Photograph 3 (P3) – Unnamed tributary to the East Fork Toklat River (R4SB) view is north looking upstream at the system and its riparian zones September 2017 – P. Sharpe.

Riverine System Functions and Values

As this system is intermittent in flow regime status it appeared to our team to possess very little wildlife habitat (aquatic) function and value apart from perhaps providing a seasonal breeding or resting/escape cover component. The stability of the system and its relatively undisturbed connectivity to the wetland systems on either bank promote moderate floodflow alteration and sediment/shoreline stabilization functions. The site is also a likely seasonal conduit of organic materials to the East Fork Toklat River.

Recommendations

If the proposed Ghiglione Bridge project were to proceed then the findings of this report including the associated wetland spatial data collected in the field could be used for D.O. #77.1 and Section 404 Clean Water Act compliance purposes. Dr. Kevin Noon (NPS-WRD), Paul Burger (Alaska Region), and Joel Wagner (NPS-WRD), or myself could your principal point of contacts for guidance related to the development of a formal wetland and floodplain statement of findings should the proposed project proceed and it is determined that permanent or temporary wetland impacts should arise as a result of the project.

However, given the size of the palustrine and riverine systems within the proposed study area Alaska Regional staff are advised to consult with Kevin Noon or Joel Wagner upon an analysis of the potential impacts as these are likely to be below the NPS and USACE de minimus value of 0.1 acre. This may reduce the compliance needs and any subsequent restoration requirements of the project under D.O.#77.1 and Section 404 Clean Water Act guidelines.

If you have any questions regarding this report please call Peter Sharpe at (267) 858-1001. Wetland data forms and Function and Value sheets and the supporting GIS data will be provided to DENA and Kevin Doniere (NPS - Alaska Regional Office) under separate cover.

cc: (by e-mail only)

