EXHIBIT CX – 01 – Discharge Report

DECEMBER 2024

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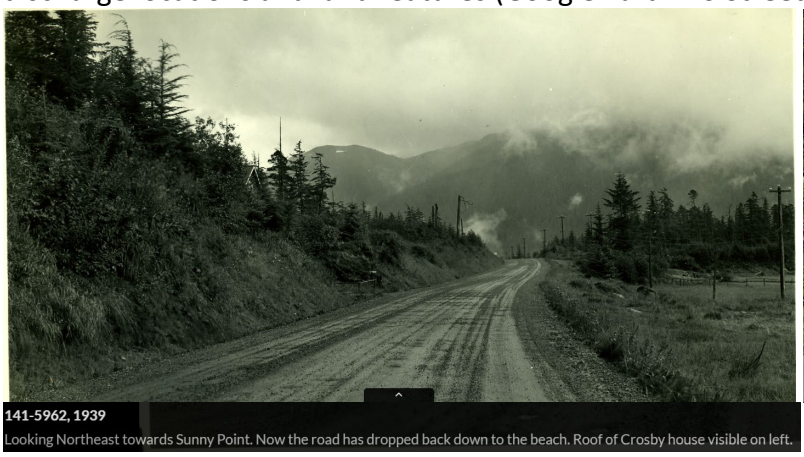
I. INTRODUCTION

This Discharge Report ("Report") outlines the U.S. Environmental Protection Agency's ("EPA") conclusions regarding the approximate location, scope, and extent of discharges of dredged and/or fill material at the nine discharge locations identified in Table 1 of EPA's Administrative Complaint. The Report also provides the underlying rationale for the conclusion that the discharge activities by the State of Alaska Department of Transportation and Public Facilities ("ADOT&PF") were not exempt under Clean Water Act Section 404(f), 33 U.S.C. § 1344.

Old Glacier Highway

Initially constructed in 1911, the Old Glacier Highway was a pioneer "corduroy log" road providing access for the construction of hydroelectric facilities to generate electricity for the various mining companies in Juneau and Douglas. The road extended to access flat grasslands of Lemon Creek and Mendenhall River valleys, which allowed homesteaders to build dairy and produce farms that supplied the local residents. The culverts constructed beneath the Old Glacier Highway may not adequately meet current hydraulic design standards to accommodate the maximum bedload and flow velocities.[1]

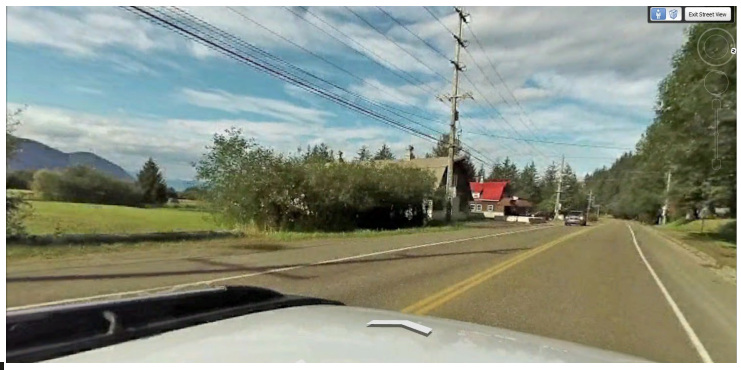
Figure 1. The historic photographs[2] of the Old Glacier Highway below are compared to images of certain discharge locations and land features (Google EarthPro Street View - September 2017).





View east - Discharge Location 2 (Right).





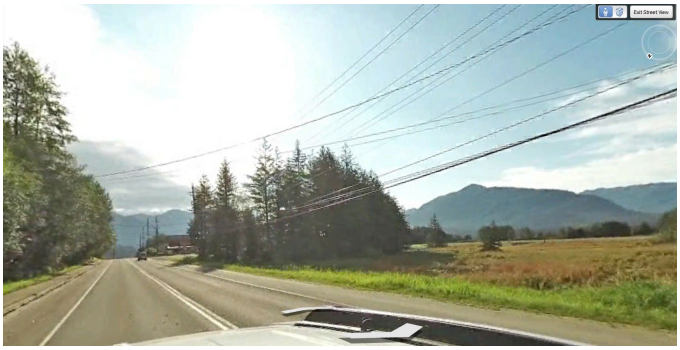
View east - Dairy Barn (left) and wetlands.

[1] Alaska Department of Transportation and Public Facilities (June 2006). *Alaska Highway Design Manual*. Chapter 9. Culverts., https://dot.alaska.gov/stwddes/desbridge/hwy_drainage_manual.shtml.

[2] Source: Juneau History – A Historical Pictorial of the Construction of Glacier Highway., http://www.juneauhistory.com.



151-6810, 1943
Looking back towards Juneau with the road straightened out and widened.



View east - Discharge Location 1 (Right) and wetlands.



152-6809, 1943
Taken from area in front of farmhouse, looking out the road.



View west - Discharge Location 1 (left) and wetlands.



155-5964, 1939
Good shot with the tide in. Today you be looking right at Fred Meyer's and the left turn onto Egan Drive. The truck is a 1939 dodge.



View west – Fred Meyer and left turn lane onto Egan Drive (left).

Egan Drive

In 1969, the Department of Highways initiated a public hearing regarding plans for a new transportation corridor between downtown Juneau to the Mendenhall Valley. [3] The Old Glacier Highway was no longer able to meet traffic demand and capacity.[4] Public comments indicated that the Mendenhall Wetlands were one of the few marsh-tidelands between the Gulf of Alaska and the Fraser River Delta in Canada, which is essential to meeting international migratory bird treaty obligations for habitat and flyways.[5] The Juneau-Douglas High School Wildlife Club conducted a poll indicating that 90 percent of students used the Mendenhall Wetlands for

[3] Laurie Craig (September 20, 2024). How Outer Drive became inner drive: The construction of Egan Drive. Juneau Empire., https://www.juneauempire.com/news/how-outer-drive-became-inner-drive-the-construction-of-egan-drive/.

[4] *Id.*

[5] *Id.*

duck hunting, fishing, and recreation.[6] Since the local community preferred an "inner route" which kept the road as close as possible to the existing Old Glacier Highway, the Department of Highways selected the inner alignment or the one paralleling Glacier Highway at Sunny Point for the new four lane Egan Drive, which was completed in 1975.[7]

Despite the construction of Egan Drive and its multiple culverts, the Mendenhall Wetlands maintain functions, ecological services, and habitat values for migratory birds and anadromous fish species. The aquatic life stages of salmon and their habitat continue to be supported for rearing, spawning, or migration between the marine waters of Gastineau Channel and the freshwaters of the Mendenhall Wetlands. The State of Alaska Department of Fish and Game has documented these waters as important to the anadromous fish in the State of Alaska Anadromous Waters Catalog.[8]

Rainfall Event (2020)

In December 2020, Juneau and Southeast Alaska experienced a large rainfall event resulting in landslides and mudslides, which contributed to the accumulation of sediments and debris along the Old Glacier Highway resulting in localized flooding.

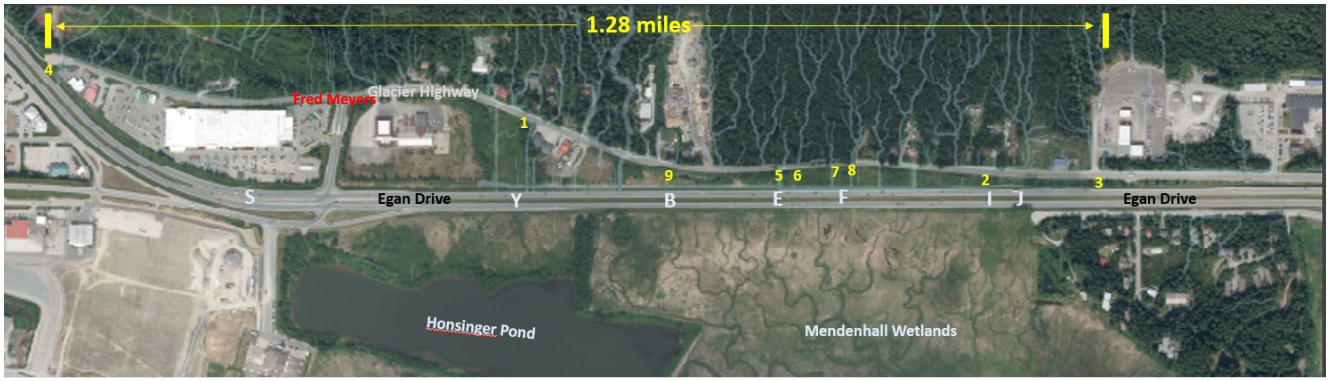
To the best of the EPA's knowledge, in or around August to September 2021,[9] ADOT&PF provided oversight, direction, and retained contractors to perform certain maintenance activities including, but not limited to, water blasting/jetting of culverts to remove accumulated sediments and debris from within multiple culverts; excavating sumps (ponds) at the culvert outlets to store surface water and sediments; discharging (side casting) the dredged material to adjacent wetlands and tributaries; and discharging fill material to create a gravel pad to support heavy equipment operations to restore and maintain surface flow and drainage across the Old Glacier Highway.

II. DISCHARGE LOCATIONS OF ALLEGED UNAUTHORIZED ACTIVITIES

The EPA conducted multiple field inspections and documented the discharges of dredged and/or fill material. These activities occurred at the nine discharge locations identified within Table 1 of EPA's Administrative Complaint. These locations are within a 1.28-mile stretch of the Old Glacier Highway between (Latitude 58.3604511; Longitude -134.5675092) and (Latitude 58.3587138; Longitude -134.5331648) in the City and Borough of Juneau in Southeast Alaska.

Figure 2. Discharge locations along the Old Glacier Highway.

[6] *Id.*
[7] *Id.*
[8] Overview - Anadromous Waters Catalog - Sport Fish. Anadromous fish are fish that are born in freshwater, spend most of their lives in saltwater, and return to freshwater to spawn. Examples include chinook, coho, and sockeye salmon. https://www.adfg.alaska.gov/sf/SARR/AWC/.
[9] Exhibit CX – 08 (Respondent's Response to Complainant's Information Request).



The EPA collected data during multiple site visits at the nine discharge locations, including their Global Positioning System (GPS) coordinates (latitude and longitude) along the Old Glacier Highway. Additionally, ADOT&PF provided written information[10] regarding the work dates and estimates of the surface area (ft^2) and volume (yds^3) of discharged (side casted) dredged and/or fill material in response to an information request from the EPA.[11] This came after ADOT&PF acknowledged to the U.S. Army Corps of Engineers (Corps) that they had discharged dredged and/or fill material at each of these locations in response to a Corps Notice of Violation.[12] This information is summarized in **TABLE 1**.

TABLE 1. CASE SUMMARY FOR DISCHARGE LOCATIONS

DISCHARGE LOCATIONS[13]			ADOT&PF SITE NO.[10]	ESTIMATED WORK DATES[10]	DISCHARGES OF DREDGED AND/OR FILL MATERIAL			
					ADOT&PF Estimates[9]		EPA Estimates	
No.	Latitude	Longitude			Area (ft^2)	Volume (yd^3)	Area (ft^2)	Volume (yd^3)
1	58.35967	-134.55226	2	8/24/2021	54	6	204	26
2	58.3587594	-134.5377072	12b	8/26/2021	480	106	870	97
3	58.3587138	-134.5331648	15	8/30/2021 to 8/31/2021	72	4	211	25
4	58.3604511	-134.5675092	19	9/8/2021 to 9/9/2021	N/A	N/A	390	43
5	58.3588128	-134.5434592	10	8/26/2021	90	10	120	9
6	58.3588163	-134.5430525	7	8/25/2021	84	14	81	9
7	58.358845	-134.541661	8a/8b	8/25/2021 to 8/26/2021	88	83	1,160	129
8	58.3589052	-134.5415510	9	8/26/2021	72	4	81	9
9	58.3588358	-134.5475791	4	8/24/2021	36	4	160	6
				TOTALS:	976	231	3,277	353

N/A = Not Available.

Discharge Location 1 – Old Glacier Highway (Latitude 58.35967, Longitude -134.55226)

[10] Exhibit CX – 08 (Respondent's Response to Complainant's Information Request).
[11] Exhibit CX – 07 (Complainant's CWA Section 308 Information Request).
[12] Exhibit CX – 05 (Corps Notice of Violation) and Exhibit CX – 06 (Respondent's Response to Corps NOV).
[13] *See* Administrative Complaint – Table 1.

Figure 3. Discharge Location 1 along the Old Glacier Highway.



ADOT&PF's written response to the EPA's information request indicated that the work resulting in discharges of dredged and/or fill material at this location started and was completed on August 24, 2021, resulting in the discharge of 6-yds^3 of dredged and/or fill material to a 54-ft^2 area.[14] According to that response, the work was performed using an excavator and a jet trailer owned by ADOT&PF.[15] An excavator was tracked to the culvert outlet, bedload material was removed and side cast to unplug the culvert.[16] The culvert was then jetted to remove bedload material from within the culvert.[17]

[14] Exhibit CX – 08 (Respondent's Response to Complainant's Information Request).
[15] *Id.*
[16] *Id.*
[17] *Id.*

Undated photographs included in ADOT&PF's response.[18]

Photo 1 (Discharge Location 1). View south (Left) and north (Right) depicting excavated sump (pond) to store sediments and surface water, which appears turbid/sediment ladened.





[18] *Id.*

Photo 2 (**Discharge Location 1).** View east depicting the discharged (side casted) dredged material in adjacent wetlands.



May 6, 2022 (Photographs taken by Mark Jen, EPA Inspector).

Photo 3 (**Discharge Location 1).** View south (Left) and west (Right) depicting the discharged (side casted) dredged material to adjacent wetlands.





Photo 4 (Discharge Location 1). View south (Left) depicting accumulated sediments in the sump (pond) and east (Right) depicting the discharged (side casted) dredged material to adjacent wetlands. The sump and drainage feature are visible.



Summary of Findings – Discharge Location 1

Based on multiple field investigations at Discharge Location 1, the EPA concludes that ADOT&PF used heavy mechanical equipment such as a truck, backhoe, excavator, and/or water vacuum jet truck to remove accumulated sediments within the culvert, to excavate a sump (pond) to store surface water and sediments, and to discharge (side cast) the dredged material to the adjacent wetlands. Sediments continue to accumulate along the bottom of the sump (pond). Based on ADOT&PF's estimates for the volume of discharged dredged and/or fill material and measurements performed by the EPA at multiple site visits, the EPA estimates the area and the volume of dredged and/or fill material at Discharge Location 1 to be approximately 204-ft^2 (17' L x 12' W x 3.5' H) and 26-yds^3, respectively.

Discharge Location 2 – Old Glacier Highway (Latitude 58.3587594 and Longitude -134.5377072)

Figure 4. Discharge Location 2 along the Old Glacier Highway.



ADOT&PF's written response to the EPA's information request indicated that the work resulting in discharges of dredged and/or fill material at this location started and completed on August 26, 2021, resulting in the discharge of 106-yds^3 of dredged and fill material into a 480-ft^2 area.[19] According to that response, the work was performed with an excavator tracked to the culvert outlet.[20] ADOT&PF removed and side-casted bedload material to unplug the culvert.[21] Bedload material was then removed from the culvert using the vac truck. The tributary downstream was then reestablished to prevent flooding.[22] This dredged material was also discharged (side casted) to adjacent wetlands.

[19] Exhibit CX – 08 (Respondent's Response to Complainant's Information Request).
[20] *Id.*
[21] *Id.*
[22] *Id.*

Alaska Department of Fish and Game (January 28, 2021)[23]

On January 19, 2021, the Alaska Department of Fish and Game (ADFG) met with ADOT&PF to observe sediment removal from an uncatalogued stream and culvert near Sunny Point (Old Glacier Highway) after heavy rainfall resulted in sediment deposition. ADOT&PF dredged sediment from the culvert inlet and outlet, the stream channel at the toe of Glacier Highway, and constructed a channel to direct flow to the Egan Drive culvert. The wildlife fence between Egan Drive and Old Glacier Highway has collected sediment and debris, resulting in ponding (Figures 1 to 4 below). This site corresponds to Discharge Location 2.



Figure 1.–Culvert inlet sediment dredging.



Figure 2.–Constructed channel at culvert outlet.

[23] See Appendix 1: Alaska Department of Fish and Game Memorandum (January 28, 2021). To Kate Kanouse, Southeast Regional Supervisor from Jesse Lindgren, Habitat Biologist regarding Sediment Dredging and Channel Relocation (FH21-I-0006).



Figure 3.–Dredged stream channel at toe of Glacier highway.



Figure 4.–Wildlife fence with collected sediment.

Undated photographs included in ADOT&PF's response.[24]

Photo 5 (Discharge Location 2). Culvert outlet and sump (pool) depicting vac jetting activities to remove sediments and debris accumulated in the culvert.





[24] *Id.*

May 6, 2022 (Photographs taken by Mark Jen, EPA Inspector)

Photo 6 (Discharge Location 2). Culvert outlet view east (Left) and north (Right) of the discharged (side casted) dredged material and fill material in adjacent wetlands. Sediments continue to accumulate at the bottom of the sump (pond).





Photo 7 (Discharge Location 2). View north (Left) depicting the culvert outlet and along the relocated/excavated drainage; and south (Right) depicting the discharge of fill material to construct a gravel pad for heavy equipment operations, which has raised the bottom elevation of the adjacent wetlands.





Photo 8 (Discharge Location 2). View east (Left) depicting gravel fill pad; and south (Right) depicting the relocated/constructed conveyance away from the Old Glacier Highway.





Photo 9 (Disharge Location 2). View south (Left) depicting accumulated sediments along the drainage; and west (Right) depicting the discharged fill material for a gravel pad to support heavy equipment operations.





Photo 10. Discharge Location 2 – View west (Left) and east (Right) depicting the previous tributary along the toe of slope of the Old Glacier Highway. Accumulated sediments appear to have been dredged and side casted.





September 13, 2022 (Photograph taken by Mark Jen, EPA Inspector)

Photo 11 (Discharge Location 2). View north (Left) and west (Right) depicting the accumulation of sediments at the culvert outlet in the sump (pond).





Photo 12. (Discharge Location 2). View east (Left) and south (Right) depicting the discharged (side casted) dredged and/or fill material to adjacent wetlands.



September 26, 2023 (Photographs taken by Mark Jen, EPA Inspector)

Photo 13 (Discharge Location 2). View south depicting the discharge of fill material for the construction of a gravel pad in adjacent wetlands.



May 23, 2024 (Photographs taken by Mark Jen, EPA Inspector)

Photo 14 (Discharge Location 2). View east (Left) of gravel fill pad and northwest (Right) depicting the culvert outlet and gravel fill pad in adjacent wetlands.





Summary of Findings - Discharge Location 2

Based on multiple field investigations at Discharge Location 2, the EPA concludes that ADOT&PF used heavy mechanical equipment, such as a truck, backhoe, excavator, and/or water vacuum jet truck to remove accumulated sediments within the culvert, to excavate a sump (pool) to store surface water and sediments, to construct and relocate the drainage feature, and to discharge (side cast) the dredged material, and to discharge gravel fill material for the construction of a pad to support heavy equipment operations, which raised the bottom elevation of the adjacent wetlands. Sediments continue to accumulate along the bottom of the sump (pond). Based on ADOT&PF's estimates for the volume of discharged dredged and/or fill material and measurements performed by the EPA at multiple site visits, the EPA estimates the area and the volume of dredged and/or fill material at Discharge Location 2 to be approximately 870-ft^2 (29' L x 30' W x 3' H) and 97-yds^3, respectively.

Discharge Location 3 – Old Glacier Highway (Latitude 58.3587138 and Longitude -134.5331648)

Figure 5. Discharge Location 3 along the Old Glacier Highway.



ADOT&PF's written response to EPA's information request indicated that the work resulting in the discharge of dredged and/or fill material at this location started on August 30, 2021, and completed on August 31, 2021, resulting in the discharge of 4-yds^3 of dredged and fill material into a 72-ft^2 area.[25] According to that response, the work was performed using an excavator owned by ADOT&PF.[26] An excavator was tracked to the culvert outlet, bedload material was removed and side cast to create a sump (pond) in which material from within the culvert could be later deposited via vac truck.[27]

[25] Exhibit CX – 08 (Respondent's Response to Complainant's Information Request).
[26] *Id.*
[27] *Id.*

Undated photographs included in ADOT&PF's response.[28]

Photo 15 (Discharge Location 3). View north depicting the culvert outlet and excavation of a sump (pond).





[28] *Id.*

May 6, 2022 (Photographs taken by Mark Jen, EPA Inspector)
ADOT&PF indicated that work occurred between August 30 and 31, 2021. The photographs below suggest work activities shortly before May 6, 2022, at Discharge Location 3 due to the heavy equipment tire tracks pressed along the side slope of the Old Glacier Highway embankment and the lack of vegetation on the discharged (side casted) dredged material piles.

Photo 16 (Discharge Location 3). View east (Left) and north (Right) depicting recent work activities associated with the heavy equipment tire tracks and discharged (side casted) dredged material lacking vegetation.



Photo 17 (Discharge Location 3). View south depicting the excavated area (Left) and the discharged (side casted) dredged material to adjacent wetlands (Right).





Photo 18 (Discharge Location 3). View south depicting the discharged (side casted) dredged material in adjacent wetlands.



Summary of Findings – Discharge Location 3

Based on multiple field investigations at Discharge Location 3, the EPA concludes that ADOT&PF used heavy mechanical equipment, such as a truck, backhoe, excavator, and/or water vacuum jet truck to remove accumulated sediments within the culvert, to construct a sump (pond), and to dredge a feature which flows into the reach of the ADFG cataloged anadromous tributary (AWC 111-50-10625-2004). The dredged material was discharged (side casted) to the adjacent wetlands. The maintenance activities at Discharge Location 3 appear to have continued even after the Corps issued an NOV to ADOT&PF. Based on ADOT&PF's estimates for the volume of discharged dredged and/or fill material and measurements performed by the EPA at multiple site visits, the EPA estimates the area and the volume of dredged and/or fill material at Discharge Location 3 to be approximately 211-ft^2 (3' H) and 25-yds^3, respectively.

Discharge Location 4 – Old Glacier Highway (Latitude 58.3604511 and Longitude -134.5675092)

Figure 6. Discharge Location 4 along the Old Glacier Highway.



ADOT&PF's written response to EPA's information request indicated that the work resulting in discharges of dredged and/or fill material at this location started on September 8, 2021, and was completed on September 9, 2021. According to that response, the work was performed using an excavator owned by ADOT&PF, which removed material and loaded it into a dump truck for offsite disposal. [29] The excavation length of the drainage feature was 800-ft, and the excavated volume of material was 820-yds^3.[30]

[29] Exhibit CX – 08 (Respondent's Response to Complainant's Information Request).
[30] *Id.*

Undated photographs included in ADOT&PF's response. [31]

Photo 19 (Discharge Location 4). View south (Left) depicting the discharged (side casted) dredged material and view north (Right) depicting the end of dredging.





[31] *Id.*

Photo 20 (Discharge Location 4). View north (Left) depicting the end of excavation and east (Right) depicting the drainage activities along Egan Drive.



May 6, 2022 (Photographs taken by Mark Jen, EPA Inspector)

Photo 21 (Discharge Location 4). View south depicting the discharged (side casted) dredged material in adjacent wetlands with Egan Drive in the background.





Photo 22 (Discharge Location 4). View north (Left) and south (Right) depicting the excavation and the discharged (side casted) dredged material in adjacent wetlands at the cul-de-sac of the Old Glacier Highway.





September 13, 2022 (Photograph taken by Mark Jen, EPA Inspector)

Photo 23 (Discharge Location 4). View south depicting the excavation and the discharged (side casted) dredged material in adjacent wetlands. Sediments appear to be accumulating.



Summary of Findings – Discharge Location 4

Based on multiple field investigations at Discharge Location 4, the EPA concludes that ADOT&PF used heavy mechanical equipment, such as a truck, backhoe, excavator, and/or water vacuum jet truck to conduct dredging activities. It appears that the dredged material was discharged (side casted) to adjacent wetlands. This dredged and/or fill material appears to have been discharged for the construction of an earthen berm. Sediments accumulate at the wildlife exclusion fence. Based on ADOT&PF's estimates for the volume of discharged dredged and/or fill material and measurements performed by the EPA at multiple site visits, the EPA estimates the area and the volume of dredged and/or fill material at Discharge Location 4 to be approximately 390-ft^2 (39' L x 10' W x 3' H) and 43-yds^3, respectively.

Discharge Location 5 – Old Glacier Highway (Latitude 58.3588128, Longitude -134.5434592)

Figure 7. Discharge Location 5 along the Old Glacier Highway.



ADOT&PF's written response to EPA's information request indicated that the work resulting in discharges of dredged and/or fill material at this location started and was completed on August 26, 2021, resulting in the discharge of 10-yds^3 of dredged and/or fill material into a 90-ft^2 area.[32] According to that response, the work was performed using an excavator owned by the ADOT&PF and a vac truck operated by Wayne Smith Trucking.[33]

[32] Exhibit CX – 08 (Respondent's Response to Complainant's Information Request).
[33] *Id.*

Undated photographs included in ADOT&PF's response.[34]

Photo 24 (Discharge Location 5). View north (Left) and south (Right) depicting the excavation of a sump (pond) at the culvert outlet to store surface water and accumulated sediments. The Egan Drive is in the background.





Photo 25 (Discharge Location 5). View west depicting the constructed sump (pond) at culvert outlet to store surface water and sediments.

[34] *Id.*



May 6, 2022 (Photographs taken by Mark Jen, EPA Inspector).

Photo 26 (Discharge Location 5). View south depicting the excavated sump (pond) and discharged (side casted) dredged material in adjacent wetlands (Right). The Egan Drive is in the background.

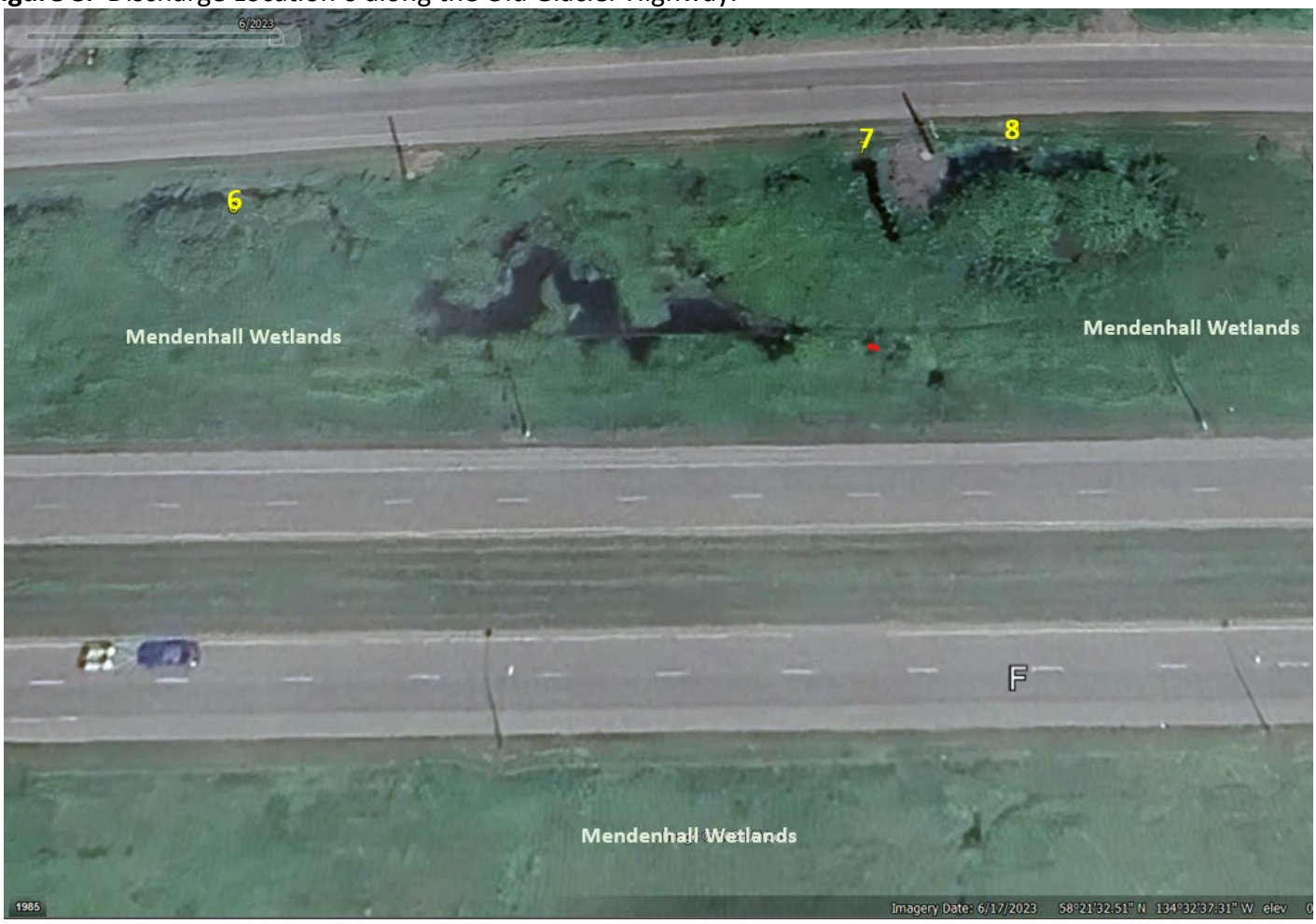


Summary of Findings – Discharge Location 5

Based on multiple field investigations at Discharge Location 5, the EPA concludes that ADOT&PF used heavy mechanical equipment, such as a truck, backhoe, excavator, and/or water vacuum jet truck to remove accumulated sediments from the culvert and to excavate dredged material for the construction of a sump (pond) for storage of surface water and sediments. Dredged material was discharged (side casted) to adjacent wetlands. Based on ADOT&PF's estimates for the volume of discharged dredged and/or fill material and measurements performed by the EPA at multiple site visits, the EPA estimates the area and the volume of dredged and/or fill material at Discharge Location 5 to be approximately 120-ft^2 (12' L x 12' W x 2' H) and 9-yds^3, respectively.

Discharge Location 6 – Old Glacier Highway (Latitude 58.3588163 and Longitude -134.5430525)

Figure 8. Discharge Location 6 along the Old Glacier Highway.



ADOT&PF's written response to EPA's information request indicated that the work resulting in discharges of dredged and/or fill material at this location started and was completed on August 25, 2021, resulting in the discharge of 14-yds^3 of dredged and fill material into an 84-ft^2 area.[35] According to that response, the work was performed using an excavator owned by the DOT&PF and a vac truck operated by contractor, Wayne Smith Trucking.[36] An excavator was tracked to the culvert outlet, bedload material was removed and side cast to unplug the culvert.[37] Bedload material was then removed from the culvert using the vac truck.[38]

[35] Exhibit CX – 08 (Respondent's Response to Complainant's Information Request).
[36] *Id.*
[37] *Id.*
[38] *Id.*

Undated photographs included in ADOT&PF's response.[39]

Photo 27 (Discharge Location 6). View north (Left) depicting the excavated sump (pond) and south (Right) depicting the discharged (side casted) dredged material in adjacent wetlands. Egan Drive is in the background.





[39] *Id.*

Photo 28 (Discharge Location 6). View south depicting the discharged (side casted) dredged material in adjacent wetlands to the right of the sump (pond). Egan Drive is in the background.



May 6, 2022 (Photographs taken by Mark Jen, EPA Inspector)

Photo 29 (Discharge Location 6). View south depicting the sump (pond) and discharged (side casted) dredged material in adjacent wetlands. Sediments continue to accumulate on the bottom of sump (pond).



Photo 30 (Discharge Location 6). View northwest (Left) and southeast (Right) depicting the sump (pond) and the discharged (side casted) dredged material in adjacent wetlands. Sediments continue to accumulate on the bottom of the sump (pond).





Photo 31 (Discharge Location 6). View southeast depicting the discharged (side casted) dredged material in adjacent wetlands from the sump (pond).





September 13, 2022 (Photograph taken by Mark Jen, EPA Inspector).

Photo 32 (Discharge Location 6). Culvert outlet depicting continued accumulation of sediments in constructed sump (pond).



May 22, 2024 (Photographs taken by Mark Jen, EPA Inspector).

Photo 33 (Discharge Location 6). Culvert outlet depicting continued accumulation of sediments in constructed sump (pond).

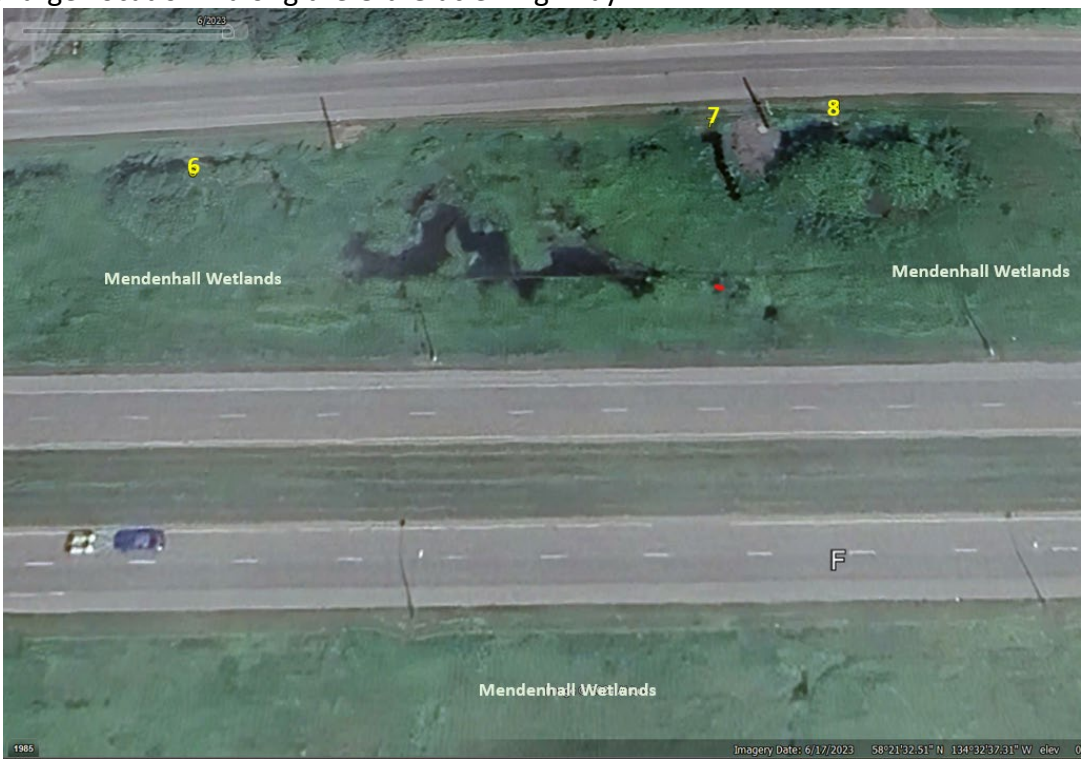


Summary of Findings – Discharge Location 6

Based on multiple field investigations at Discharge Location 6, the EPA concludes that ADOT&PF used heavy mechanical equipment, such as a truck, backhoe, excavator, and/or water vacuum jet truck to excavate dredged material for the construction of a sump (pond) for storage of surface water and sediments, which continue to build up along the bottom of the sump (pond) and has buried the culvert outlet. Dredged material was discharged (side casted) to adjacent wetlands. Based on ADOT&PF's estimates for the volume of discharged dredged and/or fill material and measurements performed by the EPA at multiple site visits, the EPA estimates the area and the volume of dredged and/or fill material at Discharge Location 6 to be approximately 81-ft^2 (12' L x 12' W x 2' H) and 9-yds^3, respectively.

Location 7 (Latitude 58.358845, Longitude -134.541661)

Figure 9. Discharge Location 7 along the Old Glacier Highway.



ADOT&PF's written response to EPA's information request indicated that the work resulting in discharges of dredged and/or fill material at this location started and was completed on August 25, 2021, resulting in the discharge of 24-yd^3 of dredged and fill material into a 24-ft^2 area.[40] According to that response, the work was performed using an excavator owned by the ADOT&PF and a vac truck operated by contractor, Wayne Smith Trucking.[41] An excavator was tracked to the culvert outlet, bedload material was removed and side cast to unplug the culvert.[42] Bedload material was then removed from the culvert using the vac truck.[43] This material was also either removed by trucking or side cast.[44]

[40] Exhibit CX – 08 (Respondent's Response to Complainant's Information Request).
[41] *Id.*
[42] *Id.*
[43] *Id.*
[44] *Id.*

Undated photographs included in ADOT&PF's response.[45]

Photo 34 (Discharge Location 7). South view (Left) and (Right) depicting a 24-inch pipe material, which was removed.





[45] *Id.*

Photo 35 (Discharge Location 7). View south depicting an excavator accessing culvert outlet on discharged (side casted) dredged material in adjacent wetlands.



May 6, 2022 (Photographs taken by Mark Jen, EPA Inspector).