DENA - Dave Schirokauer

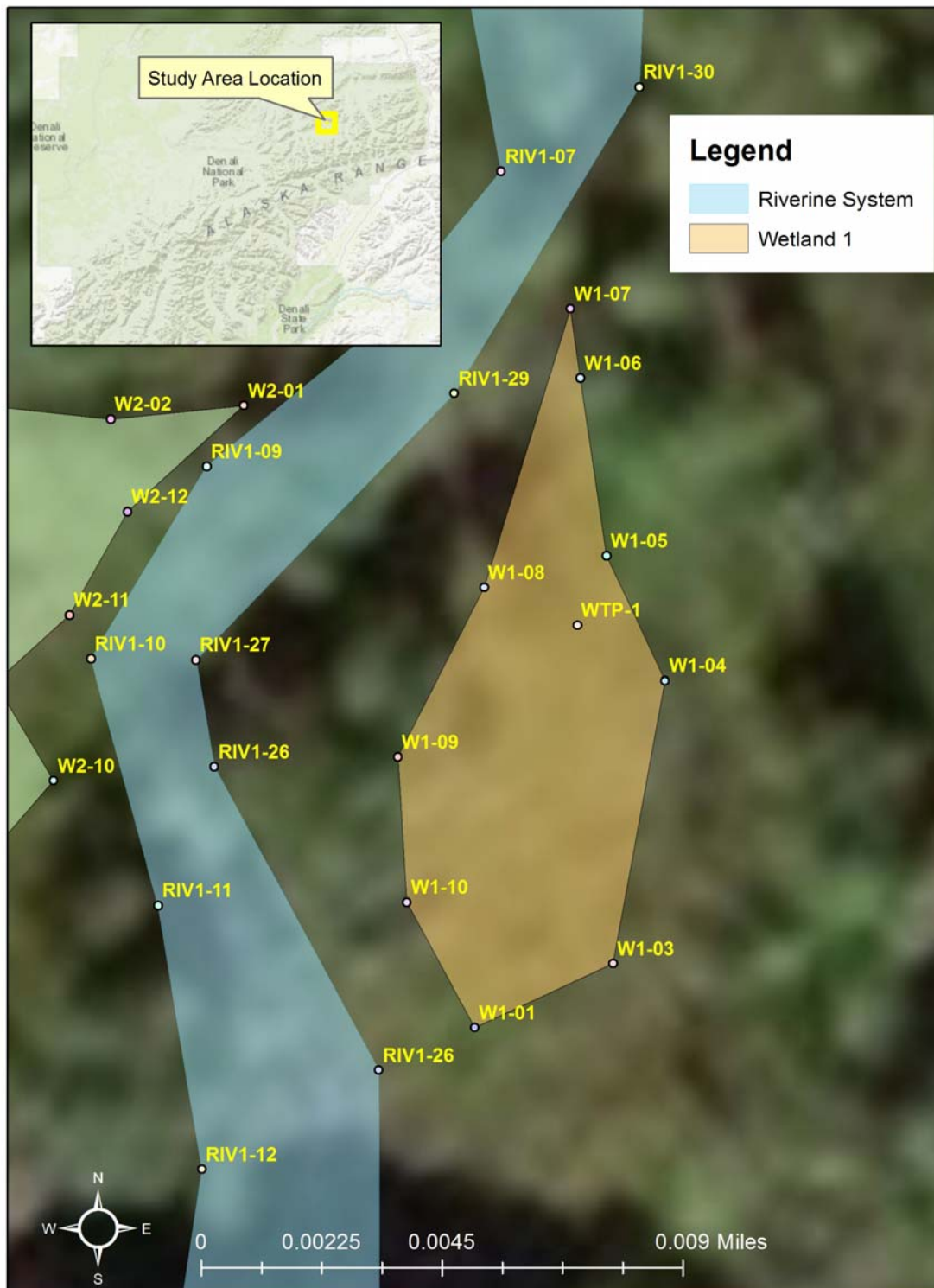
WRD - K. Noon, J. Wagner

NERO – Carmen Chapin, File DENA

References Cited

- Boggs, K., A. Garibaldi, J.L. Stevens, J. Grunblatt, and T. Helt. 2001. Denali National Park and Preserve landcover mapping project Volume 2: Landcover classes and plant associations. Natural Resource Technical Report NPS/DENA/NRTR—2001/002. National Park Service, Fort Collins, Colorado.
- Cowardin, L. M., F. C. Golet, and E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Department of Interior, Fish and Wildlife Service, Washington, D.C.
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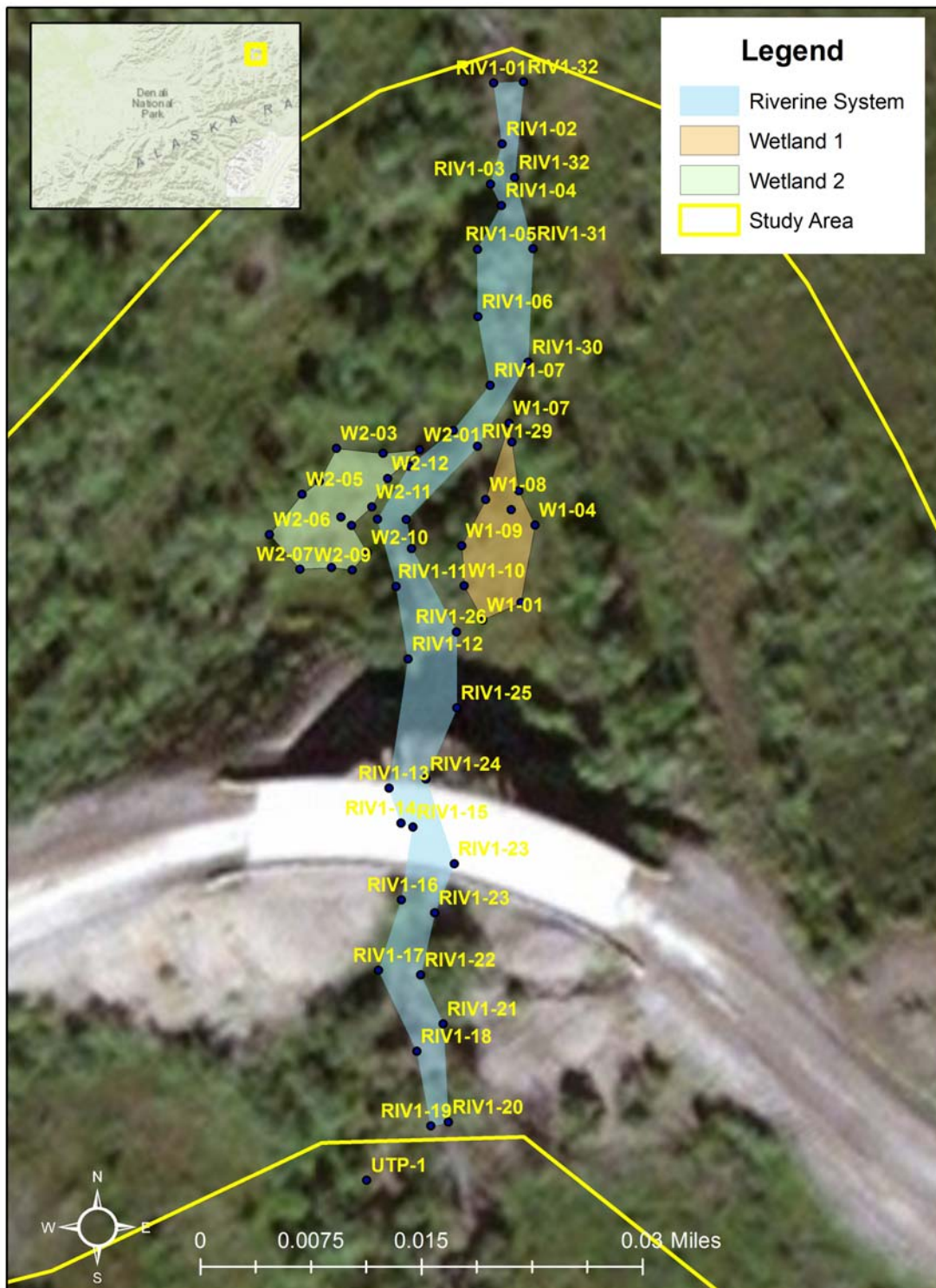
Appendix A – Detailed Project Mapping and NWI/USDA Soil Survey Maps