Photo 36 (Discharge Location 7). View south depicting the discharged fill material onto the side casted dredged material in adjacent wetlands for the construction of a gravel pad for heavy equipment operations. Egan Drive is in the background.



Photo 37 (Discharge Location 7). View south depicting the excavated elongated sump (pond) that appear to be storing surface water. The gravel fill pad is visible in the adjacent wetlands and was constructed to support heavy equipment operations.





September 13, 2022 (Photographs taken by Mark Jen, EPA Inspector).

Photo 38 (Discharge Location 7). View south depicting the gravel fill pad, which appear to be more compacted in the adjacent wetlands (Left). The excavated elongated sump (pond) store surface water (Right).





September 26, 2023 (Photographs taken by Mark Jen, EPA Inspector).

Photo 39 (Discharge Location 7). View south depicting the gravel fill pad, which appears more compacted. Egan Drive is in the background.

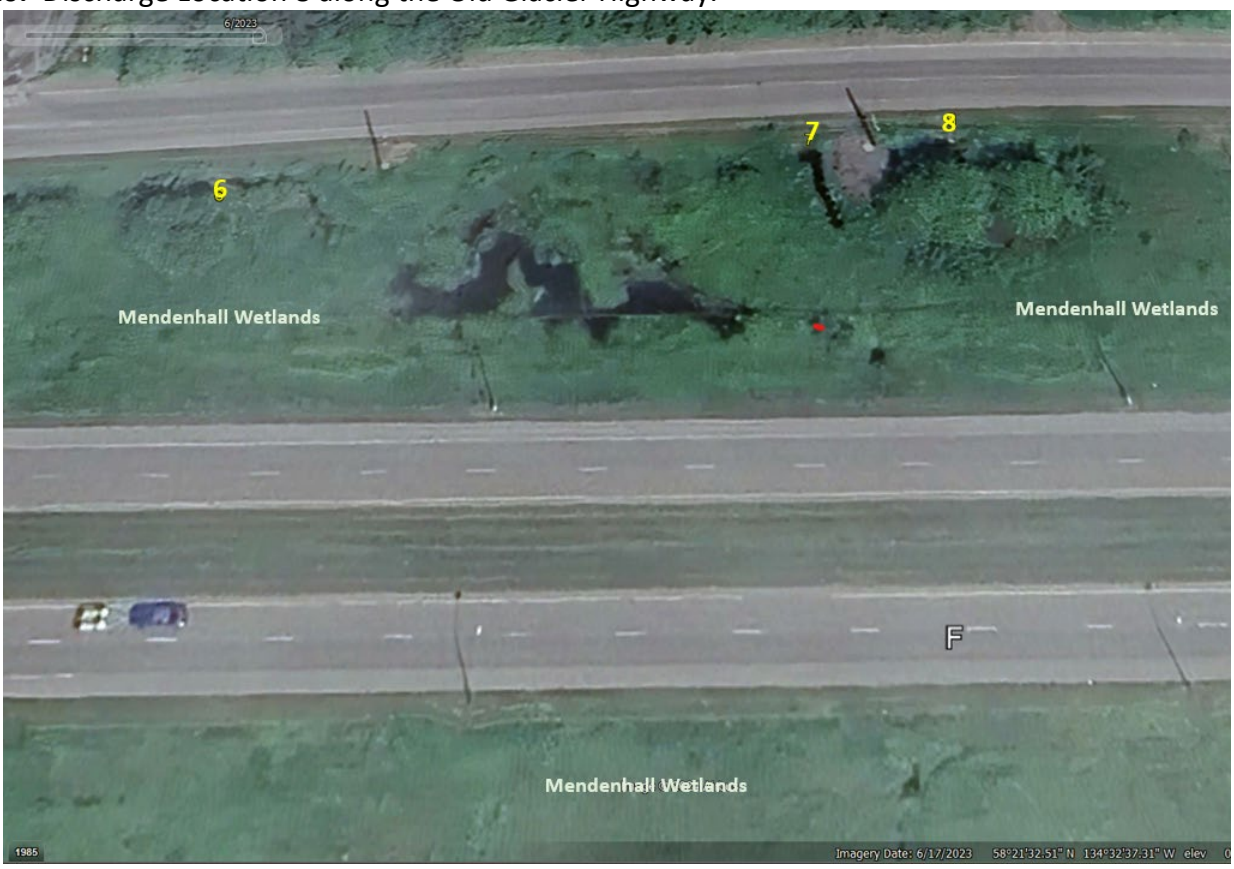


Summary of Findings – Discharge Location 7

Based on multiple field investigations at Discharge Location 7, the EPA concludes that ADOT&PF used heavy mechanical equipment, such as a truck, backhoe, excavator, and/or water vacuum jet truck to remove accumulated sediments from the culvert, to excavate dredged material for the construction of a sump (pond) to store surface water and sediments. The dredged material was discharged (side casted) to adjacent wetlands and fill material was discharged to construct an elevated gravel pad to support heavy equipment operations. Based on ADOT&PF's estimates for the volume of discharged dredged and/or fill material and measurements performed by the EPA at multiple site visits, the EPA estimates the area and the volume of dredged and/or fill material at Discharge Location 7 to be approximately 1,160-ft^2 (40' L x 29' W x 3' H) and 129-yds^3, respectively.

Discharge Location 8 – Old Glacier Highway (Latitude 58.3589052 and Longitude -134.5415510)

Figure 10. Discharge Location 8 along the Old Glacier Highway.



ADOT&PF's written response to EPA's information request indicating that the work resulted in the discharge of dredged and/or fill material at this location, started and was completed on August 26, 2021, resulting in the discharge of 4-yd^3 of dredged and fill material into a 72-ft^2 area.[46] According to that response, the work was performed using an excavator owned by the ADOT&PF and a vac truck operated by contractor, Wayne Smith Trucking.[47] An excavator was tracked to the culvert outlet, bedload material was removed and side cast to unplug the culvert.[48]

[46] Exhibit CX – 08 (Respondent's Response to Complainant's Information Request).
[47] *Id.*
[48] *Id.*

Undated photographs included in ADOT&PF's response.[49]

Photo 40 (Discharge Location 8). View north (Left) depicting the vac jetting at the culvert outlet to remove accumulated sediments. View south (Right) depicting the construction of sump (pond) and the discharged (side casted) dredged material in adjacent wetlands. The sump appears to be storing turbid/sediment laden surface water.





May 6, 2022 (Photographs taken by Mark Jen, EPA Inspector).

[49] *Id.*

Photo 41 (Discharge Location 8). View east (Left) depicting the culvert outlet, sump, and the discharge (side casted) dredged material in the foreground and background. View south (Right) depicting accumulated sediments in the sump (pond).





Photo 42 (Discharge Location 8). View south depicting the culvert outlet, sump, and the discharged (side casted) dredged material in wetlands on both sides of the sump and visible in the foreground. Egan Drive is in the background.



September 26, 2023 (Photographs taken by Mark Jen, EPA Inspector).

Photo 43 (Discharge Location 8). View depicting the culvert outlet and the sump (pond) with accumulated sediments at the bottom.





May 21, 2024 (Photographs taken by Mark Jen, EPA Inspector).

Photo 44 (Discharge Location 8). View depicting the culvert outlet and the sump (pond) with accumulated sediments at the bottom.



Summary of Findings – Discharge Location 8

Based on multiple field investigations at Discharge Location 8, the EPA concludes that ADOT&PF used heavy mechanical equipment, such as a truck, backhoe, excavator, and/or water vacuum jet truck to remove accumulated sediments from the culvert, to excavate dredged material for the construction of a sump (pond) for storage of surface water and sediments, which continues to accumulate at the bottom of the sump. The dredged material was discharged (side casted) to adjacent wetlands. Based on ADOT&PF's estimates for the volume of discharged dredged and/or fill material and measurements performed by the EPA at multiple site visits, the EPA estimates the area and the volume of dredged and/or fill material at Discharge Location 8 to be approximately 81-ft^2 (9' L x 9' W x 3' H) and 9-yds^3, respectively.

Location 9 – Old Glacier Highway (Latitude 58.3588358, Longitude -134.5475791)

Figure 11. Discharge Location 9 along the Old Glacier Highway.



ADOT&PF's written response to EPA's information request indicated that the work resulting in the discharge of dredged and/or fill material at this location started and completed on August 24, 2021, resulting in the discharge of 4-yds^3 of dredged and/or fill material into a 36-ft^2 area.[50] According to that response, the work was performed using an excavator and a jet trailer owned by ADOT&PF.[51] An excavator was tracked to the culvert outlet, bedload material was removed and side cast to unplug the culvert.[52] The culvert was then jetted to remove bedload material from within the culvert.[53]

[50] Exhibit CX – 08 (Respondent's Response to Complainant's Information Request).
[51] *Id.*
[52] *Id.*
[53] *Id.*

Undated photographs included in ADOT&PF's response.[54]

Photo 45 (Discharge Location 9). View depicting the culvert outlet and the excavated sump (pond) with the discharged (side casted) dredged material in adjacent wetlands.





[54] *Id.*

Photo 46 (Discharge Location 9). View south depicting the culvert outlet and the sump (pond) with the discharged (side casted) dredged material in adjacent wetlands. The Egan Drive is in the background.



May 6, 2022 (Photographs taken by Mark Jen, EPA Inspector).

Photo 47 (Discharge Location 9). View east depicting the discharged (side casted) dredged material in adjacent wetlands (Left) and south depicting the culvert outlet and the sump (pond) with the side casted dredged material (Right).





Summary of Findings – Discharge Location 9

Based on multiple investigations at Location 9, the EPA concludes that ADOT&PF used heavy mechanical equipment, such as a truck, backhoe, excavator, and/or water vacuum jet truck to excavate sediment to construct a sump (pond) for storage of surface water and sediments. The sediments and dredged material were discharged (side casted) to adjacent wetlands. Based on ADOT&PF's estimates for the volume of discharged dredged and/or fill material and measurements performed by the EPA at multiple site visits, the EPA estimates the area and the volume of dredged and/or fill material at Discharge Location 9 to be approximately 160-ft^2 (16' L x 10' W x 1' H) and 6-yds^3, respectively.

III. CLEAN WATER ACT SECTION 404(F), 33 U.S.C. § 1344(F)

Section 404 of the Clean Water Act establishes a program to regulate the discharge of dredged and/or fill material to "waters of the United States," including adjacent wetlands, for certain activities, including the construction and/or maintenance of transportation structures and drainage ditches. A permit or authorization is not required from the Corps if the activity:

(1) does not result in the discharge of dredged and/or fill material to "waters of the United States," including adjacent wetlands (for example, discharges are to upland or to non-jurisdictional waters) or

(2) is exempt under CWA Section 404(f), 33 U.S.C. § 1344(f) and is not recaptured under the provisions of CWA Section 404(f)(2), 33 U.S.C. § 1344(f)(2).

Exemptions under CWA Section 404(f)(1)

Pursuant to the CWA Section 404(f)(1), 33 U.S.C. § 1344(f)(1), and implementing regulations, 33 C.F.R. § 323.4(a)(2) and 40 C.F.R. § 232.3(c)(2), certain discharges to waters of the United States, including adjacent wetlands, are exempt from permitting requirements from the Corps. However, these exemptions include specific criteria and are generally limited in their scope. ADOT&PF bears the burden of proof in demonstrating that the discharges of dredged and/or fill material associated with maintenance of transportation structures and drainage ditches meet the specific criteria for the exemptions pursuant to the CWA Section 404(f)(1).

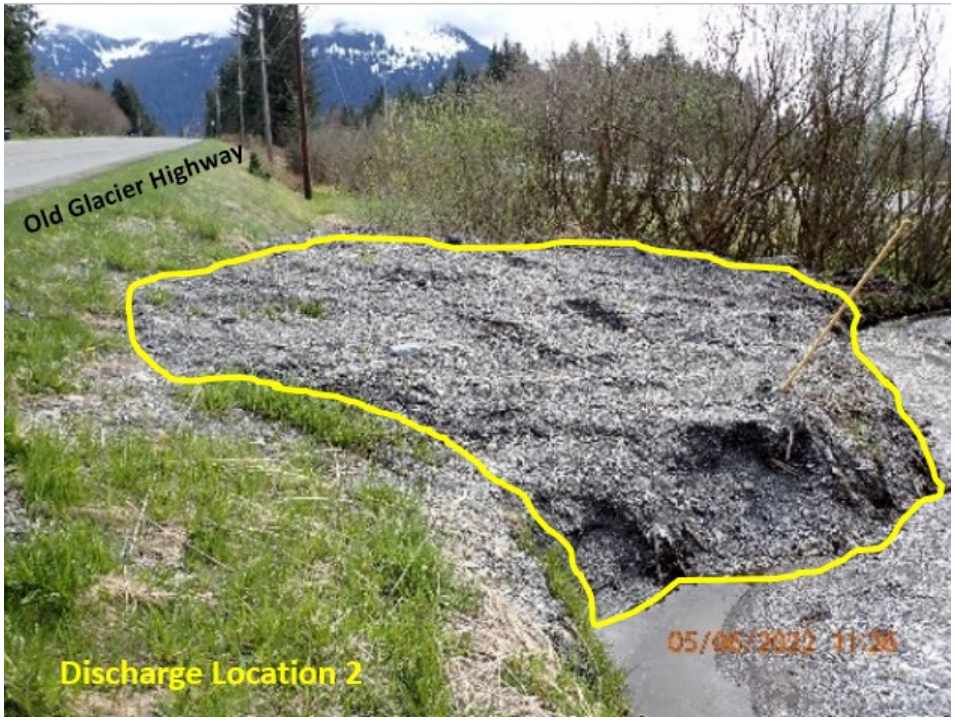
CWA Section 404(f)(1) exempts only those activities specifically identified in paragraphs (A) through (F).[55] If any discharge of dredged or fill material resulting from the activities listed in paragraphs (A) through (F) deviate from the specific criteria outlined in 33 C.F.R. § 323.4, such discharges may be subject to CWA Section 404 permitting requirements.

[55] (A) from normal farming, silviculture, and ranching activities such as plowing, seeding, cultivating, minor drainage, harvesting for the production of food, fiber, and forest products, or upland soil and water conservation practices;
(B) for the purpose of maintenance, including emergency reconstruction of recently damaged parts, of currently serviceable structures such as dikes, dams, levees, groins, riprap, breakwaters, causeways, and bridge abutments or approaches, and transportation structures;
(C) for the purpose of construction or maintenance of farm or stock ponds or irrigation ditches, or the maintenance of drainage ditches;
(D) for the purpose of construction of temporary sedimentation basins on a construction site which does not include placement of fill material into the navigable waters;
(E) for the purpose of construction or maintenance of farm roads or forest roads, or temporary roads for moving mining equipment, where such roads are constructed and maintained, in accordance with best management practices, to assure that flow and circulation patterns and chemical and biological characteristics of the navigable waters are not impaired, that the reach of the navigable waters is not reduced, and that any adverse effect on the aquatic environment will be otherwise minimized;
(F) resulting from any activity with respect to which a State has an approved program under section 1288(b)(4) of this title which meets the requirements of subparagraphs (B) and (C) of such section, is not prohibited by or otherwise subject to regulation under this section or section 1311(a) or 1342 of this title (except for effluent standards or prohibitions under section 1317 of this title).

Based on pre-filing communications between the EPA and ADOT&PF and the data collected by the EPA in the field, the only exemption that could even remotely be applicable to the subject activities is CWA Section 404(f)(1)(B), 33 U.S.C. § 1344(f)(1)(B), which exempts certain discharges associated with maintenance, including emergency reconstruction of recently damaged parts, of currently serviceable structures such as dikes, dams, levees, groins, riprap, breakwaters, causeways, and bridge abutments or approaches, and transportation structures.

The CWA Section 404(f)(1)(B) exemption would no longer fall within the scope of maintenance activities which would result in any modification that changes the character, scope, or size of the original fill design of the transportation structure. Discharging (side casting) dredged and/or fill material to waters of the United States, including adjacent wetlands, beyond the limits of the embankment and the original serviceable footprint (road prism) of the Old Glacier Highway would result in the expansion of the overall size and changing the character of the original fill design embankment.

Photo 48 (Discharge Location 2). The discharge (side casting) of fill material for the construction of a gravel pad adjacent to the Old Glacier Highway has changed the size and character of the original fill design of the road.



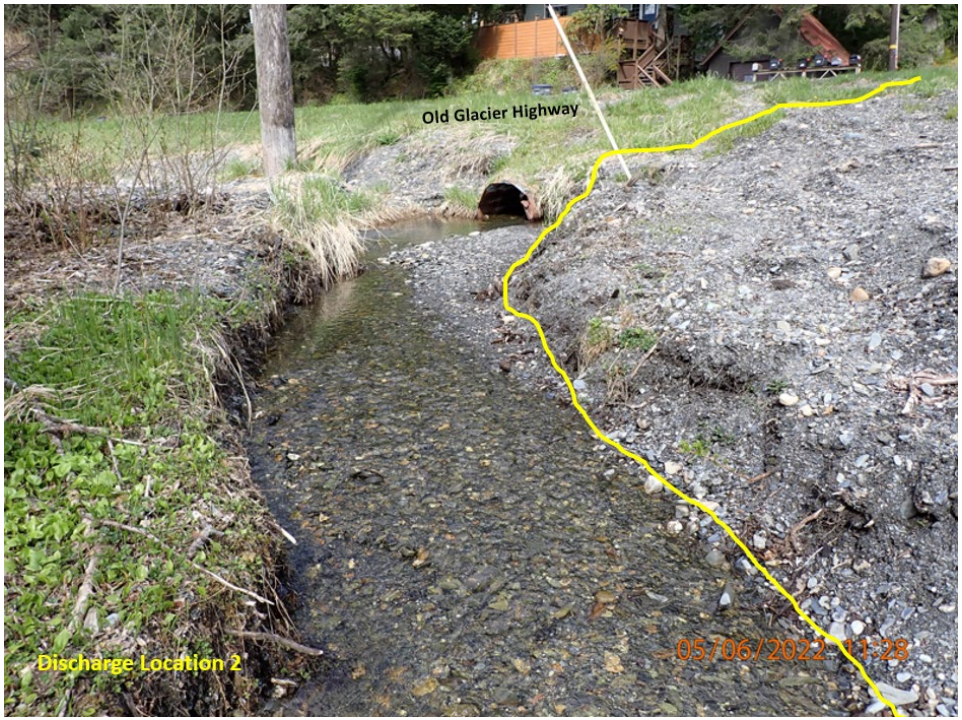


Photo 49 (Discharge Location 7). The similar effect of the gravel fill pad adjacent to the Old Glacier Highway has changed the size and character of the Old Glacier Highway.



These are two discrete examples that can be consistently applied throughout each of the nine discharge locations. Therefore, ADOT&PF's maintenance activities subject to EPA's action would not be exempt under CWA Section 404(f)(1)(B).

CWA Section 404(f)(2) Recapture Provision

The exemptions pursuant to the CWA Section 404(f)(1)(A) – (F) would not be applicable if those discharges meet the requirements of CWA Section 404(f)(2), which states that:

> *any discharge of dredged or fill material into the navigable waters incidental to any activity having as its purpose bringing an area of navigable waters into a use to which it was not previously subject, where the flow or circulation of navigable waters may be impaired or the reach of such waters be reduced, shall be required to have a permit under this section.*

CWA Section 404(f)(2) is referred to as the "recapture provision" to "recapture" an activity (i.e., to bring the activity within the scope of regulation under CWA Section 404, such that a permit would be required).

The first consideration is whether an activity results in the conversion of a waters of the United States, including adjacent wetlands, to which it was not previously subject (i.e., a non-wetland) would be considered a "change in use." The discharge (side casting) of dredged and fill material to adjacent wetlands resulted in conversion of those wetlands to uplands or non-wetlands and represents a change in use to which it was not previously subject.

The second consideration is whether the activity has impaired the flow or circulation of waters of the United States, including adjacent wetlands, or reduced the reach of such waters. This determination is made on a case-by-case basis.

The Corps and EPA regulations implementing CWA Section 404(f), 33 CFR 323.4(e) and 40 CFR 232.3(b), indicate that:

> *where the proposed discharge will result in significant discernible alterations to flow or circulation, the presumption is that flow or circulation may be impaired by such alteration.*

The discharge (side casting) of dredged and/or fill material to adjacent wetlands would result in raising the bottom elevation of waters of the United States, including adjacent wetlands, and converting the area to dry land, upland or non-wetland, thereby reducing the reach of those waters, and impairing the flow or circulation of such waters of the United States (33 CFR 323.4(e) and 40 CFR 232.3(b)). In particular, at Discharge Locations 2 and 7, fill material was discharged to wetlands to construct a gravel pad for heavy equipment operations. This had the effect of raising the bottom elevation of the adjacent wetlands, which subsequently resulted in the creation of uplands or non-wetlands. At Discharge Location 7, the construction of the elongated sump (pond) has resulted in ponding of surface water, thereby reducing the reach of those waters, and impairing the flow or circulation. To date, the discharged (side casted) dredged material continues to remain in adjacent wetlands at the discharge locations.

The EPA has the ultimate authority under the CWA to determine the geographic jurisdictional scope of waters of the United States and the application of Section 404(f) exemptions.[56] In a December 7, 2022, letter

[56] Opinion of the Attorney General of the United States (September 5, 1979). Administrator Authority to Construe § 404 of the Federal Water Pollution Control Act (aka Clean Water Act). *Civiletti Memorandum. 43 Op. Att'y Gen 197 (1979).* https://www.epa.gov/sites/default/files/2015-08/documents/civiletti_memo.pdf.

referring this enforcement matter to the EPA, the Corps made the determination that a CWA Section 404(f) exemption did not apply to the unauthorized discharges conducted by ADOT&PF.[57] The EPA agrees with the Corps' conclusion that ADOT&PF's maintenance activities at nine discharge locations along the Old Glacier Highway are not exempt under CWA Section 404(f)(1) and, even if they were, they would have been recaptured under CWA Section 404(f)(2). Therefore, permit authorization would be required by the Corps pursuant to CWA Section 404.

IV. CONCLUSION

Based on written responses from the ADOT&PF to agency information requests, and multiple investigations to collect field data and photographs at the nine discharge locations along the Old Glacier Highway, the EPA has supporting evidence to conclude that the State of Alaska Department of Transportation and Public Facilities discharged (side casted) dredged and fill material using heavy mechanical equipment to waters of the United States, including adjacent wetlands at nine discharge locations along the Old Glacier Highway without permit authorization from the Corps pursuant to CWA Section 404, 33 U.S.C. § 1344.

The EPA and the Corps evaluated ADOT&PF's maintenance activities pursuant to the CWA Section 404(f), 33 U.S.C. § 1344(f), exemptions. ADOT&PF's activities would no longer fall within the scope of maintenance activities resulting in any modification that changes the character, scope, or size of the original fill design of the transportation structure. Discharging (side casting) dredged and/or fill material to "waters of the United States," including adjacent wetlands, beyond the limits of the embankment and the original serviceable footprint (road prism) of the Old Glacier Highway would result in the expansion of the overall size and changing the character of the original fill design embankment. In addition, ADOT&PF's maintenance activities resulted in raising the bottom elevation of "waters of the United States," including adjacent wetlands, and converting the area to dry land, upland or non-wetland, thereby reducing the reach of those waters, and impairing the flow or circulation of such "waters of the United States," which is recaptured under the provisions of CWA Section 404(f)(2), 33 U.S.C. § 1344(f)(2).

Therefore, ADOT&PF's activities at nine discharge locations along the Old Glacier Highway are in violation of Section 301 of the CWA.

[57] Exhibit CX - 09 (Corps' Referral Letter to Complainant).

MEMORANDUM

State of Alaska

Department of Fish and Game
Habitat Section

TO:	Kate Kanouse Southeast Regional Supervisor	DATE:	January 28, 2021
		FILE:	FH21-I-0006
		SUBJECT:	Sediment Dredging and Channel Relocation
FROM:	Jesse Lindgren JL Habitat Biologist	PHONE NO:	(907) 465-1635

On January 19, 2021, I met with Department of Transportation and Public Facilities (DOT&PF) Maintenance and Operations Foreman Spencer Gates to observe sediment removal from an uncataloged stream and culvert near Sunny Point after heavy rainfall resulted in sediment deposition. DOT&PF dredged sediment from the culvert inlet and outlet, the stream channel at the toe of Glacier Highway, and constructed a channel to direct flow to the Egan Drive culvert. The wildlife fence between Egan Drive and Old Glacier Highway has collected sediment and debris, resulting in ponding (Figure 1–4). I did not remove fish from the work area as the stream channel and fish habitat were buried in sediment, I observed no fish during construction or in the abandoned channel along Glacier Highway.

On September 1, 2020 I surveyed this uncataloged stream that flows under and along Glacier Highway and captured 46 Dolly Varden char at the culvert outlet pool and downstream channel. The stream flows at the toe of Glacier highway to a wetland depression and under Egan Drive through a perched slip-line culvert. The new constructed channel directs flow to the directly downstream backwatered slip-line culvert under Egan Drive (Figures 5–8).

Recommendations:
I will work with DOT&PF to complete the new channel beyond the wildlife exclusion fence to the Egan Drive culvert. I will also meet with DOT&PF to address drainage, sediment deposition, and the wildlife exclusion fence on streams between Sunny Point and Fred Meyer.



Figure 1.–Culvert inlet sediment dredging.



Figure 2.–Constructed channel at culvert outlet.



Figure 3.–Dredged stream channel at toe of Glacier highway.



Figure 4.–Wildlife fence with collected sediment.



Figure 5.–Culvert outlet pool with Dolly Varden char before sediment deposition.



Figure 6.–Stream channel at toe of Glacier Highway before sediment deposition.



Figure 7.–Perched culvert under Egan Drive draining old channel.



Figure 8.–Backwatered culvert under Egan Drive draining new constructed channel.

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PLACEHOLDER

Due to file size, EXHIBIT CX 02 has been uploaded to OneDrive via a link provided by the Headquarters Hearing Clerk.

EXHIBIT CX 03
1987 Corps Delineation Manual

US Army Corps of Engineers
Waterways Experiment Station

Wetlands Research Program Technical Report Y-87-1 (on-line edition)

Corps of Engineers Wetlands Delineation Manual

by Environmental Laboratory



January 1987 - Final Report
Approved For Public Release; Distribution Is Unlimited

The following two letters used as part of the number designating technical reports of research published under the Wetlands Research Program identify the area under which the report was prepared:

	Task		Task
CP	Critical Processes	RE	Restoration & Establishment
DE	Delineation & Evaluation	SM	Stewardship & Management

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Wetlands Research Program

Technical Report Y-87-1
January 1987

Corps of Engineers Wetlands Delineation Manual

by Environmental Laboratory

U.S. Army Corps of Engineers
Waterways Experiment Station
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

Final report

Approved for public release; distribution is unlimited

Prepared for U.S. Army Corps of Engineers
Washington, DC 20314-1000

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Preface to the On-Line Edition

This is an electronic version of the 1987 *Corps of Engineers Wetlands Delineation Manual* (the 1987 Manual). The 1987 Manual is the current Federal delineation manual used in the Clean Water Act Section 404 regulatory program for the identification and delineation of wetlands. Except where noted in the manual, the approach requires positive evidence of hydrophytic vegetation, hydric soils, and wetland hydrology for a determination that an area is a wetland.

The original manual and this on-line edition were prepared by the Environmental Laboratory (EL) of the U.S. Army Engineer Waterways Experiment Station (WES), Vicksburg, Mississippi. The work was sponsored by Headquarters, U.S. Army Corps of Engineers (HQUSACE), through the Wetlands Research Program.

The manual was originally published in January 1987, following several years of development and testing of draft versions. Since that time, the use and interpretation of the 1987 Manual have been clarified and updated through a series of guidance documents and memoranda from HQUSACE. This electronic edition does not change the intent or jurisdictional area of the 1987 Manual. It does, however, attempt to clarify the manual and current guidance by including a number of boxed "USER NOTES" indicating where the original manual has been augmented by more recent information or guidance. USER NOTES were written by Dr. James S. Wakeley, EL, WES. Due to re-formatting of the text and insertion of the USER NOTES, page numbers in this edition do not match those in the original edition. Some obsolete material appears in this document as struck-out text (e.g., ~~obsolete material~~), and hypertext links are provided to sources of important supplementary information (e.g., hydric soils lists, wetland plant lists). References cited in the USER NOTES refer to the following guidance documents from HQUSACE:

"Clarification of the Phrase "Normal Circumstances" as it pertains to Cropped Wetlands," Regulatory Guidance Letter (RGL) 90-7 dated 26 September 1990.

"Implementation of the 1987 Corps Wetland Delineation Manual," memorandum from John P. Elmore dated 27 August 1991.

"Questions & Answers on the 1987 Manual," memorandum from John F. Studt dated 7 October 1991.

"Clarification and Interpretation of the 1987 Manual," memorandum from Major General Arthur E. Williams dated 6 March 1992.

"Revisions to National Plant Lists," memorandum from Michael L. Davis dated 17 January 1996.

"NRCS Field Indicators of Hydric Soils," memorandum from John F. Studt dated 21 March 1997.

Copies of the original published manual are available through the National Technical Information Service (phone 703-487-4650, NTIS document number ADA 176734/2INE). The report should be cited as follows:

> Environmental Laboratory. (1987). "Corps of Engineers Wetlands Delineation Manual," Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

Useful supplementary information for making wetland determinations can also be found at the following sites on the World Wide Web:

- Hydric soils definition, criteria, and lists
- National list of plant species that occur in wetlands
- Analyses of normal precipitation ranges and growing season limits
- National Wetlands Inventory maps and databases

Preface to the Original Edition

This manual is a product of the Wetlands Research Program (WRP) of the U.S. Army Engineer Waterways Experiment Station (WES), Vicksburg, MS. The work was sponsored by the Office, Chief of Engineers (OCE), U.S. Army. OCE Technical monitors for the WRP were Drs. John R. Hall and Robert J. Pierce, and Mr. Phillip C. Pierce.

The manual has been reviewed and concurred in by the Office of the Chief of Engineers and the Office of the Assistant Secretary of the Army (Civil Works) ~~as a method approved for voluntary use in the field for a trial period of 1 year~~.

~~This manual is not intended to change appreciably the jurisdiction of the Clean Water Act (CWA) as it is currently implemented. Should any District find that use of this method appreciably contracts or expands jurisdiction in their District as the District currently interprets CWA authority, the District should immediately discontinue use of this method and furnish a full report of the circumstances to the Office of the Chief of Engineers~~.

USER NOTES: Use of the 1987 Manual to identify and delineate wetlands potentially subject to regulation under Section 404 is now mandatory. (HQUSACE, 27 Aug 91)

This manual describes technical guidelines and methods using a multiparameter approach to identify and delineate wetlands for purposes of Section 404 of the Clean Water Act. Appendices of supporting technical information are also provided.

The manual is presented in four parts. Part II was prepared by Dr. Robert T. Huffman, formerly of the Environmental Laboratory (EL), WES, and Dr. Dana R. Sanders, Sr., of the Wetland and Terrestrial Habitat Group (WTHG), Environmental Resources Division (ERD), EL. Dr. Huffman prepared the original version of Part II in 1980, entitled "Multiple Parameter Approach to the Field Identification and Delineation of Wetlands." The original version was distributed to all Corps field elements, as well as other Federal resource and environmental regulatory agencies, for review and comments. Dr. Sanders revised the original version in 1982, incorporating review comments. Parts I, III, and IV

were prepared by Dr. Sanders, Mr. William B. Parker (formerly detailed to WES by the U.S. Department of Agriculture (USDA), Soil Conservation Service (SCS)) and Mr. Stephen W. Forsythe (formerly detailed to WES by the U.S. Department of the Interior, Fish and Wildlife Service (FWS)). Dr. Sanders also served as overall technical editor of the manual. The manual was edited by Ms. Jamie W. Leach of the WES Information Products Division.

The authors acknowledge technical assistance provided by: Mr. Russell F. Theriot, Mr. Ellis J. Clairain, Jr., and Mr. Charles J. Newling, all of WTHG, ERD; Mr. Phillip Jones, former SCS detail to WES; Mr. Porter B. Reed, FWS, National Wetland Inventory, St. Petersburg, Fla.; Dr. Dan K. Evans, Marshall University, Huntington, W. Va.; and the USDA-SCS. The authors also express gratitude to Corps personnel who assisted in developing the regional lists of species that commonly occur in wetlands, including Mr. Richard Macomber, Bureau of Rivers and Harbors; Ms. Kathy Mulder, Kansas City District; Mr. Michael Gilbert, Omaha District; Ms. Vicki Goodnight, Southwestern Division; Dr. Fred Weinmann, Seattle District; and Mr. Michael Lee, Pacific Ocean Division. Special thanks are offered to the CE personnel who reviewed and commented on the draft manual, and to those who participated in a workshop that consolidated the field comments.

The work was monitored at WES under the direct supervision of Dr. Hanley K. Smith, Chief, WTHG, and under the general supervision of Dr. Conrad J. Kirby, Jr., Chief, ERD. Dr. Smith, Dr. Sanders, and Mr. Theriot were Managers of the WRP. Dr. John Harrison was Chief, EL.

Director of WES during the preparation of this report was COL Allen F. Grum, USA. During publication, COL Dwayne G. Lee, CE, was Commander and Director. Technical Director was Dr. Robert W. Whalin.

This report should be cited as follows:

> Environmental Laboratory. (1987). "Corps of Engineers Wetlands Delineation Manual," Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.

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Conversion Factors, Non-SI to SI Units of Measurement

Non-SI units of measurement used in this report can be converted to SI (metric) units as follows:

Multiply	By	To Obtain
acres	0.4047	hectares
Fahrenheit degrees	5/9	Celsius degrees[1]
feet	0.3048	metres
inches	2.54	centimetres
miles (U.S. statute)	1.6093	kilometres
square inches	6.4516	square centimetres

[1] To obtain Celsius (C) temperature readings from Fahrenheit (F) readings, use the following formula: C = (5/9) (F - 32).

Part I: Introduction

Background

1. Recognizing the potential for continued or accelerated degradation of the Nation's waters, the U.S. Congress enacted the Clean Water Act (hereafter referred to as the Act), formerly known as the Federal Water Pollution Control Act (33 U.S.C. 1344). The objective of the Act is to maintain and restore the chemical, physical, and biological integrity of the waters of the United States. Section 404 of the Act authorizes the Secretary of the Army, acting through the Chief of Engineers, to issue permits for the discharge of dredged or fill material into the waters of the United States, including wetlands.

Purpose and Objectives

Purpose

2. The purpose of this manual is to provide users with guidelines and methods to determine whether an area is a wetland for purposes of Section 404 of the Act.

Objectives

3. Specific objectives of the manual are to:

a. Present technical guidelines for identifying wetlands and distinguishing them from aquatic habitats and other nonwetlands.[1]

b. Provide methods for applying the technical guidelines.

c. Provide supporting information useful in applying the technical guidelines.

[1] Definitions of terms used in this manual are presented in the Glossary, Appendix A.

Scope

4. This manual is limited in scope to wetlands that are a subset of "waters of the United States" and thus subject to Section 404. The term "waters of the United States" has broad meaning and incorporates both deep-water aquatic habitats and special aquatic sites, including wetlands (*Federal Register* 1982), as follows:

a. The territorial seas with respect to the discharge of fill material.

b. Coastal and inland waters, lakes, rivers, and streams that are navigable waters of the United States, including their adjacent wetlands.

c. Tributaries to navigable waters of the United States, including adjacent wetlands.

d. Interstate waters and their tributaries, including adjacent wetlands.

e. All others waters of the United States not identified above, such as isolated wetlands and lakes, intermittent streams, prairie potholes, and other waters that are not a part of a tributary system to interstate waters or navigable waters of the United States, the degradation or destruction of which could affect interstate commerce.

Determination that a water body or wetland is subject to interstate commerce and therefore is a "water of the United States" shall be made independently of procedures described in this manual.

Special aquatic sites

5. The Environmental Protection Agency (EPA) identifies six categories of special aquatic sites in their Section 404 b.(l) guidelines (*Federal Register* 1980), including:

a. Sanctuaries and refuges.

b. Wetlands.

c. Mudflats.

d. Vegetated shallows.

e. Coral reefs.

f. Riffle and pool complexes.

Although all of these special aquatic sites are subject to provisions of the Clean Water Act, this manual considers only wetlands. By definition, wetlands are vegetated. Thus, unvegetated special aquatic sites (e.g., mudflats lacking macrophytic vegetation) are not covered in this manual.

Relationship to wetland classification systems

6. The technical guideline for wetlands does not constitute a classification system. It only provides a basis for determining whether a given area is a wetland for purposes of Section 404, without attempting to classify it by wetland type.