Wetland-1 showing boundary points, and wetland test pit/vegetation data collection locations (WTP/UTP) along with a portion of the riverine system.

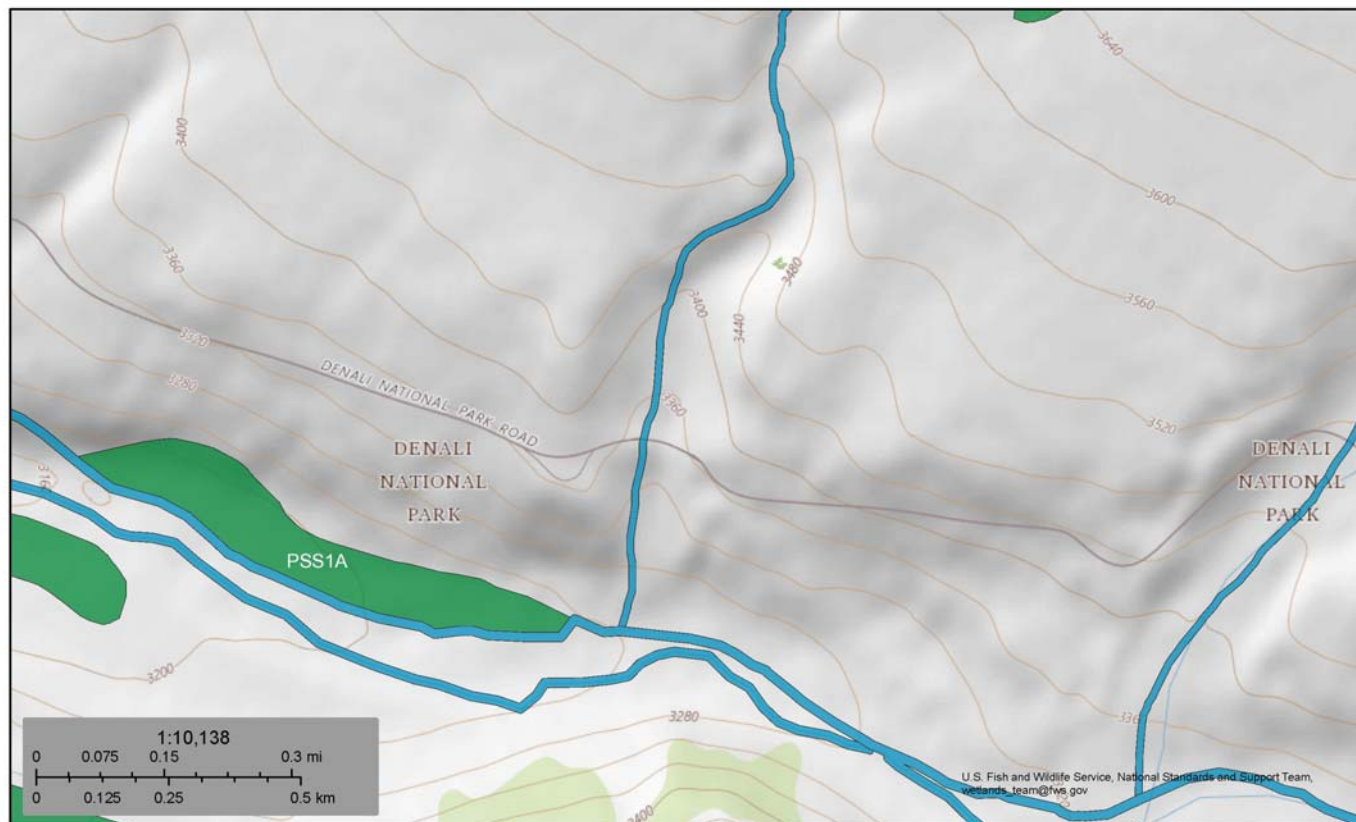


Wetland-2 showing boundary points, and wetland test pit/vegetation data collection locations (WTP/UTP) along with a portion of the riverine system.



Riverine system (R4SB) showing boundary points, and the upland test pit/vegetation data collection locations (UTP-1) for the study.

Ghiglione Bridge



December 15, 2017

Wetlands

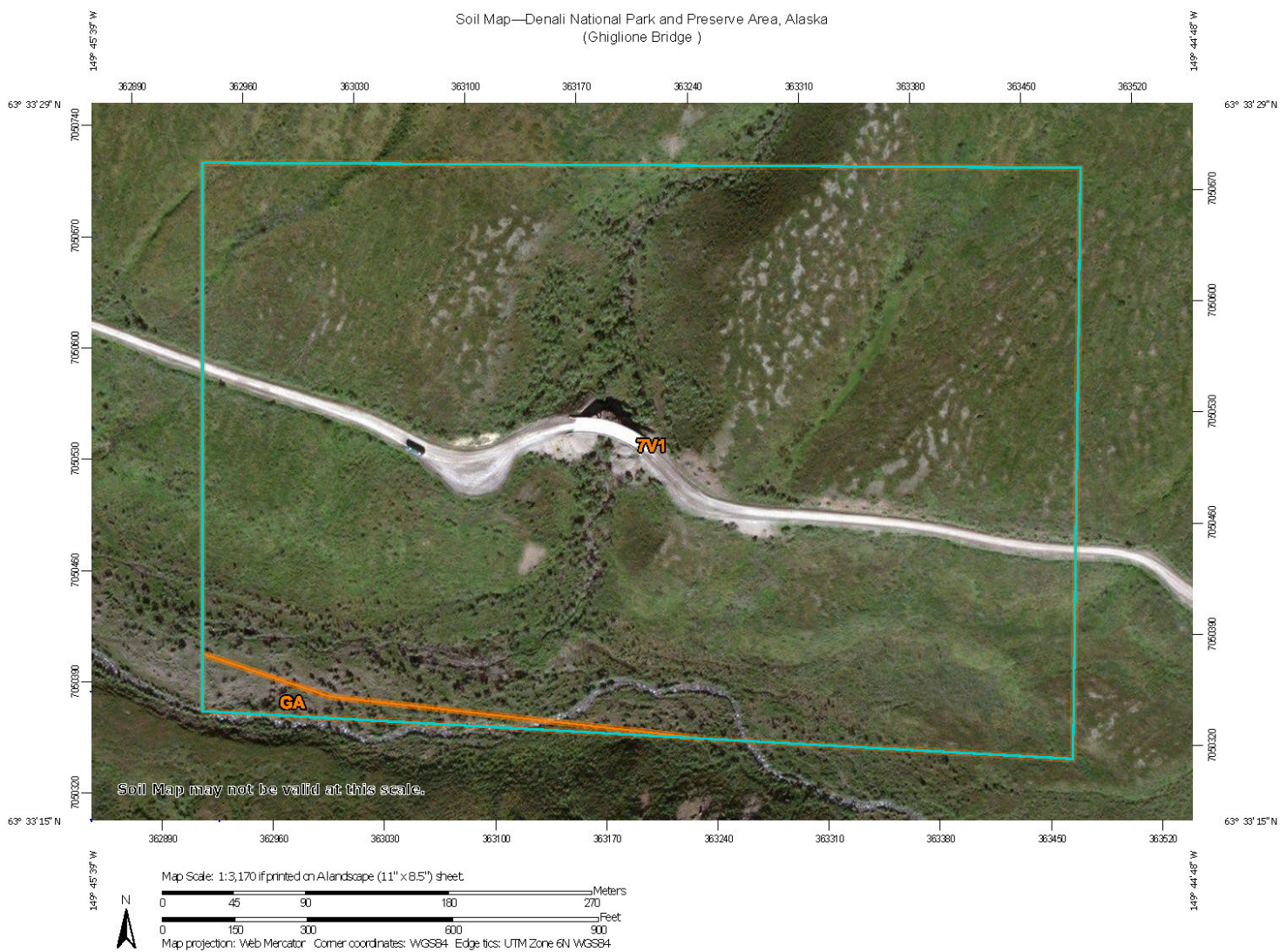
-  Estuarine and Marine Deepwater
-  Estuarine and Marine Wetland

-  Freshwater Emergent Wetland
-  Freshwater Forested/Shrub Wetland
-  Freshwater Pond

-  Lake
-  Other
-  Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper



**Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

12/15/2017
Page 1 of 3

Appendix B – Wetland Delineation Data Forms and Function and Value Sheets

WETLAND DETERMINATION DATA FORM – Alaska Region

Project/Site: Ghiglione Bridge Site Borough/City: Denali Borough Sampling Date: 9/27/17
 Applicant/Owner: Denali National Park and Preserve Sampling Point: WTP-1
 Investigator(s): NPS - See attached Report Landform (hillside, terrace, hummocks, etc.): Toe of Slope
 Local relief (concave, convex, none): Concave Slope (%): 8%
 Subregion: Interior Alaska Lat: 63.56 Long: -149.75 Datum: WGS 84
 Soil Map Unit Name: 7V1 - Alpine Lower Mountain Slope NWI classification: PSS1E
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
 Are Vegetation , Soil , or Hydrology X significantly disturbed? Are "Normal Circumstances" present? Yes No X
 Are Vegetation , Soil X, or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <u>X</u> No <u> </u>	Is the Sampled Area within a Wetland?	Yes <u>X</u> No <u> </u>
Hydric Soil Present?	Yes <u>X</u> No <u> </u>		
Wetland Hydrology Present?	Yes <u>X</u> No <u> </u>		
Remarks: Site and located adjacent to current and previous roadbeds, locally recovered from those disturbances. NPS staff noted drier than normal conditions on-site with no snow cover - NRCS - WETS table data noted precip was 90% of normal totals based on 1981-2010 range.			

VEGETATION – Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A) Total Number of Dominant Species Across All Strata: <u>5</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>80</u> (A/B)
1. <u>Salix alaxensis</u>	<u>0.5</u>	<u>Y</u>	<u>FAC</u>	
2. <u> </u>	<u> </u>	<u> </u>	<u> </u>	Prevalence Index worksheet: Total % Cover of: <u> </u> Multiply by: OBL species <u> </u> x 1 = <u> </u> FACW species <u> </u> x 2 = <u> </u> FAC species <u> </u> x 3 = <u> </u> FACU species <u> </u> x 4 = <u> </u> UPL species <u> </u> x 5 = <u> </u> Column Totals: <u> </u> (A) <u> </u> (B) Prevalence Index = B/A = <u> </u>
3. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
4. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
Total Cover: <u>0.5</u> 50% of total cover: <u>0.25</u> 20% of total cover: <u>0.1</u>				
Sapling/Shrub Stratum				
1. <u>Salix alaxensis</u>	<u>17.5</u>	<u>Y</u>	<u>FAC</u>	Hydrophytic Vegetation Indicators: <u>X</u> Dominance Test is >50% <u> </u> Prevalence Index is ≤3.0 <u> </u> Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <u> </u> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
2. <u>Salix pulchra</u>	<u>3.5</u>	<u>N</u>	<u>FACW</u>	
3. <u>Salix barclayi</u>	<u>17.5</u>	<u>Y</u>	<u>FAC</u>	
4. <u>Dasiphora fruticosa</u>	<u>1.5</u>	<u>N</u>	<u>FAC</u>	
5. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
6. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
Total Cover: <u>40</u> 50% of total cover: <u>20</u> 20% of total cover: <u>8</u>				
Herb Stratum				
1. <u>Equisetum scirpoides</u>	<u>17.5</u>	<u>Y</u>	<u>FACU</u>	Hydrophytic Vegetation Present? Yes <u>X</u> No <u> </u>
2. <u>Equisetum arvense</u>	<u>37.5</u>	<u>Y</u>	<u>FAC</u>	
3. <u>Carex bigelowii</u>	<u>3.5</u>	<u>N</u>	<u>FAC</u>	
4. <u>Calamagrostis canadensis</u>	<u>1.5</u>	<u>N</u>	<u>FAC</u>	
5. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
6. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
7. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
8. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
9. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
10. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
Total Cover: <u>60</u> 50% of total cover: <u>30</u> 20% of total cover: <u>12</u> Plot size (radius, or length x width) <u>(entire wetland)</u> % Bare Ground <u>0%</u> % Cover of Wetland Bryophytes <u>17.5%</u> Total Cover of Bryophytes <u>85%</u> (Where applicable)				
Remarks: Wetland site was very small (<0.1 acre) therefore vegetation cover for all strata was estimated across the entire wetland. Vegetation survey conducted during non-growing season conditions.				