7. Consideration should be given to the relationship between the technical guideline for wetlands and the classification system developed for the Fish and Wildlife Service (FWS), U.S. Department of the Interior, by Cowardin et al. (1979). The FWS classification system was developed as a basis for identifying, classifying, and mapping wetlands, other special aquatic sites, and deepwater aquatic habitats. Using this classification system, the National Wetland Inventory (NWI) is mapping the wetlands, other special aquatic sites, and deepwater aquatic habitats of the United States, and is also developing both a list of plant species that occur in wetlands and an associated plant database. These products should contribute significantly to application of the technical guideline for wetlands. The technical guideline for wetlands as presented in the manual includes most, but not all, wetlands identified in the FWS system. The difference is due to two principal factors:

a. The FWS system includes all categories of special aquatic sites identified in the EPA Section 404 b.(l) guidelines. All other special aquatic sites are clearly within the purview of Section 404; thus, special methods for their delineation are unnecessary.

b. The FWS system requires that a positive indicator of wetlands be present for any one of the three parameters, while the technical guideline for wetlands requires that a positive wetland indicator be present for each parameter (vegetation, soils, and hydrology), except in limited instances identified in the manual.

Organization

8. This manual consists of four parts and four appendices. Part I presents the background, purpose and objectives, scope, organization, and use of the manual.

9. Part II focuses on the technical guideline for wetlands, and stresses the need for considering all three parameters (vegetation, soils, and hydrology) when making wetland determinations. Since wetlands occur in an intermediate posi-

tion along the hydrologic gradient, comparative technical guidelines are also presented for deepwater aquatic sites and nonwetlands.

10. Part III contains general information on hydrophytic vegetation, hydric soils, and wetland hydrology. Positive wetland indicators of each parameter are included.

11. Part IV, which presents methods for applying the technical guideline for wetlands, is arranged in a format that leads to a logical determination of whether a given area is a wetland. Section A contains general information related to application of methods. Section B outlines preliminary data-gathering efforts. Section C discusses two approaches (routine and comprehensive) for making wetland determinations and presents criteria for deciding the correct approach to use. Sections D and E describe detailed procedures for making routine and comprehensive determinations, respectively. The basic procedures are described in a series of steps that lead to a wetland determination.

12. The manual also describes (Part IV, Section F) methods for delineating wetlands in which the vegetation, soils, and/or hydrology have been altered by recent human activities or natural events, as discussed below:

a. The definition of wetlands contains the phrase "under normal circumstances," which was included because there are instances in which the vegetation in a wetland has been inadvertently or purposely removed or altered as a result of recent natural events or human activities. Other examples of human alterations that may affect wetlands are draining, ditching, levees, deposition of fill, irrigation, and impoundments. When such activities occur, an area may fail to meet the diagnostic criteria for a wetland. Likewise, positive hydric soil indicators may be absent in some recently created wetlands. In such cases, an alternative method must be employed in making wetland determinations.

USER NOTES: "Normal circumstances" has been further defined as "the soil and hydrologic conditions that are normally present, without regard to whether the vegetation has been removed." The determination of whether normal circumstances exist in a disturbed area "involves an evaluation of the extent and relative permanence of the physical alteration of wetlands hydrology and hydrophytic vegetation" and consideration of the "purpose and cause of the physical alterations to hydrology and vegetation." (RGL 90-7, 26 Sep 90; HQUSACE, 7 Oct 91)

b. Natural events may also result in sufficient modification of an area that indicators of one or more wetland parameters are absent. For example, changes in river course may significantly alter hydrology, or beaver dams may create new wetland areas that lack hydric soil conditions. Catastrophic events (e.g., fires, avalanches, mudslides,

and volcanic activities) may also alter or destroy wetland indicators on a site.

Such atypical situations occur throughout the United States, and all of these cannot be identified in this manual.

13. Certain wetland types, under the extremes of normal circumstances, may not always meet all the wetland criteria defined in the manual. Examples include prairie potholes during drought years and seasonal wetlands that may lack hydrophytic vegetation during the dry season. Such areas are discussed in Part IV, Section G, and guidance is provided for making wetland determinations in these areas. However, such wetland areas may warrant additional research to refine methods for their delineation.

14. Appendix A is a glossary of technical terms used in the manual. Definitions of some terms were taken from other technical sources, but most terms are defined according to the manner in which they are used in the manual.

15. Data forms for methods presented in Part IV are included in Appendix B. Examples of completed data forms are also provided.

16. Supporting information is presented in Appendices C and D. ~~Appendix C contains lists of plant species that occur in wetlands. Section 1 consists of regional lists developed by a Federal interagency panel. Section 2 consists of shorter lists of plant species that commonly occur in wetlands of each region.~~

USER NOTES: CE-supplied plant lists are obsolete and have been superseded by the May 1988 version of the "National List of Plant Species that Occur in Wetlands" published by the U.S. Fish and Wildlife Service and available on the World Wide Web. (HQUSACE, 27 Aug 91)

Section 3 describes morphological, physiological, and reproductive adaptations associated with hydrophytic species, as well as a list of some species exhibiting such adaptations. Appendix D discusses procedures for examining soils for hydric soil indicators, ~~and also contains a list of hydric soils of the United States~~.

USER NOTES: The hydric soil list published in the 1987 Corps Manual is obsolete. Current hydric soil definition, criteria, and lists are available over the World Wide Web from the U.S.D.A. Natural Resources Conservation Service (NRCS). (HQUSACE, 27 Aug 91, 6 Mar 92)

Use

17. Although this manual was prepared primarily for use by Corps of Engineers (CE) field inspectors, it should be useful to anyone who makes wetland determinations for purposes of Section 404 of the Clean Water Act. The user is

directed through a series of steps that involve gathering of information and decisionmaking, ultimately leading to a wetland determination. A general flow diagram of activities leading to a determination is presented in Figure 1. However, not all activities identified in Figure 1 will be required for each wetland determination. For example, if a decision is made to use a routine determination procedure, comprehensive determination procedures will not be employed.

Premise for use of the manual

18. Three key provisions of the CE/EPA definition of wetlands include:

a. Inundated or saturated soil conditions resulting from permanent or periodic inundation by ground water or surface water.

b. A prevalence of vegetation typically adapted for life in saturated soil conditions (hydrophytic vegetation).

c. The presence of "normal circumstances."

19. Explicit in the definition is the consideration of three environmental parameters: hydrology, soil, and vegetation. Positive wetland indicators of all three parameters are normally present in wetlands. Although vegetation is often the most readily observed parameter, sole reliance on vegetation or either of the other parameters as the determinant of wetlands can sometimes be misleading. Many plant species can grow successfully in both wetlands and nonwetlands, and hydrophytic vegetation and hydric soils may persist for decades following alteration of hydrology that will render an area a nonwetland. The presence of hydric soils and wetland hydrology indicators in addition to vegetation indicators will provide a logical, easily defensible, and technical basis for the presence of wetlands. The combined use of indicators for all three parameters will enhance the technical accuracy, consistency, and credibility of wetland determinations. Therefore, all three parameters were used in developing the technical guideline for wetlands and all approaches for applying the technical guideline embody the multiparameter concept.

Approaches

20. The approach used for wetland delineations will vary, based primarily on the complexity of the area in question. Two basic approaches described in the manual are (a) routine and (b) comprehensive.

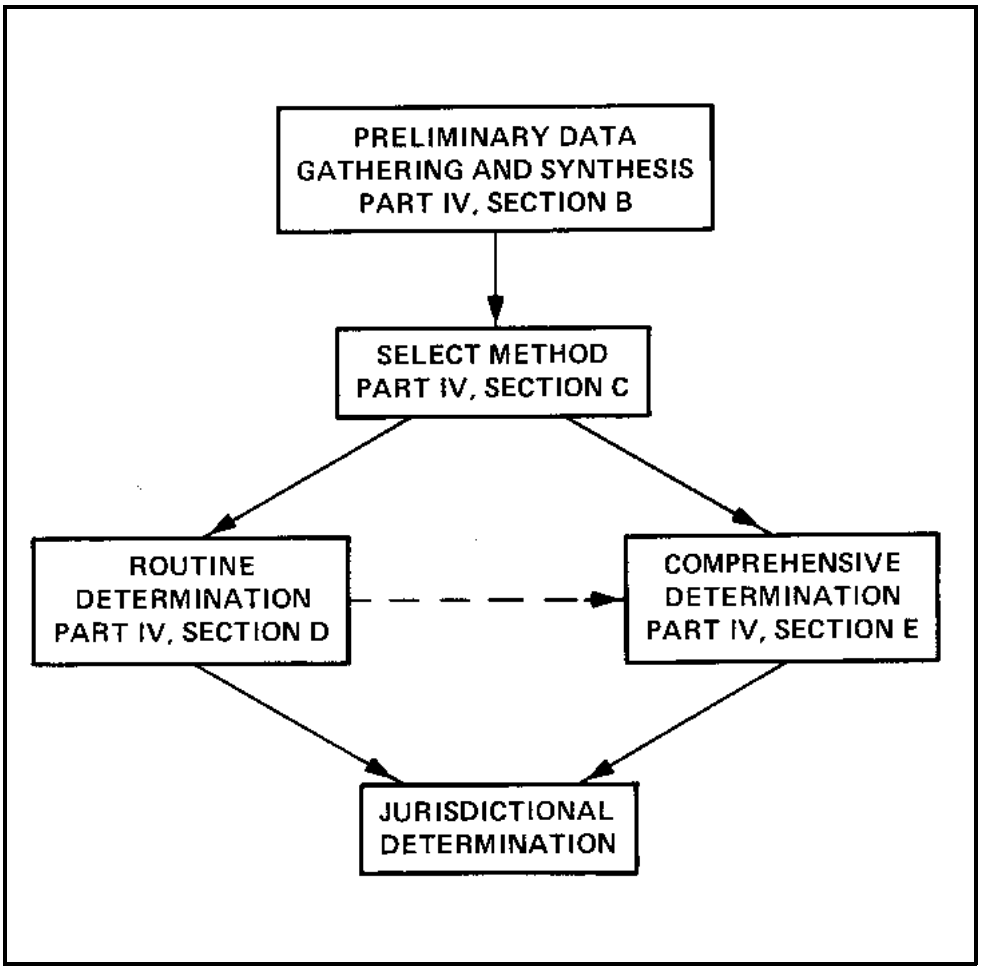


Figure 1. General schematic diagram of activities leading to a wetland/non-wetland determination

21. **Routine approach.** The routine approach normally will be used in the vast majority of determinations. The routine approach requires minimal level of effort, using primarily qualitative procedures. This approach can be further subdivided into three levels of required effort, depending on the complexity of the area and the amount and quality of preliminary data available. The following levels of effort may be used for routine determinations:

a. *Level 1 - Onsite inspection unnecessary.* (Part IV, Section D, Subsection 1).

b. *Level 2 - Onsite inspection necessary.* (Part IV, Section D, Subsection 2).

c. *Level 3 - Combination of Levels 1 and 2.* (Part IV, Section D, Subsection 3).

22. **Comprehensive approach.** The comprehensive approach requires application of quantitative procedures for making wetland determinations. It should

seldom be necessary, and its use should be restricted to situations in which the wetland is very complex and/or is the subject of likely or pending litigation. Application of the comprehensive approach (Part IV, Section E) requires a greater level of expertise than application of the routine approach, and only experienced field personnel with sufficient training should use this approach.

Flexibility

23. Procedures described for both routine and comprehensive wetland determinations have been tested and found to be reliable. However, site-specific conditions may require modification of field procedures. For example, slope configuration in a complex area may necessitate modification of the baseline and transect positions. Since specific characteristics (e.g., plant density) of a given plant community may necessitate the use of alternate methods for determining the dominant species, the user has the flexibility to employ sampling procedures other than those described. However, the basic approach for making wetland determinations should not be altered (i.e., the determination should be based on the dominant plant species, soil characteristics, and hydrologic characteristics of the area in question). The user should document reasons for using a different characterization procedure than described in the manual. *CAUTION: Application of methods described in the manual or the modified sampling procedures requires that the user be familiar with wetlands of the area and use his or her training, experience, and good judgment in making wetland determinations.*

Part II: Technical Guidelines

24. The interaction of hydrology, vegetation, and soil results in the development of characteristics unique to wetlands. Therefore, the following technical guideline for wetlands is based on these three parameters, and diagnostic environmental characteristics used in applying the technical guideline are represented by various indicators of these parameters.

25. Because wetlands may be bordered by both wetter areas (aquatic habitats) and by drier areas (nonwetlands), guidelines are presented for wetlands, deepwater aquatic habitats, and nonwetlands. However, procedures for applying the technical guidelines for deepwater aquatic habitats and nonwetlands are not included in the manual.

Wetlands

26. The following definition, diagnostic environmental characteristics, and technical approach comprise a guideline for the identification and delineation of wetlands:

a. *Definition.* The CE (*Federal Register* 1982) and the EPA (*Federal Register* 1980) jointly define wetlands 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.

b. *Diagnostic environmental characteristics.* Wetlands have the following general diagnostic environmental characteristics:

(1) *Vegetation.* The prevalent vegetation consists of macrophytes that are typically adapted to areas having hydrologic and soil conditions described in *a* above. Hydrophytic species, due to morphological, physiological, and/or reproductive adaptation(s), have the ability to grow, effectively compete, reproduce, and/or persist in anaerobic

soil conditions.[1] Indicators of vegetation associated with wetlands are listed in paragraph 35.

(2) *Soil*. Soils are present and have been classified as hydric, or they possess characteristics that are associated with reducing soil conditions. Indicators of soils developed under reducing conditions are listed in paragraphs 44 and 45.

(3) *Hydrology*. The area is inundated either permanently or periodically at mean water depths ≤6.6 ft, or the soil is saturated to the surface at some time during the growing season of the prevalent vegetation.[2] Indicators of hydrologic conditions that occur in wetlands are listed in paragraph 49.

c. Technical approach for the identification and delineation of wetlands. Except in certain situations defined in this manual, evidence of a minimum of one positive wetland indicator from each parameter (hydrology, soil, and vegetation) must be found in order to make a positive wetland determination.

Deepwater Aquatic Habitats

27. The following definition, diagnostic environmental characteristics, and technical approach comprise a guideline for deepwater aquatic habitats:

a. Definition. Deepwater aquatic habitats are areas that are permanently inundated at mean annual water depths >6.6 ft or permanently inundated areas ≤6.6 ft in depth that do not support rooted-emergent or woody plant species.[3]

b. Diagnostic environmental characteristics. Deepwater aquatic habitats have the following diagnostic environmental characteristics:

(1) *Vegetation.* No rooted-emergent or woody plant species are present in these permanently inundated areas.

(2) *Soil*. The substrate technically is not defined as a soil if the mean water depth is >6.6 ft or if it will not support rooted emergent or woody plants.

---

[1] Species (e.g., *Acer rubrum*) having broad ecological tolerances occur in both wetlands and nonwetlands.

[2] The period of inundation or soil saturation varies according to the hydrologic/soil moisture regime and occurs in both tidal and nontidal situations.

[3] Areas ≤6.6 ft mean annual depth that support only submergent aquatic plants are vegetated shallows, not wetlands.

(3) *Hydrology*. The area is permanently inundated at mean water depths >6.6 ft.

c. Technical approach for the identification and delineation of deepwater aquatic habitats. When any one of the diagnostic characteristics identified in *b* above is present, the area is a deepwater aquatic habitat.

Nonwetlands

28. The following definition, diagnostic environmental characteristics, and technical approach comprise a guideline for the identification and delineation of nonwetlands:

a. Definition. Nonwetlands include uplands and lowland areas that are neither deepwater aquatic habitats, wetlands, nor other special aquatic sites. They are seldom or never inundated, or if frequently inundated, they have saturated soils for only brief periods during the growing season, and, if vegetated, they normally support a prevalence of vegetation typically adapted for life only in aerobic soil conditions.

b. Diagnostic environmental characteristics. Nonwetlands have the following general diagnostic environmental characteristics:

(1) *Vegetation.* The prevalent vegetation consists of plant species that are typically adapted for life only in aerobic soils. These mesophytic and/or xerophytic macrophytes cannot persist in predominantly anaerobic soil conditions.[1]

(2) *Soil*. Soils, when present, are not classified as hydric, and possess characteristics associated with aerobic conditions.

(3) *Hydrology*. Although the soil may be inundated or saturated by surface water or ground water periodically during the growing season of the prevalent vegetation, the average annual duration of inundation or soil saturation does not preclude the occurrence of plant species typically adapted for life in aerobic soil conditions.

c. Technical approach for the identification and delineation of nonwetlands. When any one of the diagnostic characteristics identified in *b* above is present, the area is a nonwetland.

[1] Some species, due to their broad ecological tolerances, occur in both wetlands and nonwetlands (e.g., *Acer rubrum).*

Part III: Characteristics and Indicators of Hydrophytic Vegetation, Hydric Soils, and Wetland Hydrology

Hydrophytic Vegetation

Definition

29. **Hydrophytic vegetation.** Hydrophytic vegetation is defined herein as the sum total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present. The vegetation occurring in a wetland may consist of more than one plant community (species association). The plant community concept is followed throughout the manual. Emphasis is placed on the assemblage of plant species that exert a controlling influence on the character of the plant community, rather than on indicator species. Thus, the presence of scattered individuals of an upland plant species in a community dominated by hydrophytic species is not a sufficient basis for concluding that the area is an upland community. Likewise, the presence of a few individuals of a hydrophytic species in a community dominated by upland species is not a sufficient basis for concluding that the area has hydrophytic vegetation. *CAUTION: In determining whether an area is "vegetated" for the purpose of Section 404 jurisdiction, users must consider the density of vegetation at the site being evaluated. While it is not possible to develop a numerical method to determine how many plants or how much biomass is needed to establish an area as being vegetated or unvegetated, it is intended that the predominant condition of the site be used to make that characterization. This concept applies to areas grading from wetland to upland, and from wetland to other waters. This limitation would not necessarily apply to areas which have been disturbed by man or recent natural events.*

30. **Prevalence of vegetation.** The definition of wetlands includes the phrase "prevalence of vegetation." Prevalence, as applied to vegetation, is an imprecise, seldom-used ecological term. As used in the wetlands definition, prevalence refers to the plant community or communities that occur in an area at some point in time. Prevalent vegetation is characterized by the dominant species comprising the plant community or communities. Dominant plant species are those that contribute more to the character of a plant community than other species present, as estimated or measured in terms of some ecological parameter or parameters. The two most commonly used estimates of dominance are basal area (trees) and percent areal cover (herbs). Hydrophytic vegetation is prevalent in an area when the dominant species comprising the plant community or communities are typically adapted for life in saturated soil conditions.

USER NOTES: The "50/20 rule" is the recommended method for selecting dominant species from a plant community when quantitative data are available. The rule states that for each stratum in the plant community, dominant species are the most abundant plant species (when ranked in descending order of abundance and cumulatively totaled) that immediately exceed 50% of the total dominance measure for the stratum, plus any additional species that individually comprise 20% or more of the total dominance measure for the stratum. The list of dominant species is then combined across strata. (HQUSACE, 6 Mar 92)

31. **Typically adapted.** The term "typically adapted" refers to a species being normally or commonly suited to a given set of environmental conditions, due to some morphological, physiological, or reproductive adaptation (Appendix C, Section 3). As used in the CE wetlands definition, the governing environmental conditions for hydrophytic vegetation are saturated soils resulting from periodic inundation or saturation by surface or ground water. These periodic events must occur for sufficient duration to result in anaerobic soil conditions. When the dominant species in a plant community are typically adapted for life in anaerobic soil conditions, hydrophytic vegetation is present. Species ~~listed in Appendix C, Section 1 or 2,~~ that have an indicator status of OBL, FACW, or FAC[1] (Table 1) are considered to be typically adapted for life in anaerobic soil conditions (see paragraph 35*a*).

Influencing factors

32. Many factors (e.g., light, temperature, soil texture and permeability, man-induced disturbance, etc.) influence the character of hydrophytic vegetation. However, hydrologic factors exert an overriding influence on species that can occur in wetlands. Plants lacking morphological, physiological, and/or reproductive adaptations cannot grow, effectively compete, reproduce, and/or persist in areas that are subject to prolonged inundation or saturated soil conditions.

[1] Species having a FAC- indicator status are not considered to be typically adapted for life in anaerobic soil conditions.

Table 1
Plant Indicator Status Categories[1]

Indicator Category	Indicator Symbol	Definition
Obligate Wetland Plants	OBL	Plants that occur almost always (estimated probability >99 percent) in wetlands under natural conditions, but which may also occur rarely (estimated probability <1 percent) in nonwetlands. Examples: *Spartina alterniflora, Taxodium distichum*.
Facultative Wetland Plants	FACW	Plants that occur usually (estimated probability >67 percent to 99 percent) in wetlands, but also occur (estimated probability 1 percent to 33 percent) in nonwetlands. Examples: *Fraxinus pennsylvanica, Cornus stolonifera.*
Facultative Plants	FAC	Plants with a similar likelihood (estimated probability 33 percent to 67 percent) of occurring in both wetlands and nonwetlands. Examples: *Gleditsia triacanthos, Smilax rotundifolia.*
Facultative Upland Plants	FACU	Plants that occur sometimes (estimated probability 1 percent to <33 percent) in wetlands, but occur more often (estimated probability >67 percent to 99 percent) in nonwetlands. Examples: *Quercus rubra, Potentilla arguta.*
Obligate Upland Plants	UPL	Plants that occur rarely (estimated probability <1 percent) in wetlands, but occur almost always (estimated probability >99 percent) in nonwetlands under natural conditions. Examples: *Pinus echinata, Bromus mollis*.

[1] Categories were originally developed and defined by the USFWS National Wetlands Inventory and subsequently modified by the National Plant List Panel. The three facultative categories are subdivided by (+) and (–) modifiers ~~(see Appendix C, Section 1)~~.

Geographic diversity

33. Many hydrophytic vegetation types occur in the United States due to the diversity of interactions among various factors that influence the distribution of hydrophytic species. General climate and flora contribute greatly to regional variations in hydrophytic vegetation. Consequently, the same associations of hydrophytic species occurring in the southeastern United States are not found in the Pacific Northwest. In addition, local environmental conditions (e.g., local climate, hydrologic regimes, soil series, salinity, etc.) may result in broad variations in hydrophytic associations within a given region. For example, a coastal saltwater marsh will consist of different species than an inland freshwater marsh in the same region. An overview of hydrophytic vegetation occurring in each region of the Nation has been published by the CE in a series of eight preliminary wetland guides (Table 2), and a group of wetland and estuarine ecological profiles (Table 3) has been published by FWS.

Classification

34. Numerous efforts have been made to classify hydrophytic vegetation. Most systems are based on general characteristics of the dominant species occurring in each vegetation type. These range from the use of general physiognomic categories (e.g., overstory, subcanopy, ground cover, vines) to specific vegetation types (e.g., forest type numbers as developed by the Society of American Foresters). In other cases, vegetational characteristics are combined with hydrologic features to produce more elaborate systems. The most recent example of such a system was developed for the FWS by Cowardin et al. (1979).

Table 2
List of CE Preliminary Wetland Guides

Region	Publication Date	WES Report No.
Peninsular Florida	February 1978	TR Y-78-2
Puerto Rico	April 1978	TR Y-78-3
West Coast States	April 1978	TR-Y-78-4
Gulf Coastal Plain	May 1978	TR Y-78-5
Interior	May 1982	TR Y-78-6
South Atlantic States	May 1982	TR Y-78-7
North Atlantic States	May 1982	TR Y-78-8
Alaska	February 1984	TR Y-78-9

Table 3
List of Ecological Profiles Produced by the FWS Biological Services Program

Title	Publication Date	FWS Publication No.
"The Ecology of Intertidal Flats of North Carolina"	1979	79/39
"The Ecology of New England Tidal Flats"	1982	81/01
"The Ecology of the Mangroves of South Florida"	1982	81/24
"The Ecology of Bottomland Hardwood Swamps of the Southeast"	1982	81/37
"The Ecology of Southern California Coastal Salt Marshes"	1982	81/54
"The Ecology of New England High Salt Marshes"	1982	81/55
"The Ecology of Southeastern Shrub Bogs (Pocosins) and Carolina Bays"	1982	82/04
"The Ecology of the Apalachicola Bay System"	1984	82/05
"The Ecology of the Pamlico River, North Carolina"	1984	82/06
"The Ecology of the South Florida Coral Reefs"	1984	82/08
"The Ecology of the Sea Grasses of South Florida"	1982	82/25
"The Ecology of Tidal Marshes of the Pacific Northwest Coast"	1983	82/32
"The Ecology of Tidal Freshwater Marshes of the U.S. East Coast"	1984	83/17
"The Ecology of San Francisco Bay Tidal Marshes"	1983	82/23
"The Ecology of Tundra Ponds of the Arctic Coastal Plain"	1984	83/25
"The Ecology of Eelgrass Meadows of the Atlantic Coast"	1984	84/02
"The Ecology of Delta Marshes of Louisiana"	1984	84/09
"The Ecology of Eelgrass Meadows in the Pacific Northwest"	1984	84/24
"The Ecology of Irregularly Flooded Marshes of North-eastern Gulf of Mexico"	(In press)	85(7.1)
"The Ecology of Giant Kelp Forests in California"	1985	85(7.2)

Indicators of hydrophytic vegetation

35. Several indicators may be used to determine whether hydrophytic vegetation is present on a site. However, the presence of a single individual of a hydrophytic species does not mean that hydrophytic vegetation is present. The strongest case for the presence of hydrophytic vegetation can be made when

several indicators, such as those in the following list, are present. However, any one of the following is indicative that hydrophytic vegetation is present:[1]

a. *More than 50 percent of the dominant species are OBL, FACW, or FAC*[2] *(Table 1) on lists of plant species that occur in wetlands.* A national interagency panel has prepared a National List of Plant Species that occur in wetlands. This list categorizes species according to their affinity for occurrence in wetlands. ~~Regional subset lists of the national list, including only species having an indicator status of OBL, FACW, or FAC, are presented in Appendix C, Section 1. The CE has also developed regional lists of plant species that commonly occur in wetlands (Appendix C, Section 2). Either list may be used.~~

USER NOTES: CE-supplied plant lists are obsolete and have been superseded by the May 1988 version of the "National List of Plant Species that Occur in Wetlands" published by the U.S. Fish and Wildlife Service and available on the World Wide Web. Subsequent changes to the May 1988 national plant list, or regional versions of the national list, should not be used until they receive official review and approval. (HQUSACE, 27 Aug 91 and 17 Jan 96)

Note: A District that, on a subregional basis, questions the indicator status of FAC species may use the following option: When FAC species occur as dominants along with other dominants that are not FAC (either wetter or drier than FAC), the FAC species can be considered as neutral, and the vegetation decision can be based on the number of dominant species wetter than FAC as compared to the number of dominant species drier than FAC. When a tie occurs or all dominant species are FAC, the nondominant species must be considered. The area has hydrophytic vegetation when more than 50 percent of all considered species are wetter than FAC. When either all considered species are FAC or the number of species wetter than FAC equals the number of species drier than FAC, the wetland determination will be based on the soil and hydrology parameters. Districts adopting this option should provide documented support to the Corps representative on the regional plant list panel, so that a change in indicator status of FAC species of concern can be pursued. Corps representatives on the regional and national plant list panels will continually strive to ensure that plant species are properly designated on both a regional and subregional basis.

[1] Indicators are listed in order of decreasing reliability. Although all are valid indicators, some are stronger than others. When a decision is based on an indicator appearing in the lower portion of the list, re-evaluate the parameter to ensure that the proper decision was reached.

[2] FAC+ species are considered to be wetter (i.e., have a greater estimated probability of occurring in wetlands) than FAC species, while FAC- species are considered to be drier (i.e., have a lesser estimated probability of occurring in wetlands) than FAC species.

USER NOTES: The FAC-neutral option can not be used to exclude areas as wetlands that meet the basic vegetation rule (i.e., more than 50% of dominant species are FAC, FACW, or OBL) and meet wetland hydrology and hydric soil requirements. Presence of a plant community that satisfies the FAC-neutral option may be used as a secondary indicator of wetland hydrology. (HQUSACE, 6 Mar 92)

b. Other indicators. Although there are several other indicators of hydrophytic vegetation, it will seldom be necessary to use them. However, they may provide additional useful information to strengthen a case for the presence of hydrophytic vegetation. Additional training and/or experience may be required to employ these indicators.

(1) *Visual observation of plant species growing in areas of prolonged inundation and/or soil saturation.* This indicator can only be applied by experienced personnel who have accumulated information through several years of field experience and written documentation (field notes) that certain species commonly occur in areas of prolonged (>10 percent) inundation and/or soil saturation during the growing season. Species such as *Taxodium distichum, Typha latifolia,* and *Spartina alterniflora* normally occur in such areas. Thus, occurrence of species commonly observed in other wetland areas provides a strong indication that hydrophytic vegetation is present. *CAUTION: The presence of standing water or saturated soil on a site is insufficient evidence that the species present are able to tolerate long periods of inundation. The user must relate the observed species to other similar situations and determine whether they are normally found in wet areas, taking into consideration the season and immediately preceding weather conditions.*

(2) *Morphological adaptations.* Some hydrophytic species have easily recognized physical characteristics that indicate their ability to occur in wetlands. A given species may exhibit several of these characteristics, but not all hydrophytic species have evident morphological adaptations. A list of such morphological adaptations and a partial list of plant species with known morphological adaptations for occurrence in wetlands are provided in Appendix C, Section 3.

(3) *Technical literature.* The technical literature may provide a strong indication that plant species comprising the prevalent vegetation are commonly found in areas where soils are periodically saturated for long periods. Sources of available literature include:

(a) *Taxonomic references.* Such references usually contain at least a general description of the habitat in which a species occurs. A habitat description such as, "Occurs in water of streams and lakes and in alluvial floodplains subject to

periodic flooding," supports a conclusion that the species typically occurs in wetlands. Examples of some useful taxonomic references are provided in Table 4.

Table 4
List of Some Useful Taxonomic References

Title	Author(s)
Manual of Vascular Plants of Northeastern United States and Adjacent Canada	Gleason and Cronquist (1963)
Gray's Manual of Botany, 8th edition	Fernald (1950)
Manual of the Southeastern Flora	Small (1933)
Manual of the Vascular Flora of the Carolinas	Radford, Ahles, and Bell (1968)
A Flora of Tropical Florida	Long and Lakela (1976)
Aquatic and Wetland Plants of the Southwestern United States	Correll and Correll (1972)
Arizona Flora	Kearney and Peebles (1960)
Flora of the Pacific Northwest	Hitchcock and Cronquist (1973)
A California Flora	Munz and Keck (1959)
Flora of Missouri	Steyermark (1963)
Manual of the Plants of Colorado	Harrington (1979)
Intermountain Flora - Vascular Plants of the Intermountain West, USA - Vols I and II	Cronquist et al. (1972)
Flora of Idaho	Davis (1952)
Aquatic and Wetland Plants of the Southeastern United States - Vols I and II	Godfrey and Wooten (1979)
Manual of Grasses of the U.S.	Hitchcock (1950)

(b) *Botanical journals.* Some botanical journals contain studies that define species occurrence in various hydrologic regimes. Examples of such journals include: *Ecology, Ecological Monographs, American Journal of Botany, Journal of American Forestry, and Wetlands: The Journal of the Society of Wetland Scientists.*

(c) *Technical reports.* Governmental agencies periodically publish reports (e.g., literature reviews) that contain information on plant species occurrence in relation to hydrologic regimes. Examples of such publications include the CE preliminary regional wetland guides (Table 2) published by the U.S. Army Engineer Waterways Experiment Station (WES) and the wetland community and estuarine profiles of various habitat types (Table 3) published by the FWS.

(d) *Technical workshops, conferences, and symposia.* Publications resulting from periodic scientific meetings contain valuable information that can be used to support a decision regarding the presence of hydrophytic vegetation. These usually address specific regions or wetland types. For example, distribution of bottomland hardwood forest species in relation to hydrologic regimes was examined at a workshop on bottomland hardwood forest wetlands of the Southeastern United States (Clark and Benforado 1981).

(e) *Wetland plant database.* The NWI is producing a Plant Database that contains habitat information on approximately 5,200 plant species that occur at some estimated probability in wetlands, as compiled from the technical literature. When completed, this computerized database will be available to all governmental agencies.

(4) *Physiological adaptations.* Physiological adaptations include any features of the metabolic processes of plants that make them particularly fitted for life in saturated soil conditions. *NOTE: It is impossible to detect the presence of physiological adaptations in plant species during onsite visits.* Physiological adaptations known for hydrophytic species and species known to exhibit these adaptations are listed and discussed in Appendix C, Section 3.

(5) *Reproductive adaptations.* Some plant species have reproductive features that enable them to become established and grow in saturated soil conditions. Reproductive adaptations known for hydrophytic species are presented in Appendix C, Section 3.

Hydric Soils

Definition

36. ~~A hydric soil is a soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation (U.S. Department of Agriculture (USDA) Soil Conservation Service (SCS) 1985, as amended by the National Technical Committee for Hydric Soils (NTCHS) in December 1986).~~

Criteria for hydric soils

37. ~~Based on the above definition, the NTCHS developed the following criteria for hydric soils:~~

a. ~~All Histosols[1] except Folists;~~

b. ~~Soils in Aquic suborders, Aquic subgroups, Albolls suborder, Salorthids great group, or Pell great groups of Vertisols that are:~~

(1) ~~Somewhat poorly drained and have a water table less than 0.5 ft[2] from the surface for a significant period (usually a week or more) during the growing season, or~~

(2) ~~Poorly drained or very poorly drained and have either:~~

(a) ~~A water table at less than 1.0 ft from the surface for a significant period (usually a week or more) during the growing season if permeability is equal to or greater than 6.0 in/hr in all layers within 20 inches; or~~

(b) ~~A water table at less than 1.5 ft from the surface for a significant period (usually a week or more) during the growing season if permeability is less than 6.0 in/hr in any layer within 20 inches; or~~

c. ~~Soils that are ponded for long or very long duration during the growing season; or~~

d. ~~Soils that are frequently flooded for long duration or very long duration during the growing season.~~

USER NOTES: The hydric soil definition and criteria published in the 1987 Corps Manual are obsolete. Current hydric soil definition, criteria, and lists are available over the World Wide Web from the U.S.D.A. Natural Resources Conservation Service (NRCS). (HQUSACE, 27 Aug 91, 6 Mar 92)

A hydric soil may be either drained or undrained, and a drained hydric soil may not continue to support hydrophytic vegetation. Therefore, not all areas having hydric soils will qualify as wetlands. Only when a hydric soil supports hydrophytic vegetation and the area has indicators of wetland hydrology may the soil be referred to as a "wetland" soil.

38. A drained hydric soil is one in which sufficient ground or surface water has been removed by artificial means such that the area will no longer support hydrophyte vegetation. Onsite evidence of drained soils includes:

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[1] Soil nomenclature follows USDA-SCS (1975).

[2] A table of factors for converting Non-SI Units of Measurement to SI (metric) units is presented on page x.

a. Presence of ditches or canals of sufficient depth to lower the water table below the major portion of the root zone of the prevalent vegetation.

b. Presence of dikes, levees, or similar structures that obstruct normal inundation of an area.

c. Presence of a tile system to promote subsurface drainage.

d. Diversion of upland surface runoff from an area.

Although it is important to record such evidence of drainage of an area, a hydric soil that has been drained or partially drained still allows the soil parameter to be met. However, the area will not qualify as a wetland if the degree of drainage has been sufficient to preclude the presence of either hydrophytic vegetation or a hydrologic regime that occurs in wetlands. *NOTE: The mere presence of drainage structures in an area is not sufficient basis for concluding that a hydric soil has been drained; such areas may continue to have wetland hydrology.*

General information

39. Soils consist of unconsolidated, natural material that supports, or is capable of supporting, plant life. The upper limit is air and the lower limit is either bedrock or the limit of biological activity. Some soils have very little organic matter (mineral soils), while others are composed primarily of organic matter (Histosols). The relative proportions of particles (sand, silt, clay, and organic matter) in a soil are influenced by many interacting environmental factors. As normally defined, a soil must support plant life. The concept is expanded to include substrates that could support plant life. For various reasons, plants may be absent from areas that have well-defined soils.

40. A soil profile (Figure 2) consists of various soil layers described from the surface downward. Most soils have two or more identifiable horizons. A soil horizon is a layer oriented approximately parallel to the soil surface, and usually is differentiated from contiguous horizons by characteristics that can be seen or measured in the field (e.g., color, structure, texture, etc.). Most mineral soils have A-, B-, and C-horizons, and many have surficial organic layers (O-horizon). The A-horizon, the surface soil or topsoil, is a zone in which organic matter is usually being added to the mineral soil. It is also the zone from which both mineral and organic matter are being moved slowly downward. The next major horizon is the B-horizon, often referred to as the subsoil. The B-horizon is the zone of maximum accumulation of materials. It is usually characterized by higher clay content and/or more pronounced soil structure development and lower organic matter than the A-horizon. The next major horizon is usually the C-horizon, which consists of unconsolidated parent material that has not been sufficiently weathered to exhibit characteristics of the B-horizon. Clay content and degree of soil structure development in the C-horizon are usually less than in the B-horizon. The lowest major horizon, the R-horizon, consists of consoli-

dated bedrock. In many situations, this horizon occurs at such depths that it has no significant influence on soil characteristics.

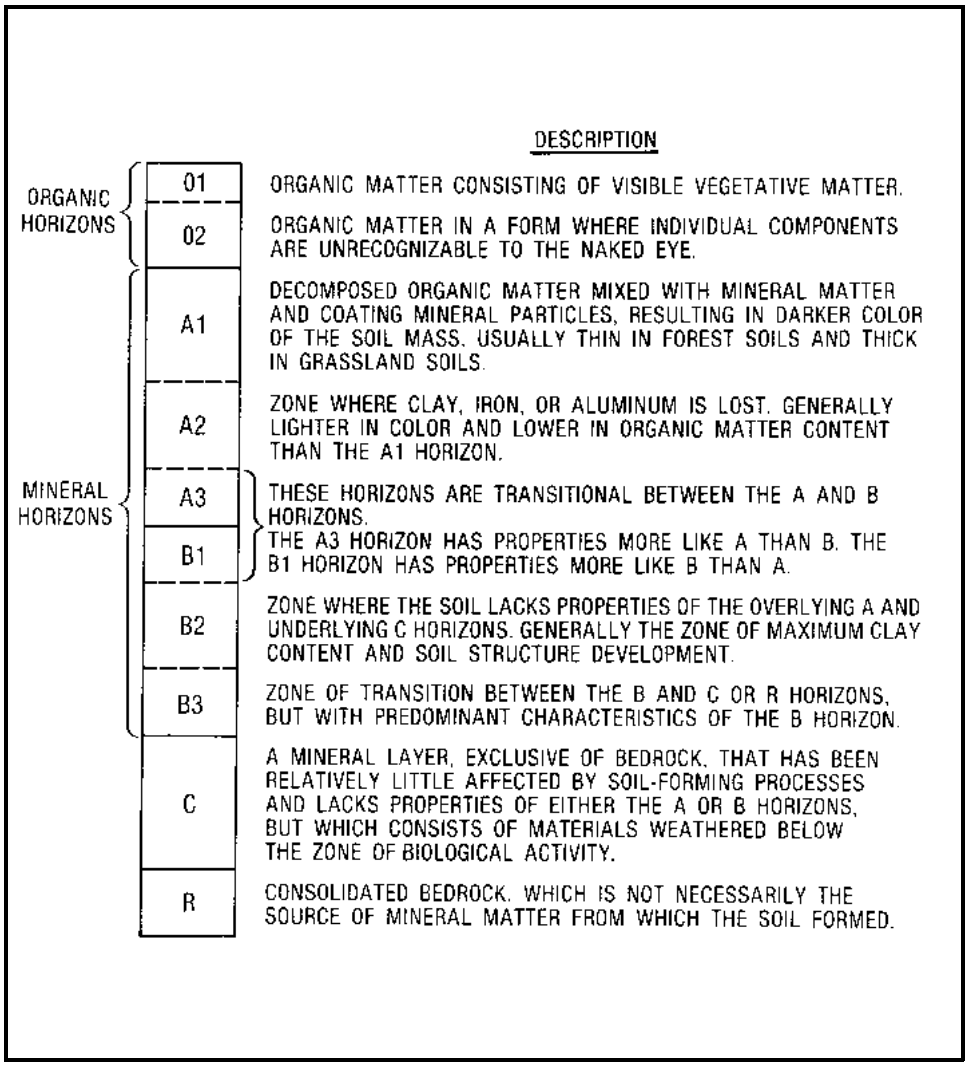


Figure 2. Generalized soil profile

Influencing factors

41. Although all soil-forming factors (climate, parent material, relief, organisms, and time) affect the characteristics of a hydric soil, the overriding influence is the hydrologic regime. The unique characteristics of hydric soils result from the influence of periodic or permanent inundation or soil saturation for sufficient duration to effect anaerobic conditions. Prolonged anaerobic soil conditions lead to a reducing environment, thereby lowering the soil redox potential. This results in chemical reduction of some soil components (e.g., iron and manganese oxides), which leads to development of soil colors and other physical characteristics that usually are indicative of hydric soils.

Classification

42. Hydric soils occur in several categories of the current soil classification system, which is published in *Soil Taxonomy* (USDA-SCS 1975). This classification system is based on physical and chemical properties of soils that can be seen, felt, or measured. Lower taxonomic categories of the system (e.g., soil series and soil phases) remain relatively unchanged from earlier classification systems.

43. Hydric soils may be classified into two broad categories: organic and mineral. Organic soils (Histosols) develop under conditions of nearly continuous saturation and/or inundation. All organic soils are hydric soils except Folists, which are freely drained soils occurring on dry slopes where excess litter accumulates over bedrock. Organic hydric soils are commonly known as peats and mucks. All other hydric soils are mineral soils. Mineral soils have a wide range of textures (sandy to clayey) and colors (red to gray). Mineral hydric soils are those periodically saturated for sufficient duration to produce chemical and physical soil properties associated with a reducing environment. They are usually gray and/or mottled immediately below the surface horizon (see paragraph 44*d*), or they have thick, dark-colored surface layers overlying gray or mottled subsurface horizons.

Wetland indicators (nonsandy soils)

44. Several indicators are available for determining whether a given soil meets the definition and criteria for hydric soils. Any one of the following indicates that hydric soils are present:[1]



Figure 3. Organic soil

a. *Organic soils (Histosols).* A soil is an organic soil when: (1) more than 50 percent (by volume) of the upper 32 inches of soil is composed of organic soil material;[2] or (2) organic soil material of any thickness rests on bedrock. Organic soils (Figure 3) are saturated for long periods and are commonly called peats or mucks.

b. *Histic epipedons.* A histic epipedon is an 8- to 16-inch layer at or near the surface of a mineral hydric soil that is saturated with

[1] Indicators are listed in order of decreasing reliability. Although all are valid indicators, some are stronger indicators than others. When a decision is based on an indicator appearing in the lower portion of the list, re-evaluate the parameter to ensure that the proper decision was reached.

[2] A detailed definition of organic soil material is available in USDA-SCS (1975).

water for 30 consecutive days or more in most years and contains a minimum of 20 percent organic matter when no clay is present or a minimum of 30 percent organic matter when clay content is 60 percent or greater. Soils with histic epipedons are inundated or saturated for sufficient periods to greatly retard aerobic decomposition of the organic surface, and are considered to be hydric soils.

c. *Sulfidic material.* When mineral soils emit an odor of rotten eggs, hydrogen sulfide is present. Such odors are only detected in waterlogged soils that are permanently saturated and have sulfidic material within a few centimeters of the soil surface. Sulfides are produced only in a reducing environment.

d. *Aquic or peraquic moisture regime.* An aquic moisture regime is a reducing one; i.e., it is virtually free of dissolved oxygen because the soil is saturated by ground water or by water of the capillary fringe (USDA-SCS 1975). Because dissolved oxygen is removed from ground water by respiration of microorganisms, roots, and soil fauna, it is also implicit that the soil temperature is above biologic zero (5° C) at some time while the soil is saturated. Soils with *peraquic* moisture regimes are characterized by the presence of ground water always at or near the soil surface. Examples include soils of tidal marshes and soils of closed, landlocked depressions that are fed by permanent streams.

e. *Reducing soil conditions.* Soils saturated for long or very long duration will usually exhibit reducing conditions. Under such conditions, ions of iron are transformed from a ferric valence state to a ferrous valence state. This condition can often be detected in the field by a ferrous iron test. A simple colorimetric field test kit has been developed for this purpose. When a soil extract changes to a pink color upon addition of α,α'-dipyridyl, ferrous iron is present, which indicates a reducing soil environment. *NOTE: This test cannot be used in mineral hydric soils having low iron content, organic soils, and soils that have been desaturated for significant periods of the growing season.*

f. *Soil colors.* The colors of various soil components are often the most diagnostic indicator of hydric soils. Colors of these components are strongly influenced by the frequency and duration of soil saturation, which leads to reducing soil conditions. Mineral hydric soils will be either gleyed or will have bright mottles and/or low matrix chroma. These are discussed below:

(1) *Gleyed soils (gray colors).* Gleyed soils develop when anaerobic soil conditions result in pronounced chemical reduction of iron, manganese, and other elements, thereby producing gray soil colors. Anaerobic conditions that occur in waterlogged soils result in the predominance of reduction processes, and such soils are greatly reduced. Iron is one of the most abundant elements in soils. Under anaerobic conditions, iron in converted from the oxidized (ferric)



Figure 4. Gleyed soil



Figure 5. Soil showing matrix (brown) and mottles (reddish-brown)

state to the reduced (ferrous) state, which results in the bluish, greenish, or grayish colors associated with the gleying effect (Figure 4). Gleying immediately below the A-horizon or 10 inches (whichever is shallower) is an indication of a markedly reduced soil, and gleyed soils are hydric soils. Gleyed soil conditions can be determined by using the gley page of the Munsell Color Book (Munsell Color 1975).

(2) *Soils with bright mottles and/or low matrix chroma.* Mineral hydric soils that are saturated for substantial periods of the growing season (but not long enough to produce gleyed soils) will either have bright mottles and a low matrix chroma or will lack mottles but have a low matrix chroma (see Appendix D, Section 1, for a definition and discussion of "chroma" and other components of soil color). *Mottled* means "marked with spots of contrasting color." Soils that have brightly colored mottles and a low matrix chroma are indicative of a fluctuating water table. The soil *matrix* is the portion (usually more than 50 percent) of a given soil layer that has the predominant color (Figure 5). Mineral hydric soils usually have one of the following color features in the horizon immediately below the A-horizon or 10 inches (whichever is shallower):

(a) Matrix chroma of 2 or less[1] in mottled soils.

(b) Matrix chroma of 1 or less[1] in unmottled soils.

NOTE: The matrix chroma of some dark (black) mineral hydric soils will not conform to the criteria described in (a) and (b) above; in such soils, gray mottles occurring at 10 inches or less are indicative of hydric conditions.

[1] Colors should be determined in soils that have been moistened; otherwise, state that colors are for dry soils.

CAUTION: Soils with significant coloration due to the nature of the parent material (e.g., red soils of the Red River Valley) may not exhibit the above characteristics. In such cases, this indicator cannot be used.

g. Soil appearing on hydric soils list. Using the criteria for hydric soils (paragraph 37), the NTCHS has developed a list of hydric soils.

USER NOTES: The NRCS has developed local lists of hydric soil mapping units that are available from NRCS county and area offices. These local lists are the preferred hydric soil lists to use in making wetland determinations. (HQUSACE, 6 Mar 92)

Listed soils have reducing conditions for a significant portion of the growing season in a major portion of the root zone and are frequently saturated within 12 inches of the soil surface. ~~The NTCHS list of hydric soils is presented in Appendix D, Section 2.~~ *CAUTION: Be sure that the profile description of the mapping unit conforms to that of the sampled soil.*

h. Iron and manganese concretions. During the oxidation-reduction process, iron and manganese in suspension are sometimes segregated as oxides into concretions or soft masses (Figure 6). These accumulations are usually black or dark brown. Concretions >2 mm in diameter occurring within 7.5 cm of the surface are evidence that the soil is saturated for long periods near the surface.



Figure 6. Iron and manganese concretions

Wetland indicators (sandy soils)

45. Not all indicators listed in paragraph 44 can be applied to sandy soils. *In particular, soil color should not be used as an indicator in most sandy soils.* However, three additional soil features may be used as indicators of sandy hydric soils, including:

a. High organic matter content in the surface horizon. Organic matter tends to accumulate above or in the surface horizon of sandy soils that

are inundated or saturated to the surface for a significant portion of the growing season. Prolonged inundation or saturation creates anaerobic conditions that greatly reduce oxidation of organic matter.

b. *Streaking of subsurface horizons by organic matter.* Organic matter is moved downward through sand as the water table fluctuates. This often occurs more rapidly and to a greater degree in some vertical sections of a sandy soil containing high content of organic matter than in others. Thus, the sandy soil appears vertically streaked with darker areas. When soil from a darker area is rubbed between the fingers, the organic matter stains the fingers.

c. *Organic pans.* As organic matter is moved downward through sandy soils, it tends to accumulate at the point representing the most commonly occurring depth to the water table. This organic matter tends to become slightly cemented with aluminum, forming a thin layer of hardened soil (spodic horizon). These horizons often occur at depths of 12 to 30 inches below the mineral surface. Wet spodic soils usually have thick dark surface horizons that are high in organic matter with dull, gray horizons above the spodic horizon.

USER NOTES: The NRCS has developed regional lists of "Field Indicators of Hydric Soils in the United States" (Version 3.2, July 1996, or later). Until approved, these indicators do not supersede those given in the 1987 Corps Manual and supplemental guidance but may be used as supplementary information. Several of the NRCS indicators were developed specifically to help in identifying hydric soils in certain problem soil types (e.g., sandy soils, soils derived from red parent materials, soils with thick, dark surfaces). These indicators may be used under procedures given in the Problem Area section of the 1987 Manual. (HQUSACE, 21 Mar 97)

CAUTION: In recently deposited sandy material (e.g., accreting sandbars), it may be impossible to find any of these indicators. In such cases, consider this as a natural atypical situation.

Wetland Hydrology

Definition

46. The term "wetland hydrology" encompasses all hydrologic characteristics of areas that are periodically inundated or have soils saturated to the surface at some time during the growing season. Areas with evident characteristics of wetland hydrology are those where the presence of water has an overriding influence on characteristics of vegetation and soils due to anaerobic and reducing conditions, respectively. Such characteristics are usually present in areas that

are inundated or have soils that are saturated to the surface for sufficient duration to develop hydric soils and support vegetation typically adapted for life in periodically anaerobic soil conditions. Hydrology is often the least exact of the parameters, and indicators of wetland hydrology are sometimes difficult to find in the field. However, it is essential to establish that a wetland area is periodically inundated or has saturated soils during the growing season.

USER NOTES: The 1987 Manual (see glossary, Appendix A) defines "growing season" as the portion of the year when soil temperature (measured 20 inches below the surface) is above biological zero (5° C or 41° F). This period "can be approximated by the number of frost-free days." Estimated starting and ending dates for the growing season are based on 28° F air temperature thresholds at a frequency of 5 years in 10 (HQUSACE, 6 Mar 92). This information is available in NRCS county soil survey reports or from the NRCS Water and Climate Center in Portland, Oregon, for most weather stations in the country.

Influencing factors

47. Numerous factors (e.g., precipitation, stratigraphy, topography, soil permeability, and plant cover) influence the wetness of an area. Regardless, the characteristic common to all wetlands is the presence of an abundant supply of water. The water source may be runoff from direct precipitation, headwater or backwater flooding, tidal influence, ground water, or some combination of these sources. The frequency and duration of inundation or soil saturation varies from nearly permanently inundated or saturated to irregularly inundated or saturated. Topographic position, stratigraphy, and soil permeability influence both the frequency and duration of inundation and soil saturation. Areas of lower elevation in a floodplain or marsh have more frequent periods of inundation and/or greater duration than most areas at higher elevations. Floodplain configuration may significantly affect duration of inundation. When the floodplain configuration is conducive to rapid runoff, the influence of frequent periods of inundation on vegetation and soils may be reduced. Soil permeability also influences duration of inundation and soil saturation. For example, clayey soils absorb water more slowly than sandy or loamy soils, and therefore have slower permeability and remain saturated much longer. Type and amount of plant cover affect both degree of inundation and duration of saturated soil conditions. Excess water drains more slowly in areas of abundant plant cover, thereby increasing frequency and duration of inundation and/or soil saturation. On the other hand, transpiration rates are higher in areas of abundant plant cover, which may reduce the duration of soil saturation.

Classification

48. Although the interactive effects of all hydrologic factors produce a continuum of wetland hydrologic regimes, efforts have been made to classify wet-

land hydrologic regimes into functional categories. These efforts have focused on the use of frequency, timing, and duration of inundation or soil saturation as a basis for classification. A classification system developed for nontidal areas is presented in Table 5. This classification system was slightly modified from the system developed by the Workshop on Bottomland Hardwood Forest Wetlands of the Southeastern United States (Clark and Benforado 1981). Recent research indicates that duration of inundation and/or soil saturation during the growing season is more influential on the plant community than frequency of inundation/ saturation during the growing season (Theriot, in press). Thus, frequency of inundation and soil saturation are not included in Table 5. ~~The WES has developed a computer program that can be used to transform stream gage data to mean sea level elevations representing the upper limit of each hydrologic zone shown in Table 5. This program is available upon request~~.[1]

USER NOTES: Based on Table 5 and on paragraph 55, Step 8.i., an area has wetland hydrology if it is inundated or saturated to the surface continuously for at least 5% of the growing season in most years (50% probability of recurrence). These areas are wetlands if they also meet hydrophytic vegetation and hydric soil requirements. (HQUSACE, 7 Oct 91 and 6 Mar 92)

Table 5
Hydrologic Zones[1] - Nontidal Areas

Zone	Name	Duration[2]	Comments
I[3]	Permanently inundated	100 percent	Inundation >6.6 ft mean water depth
II	Semipermanently to nearly permanently inundated or saturated	>75 - <100 percent	Inundation defined as ≤6.6 ft mean water depth
III	Regularly inundated or saturated	>25 - 75 percent	
IV	Seasonally inundated or saturated	>12.5 - 25 percent	
V	Irregularly inundated or saturated	≥5 - 12.5 percent	Many areas having these hydrologic characteristics are not wetlands
VI	Intermittently or never inundated or saturated	<5 percent	Areas with these hydrologic characteristics are not wetlands

[1] Zones adapted from Clark and Benforado (1981).
[2] Refers to duration of inundation and/or soil saturation during the growing season.
[3] This defines an aquatic habitat zone.

Wetland indicators

49. Indicators of wetland hydrology may include, but are not necessarily limited to: drainage patterns, drift lines, sediment deposition, watermarks,

[1] ~~R. F. Theriot, Environmental Laboratory, U.S. Army Engineer Waterways Experiment Station, P.O. Box 631, Vicksburg, MS 39180.~~

stream gage data and flood predictions, historic records, visual observation of saturated soils, and visual observation of inundation. Any of these indicators may be evidence of wetland hydrologic characteristics. Methods for determining hydrologic indicators can be categorized according to the type of indicator. Recorded data include stream gage data, lake gage data, tidal gage data, flood predictions, and historical records. Use of these data is commonly limited to areas adjacent to streams or other similar areas. Recorded data usually provide both short- and long-term information about frequency and duration of inundation, but contain little or no information about soil saturation, which must be gained from soil surveys or other similar sources. The remaining indicators require field observations. Field indicators are evidence of present or past hydrologic events (e.g., location and height of flooding). Indicators for recorded data and field observations include:[1]

a. *Recorded data.* Stream gage data, lake gage data, tidal gage data, flood predictions, and historical data may be available from the following sources:

(1) *CE District Offices.* Most CE Districts maintain stream, lake, and tidal gage records for major water bodies in their area. In addition, CE planning and design documents often contain valuable hydrologic information. For example, a General Design Memorandum (GDM) usually describes flooding frequencies and durations for a project area. Furthermore, the extent of flooding within a project area is sometimes indicated in the GDM according to elevation (height) of certain flood frequencies (1-, 2-, 5-, 10-year, etc.).

(2) *U.S. Geological Survey (USGS).* Stream and tidal gage data are available from the USGS offices throughout the Nation, and the latter are also available from the National Oceanic and Atmospheric Administration. CE Districts often have such records.

(3) *State, county, and local agencies.* These agencies often have responsibility for flood control/relief and flood insurance.

(4) *Soil Conservation Service Small Watershed Projects.* Planning documents from this agency are often helpful, and can be obtained from the SCS district office in the county.

(5) *Planning documents of developers.*

b. *Field data.* The following field hydrologic indicators can be assessed quickly, and although some of them are not necessarily indicative of hydrologic events that occur only during the growing season, they do provide evidence that inundation and/or soil saturation has occurred:

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[1] Indicators are listed in order of decreasing reliability. Although all are valid indicators, some are stronger indicators than others. When a decision is based on an indicator appearing in the lower portion of the list, re-evaluate the parameter to ensure that the proper decision was reached.

(1) *Visual observation of inundation.* The most obvious and revealing hydrologic indicator may be simply observing the areal extent of inundation. However, because seasonal conditions and recent weather conditions can contribute to surface water being present on a nonwetland site, both should be considered when applying this indicator.

(2) *Visual observation of soil saturation.* Examination of this indicator requires digging a soil pit (Appendix D, Section 1) to a depth of 16 inches and observing the level at which water stands in the hole after sufficient time has been allowed for water to drain into the hole. The required time will vary depending on soil texture. In some cases, the upper level at which water is flowing into the pit can be observed by examining the wall of the hole. This level represents the depth to the water table. The depth to saturated soils will always be nearer the surface due to the capillary fringe.

For soil saturation to impact vegetation, it must occur within a *major portion of the root zone* (usually within 12 inches of the surface) of the prevalent vegetation. The major portion of the root zone is that portion of the soil profile in which more than one half of the plant roots occur. *CAUTION: In some heavy clay soils, water may not rapidly accumulate in the hole even when the soil is saturated. If water is observed at the bottom of the hole but has not filled to the 12-inch depth, examine the sides of the hole and determine the shallowest depth at which water is entering the hole. When applying this indicator, both the season of the year and preceding weather conditions must be considered.*



Figure 7. Watermark on trees

(3) *Watermarks.* Watermarks are most common on woody vegetation. They occur as stains on bark (Figure 7) or other fixed objects (e.g., bridge pillars, buildings, fences, etc.). When several watermarks are present, the highest reflects the maximum extent of recent inundation.

(4) *Drift lines.* This indicator is most likely to be found adjacent to streams or other

sources of water flow in wetlands, but also often occurs in tidal marshes. Evidence consists of deposition of debris in a line on the surface (Figure 8) or debris entangled in aboveground vegetation or other fixed objects. Debris usually consists of remnants of vegetation (branches, stems, and leaves), sediment, litter, and other waterborne materials deposited parallel to the direction of water flow. Drift lines provide an indication of the minimum portion of the area inundated during a flooding event; the maximum level of inundation is generally at a higher elevation than that indicated by a drift line.



Figure 8. Absence of leaf litter

(5) *Sediment deposits.* Plants and other vertical objects often have thin layers, coatings, or depositions of mineral or organic matter on them after inundation (Figure 9). This evidence may remain for a considerable period before it is removed by precipitation or subsequent inundation. Sediment deposition on vegetation and other objects provides an indication of the minimum inundation level. When sediments are primarily organic (e.g., fine organic material, algae), the detritus may become encrusted on or slightly above the soil surface after dewatering occurs (Figure 10).



Figure 9. Sediment deposit on plants



Figure 10. Encrusted detritus

(6) *Drainage patterns within wetlands.* This indicator, which occurs primarily in wetlands

adjacent to streams, consists of surface evidence of drainage flow into or through an area (Figure 11). In some wetlands, this evidence may exist as a drainage pattern eroded into the soil, vegetative matter (debris) piled against thick vegetation or woody stems oriented perpendicular to the direction of water flow, or the absence of leaf litter (Figure 8). Scouring is often evident around roots of persistent vegetation. Debris may be deposited in or along the drainage pattern (Figure 12).



Figure 11. Drainage pattern



Figure 12. Debris deposited in stream channel

CAUTION: Drainage patterns also occur in upland areas after periods of considerable precipitation; therefore, topographic position must also be considered when applying this indicator.

USER NOTES: The hydrology indicators described above are considered to be "primary indicators", any one of which is sufficient evidence that wetland hydrology is present when combined with a hydrophytic plant community and hydric soils. In addition, the following "secondary indicators" may also be used to determine whether wetland hydrology is present. In the absence of a primary indicator, any two secondary indicators must be present to conclude that wetland hydrology is present. Secondary indicators are: presence of oxidized rhizospheres associated with living plant roots in the upper 12 inches of the soil, presence of water-stained leaves, local soil survey hydrology data for identified soils, and the FAC-neutral test of the vegetation. (HQUSACE, 6 Mar 92)

Part IV: Methods

Section A. Introduction

50. Part IV contains sections on preliminary data gathering, method selection, routine determination procedures, comprehensive determination procedures, methods for determinations in atypical situations, and guidance for wetland determinations in natural situations where the three-parameter approach may not always apply.

51. Significant flexibility has been incorporated into Part IV. The user is presented in Section B with various potential sources of information that may be helpful in making a determination, but not all identified sources of information may be applicable to a given situation. *NOTE: The user is not required to obtain information from all identified sources.* Flexibility is also provided in method selection (Section C). Three levels of routine determinations are available, depending on the complexity of the required determination and the quantity and quality of existing information. Application of methods presented in both Section D (routine determinations) and Section E (comprehensive determinations) may be tailored to meet site-specific requirements, especially with respect to sampling design.

52. Methods presented in Sections D and E vary with respect to the required level of technical knowledge and experience of the user. Application of the qualitative methods presented in Section D (routine determinations) requires considerably less technical knowledge and experience than does application of the quantitative methods presented in Section E (comprehensive determinations). The user must at least be able to identify the dominant plant species in the project area when making a routine determination (Section D), and should have some basic knowledge of hydric soils when employing routine methods that require soils examination. Comprehensive determinations require a basic understanding of sampling principles and the ability to identify all commonly occurring plant species in a project area, as well as a good understanding of indicators of hydric soils and wetland hydrology. The comprehensive method should only be employed by experienced field inspectors.

Section B. Preliminary Data Gathering and Synthesis

53. This section discusses potential sources of information that may be helpful in making a wetland determination. When the routine approach is used, it may often be possible to make a wetland determination based on available vegetation, soils, and hydrology data for the area. However, this section deals only with identifying potential information sources, extracting pertinent data, and synthesizing the data for use in making a determination. Based on the quantity and quality of available information and the approach selected for use (Section C), the user is referred to either Section D or Section E for the actual determination. Completion of Section B is not required, but is recommended because the available information may reduce or eliminate the need for field effort and decrease the time and cost of making a determination. However, there are instances in small project areas in which the time required to obtain the information may be prohibitive. In such cases PROCEED to paragraph 55, complete STEPS 1 through 3, and PROCEED to Section D or E.

Data sources

54. Obtain the following information, when available and applicable:

a. USGS quadrangle maps. USGS quadrangle maps are available at different scales. When possible, obtain maps at a scale of 1:24,000; otherwise, use maps at a scale of 1:62,500. Such maps are available from USGS in Reston, VA, and Menlo Park, CA, but they may already be available in the CE District Office. These maps provide several types of information:

(1) Assistance in locating field sites. Towns, minor roads, bridges, streams, and other landmark features (e.g., buildings, cemeteries, water bodies, etc.) not commonly found on road maps are shown on these maps.

(2) Topographic details, including contour lines (usually at 5- or 10-ft contour intervals).

(3) General delineation of wet areas (swamps and marshes). *NOTE: The actual wet area may be greater than that shown on the map because USGS generally maps these areas based on the driest season of the year.*

(4) Latitude, longitude, townships, ranges, and sections. These provide legal descriptions of the area.

(5) Directions, including both true and magnetic north.

(6) Drainage patterns.

(7) General land uses, such as cleared (agriculture or pasture), forested, or urban.

CAUTION: Obtain the most recent USGS maps. Older maps may show features that no longer exist and will not show new features that have developed since the map was constructed. Also, USGS is currently changing the mapping scale from 1:24,000 to 1:25,000.

b. National Wetlands Inventory products.

(1) *Wetland maps.* The standard NWI maps are at a scale of 1:24,000 or, where USGS base maps at this scale are not available, they are at 1:62,500 (1:63,350 in Alaska). Smaller scale maps ranging from 1:100,000 to 1:500,000 are also available for certain areas. Wetlands on NWI maps are classified in accordance with Cowardin et al. (1979). *CAUTION: Since not all delineated areas on NWI maps are wetlands under Department of Army jurisdiction, NWI maps should not be used as the sole basis for determining whether wetland vegetation is present.* NWI "User Notes" are available that correlate the classification system with local wetland community types. An important feature of this classification system is the water regime modifier, which describes the flooding or soil saturation characteristics. Wetlands classified as having a temporarily flooded or intermittently flooded water regime should be viewed with particular caution since this designation is indicative of plant communities that are transitional between wetland and nonwetland. These are among the most difficult plant communities to map accurately from aerial photography. For wetlands "wetter" than temporarily flooded and intermittently flooded, the probability of a designated map unit on recent NWI maps being a wetland (according to Cowardin et al. 1979) at the time of the photography is in excess of 90 percent. *CAUTION: Due to the scale of aerial photography used and other factors, all NWI map boundaries are approximate.* The optimum use of NWI maps is to plan field review (i.e., how wet, big, or diverse is the area?) and to assist during field review, particularly by showing the approximate areal extent of the wetland and its association with other communities. NWI maps are available either as a composite with, or an overlay for, USGS base maps and may be obtained from the NWI Central Office in St. Petersburg, FL, the Wetland Coordinator at each FWS regional office, or the USGS.

USER NOTES: NWI products and information are available over the World Wide Web.

(2) *Plant database*. This database of approximately 5,200 plant species that occur in wetlands provides information (e.g., ranges, habitat, etc.) about each plant species from the technical literature. The database served as a focal point for development of a national list of plants that occur in wetlands (~~Appendix C, Section 1~~).

c. *Soil Surveys.* Soil surveys are prepared by the SCS for political units (county, parish, etc.) in a state. Soil surveys contain several types of information:

(1) General information (e.g., climate, settlement, natural resources, farming, geology, general vegetation types).

(2) Soil maps for general and detailed planning purposes. These maps are usually generated from fairly recent aerial photography. *CAUTION: The smallest mapping unit is 3 acres, and a given soil series as mapped may contain small inclusions of other series.*

(3) Uses and management of soils. Any wetness characteristics of soils will be mentioned here.

(4) Soil properties. Soil and water features are provided that may be very helpful for wetland investigations. Frequency, duration, and timing of inundation (when present) are described for each soil type. Water table characteristics that provide valuable information about soil saturation are also described. Soil permeability coefficients may also be available.

(5) Soil classification. Soil series and phases are usually provided. Published soil surveys will not always be available for the area. If not, contact the county SCS office and determine whether the soils have been mapped.

d. *Stream and tidal gage data.* These documents provide records of tidal and stream flow events. They are available from either the USGS or CE District office.

e. *Environmental impact assessments (EIAs), environmental impact statements (EISs), general design memoranda (GDM), and other similar publications.* These documents may be available from Federal agencies for an area that includes the project area. They may contain some indication of the location and characteristics of wetlands consistent with the required criteria (vegetation, soils, and hydrology), and often contain flood frequency and duration data.

f. *Documents and maps from State, county, or local governments.* Regional maps that characterize certain areas (e.g., potholes, coastal areas, or basins) may be helpful because they indicate the type and character of wetlands.

g. *Remote sensing.* Remote sensing is one of the most useful information sources available for wetland identification and delineation. Recent aerial photography, particularly color infrared, provides a detailed view of an area; thus, recent land use and other features (e.g., general type and areal extent of plant communities and degree of inundation of the area when the photography was taken) can be determined. The multiagency cooperative National High Altitude Aerial Photography Program (HAP) has 1:59,000-scale color infrared photography for approximately 85 percent (December 1985) of the coterminous United States from 1980 to 1985. This photography has excellent resolution and can be ordered enlarged to 1:24,000 scale from USGS. Satellite images provide similar information as aerial photography, although the much smaller scale makes observation of detail more difficult without sophisticated equipment and extensive training. Satellite images provide more recent coverage than aerial photography (usually at 18-day intervals). Individual satellite images are more expensive than aerial photography, but are not as expensive as having an area flown and photographed at low altitudes. However, better resolution imagery is now available with remote sensing equipment mounted on fixed-wing aircraft.

h. *Local individuals and experts.* Individuals having personal knowledge of an area may sometimes provide a reliable and readily available source of information about the area, particularly information on the wetness of the area.

i. *USGS land use and land cover maps.* Maps created by USGS using remotely sensed data and a geographical information system provide a systematic and comprehensive collection and analysis of land use and land cover on a national basis. Maps at a scale of 1:250,000 are available as overlays that show land use and land cover according to nine basic levels. One level is wetlands (as determined by the FWS), which is further subdivided into forested and nonforested areas. Five other sets of maps show political units, hydrologic units, census subdivisions of counties, Federal land ownership, and State land ownership. These maps can be obtained from any USGS mapping center.

j. *Applicant's survey plans and engineering designs.* In many cases, the permit applicant will already have had the area surveyed (often at 1-ft contours or less) and will also have engineering designs for the proposed activity.

Data synthesis

55. When employing Section B procedures, use the above sources of information to complete the following steps:

- *STEP 1 - Identify the project area on a map.* Obtain a USGS quadrangle map (1:24,000) or other appropriate map, and locate the area identified in the permit application. PROCEED TO STEP 2.

- *STEP 2 - Prepare a base map.* Mark the project area boundaries on the map. Either use the selected map as the base map or trace the area on a mylar overlay, including prominent landscape features (e.g., roads, buildings, drainage patterns, etc.). If possible, obtain diazo copies of the resulting base map. PROCEED TO STEP 3.

- *STEP 3 - Determine size of the project area.* Measure the area boundaries and calculate the size of the area. PROCEED TO STEP 4 OR TO SECTION D OR E IF SECTION B IS NOT USED.

- *STEP 4 - Summarize available information on vegetation.* Examine available sources that contain information about the area vegetation. Consider the following:

    a. USGS quadrangle maps. Is the area shown as a marsh or swamp? *CAUTION: Do not use this as the sole basis for determining that hydrophytic vegetation is present.*

    b. NWI overlays or maps. Do the overlays or maps indicate that hydrophytic vegetation occurs in the area? If so, identify the vegetation type(s).

    c. EIAs, EISs, or GDMs that include the project area. Extract any vegetation data that pertain to the area.

    d. Federal, State, or local government documents that contain information about the area vegetation. Extract appropriate data.

    e. Recent (within last 5 years) aerial photography of the area. Can the area plant community type(s) be determined from the photography? Extract appropriate data.

    f. Individuals or experts having knowledge of the area vegetation. Contact them and obtain any appropriate information. *CAUTION: Ensure that the individual providing the information has firsthand knowledge of the area.*

    g. Any published scientific studies of the area plant communities. Extract any appropriate data.

    h. Previous wetland determinations made for the area. Extract any pertinent vegetation data.

    When the above have been considered, PROCEED TO STEP 5.

- *STEP 5 - Determine whether the vegetation in the project area is adequately characterized.* Examine the summarized data (STEP 4) and determine whether the area plant communities are adequately characterized. For routine determinations, the plant community type(s) and the dominant species in each vegetation layer of each community type must be known. Dominant species are those that have the largest relative basal area (overstory),[1] height (woody understory), number of stems (woody vines), or greatest areal cover (herbaceous understory). For comprehensive determinations, each plant community type present in the project area must have been quantitatively described within the past 5 years using accepted sampling and analytical procedures, and boundaries between community types must be known. Record information on DATA FORM 1.[2] In either case, PROCEED TO Section F if there is evidence of recent significant vegetation alteration due to human activities or natural events. Otherwise, PROCEED TO STEP 6.

- *STEP 6 - Summarize available information on area soils.* Examine available information and describe the area soils. Consider the following:

    a. County soil surveys. Determine the soil series present and extract characteristics for each. *CAUTION: Soil mapping units sometimes include more than one soil series.*

    b. Unpublished county soil maps. Contact the local SCS office and determine whether soil maps are available for the area. Determine the soil series of the area, and obtain any available information about possible hydric soil indicators (paragraph 44 or 45) for each soil series.

    c. Published EIAs, EISs, or GDMs that include soils information. Extract any pertinent information.

    d. Federal, State, and/or local government documents that contain descriptions of the area soils. Summarize these data.

    e. Published scientific studies that include area soils data. Summarize these data.

    f. Previous wetland determinations for the area. Extract any pertinent soils data.

    When the above have been considered, PROCEED TO STEP 7.

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[1] This term is used because species having the largest individuals may not be dominant when only a few are present. To use relative basal area, consider both the size and number of individuals of a species and subjectively compare with other species present.

[2] A separate DATA FORM 1 must be used for each plant community type.

- *STEP 7 - Determine whether soils of the project area have been adequately characterized.* Examine the summarized soils data and determine whether the soils have been adequately characterized. For routine determinations, the soil series must be known. For comprehensive determinations, both the soil series and the boundary of each soil series must be known. Record information on DATA FORM 1. In either case, if there is evidence of recent significant soils alteration due to human activities or natural events, PROCEED TO Section F. Otherwise, PROCEED TO STEP 8.