Sampling Point: WTP-1

HYDROLOGY

US Army Corps of Engineers

WETLAND DETERMINATION DATA FORM – Alaska Region

Project/Site: Ghiglione Bridge Site Borough/City: Denali Borough Sampling Date: 9/27/17
 Applicant/Owner: Denali National Park and Preserve Sampling Point: WTP-2
 Investigator(s): NPS - See attached Report Landform (hillside, terrace, hummocks, etc.): Floodplain
 Local relief (concave, convex, none): Concave Slope (%): 8%
 Subregion: Interior Alaska Lat: 63.56 Long: -149.75 Datum: WGS 84
 Soil Map Unit Name: 7V1 - Alpine Lower Mountain Slope NWI classification: PSS1E
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No X (If no, explain in Remarks.)
 Are Vegetation , Soil , or Hydrology X significantly disturbed? Are "Normal Circumstances" present? Yes No X
 Are Vegetation , Soil X, or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No <u> </u>	Is the Sampled Area within a Wetland? Yes <u>X</u> No <u> </u>
Hydric Soil Present? Yes <u>X</u> No <u> </u>	
Wetland Hydrology Present? Yes <u>X</u> No <u> </u>	
Remarks: High gradient alluvial setting. NRCS WETS data showed that precipitation was 90% of the period of record within the park based on a 1981-2010 range.	

VEGETATION – Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>2</u> (A) Total Number of Dominant Species Across All Strata: <u>3</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>67</u> (A/B)
1. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
2. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
3. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
4. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
Total Cover: <u> </u> 50% of total cover: <u> </u> 20% of total cover: <u> </u>				Prevalence Index worksheet: Total % Cover of: <u> </u> Multiply by: <u> </u> OBL species <u> </u> x 1 = <u> </u> FACW species <u> </u> x 2 = <u> </u> FAC species <u> </u> x 3 = <u> </u> FACU species <u> </u> x 4 = <u> </u> UPL species <u> </u> x 5 = <u> </u> Column Totals: <u> </u> (A) <u> </u> (B) Prevalence Index = B/A = <u> </u>
<u>Sapling/Shrub Stratum</u>	<u>37.5</u>	<u>Y</u>	<u>FAC</u>	
1. <u>Salix alaxensis</u>	<u>37.5</u>	<u>Y</u>	<u>FAC</u>	
2. <u>Salix pulchra</u>	<u>3.5</u>	<u>N</u>	<u>FACW</u>	
3. <u>Salix barclayi</u>	<u>37.5</u>	<u>Y</u>	<u>FAC</u>	
4. <u>Dasiphora fruticosa</u>	<u>17.5</u>	<u>N</u>	<u>FAC</u>	Hydrophytic Vegetation Indicators: <u>X</u> Dominance Test is >50% <u> </u> Prevalence Index is ≤3.0 <u> </u> Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <u> </u> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
5. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
6. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
7. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
8. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
Total Cover: <u>96</u> 50% of total cover: <u>48</u> 20% of total cover: <u>19.2</u>				Hydrophytic Vegetation Present? Yes <u>X</u> No <u> </u>
<u>Herb Stratum</u>	<u>3.5</u>	<u>Y</u>	<u>FACU</u>	
1. <u>Equisetum scirpoides</u>	<u>3.5</u>	<u>Y</u>	<u>FACU</u>	
2. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
3. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
4. <u> </u>	<u> </u>	<u> </u>	<u> </u>	Hydrophytic Vegetation Present? Yes <u>X</u> No <u> </u>
5. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
6. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
7. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
8. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
9. <u> </u>	<u> </u>	<u> </u>	<u> </u>	Hydrophytic Vegetation Present? Yes <u>X</u> No <u> </u>
10. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
Total Cover: <u>3.5</u> 50% of total cover: <u>1.5</u> 20% of total cover: <u>0.7</u>				
Plot size (radius, or length x width) <u>(entire wetland)</u> % Bare Ground <u>0%</u>				
% Cover of Wetland Bryophytes <u>0.5%</u> Total Cover of Bryophytes <u>85%</u> (Where applicable)				
Remarks: Wetland site was very small (<0.1 acre) therefore vegetation cover for all strata was estimated across the entire wetland. Vegetation survey conducted during non-growing season conditions. Meesia uliginosa present - bryophyte associated with wetland conditions, but very low cover (0.5%)				

Sampling Point: WTP-2

HYDROLOGY

US Army Corps of Engineers

WETLAND DETERMINATION DATA FORM – Alaska Region

Project/Site: Ghiglione Bridge Site Borough/City: Denali Borough Sampling Date: 9/27/17
 Applicant/Owner: Denali National Park and Preserve Sampling Point: UTP-1/2
 Investigator(s): NPS - See attached Report Landform (hillside, terrace, hummocks, etc.): Floodplain
 Local relief (concave, convex, none): Concave Slope (%): 10%
 Subregion: Interior Alaska Lat: 63.56 Long: -149.75 Datum: WGS 84
 Soil Map Unit Name: 7V1 - Alpine Lower Mountain Slope NWI classification: NA
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No (If no, explain in Remarks.)
 Are Vegetation , Soil , or Hydrology X significantly disturbed? Are "Normal Circumstances" present? Yes No X
 Are Vegetation , Soil X, or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <u>X</u> No <u> </u>	Is the Sampled Area within a Wetland? Yes <u> </u> No <u>X</u>
Hydric Soil Present? Yes <u> </u> No <u>X</u>	
Wetland Hydrology Present? Yes <u>X</u> No <u> </u>	
Remarks: Site and located adjacent to current and previous roadbeds, locally recovered from those disturbances. NPS staff noted drier than normal conditions on-site with no snow cover - NRCS - WETS table data noted precip was 90% of normal totals based on 1981-2010 range.	

VEGETATION – Use scientific names of plants. List all species in the plot.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A) Total Number of Dominant Species Across All Strata: <u>5</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>80</u> (A/B)
1. <u>Salix alaxensis</u>	<u>37.5</u>	<u>Y</u>	<u>FAC</u>	
2. <u> </u>	<u> </u>	<u> </u>	<u> </u>	Prevalence Index worksheet: Total % Cover of: <u> </u> Multiply by: OBL species <u> </u> x 1 = <u> </u> FACW species <u> </u> x 2 = <u> </u> FAC species <u> </u> x 3 = <u> </u> FACU species <u> </u> x 4 = <u> </u> UPL species <u> </u> x 5 = <u> </u> Column Totals: <u> </u> (A) <u> </u> (B) Prevalence Index = B/A = <u> </u>
3. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
4. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
Total Cover: <u>37.5</u> 50% of total cover: <u>18.75</u> 20% of total cover: <u>7.5</u>				
Sapling/Shrub Stratum				
1. <u>Rosa aticularis</u>	<u>7.5</u>	<u>Y</u>	<u>FACU</u>	Hydrophytic Vegetation Indicators: <u>X</u> Dominance Test is >50% <u> </u> Prevalence Index is ≤3.0 <u> </u> Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <u> </u> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.
2. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
3. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
4. <u>Dasiphora fruticosa</u>	<u>3.5</u>	<u>Y</u>	<u>FAC</u>	Hydrophytic Vegetation Present? Yes <u>X</u> No <u> </u>
5. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
6. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
Total Cover: <u>11</u> 50% of total cover: <u>5.5</u> 20% of total cover: <u>2.2</u>				
Herb Stratum				
1. <u>Equisetum scirpoides</u>	<u>3.5</u>	<u>Y</u>	<u>FACU</u>	
2. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
3. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
4. <u>Calamagrostis canadensis</u>	<u>7.5</u>	<u>N</u>	<u>FAC</u>	
5. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
6. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
7. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
8. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
9. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
10. <u> </u>	<u> </u>	<u> </u>	<u> </u>	
Total Cover: <u>11</u> 50% of total cover: <u>5.5</u> 20% of total cover: <u>2.2</u>				
Plot size (radius, or length x width) <u>(15 feet radius)</u> % Bare Ground <u>38%</u> % Cover of Wetland Bryophytes <u>NA</u> Total Cover of Bryophytes <u>NA</u> (Where applicable)				
Remarks: Bryophytes covered the majority of the ground surface and but were identified as as non-wetland associated species based on Table 7 (page 87) of the Alaska Regional Supplement (2.0).				