- *STEP 8 - Summarize available hydrology data.* Examine available information and describe the area hydrology. Consider the following:

    a. USGS quadrangle maps. Is there a significant, well-defined drainage through the area? Is the area within a major floodplain or tidal area? What range of elevations occur in the area, especially in relation to the elevation of the nearest perennial watercourse?

    b. NWI overlays or maps. Is the area shown as a wetland or deepwater aquatic habitat? What is the water regime modifier?

    c. EIAs, EISs, or GDMs that describe the project area. Extract any pertinent hydrologic data.

    d. Floodplain management maps. These maps may be used to extrapolate elevations that can be expected to be inundated on a l-, 2-, 3-year, etc., basis. Compare the elevations of these features with the elevation range of the project area to determine the frequency of inundation.

    e. Federal, State, and local government documents (e.g., CE floodplain management maps and profiles) that contain hydrologic data. Summarize these data.

    f. Recent (within past 5 years) aerial photography that shows the area to be inundated. Record the date of the photographic mission.

    g. Newspaper accounts of flooding events that indicate periodic inundation of the area.

    h. SCS County Soil Surveys that indicate the frequency and duration of inundation and soil saturation for area soils. *CAUTION: Data provided only represent average conditions for a particular soil series in its natural undrained state, and cannot be used as a positive hydrologic indicator in areas that have significantly altered hydrology.*

i. Tidal or stream gage data for a nearby water body that apparently influences the area. Obtain the gage data and complete (1) below if the routine approach is used, or (2) below if the comprehensive approach is used (OMIT IF GAGING STATION DATA ARE UNAVAILABLE):

(1) *Routine approach.* Determine the highest water level elevation reached during the growing season for each of the most recent 10 years of gage data. Rank these elevations in descending order and select the fifth highest elevation. Combine this elevation with the mean sea level elevation of the gaging station to produce a mean sea level elevation for the highest water level reached every other year. *NOTE: Stream gage data are often presented as flow rates in cubic feet per second. In these cases, ask the CE District's Hydrology Branch to convert flow rates to corresponding mean sea level elevations and adjust gage data to the site.* Compare the resulting elevations reached biennially with the project area elevations. If the water level elevation exceeds the area elevation, the area is inundated during the growing season on average at least biennially.

(2) *Comprehensive approach.* Complete the following:

(a) *Decide whether hydrologic data reflect the apparent hydrology.* Data available from the gaging station may or may not accurately reflect the area hydrology. Answer the following questions:

- Does the water level of the area appear to fluctuate in a manner that differs from that of the water body on which the gaging station is located? (In ponded situations, the water level of the area is usually higher than the water level at the gaging station.)

- Are less than 10 years of daily readings available for the gaging station?

- Do other water sources that would not be reflected by readings at the gaging station appear to significantly affect the area? For example, do major tributaries enter the stream or tidal area between the area and gaging station?

If the answer to any of the above questions is YES, the area hydrology cannot be determined from the

gaging station data. If the answer to all of the above questions is NO, PROCEED TO (b).

(b) *Analyze hydrologic data.* Subject the hydrologic data to appropriate analytical procedures. Either use duration curves or a computer program developed by WES (available from the Environmental Laboratory upon request) for determining the mean sea level elevation representing the upper limits of wetland hydrology. In the latter case, when the site elevation is lower than the mean sea level elevation representing a 5-percent duration of inundation and saturation during the growing season, the area has a hydrologic regime that may occur in wetlands. *NOTE: Duration curves do not reflect the period of soil saturation following dewatering.*

When all of the above have been considered, PROCEED TO STEP 9.

- *STEP 9 - Determine whether hydrology is adequately characterized.* Examine the summarized data and determine whether the hydrology of the project area is adequately characterized. For routine determinations, there must be documented evidence of frequent inundation or soil saturation during the growing season. For comprehensive determinations, there must be documented quantitative evidence of frequent inundation or soil saturation during the growing season, based on at least 10 years of stream or tidal gage data. Record information on DATA FORM 1. In either case, if there is evidence of recent significant hydrologic alteration due to human activities or natural events, PROCEED TO Section F. Otherwise, PROCEED TO Section C.

Section C. Selection of Method

56. All wetland delineation methods described in this manual can be grouped into two general types: routine and comprehensive. Routine determinations (Section D) involve simple, rapidly applied methods that result in sufficient qualitative data for making a determination. Comprehensive methods (Section E) usually require significant time and effort to obtain the needed quantitative data. The primary factor influencing method selection will usually be the complexity of the required determination. However, comprehensive methods may sometimes be selected for use in relatively simple determinations when rigorous documentation is required.

57. Three levels of routine wetland determinations are described below. Complexity of the project area and the quality and quantity of available information will influence the level selected for use.

a. *Level 1 - Onsite Inspection Unnecessary*. This level may be employed when the information already obtained (Section B) is sufficient for making a determination for the entire project area (see Section D, Subsection 1).

b. *Level 2 - Onsite Inspection Necessary.* This level must be employed when there is insufficient information already available to characterize the vegetation, soils, and hydrology of the entire project area (see Section D, Subsection 2).

c. *Level 3 - Combination of Levels 1 and 2.* This level should be used when there is sufficient information already available to characterize the vegetation, soils, and hydrology of a portion, but not all, of the project area. Methods described for Level 1 may be applied to portions of the area for which adequate information already exists, and onsite methods (Level 2) must be applied to the remainder of the area (see Section D, Subsection 3).

58. After considering all available information, select a tentative method (see above) for use, and PROCEED TO EITHER Section D or E, as appropriate. *NOTE: Sometimes it may be necessary to change to another method described in the manual, depending on the quality of available information and/or recent changes in the project area.*

Section D. Routine Determinations

59. This section describes general procedures for making routine wetland determinations. It is assumed that the user has already completed all applicable steps in Section B,[1] and a routine method has been tentatively selected for use (Section C). Subsections 1 through 3 describe steps to be followed when making a routine determination using one of the three levels described in Section C. Each subsection contains a flowchart that defines the relationship of steps to be used for that level of routine determinations. *NOTE: The selected method must be considered tentative because the user may be required to change methods during the determination.*

Subsection 1 - Onsite Inspection Unnecessary

60. This subsection describes procedures for making wetland determinations when sufficient information is already available (Section B) on which to base

[1] If it has been determined that it is more expedient to conduct an onsite inspection than to search for available information, complete STEPS 1 through 3 of Section B, and PROCEED TO Subsection 2.

the determination. A flowchart of required steps to be completed is presented in Figure 13, and each step is described below.

Equipment and materials

61. No special equipment is needed for applying this method. The following materials will be needed:

a. Map of project area (Section B, STEP 2).

b. Copies of DATA FORM 1 (Appendix B).

c. Appendices C and D to this manual.

Procedure

62. Complete the following steps, as necessary:

- *STEP 1 - Determine whether available data are sufficient for entire project area.* Examine the summarized data (Section B, STEPS 5, 7, and 9) and determine whether the vegetation, soils, and hydrology of the entire project area are adequately characterized. If so, PROCEED TO STEP 2. If all three parameters are adequately characterized for a portion, but not all, of the project area, PROCEED TO Subsection 3. If the vegetation, soils, and hydrology are not adequately characterized for any portion of the area, PROCEED TO Subsection 2.

- *STEP 2 - Determine whether hydrophytic vegetation is present.* Examine the vegetation data and list on DATA FORM 1 the dominant plant species found in each vegetation layer of each community type. *NOTE: A separate DATA FORM 1 will be required for each community type.* Record the indicator status for each dominant species ~~(Appendix C, Section 1 or 2)~~. When more than 50 percent of the dominant species in a plant community have an indicator status of OBL, FACW, and/or FAC,[1] hydrophytic vegetation is present. If one or more plant communities comprise hydrophytic vegetation, PROCEED TO STEP 3. If none of the plant communities comprise hydrophytic vegetation, none of the area is a wetland. Complete the vegetation section for each DATA FORM 1.

[1] For the FAC-neutral option, see paragraph 35*a*.

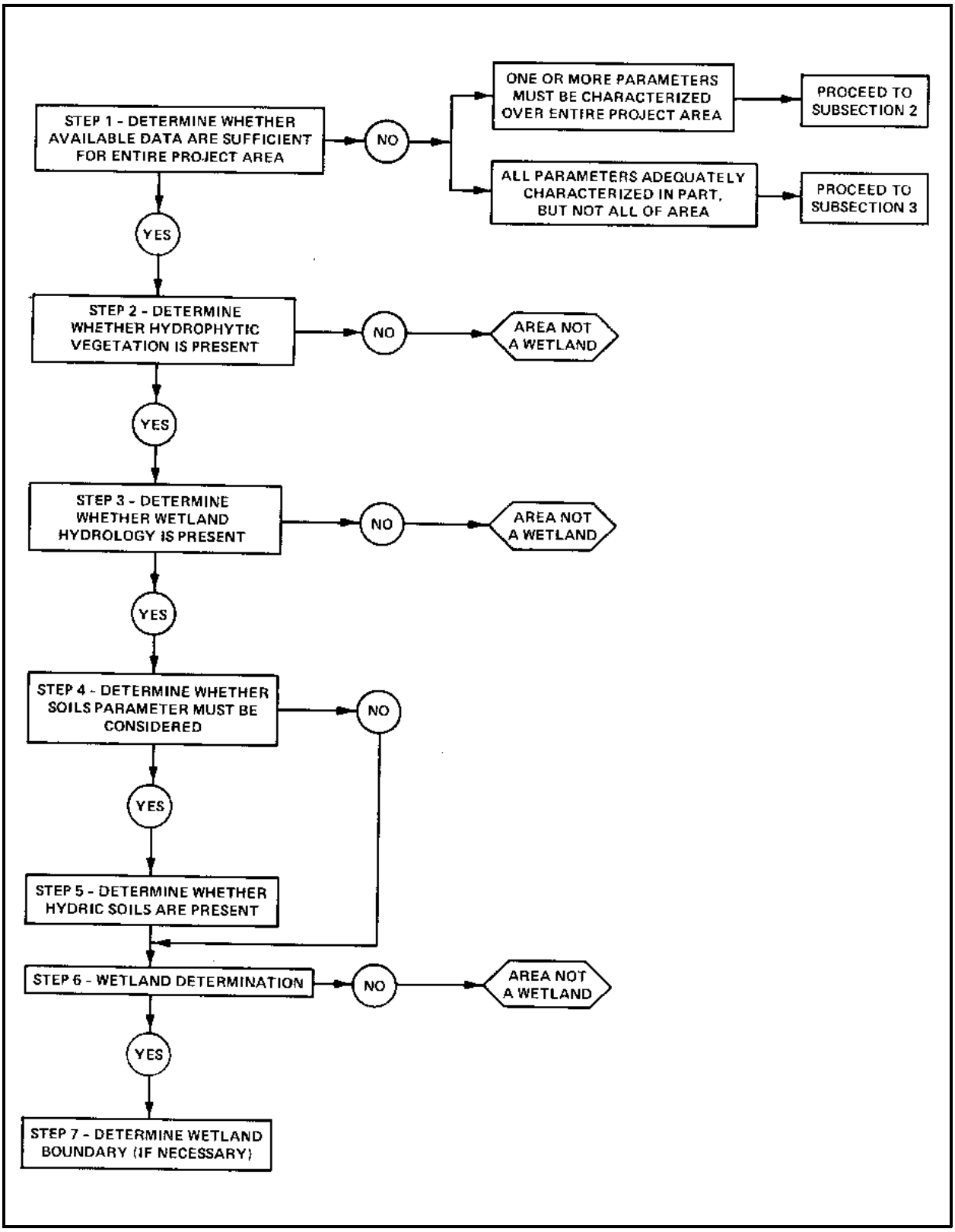


Figure 13. Flowchart of steps involved in making a wetland determination when an onsite inspection is unnecessary

- *STEP 3 - Determine whether wetland hydrology is present.* When one of the following conditions applies (STEP 2), it is only necessary to confirm that there has been no recent hydrologic alteration of the area:

    a. The entire project area is occupied by a plant community or communities in which all dominant species are OBL ~~(Appendix C, Section 1 or 2)~~.

    b. The project area contains two or more plant communities, all of which are dominated by OBL and/or FACW species, and the wetland-nonwetland boundary is abrupt[1] (e.g., a *Spartina alterniflora* marsh bordered by a road embankment).

  If either *a* or *b* applies, look for recorded evidence of recently constructed dikes, levees, impoundments, and drainage systems, or recent avalanches, mudslides, beaver dams, etc., that have significantly altered the area hydrology. If any significant hydrologic alteration is found, determine whether the area is still periodically inundated or has saturated soils for sufficient duration to support the documented vegetation (*a* or *b* above). When *a* or *b* applies and there is no evidence of recent hydrologic alteration, or when *a* or *b* do not apply and there is documented evidence that the area is periodically inundated or has saturated soils, wetland hydrology is present. Otherwise, wetland hydrology does not occur on the area. Complete the hydrology section of DATA FORM 1 and PROCEED TO STEP 4.

- *STEP 4 - Determine whether the soils parameter must be considered.* When either *a* or *b* of STEP 3 applies *and* there is either no evidence of recent hydrologic alteration of the project area or if wetland hydrology presently occurs on the area, hydric soils can be assumed to be present. If so, PROCEED TO STEP 6. Otherwise PROCEED TO STEP 5.

- *STEP 5 - Determine whether hydric soils are present.* Examine the soils data (Section B, STEP 7) and record the soil series or soil phase on DATA FORM 1 for each community type. Determine whether the soil is listed as a hydric soil ~~(Appendix D, Section 2)~~. If all community types have hydric soils, the entire project area has hydric soils. *(CAUTION: If the soil series description makes reference to inclusions of other soil types, data must be field verified).* Any portion of the area that lacks hydric soils is a nonwetland. Complete the soils section of each DATA FORM 1 and PROCEED TO STEP 6.

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[1] There must be documented evidence of periodic inundation or saturated soils when the project area: (a) has plant communities dominated by one or more FAC species; (b) has vegetation dominated by FACW species but no adjacent community dominated by OBL species; (c) has a gradual, nondistinct boundary between wetlands and nonwetlands; and/or (d) is known to have or is suspected of having significantly altered hydrology.

- *STEP 6 - Wetland determination.* Examine the DATA FORM 1 for each community type. Any portion of the project area is a wetland that has:

    a. Hydrophytic vegetation that conforms to one of the conditions identified in STEP 3*a* or 3*b* and has either no evidence of altered hydrology or confirmed wetland hydrology.

    b. Hydrophytic vegetation that does not conform to STEP 3*a* or 3*b*, has hydric soils, and has confirmed wetland hydrology.

    If STEP 6*a* or 6*b* applies to the entire project area, the entire area is a wetland. Complete a DATA FORM 1 for all plant community types. Portions of the area not qualifying as a wetland based on an office determination might or might not be wetlands. If the data used for the determination are considered to be highly reliable, portions of the area not qualifying as wetlands may properly be considered nonwetlands. PROCEED TO STEP 7. If the available data are incomplete or questionable, an onsite inspection (Subsection 2) will be required.

- *STEP 7 - Determine wetland boundary*. Mark on the base map all community types determined to be wetlands with a W and those determined to be nonwetlands with an N. Combine all wetland community types into a single mapping unit. The boundary of these community types is the interface between wetlands and nonwetlands.

Subsection 2 - Onsite Inspection Necessary

63. This subsection describes procedures for routine determinations in which the available information (Section B) is insufficient for one or more parameters. If only one or two parameters must be characterized, apply the appropriate steps and return to Subsection 1 and complete the determination. A flowchart of steps required for using this method is presented in Figure 14, and each step is described below.

Equipment and materials

64. The following equipment and materials will be needed:

a. Base map (Section B, STEP 2).

b. Copies of DATA FORM 1 (one for each community type and additional copies for boundary determinations).

c. Appendices C and D.

d. Compass.

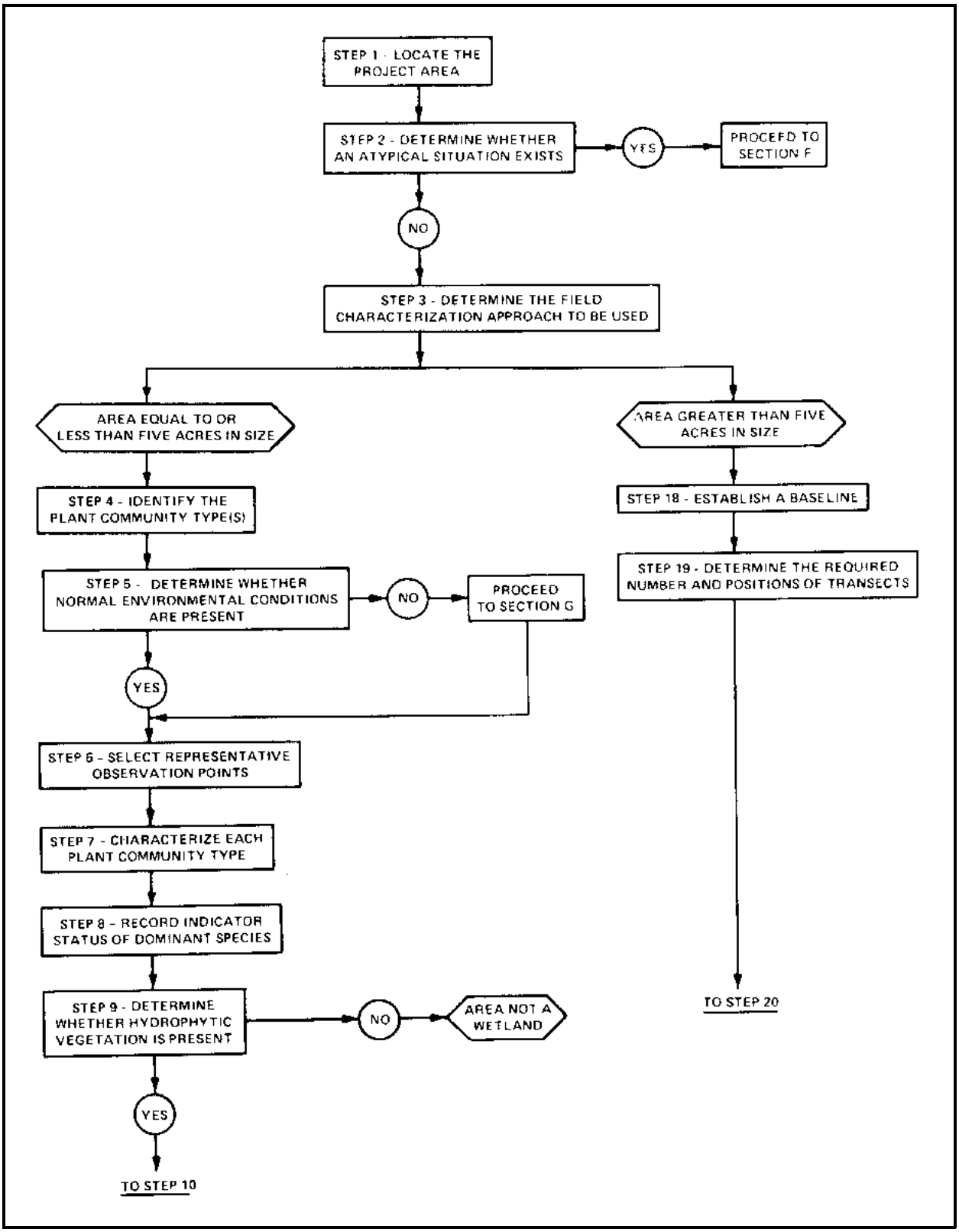


Figure 14. Flowchart of steps involved in making a routine wetland determination when an onsite visit is necessary (Continued)

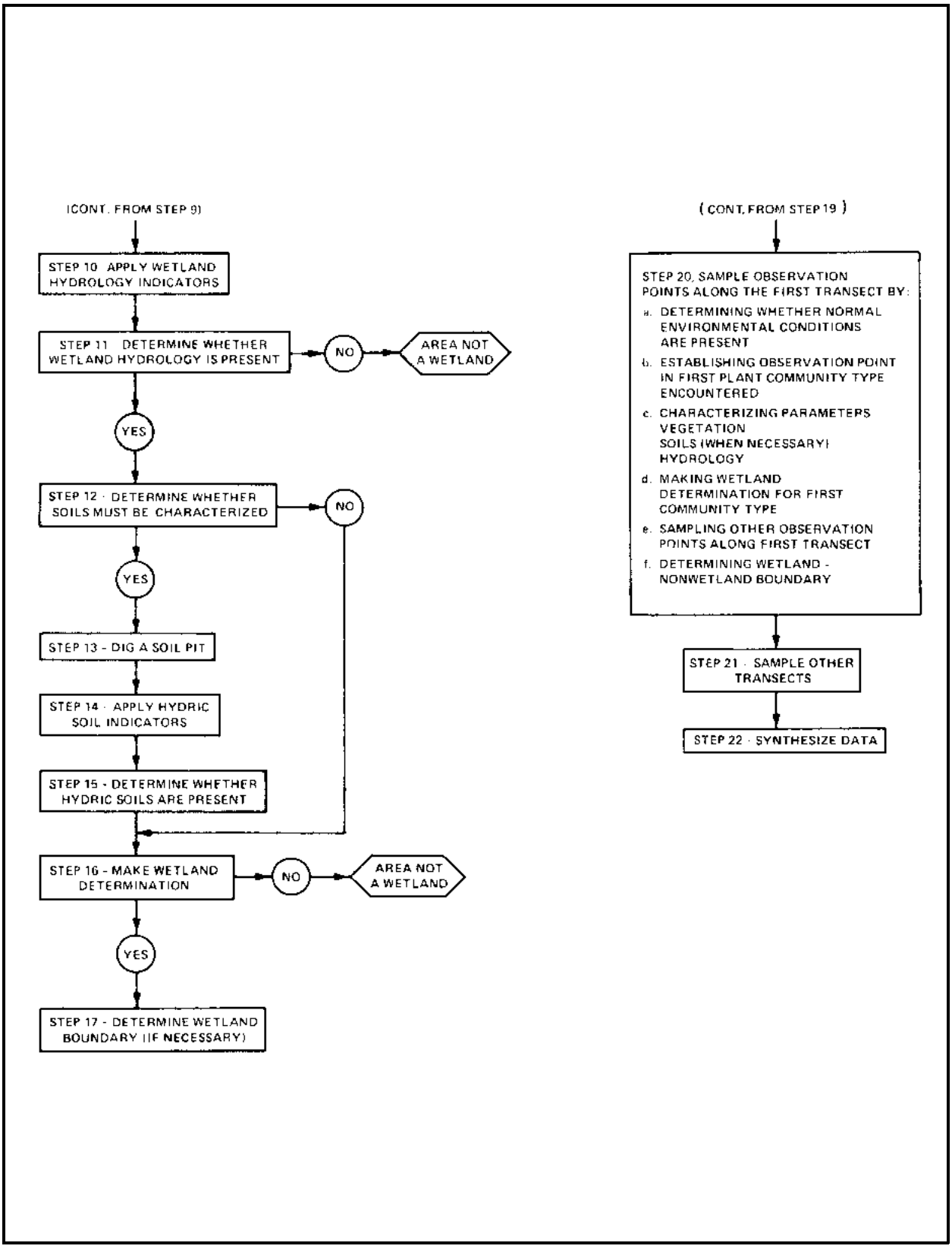


Figure 14. (Concluded)

e. Soil auger or spade (soils only).

f. Tape (300 ft).

g. Munsell Color Charts (Munsell Color 1975) (soils only).

Procedure

65. Complete the following steps, as necessary:

- *STEP 1 - Locate the project area.* Determine the spatial boundaries of the project area using information from a USGS quadrangle map or other appropriate map, aerial photography, and/or the project survey plan (when available). PROCEED TO STEP 2.

- *STEP 2 - Determine whether an atypical situation exists.* Examine the area and determine whether there is evidence of sufficient natural or human-induced alteration to significantly alter the area vegetation, soils, and/or hydrology. *NOTE: Include possible offsite modifications that may affect the area hydrology.* If not, PROCEED TO STEP 3.

  If one or more parameters have been significantly altered by an activity that would normally require a permit, PROCEED TO Section F and determine whether there is sufficient evidence that hydrophytic vegetation, hydric soils, and/or wetland hydrology were present prior to this alteration. Then, return to this subsection and characterize parameters not significantly influenced by human activities. PROCEED TO STEP 3.

- *STEP 3 - Determine the field characterization approach to be used.* Considering the size and complexity of the area, determine the field characterization approach to be used. When the area is equal to or less than 5 acres in size (Section B, STEP 3) and the area is thought to be relatively homogeneous with respect to vegetation, soils, and/or hydrologic regime, PROCEED TO STEP 4. When the area is greater than 5 acres in size (Section B, STEP 3) or appears to be highly diverse with respect to vegetation, PROCEED TO STEP 18.

Areas Equal To or Less Than 5 Acres in Size

- *STEP 4 - Identify the plant community type(s).* Traverse the area and determine the number and locations of plant community types. Sketch the location of each on the base map (Section B, STEP 2), and give each community type a name. PROCEED TO STEP 5.

- *STEP 5 - Determine whether normal environmental conditions are present.* Determine whether normal environmental conditions are present by considering the following:

    a. Is the area presently lacking hydrophytic vegetation or hydrologic indicators due to annual or seasonal fluctuations in precipitation or ground-water levels?

    b. Are hydrophytic vegetation indicators lacking due to seasonal fluctuations in temperature?

  If the answer to either of these questions is thought to be YES, PROCEED TO Section G. If the answer to both questions is NO, PROCEED TO STEP 6.

- *STEP 6 - Select representative observation points.* Select a representative observation point in each community type. A representative observation point is one in which the apparent characteristics (determine visually) best represent characteristics of the entire community. Mark on the base map the approximate location of the observation point. PROCEED TO STEP 7.

- *STEP 7 - Characterize each plant community type.* Visually determine the dominant plant species in each vegetation layer of each community type and record them on DATA FORM 1 (use a separate DATA FORM 1 for each community type). Dominant species are those having the greatest relative basal area (woody overstory),[1] greatest height (woody understory), greatest percentage of areal cover (herbaceous understory), and/or greatest number of stems (woody vines). PROCEED TO STEP 8.

- *STEP 8 - Record indicator status of dominant species.* Record on DATA FORM 1 the indicator status ~~(Appendix C, Section 1 or 2)~~ of each dominant species in each community type. PROCEED TO STEP 9.

- *STEP 9 - Determine whether hydrophytic vegetation is present.* Examine each DATA FORM 1. When more than 50 percent of the dominant species in a community type have an indicator status (STEP 8) of OBL, FACW, and/or FAC,[2] hydrophytic vegetation is present. Complete the vegetation section of each DATA FORM 1. Portions of the area failing this test are not wetlands. PROCEED TO STEP 10.

- *STEP 10 - Apply wetland hydrologic indicators.* Examine the portion of the area occupied by each plant community type for positive indicators

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[1] This term is used because species having the largest individuals may not be dominant when only a few are present. To determine relative basal area, consider both the size and number of individuals of a species and subjectively compare with other species present.

[2] For the FAC-neutral option, see paragraph 35*a*.

of wetland hydrology (Part III, paragraph 49). Record findings on the appropriate DATA FORM 1. PROCEED TO STEP 11.

- *STEP 11 - Determine whether wetland hydrology is present.* Examine the hydrologic information on DATA FORM 1 for each plant community type. Any portion of the area having a positive wetland hydrology indicator has wetland hydrology. If positive wetland hydrology indicators are present in all community types, the entire area has wetland hydrology. If no plant community type has a wetland hydrology indicator, none of the area has wetland hydrology. Complete the hydrology portion of each DATA FORM 1. PROCEED TO STEP 12.

- *STEP 12 - Determine whether soils must be characterized.* Examine the vegetation section of each DATA FORM 1. Hydric soils are assumed to be present in any plant community type in which:

    a. All dominant species have an indicator status of OBL.

    b. All dominant species have an indicator status of OBL or FACW, and the wetland boundary (when present) is abrupt.[1]

  When either *a* or *b* occurs and wetland hydrology is present, check the hydric soils blank as positive on DATA FORM 1 and PROCEED TO STEP 16. If neither *a* nor *b* applies, PROCEED TO STEP 13.

- *STEP 13 - Dig a soil pit.* Using a soil auger or spade, dig a soil pit at the representative location in each community type. The procedure for digging a soil pit is described in Appendix D, Section 1. When completed, approximately 16 inches of the soil profile will be available for examination. PROCEED TO STEP 14.

- *STEP 14 - Apply hydric soil indicators.* Examine the soil at each location and compare its characteristics immediately below the A-horizon or 10 inches (whichever is shallower) with the hydric soil indicators described in Part III, paragraph 44 and/or 45. Record findings on the appropriate DATA FORM 1's. PROCEED TO STEP 15.

- *STEP 15 - Determine whether hydric soils are present.* Examine each DATA FORM 1 and determine whether a positive hydric soil indicator was found. If so, the area at that location has hydric soil. If soils at all sampling locations have positive hydric soil indicators, the entire area has hydric soils. If soils at all sampling locations lack positive hydric soil indicators, none of the area is a wetland. Complete the soil section of each DATA FORM 1. PROCEED TO STEP 16.

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[1] The soils parameter must be considered in any plant community in which: (a) the community is dominated by one or more FAC species; (b) no community type dominated by OBL species is present; (c) the boundary between wetlands and nonwetlands is gradual or nondistinct; (d) the area is known to or is suspected of having significantly altered hydrology.

- *STEP 16 - Make wetland determination.* Examine DATA FORM 1. If the entire area presently or normally has wetland indicators of all three parameters (STEPS 9, 11, and 15), the entire area is a wetland. If the entire area presently or normally lacks wetland indicators of one or more parameters, the entire area is a nonwetland. If only a portion of the area presently or normally has wetland indicators for all three parameters, PROCEED TO STEP 17.

- *STEP 17 - Determine wetland-nonwetland boundary.* Mark each plant community type on the base map with a W if wetland or an N if nonwetland. Combine all wetland plant communities into one mapping unit and all nonwetland plant communities into another mapping unit. The wetland-nonwetland boundary will be represented by the interface of these two mapping units.

Areas Greater Than 5 Acres in Size

- *STEP 18 - Establish a baseline.* Select one project boundary as a baseline. The baseline should parallel the major watercourse through the area or should be perpendicular to the hydrologic gradient (Figure 15). Determine the approximate baseline length. PROCEED TO STEP 19.

- *STEP 19 - Determine the required number and position of transects.* Use the following to determine the required number and position of transects (specific site conditions may necessitate changes in intervals):

Baseline Length, Miles	Number of Required Transects
≤0.25	3
>0.25 - 0.50	3
>0.50 - 0.75	3
>0.75 - 1.00	3
>1.00 - 2.00	3-5
>2.00 - 4.00	5-8
>4.00	8 or more[1]

[1] Transect intervals should not exceed 0.5 mile.

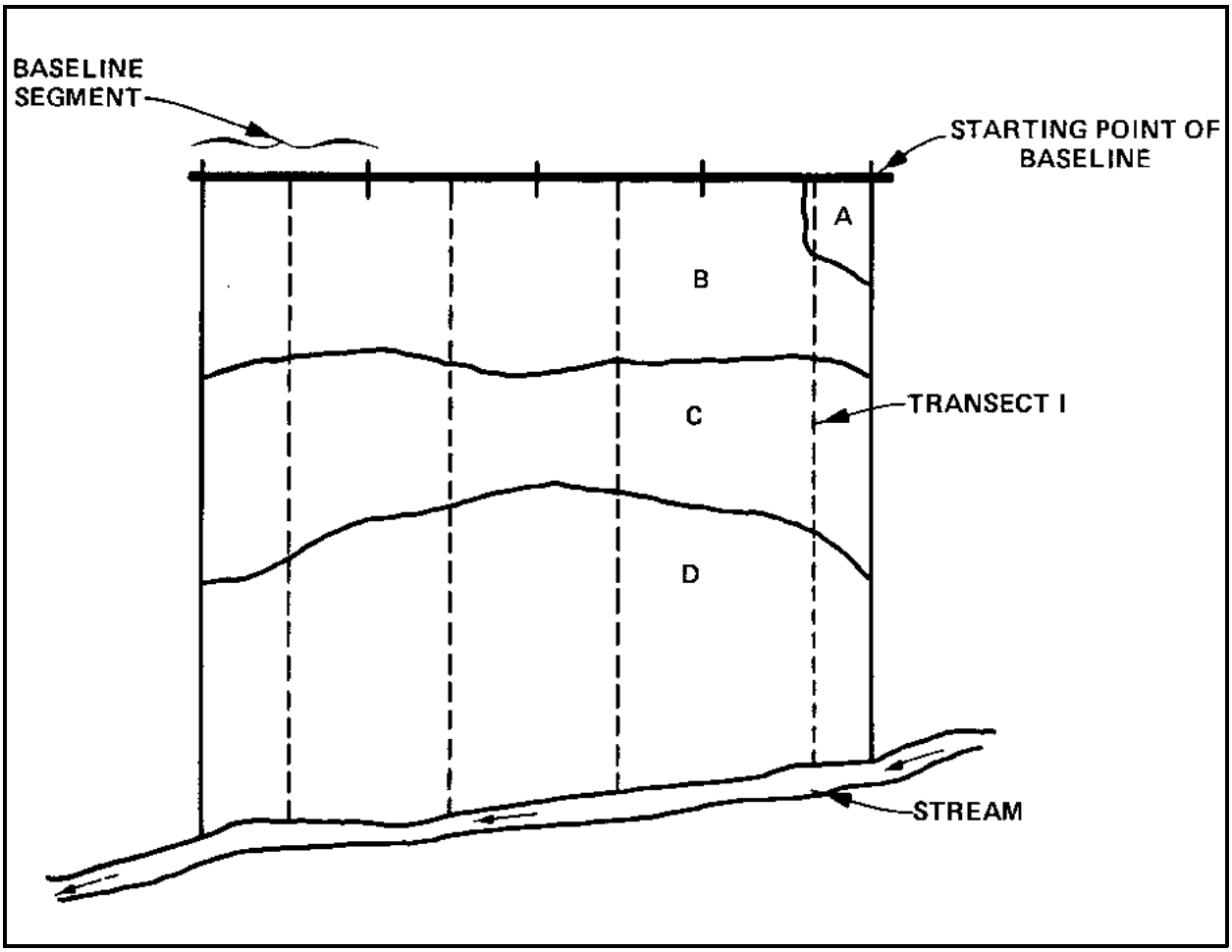


Figure 15. General orientation of baseline and transects (dotted lines) in a hypothetical project area. Alpha characters represent different plant communities. All transects start at the midpoint of a baseline segment except the first, which was repositioned to include community type A

Divide the baseline length by the number of required transects. Establish one transect in each resulting baseline increment. Use the midpoint of each baseline increment as a transect starting point. For example, if the baseline is 1,200 ft in length, three transects would be established—one at 200 ft, one at 600 ft, and one at 1,000 ft from the baseline starting point. *CAUTION: All plant community types must be included. This may necessitate relocation of one or more transect lines. PROCEED TO STEP 20.*

- *STEP 20 - Sample observation points along the first transect.* Beginning at the starting point of the first transect, extend the transect at a 90-deg angle to the baseline. Use the following procedure as appropriate to simultaneously characterize the parameters at each observation point. Combine field-collected data with information already available and make a wetland determination at each observation point. A DATA FORM 1 must be completed for each observation point.

a. *Determine whether normal environmental conditions are present.* Determine whether normal environmental conditions are present by considering the following:

(1) Is the area presently lacking hydrophytic vegetation and/or hydrologic indicators due to annual or seasonal fluctuations in precipitation or ground-water levels?

(2) Are hydrophytic vegetation indicators lacking due to seasonal fluctuations in temperature?

If the answer to either of these questions is thought to be YES, PROCEED TO Section G. If the answer to both questions is NO, PROCEED TO STEP 20*b*.

b. *Establish an observation point in the first plant community type encountered.* Select a representative location along the transect in the first plant community type encountered. When the first plant community type is large and covers a significant distance along the transect, select an area that is no closer than 300 ft to a perceptible change in plant community type. PROCEED TO STEP 20*c*.

c. *Characterize parameters.* Characterize the parameters at the observation point by completing (1), (2), and (3) below:

(1) *Vegetation.* Record on DATA FORM 1 the dominant plant species in each vegetation layer occurring in the immediate vicinity of the observation point. Use a 5-ft radius for herbs and saplings/shrubs, and a 30-ft radius for trees and woody vines (when present). Subjectively determine the dominant species by estimating those having the largest relative basal area[1] (woody overstory), greatest height (woody understory), greatest percentage of areal cover (herbaceous understory), and/or greatest number of stems (woody vines). *NOTE: Plot size may be estimated, and plot size may also be varied when site conditions warrant.* Record on DATA FORM 1 any dominant species observed to have morphological adaptations (Appendix C, Section 3) for occurrence in wetlands, and determine and record dominant species that have known physiological adaptations for occurrence in wetlands (Appendix C, Section 3). Record on DATA FORM 1 the indicator status ~~(Appendix C, Section 1 or 2)~~ of each dominant species. Hydrophytic

[1] This term is used because species having the largest individuals may not be dominant when only a few are present. To use relative basal area, consider both the size and number of individuals of a species and subjectively compare with other species present.

vegetation is present at the observation point when more than 50 percent of the dominant species have an indicator status of OBL, FACW, and/or FAC;[1] when two or more dominant species have observed morphological or known physiological adaptations for occurrence in wetlands; or when other indicators of hydrophytic vegetation (Part III, paragraph 35) are present. Complete the vegetation section of DATA FORM 1. PROCEED TO (2).

(2) *Soils.* In some cases, it is not necessary to characterize the soils. Examine the vegetation of DATA FORM 1. Hydric soils can be assumed to be present when:

(a) All dominant plant species have an indicator status of OBL.

(b) All dominant plant species have an indicator status of OBL and/or FACW (at least one dominant species must be OBL).[2]

When either (a) or (b) applies, check the hydric soils blank as positive and PROCEED TO (3). If neither (a) nor (b) applies but the vegetation qualifies as hydrophytic, dig a soil pit at the observation point using the procedure described in Appendix D, Section 1. Examine the soil immediately below the A-horizon or 10-inches (whichever is shallower) and compare its characteristics (Appendix D, Section 1) with the hydric soil indicators described in Part III, paragraph 44 and/or 45. Record findings on DATA FORM 1. If a positive hydric soil indicator is present, the soil at the observation point is a hydric soil. If no positive hydric soil indicator is found, the area at the observation point does not have hydric soils and the area at the observation point is not a wetland. Complete the soils section of DATA FORM 1 for the observation point. PROCEED TO (3) if hydrophytic vegetation (1) and hydric soils (2) are present. Otherwise, PROCEED TO STEP 20*d*.

(3) *Hydrology*. Examine the observation point for indicators of wetland hydrology (Part III, paragraph 49) and record observations on DATA FORM 1. Consider the indicators in the same sequence as presented in Part III, paragraph 49. If a positive wetland hydrology indicator

[1] For the FAC-neutral option, see paragraph 35*a*.
[2] Soils must be characterized when any dominant species has an indicator status of FAC.

is present, the area at the observation point has wetland hydrology. If no positive wetland hydrologic indicator is present, the area at the observation point is not a wetland. Complete the hydrology section of DATA FORM 1 for the observation point. PROCEED TO STEP 20*d*.

d. *Wetland determination.* Examine DATA FORM 1 for the observation point. Determine whether wetland indicators of all three parameters are or would normally be present during a significant portion of the growing season. If so, the area at the observation point is a wetland. If no evidence can be found that the area at the observation point normally has wetland indicators for all three parameters, the area is a nonwetland. PROCEED TO STEP 20*e*.

e. *Sample other observation points along the first transect.* Continue along the first transect until a different community type is encountered. Establish a representative observation point within this community type and repeat STEP 20*c* and 20*d*. If the areas at both observation points are either wetlands or nonwetlands, continue along the transect and repeat STEP 20*c* and 20*d* for the next community type encountered. Repeat for all other community types along the first transect. If the area at one observation point is wetlands and the next observation point is nonwetlands (or vice versa), PROCEED TO STEP 20*f*.

f. *Determine wetland-nonwetland boundary.* Proceed along the transect from the wetland observation point toward the nonwetland observation point. Look for subtle changes in the plant community (e.g., the first appearance of upland species, disappearance of apparent hydrology indicators, or slight changes in topography). When such features are noted, establish an observation point and repeat the procedures described in STEP 20*c* through 20*d*. *NOTE: A new DATA FORM 1 must be completed for this observation point, and all three parameters must be characterized by field observation.* If the area at this observation point is a wetland, proceed along the transect toward the nonwetland observation point until upland indicators are more apparent. Repeat the procedures described in STEP 20*c* through 20*d*. If the area at this observation point is a nonwetland, move halfway back along the transect toward the last documented wetland observation point and repeat the procedure described in STEP 20*c* through 20*d*. Continue this procedure until the wetland-nonwetland boundary is found. It is not necessary to complete a DATA FORM 1 for all intermediate points, but a DATA FORM 1 should be completed for the wetland-nonwetland boundary. Mark the position of the wetland boundary on the base map, and continue along the first transect until all community types have been sampled and

all wetland boundaries located. *CAUTION: In areas where wetlands are interspersed among nonwetlands (or vice versa), several boundary determinations will be required.* When all necessary wetland determinations have been completed for the first transect, PROCEED TO STEP 21.

- *STEP 21 - Sample other transects.* Repeat procedures described in STEP 21 for all other transects. When completed, a wetland determination will have been made for one observation point in each community type along each transect, and all wetland-nonwetland boundaries along each transect will have been determined. PROCEED TO STEP 22.

- *STEP 22 - Synthesize data.* Examine all completed copies of DATA FORM 1, and mark each plant community type on the base map. Identify each plant community type as either a wetland (W) or nonwetland (N). If all plant community types are identified as wetlands, the entire area is wetlands. If all plant community types are identified as nonwetlands, the entire area is nonwetlands. If both wetlands and nonwetlands are present, identify observation points that represent wetland boundaries on the base map. Connect these points on the map by generally following contour lines to separate wetlands from nonwetlands. Walk the contour line between transects to confirm the wetland boundary. Should anomalies be encountered, it will be necessary to establish short transects in these areas, apply the procedures described in STEP 20*f*, and make any necessary adjustments on the base map.

Subsection 3 - Combination of Levels I and 2

66. In some cases, especially for large projects, adequate information may already be available (Section B) to enable a wetland determination for a portion of the project area, while an onsite visit will be required for the remainder of the area. Since procedures for each situation have already been described in Subsections 1 and 2, they will not be repeated. Apply the following steps:

- *STEP 1 - Make wetland determination for portions of the project area that are already adequately characterized.* Apply procedures described in Subsection 1. When completed, a DATA FORM 1 will have been completed for each community type, and a map will have been prepared identifying each community type as wetland or nonwetland and showing any wetland boundary occurring in this portion of the project area. PROCEED TO STEP 2.

- *STEP 2 - Make wetland determination for portions of the project area that require an onsite visit.* Apply procedures described in Subsection 2. When completed, a DATA FORM 1 will have been completed for each plant community type or for a number of observation points (including

wetland boundary determinations). A map of the wetland (if present) will also be available. PROCEED TO STEP 3.

- *STEP 3 - Synthesize data.* Using the maps resulting from STEPS 1 and 2, prepare a summary map that shows the wetlands of the entire project area. *CAUTION: Wetland boundaries for the two maps will not always match exactly. When this occurs, an additional site visit will be required to refine the wetland boundaries. Since the degree of resolution of wetland boundaries will be greater when determined onsite, it may be necessary to employ procedures described in Subsection 2 in the vicinity of the boundaries determined from Subsection 1 to refine these boundaries.*

Section E. Comprehensive Determinations

67. This section describes procedures for making comprehensive wetland determinations. Unlike procedures for making routine determinations (Section D), application of procedures described in this section will result in maximum information for use in making determinations, and the information usually will be quantitatively expressed. Comprehensive determinations should only be used when the project area is very complex and/or when the determination requires rigorous documentation. This type of determination may be required in areas of any size, but will be especially useful in large areas. There may be instances in which only one parameter (vegetation, soil, or hydrology) is disputed. In such cases, only procedures described in this section that pertain to the disputed parameter need be completed. It is assumed that the user has already completed all applicable steps in Section B. *NOTE: Depending on site characteristics, it may be necessary to alter the sampling design and/or data collection procedures.*

68. This section is divided into five basic types of activities. The first consists of preliminary field activities that must be completed prior to making a determination (STEPS 1 through 5). The second outlines procedures for determining the number and locations of required determinations (STEPS 6 through 8). The third describes the basic procedure for making a comprehensive wetland determination at any given point (STEPS 9 through 17). The fourth describes a procedure for determining wetland boundaries (STEP 18). The fifth describes a procedure for synthesizing the collected data to determine the extent of wetlands in the area (STEPS 20 and 21). A flowchart showing the relationship of various steps required for making a comprehensive determination is presented in Figure 16.

Equipment and materials

69. Equipment and materials needed for making a comprehensive determination include:

a. Base map (Section B, STEP 2).

b. Copies of DATA FORMS 1 and 2.

c. Appendices C and D.

d. Compass.

e. Tape (300 ft).

f. Soil auger or spade.

g. Munsell Color Charts (Munsell Color 1975).

h. Quadrat (3.28 ft by 3.28 ft).

i. Diameter or basal area tape (for woody overstory).

Field procedures

70. Complete the following steps:

- *STEP 1 - Identify the project area.* Using information from the USGS quadrangle or other appropriate map (Section B), locate and measure the spatial boundaries of the project area. Determine the compass heading of each boundary and record on the base map (Section B, STEP 2). The applicant's survey plan may be helpful in locating the project boundaries. PROCEED TO STEP 2.

- *STEP 2 - Determine whether an atypical situation exists.* Examine the area and determine whether there is sufficient natural or human-induced alteration to significantly change the area vegetation, soils, and/or hydrology. If not, PROCEED TO STEP 3. If one or more parameters have been recently altered significantly, PROCEED TO Section F and determine whether there is sufficient evidence that hydrophytic vegetation, hydric soils, and/or wetland hydrology were present on the area prior to alteration. Then return to this section and characterize parameters not significantly influenced by human activities. PROCEED TO STEP 3.

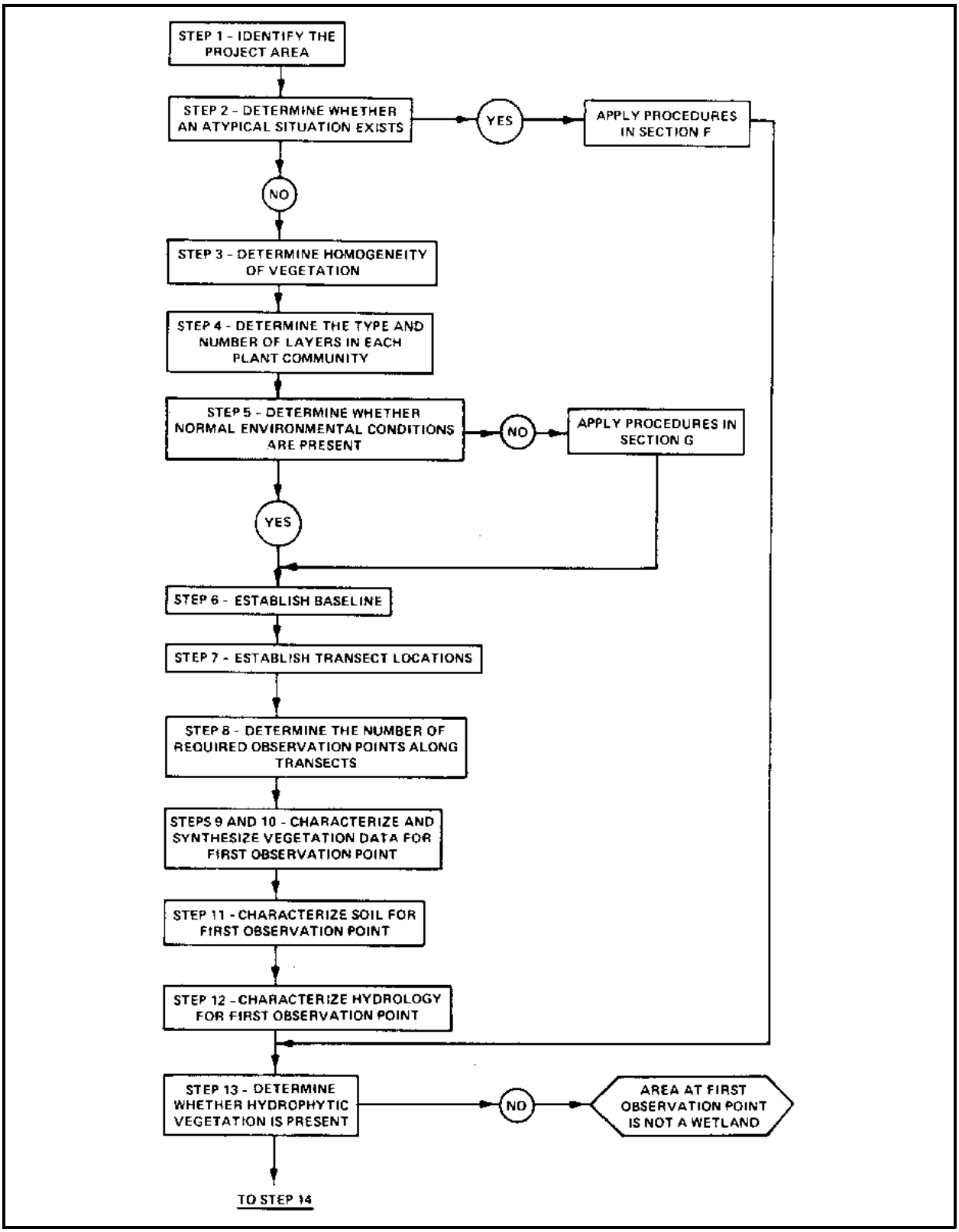


Figure 16. Flowchart of steps involved in making a comprehensive wetland determination (Section E) (Continued)

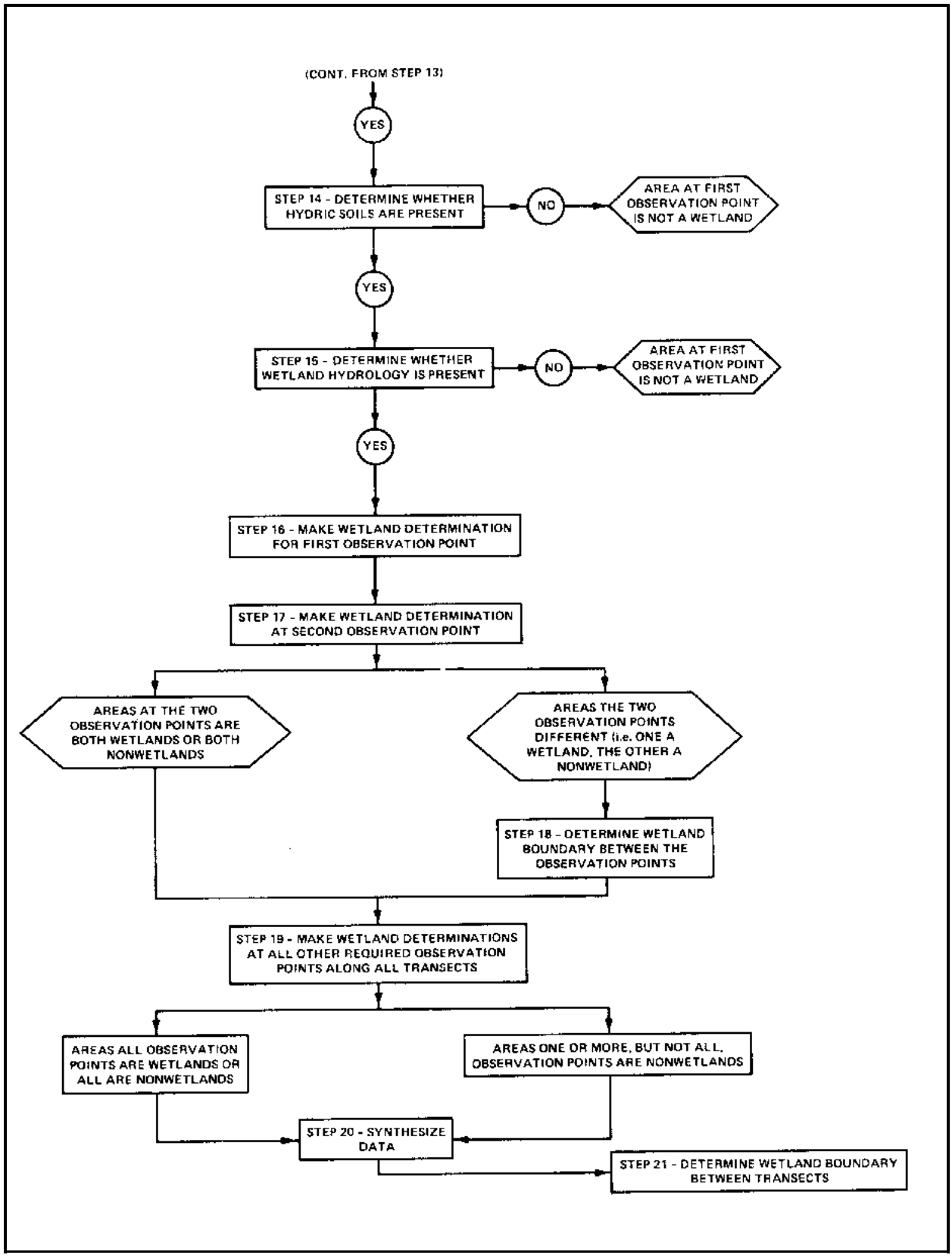


Figure 16. (Concluded)

- *STEP 3 - Determine homogeneity of vegetation.* While completing STEP 2, determine the number of plant community types present. Mark the approximate location of each community type on the base map. The number and locations of required wetland determinations will be strongly influenced by both the size of the area and the number and distribution of plant community types; the larger the area and greater the number of plant community types, the greater the number of required wetland determinations. It is imperative that all plant community types occurring in all portions of the area be included in the investigation. PROCEED TO STEP 4.

- *STEP 4 - Determine the type and number of layers in each plant community.* Examine each identified plant community type and determine the type(s) and number of layers in each community. Potential layers include trees (woody overstory), saplings/shrubs (woody understory), herbs (herbaceous understory), and/or woody vines. PROCEED TO STEP 5.

- *STEP 5 - Determine whether normal environmental conditions are present.* Determine whether normal environmental conditions are present at the observation point by considering the following:

    a. Is the area at the observation point presently lacking hydrophytic vegetation and/or hydrologic indicators due to annual or seasonal fluctuations in precipitation or groundwater levels?

    b. Are hydrophytic vegetation indicators lacking due to seasonal fluctuations in temperature?

    If the answer to either of these questions is thought to be YES, PROCEED TO Section G. If the answer to both questions is NO, PROCEED TO STEP 6.

- *STEP 6 - Establish a baseline.* Select one project boundary area as a baseline. The baseline should extend parallel to any major watercourse and/or perpendicular to a topographic gradient (see Figure 17). Determine the baseline length and record on the base map both the baseline length and its compass heading. PROCEED TO STEP 7.

- *STEP 7 - Establish transect locations.* Divide the baseline into a number of equal segments (Figure 17). Use the following as a guide to determine the appropriate number of baseline segments:

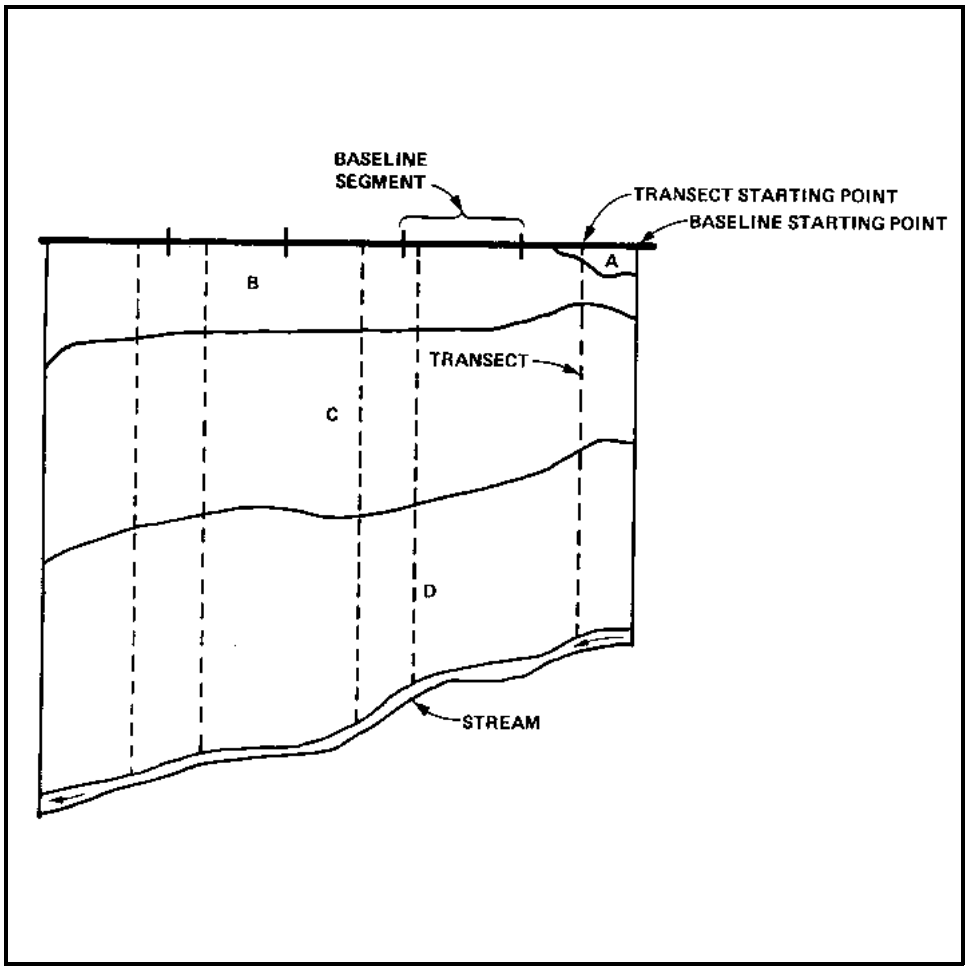


Figure 17. General orientation of baseline and transects in a hypothetical project area. Alpha characters represent different plant communities. Transect positions were determined using a random numbers table

Baseline Length, ft	Number of Segments	Length of Baseline Segment, ft
>50 - 500	3	18 - 167
>500 - 1,000	3	167 - 333
>1,000 - 5,000	5	200 - 1,000
>5,000 - 10,000	7	700 - 1,400
>10,000[1]	Variable	2,000

[1] If the baseline exceeds 5 miles, baseline segments should be 0.5 mile in length.

Use a random numbers table or a calculator with a random numbers generation feature to determine the position of a transect starting point within each baseline segment. For example, when the baseline is 4,000 ft, the number of baseline segments will be five, and the baseline segment length will be 4,000/5 = 800 ft. Locate the first transect within the first 800 ft of the baseline. If the random numbers table yields 264 as the

distance from the baseline starting point, measure 264 ft from the baseline starting point and establish the starting point of the first transect. If the second random number selected is 530, the starting point of the second transect will be located at a distance of 1,330 ft (800 + 530 ft) from the baseline starting point. *CAUTION: Make sure that each plant community type is included in at least one transect. If not, modify the sampling design accordingly.* When the starting point locations for all required transects have been determined, PROCEED TO STEP 8.

- *STEP 8 - Determine the number of required observation points along transects.* The number of required observation points along each transect will be largely dependent on transect length. Establish observation points along each transect using the following as a guide:

Transect Length, ft	Number of Observation Points	Interval Between Observation Points, ft
<1,000	2-10	100
1,000 - <5,000	10	100 - 500
5,000 - <10,000	10	500 - 1,000
≥ 10,000	>10	1,000

Establish the first observation point at a distance of 50 ft from the baseline (Figure 17). When obvious nonwetlands occupy a long portion of the transect from the baseline starting point, establish the first observation point in the obvious nonwetland at a distance of approximately 300 ft from the point that the obvious nonwetland begins to intergrade into a potential wetland community type. Additional observation points must also be established to determine the wetland boundary between successive regular observation points when one of the points is a wetland and the other is a nonwetland. *CAUTION: In large areas having a mosaic of plant community types, several wetland boundaries may occur along the same transect.* PROCEED TO STEP 9 and apply the comprehensive wetland determination procedure at each required observation point. Use the described procedure to simultaneously characterize the vegetation, soil, and hydrology at each required observation point along each transect, and use the resulting characterization to make a wetland determination at each point. *NOTE: ALL required wetland boundary determinations should be made while proceeding along a transect.*

- *STEP 9 - Characterize the vegetation at the first observation point along the first transect.*[1] Record on DATA FORM 2 the vegetation occurring

[1] There is no single best procedure for characterizing vegetation. Methods described in STEP 9 afford standardization of the procedure. However, plot size and descriptors for determining dominance may vary.

at the first observation point along the first transect by completing the following (as appropriate):

a. *Trees.* Identify each tree occurring within a 30-ft radius[1] of the observation point, measure its basal area (square inches) or diameter at breast height (DBH) using a basal area tape or diameter tape, respectively, and record. *NOTE: If DBH is measured, convert values to basal area by applying the formula* $A = \pi r^2$. *This must be done on an individual basis.* A tree is any nonclimbing, woody plant that has a DBH of ≥ 3.0 in., regardless of height.

b. *Saplings/shrubs.* Identify each sapling/shrub occurring within a 10-ft radius of the observation point, estimate its height, and record the midpoint of its class range using the following height classes (height is used as an indication of dominance; taller individuals exert a greater influence on the plant community):

Height Class	Height Class Range, ft	Midpoint of Range, ft
1	1-3	2
2	3-5	4
3	5-7	6
4	7-9	8
5	9-11	10
6	>11	12

A sapling/shrub is any woody plant having a height >3.2 ft but a stem diameter of <3.0 in., exclusive of woody vines.

c. *Herbs.* Place a 3.28- by 3.28-ft quadrat with one corner touching the observation point and one edge adjacent to the transect line. As an alternative, a 1.64-ft-radius plot with the center of the plot representing the observation point position may be used. Identify each plant species with foliage extending into the quadrat and estimate its percent cover by applying the following cover classes:

[1] A larger sampling plot may be necessary when trees are large and widely spaced.

Cover Class	Class Range, Percent	Midpoint of Class Range, Percent
1	0-5	2.5
2	>5-25	15.0
3	>25-50	37.5
4	>50-75	62.5
5	>75-95	85.0
6	>95-100	97.5

Include all nonwoody plants and woody plants <3.2 ft in height. *NOTE: Total percent cover for all species will often exceed 100 percent.*

d. *Woody vines (lianas).* Identify species of woody vines climbing each tree and sapling/shrub sampled in STEPS 9*a* and 9*b* above, and record the number of stems of each. Since many woody vines branch profusely, count or estimate the number of stems at the ground surface. Include only individuals rooted in the 10-ft radius plot. Do not include individuals <3.2 ft in height. PROCEED TO STEP 10.

- *STEP 10 - Analyze field vegetation data.* Examine the vegetation data (STEP 9) and determine the dominant species in each vegetation layer[1] by completing the following:

a. *Trees.* Obtain the total basal area (square inches) for each tree species identified in STEP 9*a* by summing the basal area of all individuals of a species found in the sample plot. Rank the species in descending order of dominance based on total basal area. Complete DATA FORM 2 for the tree layer.

b. *Saplings/shrubs.* Obtain the total height for each sapling/shrub species identified in STEP 9*b*. Total height, which is an estimate of dominance, is obtained by summing the midpoints of height classes for all individuals of a species found in the sample plot. Rank the species in descending order of dominance based on sums of midpoints of height class ranges. Complete DATA FORM 2 for the sapling/shrub layer.

c. *Herbs.* Obtain the total cover for each herbaceous and woody seedling species identified in STEP 9*c*. Total cover is obtained by using the midpoints of the cover class range as-

[1] The same species may occur as a dominant in more than one vegetation layer.

signed to each species (only one estimate of cover is made for a species in a given plot). Rank herbs and woody seedlings in descending order of dominance based on percent cover. Complete DATA FORM 2 for the herbaceous layer.

d. *Woody vines (lianas).* Obtain the total number of individuals of each species of woody vine identified in STEP 9*d*. Rank the species in descending order of dominance based on number of stems. Complete DATA FORM 2 for the woody vine layer. PROCEED TO STEP 11.

- *STEP 11 - Characterize soil.* If a soil survey is available (Section B), the soil type may already be known. Have a soil scientist confirm that the soil type is correct, and determine whether the soil series is a hydric soil ~~(Appendix D, Section 2)~~. *CAUTION: Mapping units on soil surveys sometimes have inclusions of soil series or phases not shown on the soil survey map.* If a hydric soil type is confirmed, record on DATA FORM 1 and PROCEED TO STEP 12. If not, dig a soil pit using a soil auger or spade (See Appendix D, Section 1) and look for indicators of hydric soils immediately below the A-horizon or 10 inches (whichever is shallower) (Part III, paragraphs 44 and/or 45). Record findings on DATA FORM 1. PROCEED TO STEP 12.

- *STEP 12 - Characterize hydrology.* Examine the observation point for indicators of wetland hydrology (Part III, paragraph 49) and record observations on DATA FORM 1. Consider indicators in the same sequence as listed in paragraph 49. PROCEED TO STEP 13.

- *STEP 13 - Determine whether hydrophytic vegetation is present.* Record the three dominant species from each vegetation layer (five species if only one or two layers are present) on DATA FORM 1.[1] Determine whether these species occur in wetlands by considering the following:

  a. *More than 50 percent of the dominant plant species are OBL, FACW, and/or FAC[2] on lists of plant species that occur in wetlands.* Record the indicator status of all dominant species ~~(Appendix C, Section 1 or 2)~~ on DATA FORM 1. Hydrophytic vegetation is present when the majority of the dominant species have an indicator status of OBL, FACW, or FAC. *CAUTION: Not necessarily all plant communities composed of only FAC species are hydrophytic communities. They are hydrophytic communities only when positive indicators of hydric soils and wetland hydrology are also found.* If this indicator is satisfied, complete the vegetation portion of

[1] Record all dominant species when less than three are present in a vegetation layer.
[2] For the FAC-neutral option, see paragraph 35*a*.

DATA FORM 1 and PROCEED TO STEP 14. If not, consider other indicators of hydrophytic vegetation.

b. *Presence of adaptations for occurrence in wetlands.* Do any of the species listed on DATA FORM 1 have observed morphological or known physiological adaptations (Appendix C, Section 3) for occurrence in wetlands? If so, record species having such adaptations on DATA FORM 1. When two or more dominant species have observed morphological adaptations or known physiological adaptations for occurrence in wetlands, hydrophytic vegetation is present. If so, complete the vegetation portion of DATA FORM 1 and PROCEED TO STEP 14. If not, consider other indicators of hydrophytic vegetation.

c. *Other indicators of hydrophytic vegetation.* Consider other indicators (see Part III, paragraph 35) that the species listed on DATA FORM 1 are commonly found in wetlands. If so, complete the vegetation portion of DATA FORM 1 by recording sources of supporting information, and PROCEED TO STEP 14. If no indicator of hydrophytic vegetation is present, the area at the observation point is not a wetland. In such cases, it is unnecessary to consider soil and hydrology at that observation point. PROCEED TO STEP 17.

- *STEP 14 - Determine whether hydric soils are present.* Examine DATA FORM 1 and determine whether any indicator of hydric soils is present. If so, complete the soils portion of DATA FORM 1 and PROCEED TO STEP 15. If not, the area at the observation point is not a wetland. PROCEED TO STEP 17.

- *STEP 15 - Determine whether wetland hydrology is present.* Examine DATA FORM 1 and determine whether any indicator of wetland hydrology is present. Complete the hydrology portion of DATA FORM 1 and PROCEED TO STEP 16.

- *STEP 16 - Make wetland determination.* When the area at the observation point presently or normally has wetland indicators of all three parameters, it is a wetland. When the area at the observation point presently or normally lacks wetland indicators of one or more parameters, it is a nonwetland. PROCEED TO STEP 17.

- *STEP 17 - Make wetland determination at second observation point.* Locate the second observation point along the first transect and make a wetland determination by repeating procedures described in STEPS 9 through 16. When the area at the second observation point is the same as the area at the first observation point (i.e., both wetlands or both nonwetlands), PROCEED TO STEP 19. When the areas at the two ob-

servation points are different (i.e., one wetlands, the other nonwetlands), PROCEED TO STEP 18.

- *STEP 18 - Determine the wetland boundary between observation points.* Determine the position of the wetland boundary by applying the following procedure:

    a. Look for a change in vegetation or topography. *NOTE: The changes may sometimes be very subtle.* If a change is noted, establish an observation point and repeat STEPS 9 through 16. Complete a DATA FORM 1. If the area at this point is a wetland, proceed toward the nonwetland observation point until a more obvious change in vegetation or topography is noted and repeat the procedure. If there is no obvious change, establish the next observation point approximately halfway between the last observation point and the nonwetland observation point and repeat STEPS 9 through 16.

    b. Make as many additional wetland determinations as necessary to find the wetland boundary. *NOTE: The completed DATA FORM 1's for the original two observation points often will provide a clue as to the parameters that change between the two points.*

    c. When the wetland boundary is found, mark the boundary location on the base map and indicate on the DATA FORM 1 that this represents a wetland boundary. Record the distance of the boundary from one of the two regular observation points. Since the regular observation points represent known distances from the baseline, it will be possible to accurately pinpoint the boundary location on the base map. PROCEED TO STEP 19.

- *STEP 19 - Make wetland determinations at all other required observation points along all transects.* Continue to locate and sample all required observation points along all transects. *NOTE: The procedure described in STEP 18 must be applied at every position where a wetland boundary occurs between successive observation points.* Complete a DATA FORM 1 for each observation point and PROCEED TO STEP 20.

- *STEP 20 - Synthesize data to determine the portion of the area containing wetlands.* Examine all completed copies of DATA FORM 1 (STEP 19), and mark on a copy of the base map the locations of all observation points that are wetlands with a W and all observation points that are nonwetlands with an N. Also, mark all wetland boundaries occurring along transects with an X. If all the observation points are wetlands, the entire area is wetlands. If all observation points are nonwetlands, none of the area is wetlands. If some wetlands and some nonwetlands are present, connect the wetland boundaries (X) by following contour lines between transects. *CAUTION: If the determination is considered to be*

highly controversial, it may be necessary to be more precise in determining the wetland boundary between transects. This is also true for very large areas where the distance between transects is greater. If this is necessary, PROCEED TO STEP 21.

- *STEP 21 - Determine wetland boundary between transects.* Two procedures may be used to determine the wetland boundary between transects, both of which involve surveying:

    a. *Survey contour from wetland boundary along transects.* The first method involves surveying the elevation of the wetland boundaries along transects and then extending the survey to determine the same contour between transects. This procedure will be adequate in areas where there is no significant elevational change between transects. However, if a significant elevational change occurs between transects, either the surveyor must adjust elevational readings to accommodate such changes or the second method must be used. *NOTE: The surveyed wetland boundary must be examined to ensure that no anomalies exist. If these occur, additional wetland determinations will be required in the portion of the area where the anomalies occur, and the wetland boundary must be adjusted accordingly.*

    b. *Additional wetland determinations between transects.* This procedure consists of traversing the area between transects and making additional wetland determinations to locate the wetland boundary at sufficiently close intervals (not necessarily standard intervals) so that the area can be surveyed. Place surveyor flags at each wetland boundary location. Enlist a surveyor to survey the points between transects. From the resulting survey data, produce a map that separates wetlands from nonwetlands.

Section F. Atypical Situations

71. Methods described in this section should be used only when a determination has already been made in Section D or E that positive indicators of hydrophytic vegetation, hydric soils, and/or wetland hydrology could not be found due to effects of recent human activities or natural events. This section is applicable to delineations made in the following types of situations:

a. *Unauthorized activities.* Unauthorized discharges requiring enforcement actions may result in removal or covering of indicators of one or more wetland parameters. Examples include, but are not limited to: (1) alteration or removal of vegetation; (2) placement of dredged or fill material over hydric soils; and/or (3) construction of levees, drainage systems, or

dams that significantly alter the area hydrology. NOTE: This section should not be used for activities that have been previously authorized or those that are exempted from CE regulation. For example, this section is not applicable to areas that have been drained under CE authorization or that did not require CE authorization. Some of these areas may still be wetlands, but procedures described in Section D or E must be used in these cases.

b. *Natural events.* Naturally occurring events may result in either creation or alteration of wetlands. For example, recent beaver dams may impound water, thereby resulting in a shift of hydrology and vegetation to wetlands. However, hydric soil indicators may not have developed due to insufficient time having passed to allow their development. Fire, avalanches, volcanic activity, and changing river courses are other examples. *NOTE: It is necessary to determine whether alterations to an area have resulted in changes that are now the "normal circumstances."* The relative permanence of the change and whether the area is now functioning as a wetland must be considered.

c. *Man-induced wetlands.* Procedures described in Subsection 4 are for use in delineating wetlands that have been purposely or incidentally created by human activities, but in which wetland indicators of one or more parameters are absent. For example, road construction may have resulted in impoundment of water in an area that previously was nonwetland, thereby effecting hydrophytic vegetation and wetland hydrology in the area. However, the area may lack hydric soil indicators. *NOTE: Subsection D is not intended to bring into CE jurisdiction those manmade wetlands that are exempted under CE regulations or policy.* It is also important to consider whether the man-induced changes are now the "normal circumstances" for the area. Both the relative permanence of the change and the functioning of the area as a wetland are implied.

72. When any of the three types of situations described in paragraph 71 occurs, application of methods described in Sections D and/or E will lead to the conclusion that the area is not a wetland because positive wetland indicators for at least one of the three parameters will be absent. Therefore, apply procedures described in one of the following subsections (as appropriate) to determine whether positive indicators of hydrophytic vegetation, hydric soils, and/or wetland hydrology existed prior to alteration of the area. Once these procedures have been employed, RETURN TO Section D or E to make a wetland determination. PROCEED TO the appropriate subsection.

Subsection 1 - Vegetation

73. Employ the following steps to determine whether hydrophytic vegetation previously occurred:

- *STEP 1 - Describe the type of alteration.* Examine the area and describe the type of alteration that occurred. Look for evidence of selective harvesting, clear cutting, bulldozing, recent conversion to agriculture, or other activities (e.g., burning, discing, or presence of buildings, dams, levees, roads, parking lots, etc.). Determine the approximate date[1] when the alteration occurred. Record observations on DATA FORM 3, and PROCEED TO STEP 2.