Sampling Point: UTP-1/2

HYDROLOGY

US Army Corps of Engineers

Wetland Function-Value Evaluation Form

Total area of wetland 0.02 ac Human made? No Is wetland part of a wildlife corridor? Yes or a "habitat island"? No

Adjacent land use park road, and public lands Distance to nearest roadway or other development 65 feet

Dominant wetland systems present PSS1E Contiguous undeveloped buffer zone present No

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? Upper Region

How many tributaries contribute to the wetland? 1 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Wetland -1 (Ghiglione Bridge)

Latitude 63.556 Longitude -149.754

Prepared by: NPS Date 9/28/2017

Wetland Impact:
Type NA Area NA

Evaluation based on:
Office _____ Field X

Corps manual wetland delineation
completed? Y X N _____

Function/Value	Suitability Y N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
 Groundwater Recharge/Discharge	X	4,7,9,12	7	
 Floodflow Alteration	X	5,6,9,11,13,16	5	
 Fish and Shellfish Habitat		X		
 Sediment/Toxicant Retention	X	8,9,10,14	14	May become more important w/upstream bridge work
 Nutrient Removal	X	3,12,5	12	
 Production Export	X	1,2,4,5,8,10,12	4	
 Sediment/Shoreline Stabilization	X	2,4,6,7,9,12,13,14,15	15	
 Wildlife Habitat	X	1,3,4,6,7,8,9,14,15,17,21	1	
 Recreation	X	1,4,5	1	
 Educational/Scientific Value	X	2,4,5,6,10,11,14,16	6	
 Uniqueness/Heritage		X	7,16,17,18,19,22	Within the context of DENA - not unique though some rational references apply
 Visual Quality/Aesthetics		X	8,11	visual quality low - mainly looking at existing bridge
 ES Endangered Species Habitat		X		
Other				

Notes:

* Refer to backup list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland 0.03 ac Human made? No Is wetland part of a wildlife corridor? Yes or a "habitat island"? No

Adjacent land use park road, and public lands Distance to nearest roadway or other development 65 feet

Dominant wetland systems present PSS1E Contiguous undeveloped buffer zone present No

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? Upper Region

How many tributaries contribute to the wetland? 1 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Wetland -2 (Ghiglione Bridge)

Latitude 63.5567 Longitude -149.7544

Prepared by: NPS Date 9/28/2017

Wetland Impact:
Type NA Area NA

Evaluation based on:
Office _____ Field X

Corps manual wetland delineation
completed? Y X N _____

Function/Value	Suitability Y N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
 Groundwater Recharge/Discharge	X	3,4,7,9,12,13	13	Wetland receives GW from the adjacent hillside and it appears to discharge to the adjacent tributary shown on project mapping.
 Floodflow Alteration	X	2,3,5,9,10,11,13	9,11	
 Fish and Shellfish Habitat		X		
 Sediment/Toxicant Retention	X	4,9,10,14	14	Wetland located at base of park road and old road cut - good geomorphic position for retention of sediment/toxicants.
 Nutrient Removal		X		
 Production Export	X	1,4,8,12	8	
 Sediment/Shoreline Stabilization		X		
 Wildlife Habitat	X	5,7,8,16,17,18,21	21	
 Recreation		X		
 Educational/Scientific Value		X		
 Uniqueness/Heritage		X		Carcass dump area - not unique among DENA resources
 Visual Quality/Aesthetics		X		
 ES Endangered Species Habitat		X		
Other				

Notes:

* Refer to backup list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland 0.12 ac Human made? No Is wetland part of a wildlife corridor? Yes or a "habitat island"? No

Adjacent land use park road and public lands Distance to nearest roadway or other development NA

Dominant wetland systems present R4SB Contiguous undeveloped buffer zone present No

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? NA

How many tributaries contribute to the wetland? 1 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Riverine System (Ghiglione Bridge)

Latitude 63.5563 Longitude -149.7543

Prepared by: NPS Date 9/28/2017

Wetland Impact:
Type NA Area NA

Evaluation based on:
Office _____ Field X

Corps manual wetland delineation
completed? Y X N _____

Function/Value	Suitability Y N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
 Groundwater Recharge/Discharge	X			Many of the rationale references here do not easily apply within the context of an intermittent riverine system such as this. We attempted to apply those which we felt were most applicable.
 Floodflow Alteration	X	2,3	2	
 Fish and Shellfish Habitat	X			
 Sediment/Toxicant Retention	X			
 Nutrient Removal	X			
 Production Export	X			
 Sediment/Shoreline Stabilization	X	1,2,3,4,9	2	
 Wildlife Habitat	X			
 Recreation	X			
 Educational/Scientific Value	X			
 Uniqueness/Heritage	X			
 Visual Quality/Aesthetics	X			
ES Endangered Species Habitat	X			
Other				

Notes:

*Refer to backup list of numbered considerations.