- *STEP 2 - Describe effects on vegetation.* Record on DATA FORM 3 a general description of how the activities (STEP 1) have affected the plant communities. Consider the following:

    a. Has all or a portion of the area been cleared of vegetation?

    b. Has only one layer of the plant community (e.g., trees) been removed?

    c. Has selective harvesting resulted in removal of some species?

    d. Has all vegetation been covered by fill, dredged material, or structures?

    e. Have increased water levels resulted in the death of some individuals?

    PROCEED TO STEP 3.

- *STEP 3 - Determine the type of vegetation that previously occurred.* Obtain all possible evidence of the type of plant communities that occurred in the area prior to alteration. Potential sources of such evidence include:

    a. *Aerial photography*. Recent (within 5 years) aerial photography can often be used to document the type of previous vegetation. The general type of plant communities formerly present can usually be determined, and species identification is sometimes possible.

    b. *Onsite inspection.* Many types of activities result in only partial removal of the previous plant communities, and remaining species may be indicative of hydrophytic vegetation. In other cases, plant fragments (e.g., stumps, roots) may be used to reconstruct the plant community types that occurred prior to site alteration. Sometimes, this can be determined by examining piles of debris resulting from land-clearing opera-

[1] It is especially important to determine whether the alteration occurred prior to implementation of Section 404.

tions or excavation to uncover identifiable remains of the previous plant community.

c. *Previous site inspections.* Documented evidence from previous inspections of the area may describe the previous plant communities, particularly in cases where the area was altered after a permit application was denied.

d. *Adjacent vegetation.* Circumstantial evidence of the type of plant communities that previously occurred may sometimes be obtained by examining the vegetation in adjacent areas. If adjacent areas have the same topographic position, soils, and hydrology as the altered area, the plant community types on the altered area were probably similar to those of the adjacent areas.

e. *SCS records.* Most SCS soil surveys include a description of the plant community types associated with each soil type. If the soil type on the altered area can be determined, it may be possible to generally determine the type of plant communities that previously occurred.

f. *Permit applicant.* In some cases, the permit applicant may provide important information about the type of plant communities that occurred prior to alteration.

g. *Public.* Individuals familiar with the area may provide a good general description of the previously occurring plant communities.

h. *NWI wetland maps.* The NWI has developed wetland type maps for many areas. These may be useful in determining the type of plant communities that occurred prior to alteration.

To develop the strongest possible record, all of the above sources should be considered. If the plant community types that occurred prior to alteration can be determined, record them on DATA FORM 3 and also record the basis used for the determination. PROCEED TO STEP 4. If it is impossible to determine the plant community types that occurred on the area prior to alteration, a determination cannot be made using all three parameters. In such cases, the determination must be based on the other two parameters. PROCEED TO Subsection 2 or 3 if one of the other parameters has been altered, or return to the appropriate Subsection of Section D or to Section E, as appropriate.

- *STEP 4 - Determine whether plant community types constitute hydrophytic vegetation.* Develop a list of species that previously occurred on the site (DATA FORM 3). Subject the species list to applicable indicators of hydrophytic vegetation (Part III, paragraph 35). If none of the

indicators are met, the plant communities that previously occurred did not constitute hydrophytic vegetation. If hydrophytic vegetation was present and no other parameter was in question, record appropriate data on the vegetation portion of DATA FORM 3, and return to either the appropriate subsection of Section D or to Section E. If either of the other parameters was also in question, PROCEED TO Subsection 2 or 3.

Subsection 2 - Soils

74. Employ the following steps to determine whether hydric soils previously occurred:

- *STEP 1 - Describe the type of alteration.* Examine the area and describe the type of alteration that occurred. Look for evidence of:

    a. *Deposition of dredged or fill material or natural sedimentation.* In many cases the presence of fill material will be obvious. If so, it will be necessary to dig a hole to reach the original soil (sometimes several feet deep). Fill material will usually be a different color or texture than the original soil (except when fill material has been obtained from like areas onsite). Look for decomposing vegetation between soil layers and the presence of buried organic or hydric soil layers. In accreting or recently formed sandbars in riverine situations, the soils may support hydrophytic vegetation but lack hydric soil characteristics.

    b. *Presence of nonwoody debris at the surface.* This can only be applied in areas where the original soils do not contain rocks. Nonwoody debris includes items such as rocks, bricks, and concrete fragments.

    c. *Subsurface plowing.* Has the area recently been plowed below the A-horizon or to depths of greater than 10 in.?

    d. *Removal of surface layers.* Has the surface soil layer been removed by scraping or natural landslides? Look for bare soil surfaces with exposed plant roots or scrape scars on the surface.

    e. *Presence of man-made structures.* Are buildings, dams, levees, roads, or parking lots present?

Determine the approximate date[1] when the alteration occurred. This may require checking aerial photography, examining building permits, etc. Record on DATA FORM 3, and PROCEED TO STEP 2.

- *STEP 2 - Describe effects on soils.* Record on DATA FORM 3 a general description of how identified activities in STEP 1 have affected the soils. Consider the following:

    a. Has the soil been buried? If so, record the depth of fill and determine whether the original soil is intact.

    b. Has the soil been mixed at a depth below the A-horizon or 10 inches? If so, it will be necessary to examine soil at a depth immediately below the plowed zone. Record supporting evidence.

    c. Has the soil been sufficiently altered to change the soil phase? Describe these changes.

    PROCEED TO STEP 3.

- *STEP 3 - Characterize soils that previously occurred.* Obtain all possible evidence that may be used to characterize soils that previously occurred on the area. Consider the following potential sources of information:

    a. Soil surveys. In many cases, recent soil surveys will be available. If so, determine the soil series that were mapped for the area, and compare these soil series with the list of hydric soils ~~(Appendix D, Section 2)~~. If all soil series are listed as hydric soils, the entire area had hydric soils prior to alteration.

    b. Characterization of buried soils. When fill material has been placed over the original soil without physically disturbing the soil, examine and characterize the buried soils. To accomplish this, dig a hole through the fill material until the original soil is encountered. Determine the point at which the original soil material begins. Remove 12 inches of the original soil from the hole and look for indicators of hydric soils (Part III, paragraphs 44 and/or 45) immediately below the A-horizon or 10 inches (whichever is shallower). Record on DATA FORM 3 the color of the soil matrix, presence of an organic layer, presence of mottles or gleying, and/or presence of iron and manganese concretions. If the original soil is mottled and the

[1] It is especially important to determine whether the alteration occurred prior to implementation of Section 404.

chroma of the soil matrix is 2 or less,[1] a hydric soil was formerly present on the site. If any of these indicators are found, the original soil was a hydric soil. *(NOTE: When the fill material is a thick layer, it might be necessary to use a backhoe or posthole digger to excavate the soil pit.)* If USGS quadrangle maps indicate distinct variation in area topography, this procedure must be applied in each portion of the area that originally had a different surface elevation. Record findings on DATA FORM 3.

c. *Characterization of plowed soils.* Determine the depth to which the soil has been disturbed by plowing. Look for hydric soil characteristics (Part III, paragraphs 44 and/or 45) immediately below this depth. Record findings on DATA FORM 3.

d. *Removal of surface layers.* Dig a hole (Appendix D, Section 1) and determine whether the entire surface layer (A-horizon) has been removed. If so, examine the soil immediately below the top of the subsurface layer (B-horizon) for hydric soil characteristics. As an alternative, examine an undisturbed soil of the same soil series occurring in the same topographic position in an immediately adjacent area that has not been altered. Look for hydric soil indicators immediately below the A-horizon or 10 inches (whichever is shallower), and record findings on DATA FORM 3.

If sufficient data on soils that existed prior to alteration can be obtained to determine whether a hydric soil was present, PROCEED TO STEP 4. If not, a determination cannot be made using soils. Use the other parameters (Subsections 1 and 3) for the determination.

- *STEP 4 - Determine whether hydric soils were formerly present.* Examine the available data and determine whether indicators of hydric soils (Part III, paragraphs 44 and/or 45) were formerly present. If no indicators of hydric soils were found, the original soils were not hydric soils. If indicators of hydric soils were found, record the appropriate indicators on DATA FORM 3 and PROCEED TO Subsection 3 if the hydrology of the area has been significantly altered or return either to the appropriate subsection of Section D or to Section E and characterize the area hydrology.

[1] The matrix chroma must be 1 or less if no mottles are present. The soil must be moist when colors are determined.

Subsection 3 - Hydrology

75. Apply the following steps to determine whether wetland hydrology previously occurred:

- *STEP 1 - Describe the type of alteration.* Examine the area and describe the type of alteration that occurred. Look for evidence of:

    a. *Dams.* Has recent construction of a dam or some natural event (e.g., beaver activity or landslide) caused the area to become increasingly wetter or drier? *NOTE: This activity could have occurred a considerable distance away from the site in question.*

    b. *Levees, dikes, and similar structures.* Have levees or dikes recently been constructed that prevent the area from becoming periodically inundated by overbank flooding?

    c. *Ditching.* Have ditches been constructed recently that cause the area to drain more rapidly following inundation?

    d. *Filling of channels or depressions (land-leveling).* Have natural channels or depressions been recently filled?

    e. *Diversion of water.* Has an upstream drainage pattern been altered that results in water being diverted from the area?

    f. *Ground-water extraction.* Has prolonged and intensive pumping of ground water for irrigation or other purposes significantly lowered the water table and/or altered drainage patterns?

    g. *Channelization.* Have feeder streams recently been channelized sufficiently to alter the frequency and/or duration of inundation?

    Determine the approximate date[1] when the alteration occurred. Record observations on DATA FORM 3 and PROCEED TO STEP 2.

- *STEP 2 - Describe effects of alteration on area hydrology.* Record on DATA FORM 3 a general description of how the observed alteration (STEP 1) has affected the area. Consider the following:

    a. Is the area more frequently or less frequently inundated than prior to alteration? To what degree and why?

[1] It is especially important to determine whether the alteration occurred prior to implementation of Section 404.

b. Is the duration of inundation and soil saturation different than prior to alteration? How much different and why?

PROCEED TO STEP 3.

- *STEP 3 - Characterize the hydrology that previously existed in the area.* Obtain all possible evidence that may be used to characterize the hydrology that previously occurred. Potential sources of information include:

  a. *Stream or tidal gage data.* If a stream or tidal gaging station is located near the area, it may be possible to calculate elevations representing the upper limit of wetlands hydrology based on duration of inundation. Consult hydrologists from the local CE District Office for assistance. The resulting mean sea level elevation will represent the upper limit of inundation for the area in the absence of any alteration. If fill material has not been placed on the area, survey this elevation from the nearest USGS benchmark. Record elevations representing zone boundaries on DATA FORM 3. If fill material has been placed on the area, compare the calculated elevation with elevations shown on a USGS quadrangle or any other survey map that predated site alteration.

  b. *Field hydrologic indicators.* Certain field indicators of wetland hydrology (Part III, paragraph 49) may still be present. Look for watermarks on trees or other structures, drift lines, and debris deposits. Record these on DATA FORM 3. If adjacent undisturbed areas are in the same topographic position and are similarly influenced by the same sources of inundation, look for wetland indicators in these areas.

  c. *Aerial photography.* Examine any available aerial photography and determine whether the area was inundated at the time of the photographic mission. Consider the time of the year that the aerial photography was taken and use only photography taken during the growing season and prior to site alteration.

  d. *Historical records.* Examine any available historical records for evidence that the area has been periodically inundated. Obtain copies of any such information and record findings on DATA FORM 3.

  e. *Floodplain management maps.* Determine the previous frequency of inundation of the area from Floodplain Management Maps (if available). Record flood frequency on DATA FORM 3.

f. *Public or local government officials.* Contact individuals who might have knowledge that the area was periodically inundated.

If sufficient data on hydrology that existed prior to site alteration can be obtained to determine whether wetland hydrology was previously present, PROCEED TO STEP 4. If not, a determination involving hydrology cannot be made. Use other parameters (Subsections 1 and 2) for the wetland determination. Return to either the appropriate subsection of Section D or to Section E and complete the necessary data forms. PROCEED TO STEP 4 if the previous hydrology can be characterized.

- *STEP 4 - Determine whether wetland hydrology previously occurred.* Examine the available data and determine whether indicators of wetland hydrology (Part III, paragraph 49) were present prior to site alteration. If no indicators of wetland hydrology were found, the original hydrology of the area was not wetland hydrology. If indicators of wetland hydrology were found, record the appropriate indicators on DATA FORM 3 and return either to the appropriate subsection of Section D or to Section E and complete the wetland determination.

Subsection 4 - Man-Induced Wetlands

76. A man-induced wetland is an area that has developed at least some characteristics of naturally occurring wetlands due to either intentional or incidental human activities. Examples of man-induced wetlands include irrigated wetlands, wetlands resulting from impoundment (e.g., reservoir shorelines), wetlands resulting from filling of formerly deepwater habitats, dredged material disposal areas, and wetlands resulting from stream channel realignment. Some man-induced wetlands may be subject to Section 404. In virtually all cases, man-induced wetlands involve a significant change in the hydrologic regime, which may either increase or decrease the wetness of the area. Although wetland indicators of all three parameters (i.e., vegetation, soils, and hydrology) may be found in some man-induced wetlands, indicators of hydric soils are usually absent. Hydric soils require long periods (hundreds of years) for development of wetness characteristics, and most man-induced wetlands have not been in existence for a sufficient period to allow development of hydric soil characteristics. Therefore, application of the multiparameter approach in making wetland determinations in man-induced wetlands must be based on the presence of hydrophytic vegetation and wetland hydrology. [1] There must also be documented evidence that the wetland resulted from human activities. Employ the following steps to determine whether an area consists of wetlands resulting from human activities:

[1] Uplands that support hydrophytic vegetation due to agricultural irrigation and that have an obvious hydrologic connection to other "waters of the United States" should not be delineated as wetlands under this subsection.

- *STEP 1 - Determine whether the area represents a potential man-induced wetland.* Consider the following questions:

    a. Has a recent man-induced change in hydrology occurred that caused the area to become significantly wetter?

    b. Has a major man-induced change in hydrology that occurred in the past caused a former deepwater aquatic habitat to become significantly drier?

    c. Has man-induced stream channel realignment significantly altered the area hydrology?

    d. Has the area been subjected to long-term irrigation practices?

    If the answer to any of the above questions is YES, document the approximate time during which the change in hydrology occurred, and PROCEED TO STEP 2. If the answer to all of the questions is NO, procedures described in Section D or E must be used.

- *STEP 2 - Determine whether a permit will be needed if the area is found to be a wetland.* Consider the current CE regulations and policy regarding man-induced wetlands. If the type of activity resulting in the area being a potential man-induced wetland is exempted by regulation or policy, no further action is needed. If not exempt, PROCEED TO STEP 3.

- *STEP 3 - Characterize the area vegetation, soils, and hydrology.* Apply procedures described in Section D (routine determinations) or Section E (comprehensive determinations) to the area. Complete the appropriate data forms and PROCEED TO STEP 4.

- *STEP 4 - Wetland determination.* Based on information resulting from STEP 3, determine whether the area is a wetland. When wetland indicators of all three parameters are found, the area is a wetland. When indicators of hydrophytic vegetation and wetland hydrology are found *and* there is documented evidence that the change in hydrology occurred so recently that soils could not have developed hydric characteristics, the area is a wetland. In such cases, it is assumed that the soils are functioning as hydric soils. *CAUTION: If hydrophytic vegetation is being maintained only because of man-induced wetland hydrology that would no longer exist if the activity (e.g., irrigation) were to be terminated, the area should not be considered a wetland.*

Section G - Problem Areas

77. There are certain wetland types and/or conditions that may make application of indicators of one or more parameters difficult, at least at certain times of the year. These are not considered to be atypical situations. Instead, they are wetland types in which wetland indicators of one or more parameters may be periodically lacking due to *normal* seasonal or annual variations in environmental conditions that result from causes other than human activities or catastrophic natural events.

Types of problem areas

78. Representative examples of potential problem areas, types of variations that occur, and their effects on wetland indicators are presented in the following subparagraphs. Similar situations may sometimes occur in other wetland types. *NOTE: This section is not intended to bring nonwetland areas having wetland indicators of two, but not all three, parameters into Section 404 jurisdiction.*

a. *Wetlands on drumlins.* Slope wetlands occur in glaciated areas in which thin soils cover relatively impermeable glacial till or in which layers of glacial till have different hydraulic conditions that produce a broad zone of ground-water seepage. Such areas are seldom, if ever, flooded, but downslope groundwater movement keeps the soils saturated for a sufficient portion of the growing season to produce anaerobic and reducing soil conditions. This fosters development of hydric soil characteristics and selects for hydrophytic vegetation. Indicators of wetland hydrology may be lacking during the drier portion of the growing season.

b. *Seasonal wetlands.* In many regions (especially in western states), depressional areas occur that have wetland indicators of all three parameters during the wetter portion of the growing season, but normally lack wetland indicators of hydrology and/or vegetation during the drier portion of the growing season. Obligate hydrophytes and facultative wetland plant species ~~(Appendix C, Section 1 or 2)~~ normally are dominant during the wetter portion of the growing season, while upland species (annuals) may be dominant during the drier portion of the growing season. These areas may be inundated during the wetter portion of the growing season, but wetland hydrology indicators may be totally lacking during the drier portion of the growing season. It is important to establish that an area truly is a water body. Water in a depression normally must be sufficiently persistent to exhibit an ordinary high-water mark or the presence of wetland characteristics before it can be considered as a water body potentially subject to Clean Water Act jurisdiction. The determination that an area exhibits wetland characteristics for a sufficient portion of the growing season to qualify as a wetland under the Clean Water Act must be made on a case-by-case basis. Such determinations should consider the respective length of time that the area exhibits upland and wetland characteristics, and the manner in which the area fits

into the overall ecological system as a wetland. Evidence concerning the persistence of an area's wetness can be obtained from its history, vegetation, soil, drainage characteristics, uses to which it has been subjected, and weather or hydrologic records.

c. *Prairie potholes.* Prairie potholes normally occur as shallow depressions in glaciated portions of the north-central United States. Many are landlocked, while others have a drainage outlet to streams or other potholes. Most have standing water for much of the growing season in years of normal or above normal precipitation, but are neither inundated nor have saturated soils during most of the growing season in years of below normal precipitation. During dry years, potholes often become incorporated into farming plans, and are either planted to row crops (e.g., soybeans) or are mowed as part of a haying operation. When this occurs, wetland indicators of one or more parameters may be lacking. For example, tillage would eliminate any onsite hydrologic indicator, and would make detection of soil and vegetation indicators much more difficult.

d. *Vegetated flats.* In both coastal and interior areas throughout the Nation, vegetated flats are often dominated by annual species that are categorized as OBL. Application of procedures described in Sections D and E during the growing season will clearly result in a positive wetland determination. However, these areas will appear to be unvegetated mudflats when examined during the nongrowing season, and the area would not qualify at that time as a wetland due to an apparent lack of vegetation.

Wetland determinations in problem areas

79. Procedures for making wetland determinations in problem areas are presented below. Application of these procedures is appropriate only when a decision has been made in Section D or E that wetland indicators of one or more parameters were lacking, probably due to normal seasonal or annual variations in environmental conditions. Specific procedures to be used will vary according to the nature of the area, site conditions, and parameter(s) affected by the variations in environmental conditions. A determination must be based on the best evidence available to the field inspector, including:

a. Available information (Section B).

b. Field data resulting from an onsite inspection.

c. Basic knowledge of the ecology of the particular community type(s) and environmental conditions associated with the community type.

NOTE: The procedures described below should only be applied to parameters not adequately characterized in Section D or E. Complete the following steps:

- *STEP 1 - Identify the parameter(s) to be considered.* Examine the DATA FORM 1 (Section D or E) and identify the parameter(s) that must be given additional consideration. PROCEED TO STEP 2.

- *STEP 2 - Determine the reason for further consideration.* Determine the reason why the parameter(s) identified in STEP 1 should be given further consideration. This will require a consideration and documentation of:

    a. Environmental condition(s) that have impacted the parameter(s).

    b. Impacts of the identified environmental condition(s) on the parameter(s) in question.

  Record findings in the comments section of DATA FORM 1. PROCEED TO STEP 3.

- *STEP 3 - Document available information for parameter(s) in question.* Examine the available information and consider personal ecological knowledge of the range of normal environmental conditions of the area. Local experts (e.g., university personnel) may provide additional information. Record information on DATA FORM 1. PROCEED TO STEP 4.

- *STEP 4 - Determine whether wetland indicators are normally present during a portion of the growing season.* Examine the information resulting from STEP 3 and determine whether wetland indicators are *normally* present during part of the growing season. If so, record on DATA FORM 1 the indicators normally present and return to Section D or Section E and make a wetland determination. If no information can be found that wetland indicators of all three parameters are normally present during part of the growing season, the determination must be made using procedures described in Section D or Section E.

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Appendix A
Glossary

Active water table. A condition in which the zone of soil saturation fluctuates, resulting in periodic anaerobic soil conditions. Soils with an active water table often contain bright mottles and matrix chromas of 2 or less.

Adaptation. A modification of a species that makes it more fit for existence under the conditions of its environment. These modifications are the result of genetic selection processes.

Adventitious roots. Roots found on plant stems in positions where they normally do not occur.

Aerenchymous tissue. A type of plant tissue in which cells are unusually large and arranged in a manner that results in air spaces in the plant organ. Such tissues are often referred to as spongy and usually provide increased buoyancy.

Aerobic. A situation in which molecular oxygen is a part of the environment.

Anaerobic. A situation in which molecular oxygen is absent (or effectively so) from the environment.

Aquatic roots. Roots that develop on stems above the normal position occupied by roots in response to prolonged inundation.

Aquic moisture regime. A mostly reducing soil moisture regime nearly free of dissolved oxygen due to saturation by ground water or its capillary fringe and occurring at periods when the soil temperature at 19.7 in. is greater than 5 °C.

Arched roots. Roots produced on plant stems in a position above the normal position of roots, which serve to brace the plant during and following periods of prolonged inundation.

Areal cover. A measure of dominance that defines the degree to which above-ground portions of plants (not limited to those rooted in a sample plot) cover the ground surface. It is possible for the total areal cover in a community to exceed 100 percent because (a) most plant communities consist of two or more vegetative strata; (b) areal cover is estimated by vegetative layer; and (c) foliage within a single layer may overlap.

Atypical situation. As used herein, this term refers to areas in which one or more parameters (vegetation, soil, and/or hydrology) have been sufficiently altered by recent human activities or natural events to preclude the presence of wetland indicators of the parameter.

Backwater flooding. Situations in which the source of inundation is overbank flooding from a nearby stream.

Basal area. The cross-sectional area of a tree trunk measured in square inches, square centimeters, etc. Basal area is normally measured at 4.5 ft above the ground level and is used as a measure of dominance. The most easily used tool for measuring basal area is a tape marked in square inches. When plot-less methods are used, an angle gauge or prism will provide a means for rapidly determining basal area. This term is also applicable to the cross-sectional area of a clumped herbaceous plant, measured at 1.0 in. above the soil surface.

Bench mark. A fixed, more or less permanent reference point or object, the elevation of which is known. The U.S. Geological Survey (USGS) installs brass caps in bridge abutments or otherwise permanently sets bench marks at convenient locations nationwide. The elevations on these marks are referenced to the National Geodetic Vertical Datum (NGVD), also commonly known as mean sea level (MSL). Locations of these bench marks on USGS quadrangle maps are shown as small triangles. However, the marks are sometimes destroyed by construction or vandalism. The existence of any bench mark should be field verified before planning work that relies on a particular reference point. The USGS and/or local state surveyor's office can provide information on the existence, exact location, and exact elevation of bench marks.

Biennial. An event that occurs at 2-year intervals.

Buried soil. A once-exposed soil now covered by an alluvial, loessal, or other deposit (including man-made).

Canopy layer. The uppermost layer of vegetation in a plant community. In forested areas, mature trees comprise the canopy layer, while the tallest herbaceous species constitute the canopy layer in a marsh.

Capillary fringe. A zone immediately above the water table (zero gauge pressure) in which water is drawn upward from the water table by capillary action.

Chemical reduction. Any process by which one compound or ion acts as an electron donor. In such cases, the valence state of the electron donor is decreased.

Chroma. The relative purity or saturation of a color; intensity of distinctive hue as related to grayness; one of the three variables of color.

Comprehensive wetland determination. A type of wetland determination that is based on the strongest possible evidence, requiring the collection of quantitative data.

Concretion. A local concentration of chemical compounds (e.g., calcium carbonate, iron oxide) in the form of a grain or nodule of varying size, shape, hardness, and color. Concretions of significance in hydric soils are usually iron and/or manganese oxides occurring at or near the soil surface, which develop under conditions of prolonged soil saturation.

Contour. An imaginary line of constant elevation on the ground surface. The corresponding line on a map is called a "contour line."

Criteria. Standards, rules, or tests on which a judgment or decision may be based.

Deepwater aquatic habitat. Any open water area that has a mean annual water depth >6.6 ft, lacks soil, and/or is either unvegetated or supports only floating or submersed macrophytes.

Density. The number of individuals of a species per unit area.

Detritus. Minute fragments of plant parts found on the soil surface. When fused together by algae or soil particles, this is an indicator that surface water was recently present.

Diameter at breast height (DBH). The width of a plant stem as measured at 4.5 ft above the ground surface.

Dike. A bank (usually earthen) constructed to control or confine water.

Dominance. As used herein, a descriptor of vegetation that is related to the standing crop of a species in an area, usually measured by height, areal cover, or basal area (for trees).

Dominant species. As used herein, a plant species that exerts a controlling influence on or defines the character of a community.

Drained. A condition in which ground or surface water has been reduced or eliminated from an area by artificial means.

Drift line. An accumulation of debris along a contour (parallel to the water flow) that represents the height of an inundation event.

Duration (inundation/soil saturation). The length of time during which water stands at or above the soil surface (inundation), or during which the soil is saturated. As used herein, duration refers to a period during the growing season.

Ecological tolerance. The range of environmental conditions in which a plant species can grow.

Emergent plant. A rooted herbaceous plant species that has parts extending above a water surface.

Field capacity. The percentage of water remaining in a soil after it has been saturated and after free drainage is negligible.

Fill material. Any material placed in an area to increase surface elevation.

Flooded. A condition in which the soil surface is temporarily covered with flowing water from any source, such as streams overflowing their banks, runoff from adjacent or surrounding slopes, inflow from high tides, or any combination of sources.

Flora. A list of all plant species that occur in an area.

Frequency (inundation or soil saturation). The periodicity of coverage of an area by surface water or soil saturation. It is usually expressed as the number of years (e.g., 50 years) the soil is inundated or saturated at least once each year during part of the growing season per 100 years or as a l-, 2-, 5-year, etc., inundation frequency.

Frequency (vegetation). The distribution of individuals of a species in an area. It is quantitatively expressed as

$$\frac{\text{Number of samples containing species A}}{\text{Total number of samples}} \times 100$$

More than one species may have a frequency of 100 percent within the same area.

Frequently flooded. A flooding class in which flooding is likely to occur often under normal weather conditions (more than 50-percent chance of flooding in any year or more than 50 times in 100 years).

Gleyed. A soil condition resulting from prolonged soil saturation, which is manifested by the presence of bluish or greenish colors through the soil mass or in mottles (spots or streaks) among other colors. Gleying occurs under re-

ducing soil conditions resulting from soil saturation, by which iron is reduced predominantly to the ferrous state.

Ground water. That portion of the water below the ground surface that is under greater pressure than atmospheric pressure.

Growing season. The portion of the year when soil temperatures at 19.7 in. below the soil surface are higher than biologic zero (5 °C) (U.S. Department of Agriculture—Soil Conservation Service 1985). For ease of determination this period can be approximated by the number of frost-free days (U.S Department of the Interior 1970).

Habitat. The environment occupied by individuals of a particular species, population, or community.

Headwater flooding. A situation in which an area becomes inundated directly by surface runoff from upland areas.

Herb. A nonwoody individual of a macrophytic species. In this manual, seedlings of woody plants (including vines) that are less than 3.2 ft in height are considered to be herbs.

Herbaceous layer. Any vegetative stratum of a plant community that is composed predominantly of herbs.

Histic epipedon. An 8- to 16-in. soil layer at or near the surface that is saturated for 30 consecutive days or more during the growing season in most years and contains a minimum of 20 percent organic matter when no clay is present or a minimum of 30 percent organic matter when 60 percent or greater clay is present.

Histosols. An order in soil taxonomy composed of organic soils that have organic soil materials in more than half of the upper 80 cm or that are of any thickness if directly overlying bedrock.

Homogeneous vegetation. A situation in which the same plant species association occurs throughout an area.

Hue. A characteristic of color that denotes a color in relation to red, yellow, blue, etc; one of the three variables of color. Each color chart in the Munsell Color Book (Munsell Color 1975) consists of a specific hue.

Hydric soil. A soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation (U.S. Department of Agriculture—Soil Conservation Service 1985). Hydric soils that occur in areas having positive indicators of hydrophytic vegetation and wetland hydrology are wetland soils.

Hydric soil condition. A situation in which characteristics exist that are associated with soil development under reducing conditions.

Hydrologic regime. The sum total of water that occurs in an area on average during a given period.

Hydrologic zone. An area that is inundated or has saturated soils within a specified range of frequency and duration of inundation and soil saturation.

Hydrology. The science dealing with the properties, distribution, and circulation of water.

Hydrophyte. Any macrophyte that grows in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content; plants typically found in wet habitats.

Hydrophytic vegetation. The sum total of macrophytic plant life growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content. When hydrophytic vegetation comprises a community where indicators of hydric soils and wetland hydrology also occur, the area has wetland vegetation.

Hypertrophied lenticels. An exaggerated (oversized) pore on the surface of stems of woody plants through which gases are exchanged between the plant and the atmosphere. The enlarged lenticels serve as a mechanism for increasing oxygen to plant roots during periods of inundation and/or saturated soils.

Importance value. A quantitative term describing the relative influence of a plant species in a plant community, obtained by summing any combination of relative frequency, relative density, and relative dominance.

Indicator. As used in this manual, an event, entity, or condition that typically characterizes a prescribed environment or situation; indicators determine or aid in determining whether or not certain stated circumstances exist.

Indicator status. One of the categories (e.g., OBL) that describes the estimated probability of a plant species occurring in wetlands.

Intercellular air space. A cavity between cells in plant tissues, resulting from variations in cell shape and configuration. Aerenchymous tissue (a morphological adaptation found in many hydrophytes) often has large intercellular air spaces.

Inundation. A condition in which water from any source temporarily or permanently covers a land surface.

Levee. A natural or man-made feature of the landscape that restricts movement of water into or through an area.

Liana. As used in this manual, a layer of vegetation in forested plant communities that consists of woody vines. The term may also be applied to a given species.

Limit of biological activity. With reference to soils, the zone below which conditions preclude normal growth of soil organisms. This term often is used to refer to the temperature (5 °C) in a soil below which metabolic processes of soil microorganisms, plant roots, and animals are negligible.

Long duration (flooding). A flooding class in which the period of inundation for a single event ranges from 7 days to 1 month.

Macrophyte. Any plant species that can be readily observed without the aid of optical magnification. This includes all vascular plant species and mosses (e.g., *Sphagnum* spp.), as well as large algae (e.g., *Cara* spp., kelp).

Macrophytic. A term referring to a plant species that is a macrophyte.

Major portion of the root zone. The portion of the soil profile in which more than 50 percent of plant roots occur. In wetlands, this usually constitutes the upper 12 in. of the profile.

Man-induced wetland. Any area that develops wetland characteristics due to some activity (e.g., irrigation) of man.

Mapping unit. As used in this manual, some common characteristic of soil, vegetation, and/or hydrology that can be shown at the scale of mapping for the defined purpose and objectives of a survey.

Mean sea level. A datum, or "plane of zero elevation," established by averaging all stages of oceanic tides over a 19-year tidal cycle or "epoch." This plane is corrected for curvature of the earth and is the standard reference for elevations on the earth's surface. The correct term for mean sea level is the National Geodetic Vertical Datum (NGVD).

Mesophytic. Any plant species growing where soil moisture and aeration conditions lie between extremes. These species are typically found in habitats with average moisture conditions, neither very dry nor very wet.

Metabolic processes. The complex of internal chemical reactions associated with life-sustaining functions of an organism.

Method. A particular procedure or set of procedures to be followed.

Mineral soil. A soil consisting predominantly of, and having its properties determined predominantly by, mineral matter usually containing less than 20 percent organic matter.

Morphological adaptation. A feature of structure and form that aids in fitting a species to its particular environment (e.g., buttressed base, adventitious roots, aerenchymous tissue).

Mottles. Spots or blotches of different color or shades of color interspersed within the dominant color in a soil layer, usually resulting from the presence of periodic reducing soil conditions.

Muck. Highly decomposed organic material in which the original plant parts are not recognizable.

Multitrunk. A situation in which a single individual of a woody plant species has several stems.

Nonhydric soil. A soil that has developed under predominantly aerobic soil conditions. These soils normally support mesophytic or xerophytic species.

Nonwetland. Any area that has sufficiently dry conditions that indicators of hydrophytic vegetation, hydric soils, and/or wetland hydrology are lacking. As used in this manual, any area that is neither a wetland, a deepwater aquatic habitat, nor other special aquatic site.

Organic pan. A layer usually occurring at 12 to 30 in. below the soil surface in coarse-textured soils, in which organic matter and aluminum (with or without iron) accumulate at the point where the top of the water table most often occurs. Cementing of the organic matter slightly reduces permeability of this layer.

Organic soil. A soil is classified as an organic soil when it is: (1) saturated for prolonged periods (unless artificially drained) and has more than 30 percent organic matter if the mineral fraction is more than 50 percent clay, or more than 20 percent organic matter if the mineral fraction has no clay; or (2) never saturated with water for more than a few days and having more than 34 percent organic matter.

Overbank flooding. Any situation in which inundation occurs as a result of the water level of a stream rising above bank level.

Oxidation-reduction process. A complex of biochemical reactions in soil that influences the valence state of component elements and their ions. Prolonged soil saturation during the growing season elicits anaerobic conditions that shift the overall process to a reducing condition.

Oxygen pathway. The sequence of cells, intercellular spaces, tissues, and organs, through which molecular oxygen is transported in plants. Plant species having pathways for oxygen transport to the root system are often adapted for life in saturated soils.

Parameter. A characteristic component of a unit that can be defined. Vegetation, soil, and hydrology are three parameters that may be used to define wetlands.

Parent material. The unconsolidated and more or less weathered mineral or organic matter from which a soil profile develops.

Ped. A unit of soil structure (e.g., aggregate, crumb, prism, block, or granule) formed by natural processes.

Peraquic moisture regime. A soil condition in which a reducing environment always occurs due to the presence of ground water at or near the soil surface.

Periodically. Used herein to define detectable regular or irregular saturated soil conditions or inundation, resulting from ponding of ground water, precipitation, overland flow, stream flooding, or tidal influences that occur(s) with hours, days, weeks, months, or even years between events.

Permeability. A soil characteristic that enables water or air to move through the profile, measured as the number of inches per hour that water moves downward through the saturated soil. The rate at which water moves through the least permeable layer governs soil permeability.

Physiognomy. A term used to describe a plant community based on the growth habit (e.g., trees, herbs, lianas) of the dominant species.

Physiological adaptation. A feature of the basic physical and chemical activities that occurs in cells and tissues of a species, which results in it being better fitted to its environment (e.g., ability to absorb nutrients under low oxygen tensions).

Plant community. All of the plant populations occurring in a shared habitat or environment.

Plant cover. See areal cover.

Pneumatophore. Modified roots that may function as a respiratory organ in species subjected to frequent inundation or soil saturation (e.g., cypress knees).

Ponded. A condition in which water stands in a closed depression. Water may be removed only by percolation, evaporation, and/or transpiration.

Poorly drained. Soils that commonly are wet at or near the surface during a sufficient part of the year that field crops cannot be grown under natural conditions. Poorly drained conditions are caused by a saturated zone, a layer with low hydraulic conductivity, seepage, or a combination of these conditions.

Population. A group of individuals of the same species that occurs in a given area.

Positive wetland indicator. Any evidence of the presence of hydrophytic vegetation, hydric soil, and/or wetland hydrology in an area.

Prevalent vegetation. The plant community or communities that occur in an area during a given period. The prevalent vegetation is characterized by the dominant macrophytic species that comprise the plant community.

Quantitative. A precise measurement or determination expressed numerically.

Range. As used herein, the geographical area in which a plant species is known to occur.

Redox potential. A measure of the tendency of a system to donate or accept electrons, which is governed by the nature and proportions of the oxidizing and reducing substances contained in the system.

Reducing environment. An environment conducive to the removal of oxygen and chemical reduction of ions in the soils.

Relative density. A quantitative descriptor, expressed as a percent, of the relative number of individuals of a species in an area; it is calculated by

$$\frac{\text{Number of individuals of species A}}{\text{Total number of individuals of all species}} \times 100$$

Relative dominance. A quantitative descriptor, expressed as a percent, of the relative size or cover of individuals of a species in an area; it is calculated by

$$\frac{\text{Amount}^{1} \text{ of species A}}{\text{Total amount of all species}} \times 100$$

Relative frequency. A quantitative descriptor, expressed as a percent, of the relative distribution of individuals of a species in an area; it is calculated by

$$\frac{\text{Frequency of species A}}{\text{Total frequency of all species}} \times 100$$

Relief. The change in elevation of a land surface between two points; collectively, the configuration of the earth's surface, including such features as hills and valleys.

---

[1] The "amount" of a species may be based on percent areal cover, basal area, or height.

Reproductive adaptation. A feature of the reproductive mechanism of a species that results in it being better fitted to its environment (e.g., ability for seed germination under water).

Respiration. The sum total of metabolic processes associated with conversion of stored (chemical) energy into kinetic (physical) energy for use by an organism.

Rhizosphere. The zone of soil in which interactions between living plant roots and microorganisms occur.

Root zone. The portion of a soil profile in which plant roots occur.

Routine wetland determination. A type of wetland determination in which office data and/or relatively simple, rapidly applied onsite methods are employed to determine whether or not an area is a wetland. Most wetland determinations are of this type, which usually does not require collection of quantitative data.

Sample plot. An area of land used for measuring or observing existing conditions.

Sapling/shrub. A layer of vegetation composed of woody plants <3.0 in. in diameter at breast height but greater than 3.2 ft in height, exclusive of woody vines.

Saturated soil conditions. A condition in which all easily drained voids (pores) between soil particles in the root zone are temporarily or permanently filled with water to the soil surface at pressures greater than atmospheric.

Soil. Unconsolidated mineral and organic material that supports, or is capable of supporting, plants, and which has recognizable properties due to the integrated effect of climate and living matter acting upon parent material, as conditioned by relief over time.

Soil horizon. A layer of soil or soil material approximately parallel to the land surface and differing from adjacent genetically related layers in physical, chemical, and biological properties or characteristics (e.g., color, structure, texture, etc.).

Soil matrix. The portion of a given soil having the dominant color. In most cases, the matrix will be the portion of the soil having more than 50 percent of the same color.

Soil permeability. The ease with which gases, liquids, or plant roots penetrate or pass through a layer of soil.

Soil phase. A subdivision of a soil series having features (e.g., slope, surface texture, and stoniness) that affect the use and management of the soil, but

which do not vary sufficiently to differentiate it as a separate series. These are usually the basic mapping units on detailed soil maps produced by the Soil Conservation Service.

Soil pore. An area within soil occupied by either air or water, resulting from the arrangement of individual soil particles or peds.

Soil profile. A vertical section of a soil through all its horizons and extending into the parent material.

Soil series. A group of soils having horizons similar in differentiating characteristics and arrangement in the soil profile, except for texture of the surface horizon.

Soil structure. The combination or arrangement of primary soil particles into secondary particles, units, or peds.

Soil surface. The upper limits of the soil profile. For mineral soils, this is the upper limit of the highest (Al) mineral horizon. For organic soils, it is the upper limit of undecomposed, dead organic matter.

Soil texture. The relative proportions of the various sizes of particles in a soil.

Somewhat poorly drained. Soils that are wet near enough to the surface or long enough that planting or harvesting operations or crop growth is markedly restricted unless artificial drainage is provided. Somewhat poorly drained soils commonly have a layer with low hydraulic conductivity, wet conditions high in the profile, additions of water through seepage, or a combination of these conditions.

Stilted roots. Aerial roots arising from stems (e.g., trunk and branches), presumably providing plant support (e.g., *Rhizophora mangle).*

Stooling. A form of asexual reproduction in which new shoots are produced at the base of senescing stems, often resulting in a multitrunk growth habit.

Stratigraphy. Features of geology dealing with the origin, composition, distribution, and succession of geologic strata (layers).

Substrate. The base or substance on which an attached species is growing.

Surface water. Water present above the substrate or soil surface.

Tidal. A situation in which the water level periodically fluctuates due to the action of lunar and solar forces upon the rotating earth.

Topography. The configuration of a surface, including its relief and the position of its natural and man-made features.

Transect. As used herein, a line on the ground along which observations are made at some interval.

Transition zone. The area in which a change from wetlands to nonwetlands occurs. The transition zone may be narrow or broad.

Transpiration. The process in plants by which water vapor is released into the gaseous environment, primarily through stomata.

Tree. A woody plant >3.0 in. in diameter at breast height, regardless of height (exclusive of woody vines).

Typical. That which normally, usually, or commonly occurs.

Typically adapted. A term that refers to a species being normally or commonly suited to a given set of environmental conditions, due to some feature of its morphology, physiology, or reproduction.

Unconsolidated parent material. Material from which a soil develops, usually formed by weathering of rock or placement in an area by natural forces (e.g., water, wind, or gravity).

Under normal circumstances. As used in the definition of wetlands, this term refers to situations in which the vegetation has not been substantially altered by man's activities.

Uniform vegetation. As used herein, a situation in which the same group of dominant species generally occurs throughout a given area.

Upland. As used herein, any area that does not qualify as a wetland because the associated hydrologic regime is not sufficiently wet to elicit development of vegetation, soils, and/or hydrologic characteristics associated with wetlands. Such areas occurring within floodplains are more appropriately termed nonwetlands.

Value (soil color). The relative lightness or intensity of color, approximately a function of the square root of the total amount of light reflected from a surface; one of the three variables of color.

Vegetation. The sum total of macrophytes that occupy a given area.

Vegetation layer. A subunit of a plant community in which all component species exhibit the same growth form (e.g., trees, saplings/shrubs, herbs).

Very long duration (flooding). A duration class in which the length of a single inundation event is greater than 1 month.

Very poorly drained. Soils that are wet to the surface most of the time. These soils are wet enough to prevent the growth of important crops (except rice) unless artificially drained.

Watermark. A line on a tree or other upright structure that represents the maximum static water level reached during an inundation event.

Water table. The upper surface of ground water or that level below which the soil is saturated with water. It is at least 6 in. thick and persists in the soil for more than a few weeks.

Wetlands. 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 boundary. The point on the ground at which a shift from wetlands to nonwetlands or aquatic habitats occurs. These boundaries usually follow contours.

Wetland determination. The process or procedure by which an area is adjudged a wetland or nonwetland.

Wetland hydrology. The sum total of wetness characteristics in areas that are inundated or have saturated soils for a sufficient duration to support hydrophytic vegetation.

Wetland plant association. Any grouping of plant species that recurs wherever certain wetland conditions occur.

Wetland soil. A soil that has characteristics developed in a reducing atmosphere, which exists when periods of prolonged soil saturation result in anaerobic conditions. Hydric soils that are sufficiently wet to support hydrophytic vegetation are wetland soils.

Wetland vegetation. The sum total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present. As used herein, hydrophytic vegetation occurring in areas that also have hydric soils and wetland hydrology may be properly referred to as wetland vegetation.

Woody vine. See liana.

Xerophytic. A plant species that is typically adapted for life in conditions where a lack of water is a limiting factor for growth and/or reproduction. These species are capable of growth in extremely dry conditions as a result of morphological, physiological, and/or reproductive adaptations.

Appendix B
Blank and Example Data Forms

USER NOTES: The following field data form ("Data Form, Routine Wetland Determination, 1987 COE Wetlands Delineation Manual") dated 3/92 is the HQUSACE-approved replacement for Data Form 1 given in the 1987 Manual. (HQUSACE, 6 Mar 92)

DATA FORM
ROUTINE WETLAND DETERMINATION
(1987 COE Wetlands Delineation Manual)

Project/Site: _____ Applicant/Owner: _____ Investigator: _____	Date: _____ County: _____ State: _____
Do Normal Circumstances exist on the site? Yes No Is the site significantly disturbed (Atypical Situation)? Yes No Is the area a potential Problem Area? Yes No (If needed, explain on reverse.)	Community ID: _____ Transect ID: _____ Plot ID: _____

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1.			9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW or FAC (excluding FAC-). _____

Remarks:

HYDROLOGY

___ Recorded Data (Describe in Remarks):
- ___ Stream, Lake, or Tide Gauge
- ___ Aerial Photographs
- ___ Other

___ No Recorded Data Available

Field Observations:

Depth of Surface Water: _____(in.)

Depth to Free Water in Pit: _____(in.)

Depth to Saturated Soil: _____(in.)

Wetland Hydrology Indicators:

Primary Indicators:
- ___ Inundated
- ___ Saturated in Upper 12 Inches
- ___ Water Marks
- ___ Drift Lines
- ___ Sediment Deposits
- ___ Drainage Patterns in Wetlands

Secondary Indicators (2 or more required):
- ___ Oxidized Root Channels in Upper 12 Inches
- ___ Water-Stained Leaves
- ___ Local Soil Survey Data
- ___ FAC-Neutral Test
- ___ Other (Explain in Remarks)

Remarks:

SOILS

Map Unit Name
(Series and Phase): _____ Drainage Class: _____
Field Observations
Taxonomy (Subgroup): _____ Confirm Mapped Type? Yes No

Profile Description:

Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle Abundance/ Size/Contrast	Texture, Concretions, Structure, etc.

Hydric Soil Indicators:

___ Histosol
___ Histic Epipedon
___ Sulfidic Odor
___ Aquic Moisture Regime
___ Reducing Conditions
___ Gleyed or Low-Chroma Colors
___ Concretions
___ High Organic Content in Surface Layer in Sandy Soils
___ Organic Streaking in Sandy Soils
___ Listed on Local Hydric Soils List
___ Listed on National Hydric Soils List
___ Other (Explain in Remarks)

Remarks:

WETLAND DETERMINATION

Hydrophytic Vegetation Present? Yes No (Circle)
Wetland Hydrology Present? Yes No
Hydric Soils Present? Yes No

(Circle)
Is this Sampling Point Within a Wetland? Yes No

Remarks:

Approved by HQUSACE 3/92

DATA FORM 1

WETLAND DETERMINATION

Applicant Name:_____ Application Number:_____ Project Name:_____

State:_____ County:_____ Legal Description: Township:_____ Range:_____

Date:_____ Plot No.:_____ Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7.	
2.		8.	
3.		9.	
Saplings/shrubs		Woody vines	
4.		10.	
5.		11.	
6.		12.	

% of species that are OBL, FACW, and/or FAC:____. Other indicators:_____.

Hydrophytic vegetation: Yes ____ No ____. Basis:_____.

Soil

Series and phase:_____ On hydric soils list? Yes_____; No____.

Mottled: Yes_____; No_____. Mottle color:_____; Matrix color:_____.

Gleyed: Yes_____ No_____ Other indicators:_____.

Hydric soils: Yes_____ No_____; Basis:_____.

Hydrology

Inundated: Yes_____; No_____. Depth of standing water:_____.

Saturated soils: Yes_____; No_____. Depth to saturated soil:_____.

Other indicators:_____.

Wetland hydrology: Yes_____; No_____. Basis:_____.

Atypical situation: Yes____; No_____.

Normal Circumstances? Yes_____ No_____.

Wetland Determination: Wetland_____; Nonwetland_____.

Comments:

Determined by:_____

DATA FORM 2

VEGETATION-COMPREHENSIVE DETERMINATION

Applicant Name:_____ Application No.:_____ Project Name:_____

Location:_____ Plot #:_____ Date:_____ Determined By:_____

VEGETATION LAYER

TREES	BASAL AREA	TOTAL BASAL AREA	RANK	HERBS	MIDPOINT OF % COVER CLASS	RANK
1				1		
2				2		
3				3		
4				4		
5				5		
6				6		
7				7		
8				8		
9				9		
10				10		

SAPLINGS/SHRUBS	MIDPOINT OF HEIGHT CLASS	TOTAL HEIGHT CLASS	RANK	WOODY VINES	NUMBER OF STEMS	RANK
1				1		
2				2		
3				3		
4				4		
5				5		
6				6		
7				7		
8				8		
9				9		
10				10		

DATA FORM 3

ATYPICAL SITUATIONS

Applicant Name:_____ Application Number:_____ Project Name:_____

Location:_____ Plot Number:_____ Date:_____

A. VEGETATION:

1. Type of Alteration:_____

_____

_____.

2. Effect on Vegetation:_____

_____

_____.

3. Previous Vegetation:_____

(Attach documentation) _____

_____.

4. Hydrophytic Vegetation? Yes_____No_____.

B. SOILS:

1. Type of Alteration:_____

_____

_____.

2. Effect on Soils:_____

_____

_____.

3. Previous Soils:_____

(Attach documentation) _____

_____.

4. Hydric Soils? Yes_____No_____.

C. HYDROLOGY:

1. Type of Alteration:_____

_____

_____.

2. Effect on Hydrology:_____

_____

_____.

3. Previous Hydrology:_____

(Attach documentation) _____

_____.

4. Wetland Hydrology? Yes_____No_____.

Characterized By:_____

DATA FORM 1

WETLAND DETERMINATION

Applicant Name: John Doe Application Number: R-85-1421 Project Name: Zena Acricultural Land

State: LA County: Choctaw Legal Description: Township: 7N Range: 2E

Date: 10/08/85 Plot No.: 1-1 Section: 32

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1. *Quercus lyrata*	OBL	7. *Polygonum hydropiperoides*	OBL
2. *Carya aquatica*	OBL	8. *Boehmeria cylindrica*	FACW+
3. *Gleditsia aquatica*	OBL	9. *Brunnichia cirrhosa*	--
Saplings/shurbs		Woody vines	
4. *Forestiera acuminata*	OBL	10. *Toxicodendron radicans*	FAC
5. *Planera aquatica*	OBL	11. --	--
6. --	--	12. --	--

% of species that are OBL, FACW, and/or FAC: 100%. Other indicators: --.

Hydrophytic vegetation: Yes X No ____. Basis: 50% of dominants are OBL, FACW, and/or FAC on plant list.

Soil

Series and phase: Sharkey, frequently flooded On hydric soils list? Yes X; No ____.

Mottled: Yes X; No ____. Mottle color: 5YR4/6; Matrix color: 10YR4/1.

Gleyed: Yes ____ No X. Other indicators: ____.

Hydric soils: Yes X No ____; Basis: On hydric soil list and matrix color.

Hydrology

Inundated: Yes ____; No X. Depth of standing water: --.

Saturated soils: Yes X; No ____. Depth to saturated soil: 6".

Other indicators: Drift lines and sediment deposits present on trees.

Wetland hydrology: Yes X; No ____. Basis: Saturated soils.

Atypical situation: Yes ____; No X.

Normal Circumstances?: Yes X No ____.

Wetland Determination: Wetland X; Nonwetland ____.

Comments: No rain reported from area in previous two weeks.

Determined by: Zelda Schmell (Signed)

DATA FORM 2

VEGETATION-COMPREHENSIVE DETERMINATION

Applicant Name: John Doe Application No.: R-85-1421 Project Name: Zena Agricultural Land

Location: LA (Choctaw Parish) Plot #: 1-1 Date: 10/08/85 Determined By: Zelda Schmell

VEGETATION LAYER

	TREES	BASAL AREA (in^2)	TOTAL BASAL AREA	RANK
1	*Quercus lyrata*	465	1,145	1
2	*Quercus lyrata*	680		
3	*Carya aquatica*	85	243	3
4	*Carya aquatica*	120		
5	*Carya aquatica*	38		
6	*Gleditsia aquatica*	235	253	2
7	*Gleditsia aquatica*	18		
8	*Diospyros virginiana*	46	46	
9				
10				

	HERBS	MIDPOINT OF % COVER CLASS	RANK
1	*Boehmeria cylindrica*	37.5	2
2	*Polygonum hydropiperoides*	62.5	1
3	*Brunnichia ovata*	37.5	3
4	*Gleditsia aquatica* (seedling)	2.5	
5	*Eclipta alba*	2.5	
6			
7			
8			
9			
10			

	SAPLINGS/SHRUBS	MIDPOINT OF HEIGHT CLASS	TOTAL HEIGHT CLASS	RANK
1	*Forestiera acuminata*	4.5	13.0	1
2	*Forestiera acuminata*	4.5		
3	*Forestiera acuminata*	1.5		
4	*Forestiera acuminata*	2.5		
5	*Planera aquatica*	4.5	8.0	2
6	*Planera aquatica*	3.5		
7	*Carya aquatica*	1.5	1.5	
8				
9				
10				

	WOODY VINES	NUMBER OF STEMS	RANK
1	*Toxicodendron radicans*	35	1
2	(only woody vine present)		
3			
4			
5			
6			
7			
8			
9			
10			

DATA FORM 3

ATYPICAL SITUATIONS

Applicant Name: Wetland Developers, Inc. Application Number: R-85-12 Project Name: Big Canal

Location: Joshua Co., MT Plot Number: 2 Date: 10/08/85

A. VEGETATION:

1. Type of Alteration: Vegetation totally removed or covered by placement of fill from canal (1984).

2. Effect on Vegetation: None remaining.

3. Previous Vegetation: *Carex nebrascensis* - *Juncus effusus* freshwater marsh (based on contiguous plant communities and aerial photography predating fill).
(Attach documentation)

4. Hydrophytic Vegetation? Yes X No .

B. SOILS:

1. Type of Alteration: Original soil covered by 4 feet of fill material excavated from canal.

2. Effect on Soils: Original soil buried in 1984.

3. Previous Soils: Original soil examined at 10 inches below original soil surface. Soil gleyed (color notation 5Y2/0).
(Attach documentation)

4. Hydric Soils? Yes X No .

C. HYDROLOGY:

1. Type of Alteration: 4 feet of fill material placed on original surface.

2. Effect on Hydrology: Area no longer is inundated.

3. Previous Hydrology: Examination of color IR photography taken on 6/5/84 showed the area to be inundated. Gaging station data from gage 2 miles upstream indicated the area has been inundated for as much as 3 months of the growing season during 8 of the past 12 years.
(Attach documentation)

4. Wetland Hydrology? Yes X No .

Characterized By: Joe Zook

Appendix C
Vegetation

1. This appendix contains three sections. ~~Section 1 is a subset of the regional list of plants that occur in wetlands, but includes only those species having an indicator status of OBL, FACW, or FAC. Section 2 is a list of plants that commonly occur in wetlands of a given region. Since many geographic areas of Section 404 responsibility include portions of two or more plant list regions, users will often need more than one regional list; thus, Sections 1 and 2 will be published separately from the remainder of the manual. Users will be furnished all appropriate regional lists.~~

USER NOTES: CE-supplied plant lists are obsolete and have been superseded by the May 1988 version of the "National List of Plant Species that Occur in Wetlands" published by the U.S. Fish and Wildlife Service and available on the World Wide Web. (HQUSACE, 27 Aug 91)

2. Section 3, which is presented herein, describes morphological, physiological, and reproductive adaptations that can be observed or are known to occur in plant species that are typically adapted for life in anaerobic soil conditions.

Section 3 - Morphological, Physiological, and Reproductive Adaptations of Plant Species for Occurrence in Areas Having Anaerobic Soil Conditions

Morphological adaptations

3. Many plant species have morphological adaptations for occurrence in wetlands. These structural modifications most often provide the plant with increased buoyancy or support. In some cases (e.g., adventitious roots), the adaptation may facilitate the uptake of nutrients and/or gases (particularly oxygen). However, not all species occurring in areas having anaerobic soil condi-

tions exhibit morphological adaptations for such conditions. The following is a list of morphological adaptations that a species occurring in areas having anaerobic soil conditions may possess (a partial list of species with such adaptations is presented in Table Cl):

Table C1
Partial List of Species with Known Morphological Adaptations for Occurrence in Wetlands[1]

Species	Common Name	Adaptation
Acer negundo	Box elder	Adventitious roots
Acer rubrum	Red maple	Hypertrophied lenticels
Acer saccharinum	Silver maple	Hypertrophied lenticels; adventitious roots (juvenile plants)
Alisma spp.	Water plantain	Polymorphic leaves
Alternanthera philoxeroides	Alligatorweed	Adventitious roots; inflated, floating stems
Avicennia nitida	Black mangrove	Pneumatophores; hypertrophied lenticels
Brasenia schreberi	Watershield	Inflated, floating leaves
Caladium mariscoides	Twig rush	Inflated stems
Cyperus spp. (most species)	Flat sedge	Inflated stems and leaves
Eleocharis spp. (most species)	Spikerush	Inflated stems and leaves
Forestiera accuminata	Swamp privet	Multi-trunk, stooling
Fraxinus pennsylvanica	Green ash	Buttressed trunks; adventitious roots
Gleditsia aquatica	Water locust	Hypertrophied lenticels
Juncus spp.	Rush	Inflated stems and leaves
Limnobium spongia	Frogbit	Inflated, floating leaves
Ludwigia spp.	Waterprimrose	Adventitious roots; inflated floating stems
Menyanthes trifoliata	Buckbean	Inflated stems (rhizome)
Myrica gale	Sweetgale	Hypertrophied lenticels
Nelumbo spp.	Lotus	Floating leaves
Nuphar spp.	Cowlily	Floating leaves
Nymphaea spp.	Waterlily	Floating leaves
Nyssa aquatica	Water tupelo	Buttressed trunks; pneumatophores; adventitious roots
Nyssa ogechee	Ogechee tupelo	Buttressed trunks; multi-trunk; stooling
Nyssa sylvatica var. *biflora*	Swamp blackgum	Buttressed trunks
Platanus occidentalis	Sycamore	Adventitious roots
Populus deltoides	Cottonwood	Adventitious roots
Quercus laurifolia	Laurel oak	Shallow root system
Quercus palustris	Pin oak	Adventitious roots
Rhizophora mangle	Red mangrove	Pneumatophores
Sagittaria spp.	Arrowhead	Polymorphic leaves
Salix spp.	Willow	Hypertrophied lenticels; adventitious roots; oxygen pathway to roots
Scirpus spp.	Bulrush	Inflated stems and leaves
Spartina alterniflora	Smooth cordgrass	Oxygen pathway to roots
Taxodium distichum	Bald cypress	Buttressed trunks; pneumatophores

[1] Many other species exhibit one or more morphological adaptations for occurrence in wetlands. However, not all individuals of a species will exhibit these adaptations under field conditions, and individuals occurring in uplands characteristically may not exhibit them.

a. *Buttressed tree trunks.* Tree species (e.g., *Taxodium distichum)* may develop enlarged trunks (Figure Cl) in response to frequent inundation. This adaptation is a strong indicator of hydrophytic vegetation in non-tropical forested areas.

b. *Pneumatophores.* These modified roots may serve as respiratory organs in species subjected to frequent inundation or soil saturation. Cypress knees (Figure C2) are a classic example, but other species (e.g., *Nyssa aquatica, Rhizophora mangle)* may also develop pneumatophores.



Figure C1. Buttressed tree truck (bald cypress)



Figure C2. Pneumatophores (bald cypress)

c. *Adventitious roots.* Sometimes referred to as "water roots," adventitious roots occur on plant stems in positions where roots normally are not found. Small fibrous roots protruding from the base of trees (e.g., *Salix nigra)* or roots on stems of herbaceous plants and tree seedlings in positions immediately above the soil surface (e.g., *Ludwigia* spp.) occur in response to inundation or soil saturation (Figure C3). These usually develop during periods of sufficiently prolonged soil saturation to destroy most of the root system. *CAUTION: Not all adventitious roots develop as a result of inundation or soil saturation. For example, aerial roots on woody vines are not normally produced as a response to inundation or soil saturation.*



Figure C3. Adventitious roots

d. *Shallow root systems.* When soils are inundated or saturated for long periods during the growing season, anaerobic conditions develop in the zone of root growth. Most species with deep root systems cannot survive in such conditions. Most species capable of growth during periods when soils are oxygenated only near the surface have shallow root systems. In forested wetlands,

windthrown trees (Figure C4) are often indicative of shallow root systems.



Figure C4. Wind-thrown tree with shallow root system

e. *Inflated leaves, stems, or roots.* Many hydrophytic species, particularly herbs (e.g., *Limnobium spongia*, *Ludwigia* spp.) have or develop spongy (aerenchymous) tissues in leaves, stems, and/or roots that provide buoyancy or support and serve as a reservoir or passageway for oxygen needed for metabolic processes. An example of inflated leaves is shown in Figure C5.



Figure C5. Inflated leaves

f. *Polymorphic leaves.* Some herbaceous species produce different types of leaves, depending on the water level at the time of leaf formation. For example, *Alisma* spp. produce strap-shaped leaves when totally submerged, but produce broader, floating leaves when plants are emergent. *CAUTION: Many upland species also produce polymorphic leaves.*

g. *Floating leaves.* Some species (e.g., *Nymphaea* spp.) produce leaves that are uniquely adapted for floating on a water surface (Figure C6). These leaves have stomata primarily on the upper surface and a thick waxy cuticle that restricts water penetration. The presence of species with floating leaves is strongly indicative of hydrophytic vegetation.



Figure C6. Floating leaves

h. *Floating stems.* A number of species (e.g., *Alternanthera philoxeroides*) produce matted stems that have large internal air spaces when occurring in inun-

dated areas. Such species root in shallow water and grow across the water surface into deeper areas. Species with floating stems often produce adventitious roots at leaf nodes.

i. *Hypertrophied lenticels.* Some plant species (e.g., *Gleditsia aquatica*) produce enlarged lenticels on the stem in response to prolonged inundation or soil saturation. These are thought to increase oxygen uptake through the stem during such periods.



Figure C7. Multitrunk plant

k. *Multitrunks or stooling.* Some woody hydrophytes characteristically produce several trunks of different ages (Figure C7) or produce new stems arising from the base of a senescing individual (e.g., *Forestiera acuminata, Nyssa ogechee)* in response to inundation.

l. *Oxygen pathway to roots.* Some species (e.g., *Spartina alterniflora*) have a specialized cellular arrangement that facilitates diffusion of gaseous oxygen from leaves and stems to the root system.

Physiological adaptations

4. Most, if not all, hydrophytic species are thought to possess physiological adaptations for occurrence in areas that have prolonged periods of anaerobic soil conditions. However, relatively few species have actually been proven to possess such adaptations, primarily due to the limited research that has been conducted. Nevertheless, several types of physiological adaptations known to occur in hydrophytic species are discussed below, and a list of species having one or more of these adaptations is presented in Table C2. *NOTE: Since it is impossible to detect these adaptations in the field, use of this indicator will be limited to observing the species in the field and checking the list in Table C2 to determine whether the species is known to have a physiological adaptation for occurrence in areas having anaerobic soil conditions.*

Table C2
Species Exhibiting Physiological Adaptations for Occurrence in Wetlands

Species	Physiological Adaptation
Alnus incana	Increased levels of nitrate reductase; malate accumulation
Alnus rubra	Increased levels of nitrate reductase
Baccharis viminea	Ability for root growth in low oxygen tensions
Betula pubescens	Oxidizes the rhizosphere; malate accumulation
Carex arenaria	Malate accumulation
Carex flacca	Absence of ADH activity
Carex lasiocarpa	Malate accumulation
Deschampsia cespitosa	Absence of ADH activity
Filipendula ulmaria	Absence of ADH activity
Fraxinus pennsylvanica	Oxidizes the rhizosphere
Glyceria maxima	Malate accumulation; absence of ADH activity
Juncus effusus	Ability for root growth in low oxygen tensions; absence of ADH activity
Larix laricina	Slight increases in metabolic rates; increased levels of nitrate reductase
Lobelia dortmanna	Oxidizes the rhizosphere
Lythrum salicaria	Absence of ADH activity
Molinia caerulea	Oxidizes the rhizosphere
Myrica gale	Oxidizes the rhizosphere
Nuphar lutea	Organic acid production
Nyssa aquatica	Oxidizes the rhizosphere
Nyssa sylvatica var. *biflora*	Oxidizes the rhizosphere; malate accumulation
Phalaris arundinacea	Absence of ADH activity; ability for root growth in low oxygen tensions
Phragmites australis	Malate accumulation
Pinus contorta	Slight increases in metabolic rates; increased levels of nitrate reductase
Polygonum amphibium	Absence of ADH activity
Potentilla anserina	Absence of ADH activity; ability for root growth in low oxygen tensions
Ranunculus flammula	Malate accumulation; absence of ADH activity
Salix cinerea	Malate accumulation
Salix fragilis	Oxidizes the rhizosphere
Salix lasiolepis	Ability for root growth in low oxygen tensions
Scirpus maritimus	Ability for root growth in low oxygen tensions
Senecio vulgaris	Slight increases in metabolic rates
Spartina alterniflora	Oxidizes the rhizosphere
Trifolia subterraneum	Low ADH activity
Typha angustifolia	Ability for root growth in low oxygen tensions

a. Accumulation of malate. Malate, a nontoxic metabolite, accumulates in roots of many hydrophytic species (e.g., *Glyceria maxima*, *Nyssa sylvatica* var. *biflora*). Nonwetland species concentrate ethanol, a toxic by-product of anaerobic respiration, when growing in anaerobic soil conditions. Under such conditions, many hydrophytic species produce high concentrations of malate and unchanged concentrations of ethanol, thereby avoiding accumulation of toxic materials. Thus, species having the ability to concentrate malate instead of ethanol in the root system under anaerobic soil conditions are adapted for life in such conditions, while species that concentrate ethanol are poorly adapted for life in anaerobic soil conditions.

b. Increased levels of nitrate reductase. Nitrate reductase is an enzyme involved in conversion of nitrate nitrogen to nitrite nitrogen, an intermediate step in ammonium production. Ammonium ions can accept electrons as a replacement for gaseous oxygen in some species, thereby allowing continued functioning of metabolic processes under low soil oxygen conditions. Species that produce high levels of nitrate reductase (e.g., *Larix laricina*) are adapted for life in anaerobic soil conditions.

c. Slight increases in metabolic rates. Anaerobic soil conditions effect short-term increases in metabolic rates in most species. However, the rate of metabolism often increases only slightly in wetland species, while metabolic rates increase significantly in nonwetland species. Species exhibiting only slight increases in metabolic rates (e.g., *Larix laricina, Senecio vulgaris)* are adapted for life in anaerobic soil conditions.

d. Rhizosphere oxidation. Some hydrophytic species (e.g., *Nyssa sylvatica, Myrica gale*) are capable of transferring gaseous oxygen from the root system into soil pores immediately surrounding the roots. This adaptation prevents root deterioration and maintains the rates of water and nutrient absorption under anaerobic soil conditions.

e. Ability for root growth in low oxygen tensions. Some species (e.g., *Typha angustifolia, Juncus effusus*) have the ability to maintain root growth under soil oxygen concentrations as low as 0.5 percent. Although prolonged (>l year) exposure to soil oxygen concentrations lower than 0.5 percent generally results in the death of most individuals, this adaptation enables some species to survive extended periods of anaerobic soil conditions.

f. Absence of alcohol dehydrogenase (ADH) activity. ADH is an enzyme associated with increased ethanol production. When the enzyme is not functioning, ethanol production does not increase significantly. Some hydrophytic species (e.g., *Potentilla anserina, Polygonum amphibium*) show only slight increases in ADH activity under anaerobic soil conditions. Therefore, ethanol production occurs at a slower rate in species that have low concentrations of ADH.

Reproductive adaptations

5. Some plant species have reproductive features that enable them to become established and grow in saturated soil conditions. The following have been identified in the technical literature as reproductive adaptations that occur in hydrophytic species:

a. *Prolonged seed viability.* Some plant species produce seeds that may remain viable for 20 years or more. Exposure of these seeds to atmospheric oxygen usually triggers germination. Thus, species (e.g., *Taxodium distichum)* that grow in very wet areas may produce seeds that germinate only during infrequent periods when the soil is dewatered. *NOTE: Many upland species also have prolonged seed viability, but the trigger mechanism for germination is not exposure to atmospheric oxygen.*

b. *Seed germination under low oxygen concentrations.* Seeds of some hydrophytic species germinate when submerged. This enables germination during periods of early-spring inundation, which may provide resulting seedlings a competitive advantage over species whose seeds germinate only when exposed to atmospheric oxygen.

c. *Flood-tolerant seedlings.* Seedlings of some hydrophytic species (e.g., *Fraxinus pennsylvanica)* can survive moderate periods of total or partial inundation. Seedlings of these species have a competitive advantage over seedlings of flood-intolerant species.

Appendix D
Hydric Soils

1. This appendix consists of two sections. Section 1 describes the basic procedure for digging a soil pit and examining for hydric soil indicators. ~~Section 2 is a list of hydric soils of the United States.~~

Section I - Procedures for Digging a Soil Pit and Examining for Hydric Soil Indicators

Digging a soil pit

2. Apply the following procedure: Circumscribe a 1-ft-diam area, preferably with a tile spade (sharpshooter). Extend the blade vertically downward, cut all roots to the depth of the blade, and lift the soil from the hole. This should provide approximately 16 inches of the soil profile for examination. *NOTE: Observations are usually made immediately below the A-horizon or 10 in. (whichever is shallower).* In many cases, a soil auger or probe can be used instead of a spade. If so, remove successive cores until 16 inches of the soil profile have been removed. Place successive cores in the same sequence as removed from the hole. *NOTE: An auger or probe cannot be effectively used when the soil profile is loose, rocky, or contains a large volume of water (e.g., peraquic moisture regime).*

Examining the soil

3. Examine the soil for hydric soils indicators (paragraphs 44 and/or 45 of main text (for sandy soils)). *NOTE: It may not be necessary to conduct a classical characterization (e.g., texture, structure, etc.) of the soil*. Consider the hydric soil indicators in the following sequence *(NOTE: The soil examination can be terminated when a positive hydric soil indicator is found):*

Nonsandy soils.

a. Determine whether an organic soil is present (see paragraph 44 of the main text). If so, the soil is hydric.

b. Determine whether the soil has a histic epipedon (see paragraph 44 of the main text). Record the thickness of the histic epipedon on Data Form 1.

c. Determine whether sulfidic materials are present by smelling the soil. The presence of a "rotten egg" odor is indicative of hydrogen sulfide, which forms only under extreme reducing conditions associated with prolonged inundation/soil saturation.

d. Determine whether the soil has an aquic or peraquic moisture regime (see paragraph 44 of the main text). If so, the soil is hydric.

e. Conduct a ferrous iron test. A colorimetric field test kit has been developed for this purpose. A reducing soil environment is present when the soil extract turns pink upon addition of α,α'-dipyridyl.

f. Determine the color(s) of the matrix and any mottles that may be present. Soil color is characterized by three features: hue, value, and chroma. Hue refers to the soil color in relation to red, yellow, blue, etc. Value refers to the lightness of the hue. Chroma refers to the strength of the color (or departure from a neutral of the same lightness). Soil colors are determined by use of a Munsell Color Book (Munsell Color 1975).[1] Each Munsell Color Book has color charts of different hues, ranging from 10R to 5Y. Each page of hue has color chips that show values and chromas. Values are shown in columns down the page from as low as 0 to as much as 8, and chromas are shown in rows across the page from as low as 0 to as much as 8. In writing Munsell color notations, the sequence is always hue, value, and chroma (e.g., 10YR 5/2). To determine soil color, place a small portion of soil[2] in the openings behind the color page and match the soil color to the appropriate color chip. *NOTE: Match the soil to the nearest color chip.* Record on DATA FORM 1 the hue, value, and chroma of the best matching color chip. *CAUTION: Never place soil on the face or front of the color page because this might smear the color chips.* Mineral hydric soils usually have one of the following color features immediately below the A-horizon or 10 inches (whichever is shallower):

(1) Gleyed soil.

---

[1] See references at the end of the main text.

[2] The soil must be moistened if dry at the time of examination.

Determine whether the soil is gleyed. If the matrix color best fits a color chip found on the gley page of the Munsell soil color charts, the soil is gleyed. This indicates prolonged soil saturation, and the soil is highly reduced.

(2) Nongleyed soil.

(a) Matrix chroma of 2 or less in mottled soils.[1]

(b) Matrix chroma of 1 or less in unmottled soils.[1]

(c) Gray mottles within 10 in. of the soil surface in dark (black) mineral soils (e.g., Mollisols) that do not have characteristics of (a) or (b) above.

Soils having the above color characteristics are normally saturated for significant duration during the growing season. However, hydric soils with significant coloration due to the nature of the parent material (e.g., red soils of the Red River Valley) may not exhibit chromas within the range indicated above. In such cases, this indicator cannot be used.

g. Determine whether the mapped soil series or phase is on the national list of hydric soils (Section 2). *CAUTION: It will often be necessary to compare the profile description of the soil with that of the soil series or phase indicated on the soil map to verify that the soil was correctly mapped. This is especially true when the soil survey indicates the presence of inclusions or when the soil is mapped as an association of two or more soil series.*

h. Look for iron and manganese concretions. Look for small (>0.08-in.) aggregates within 3 in. of the soil surface. These are usually black or dark brown and reflect prolonged saturation near the soil surface.

Sandy soils.

Look for one of the following indicators in sandy soils:

a. A layer of organic material above the mineral surface or high organic matter content in the surface horizon (see paragraph 45*a* of the main text). This is evidenced by a darker color of the surface layer due to organic matter interspersed among or adhering to the sand particles. This is not observed in upland soils due to associated aerobic conditions.

b. Streaking of subsurface horizons (see paragraph 45*b* of the main text). Look for dark vertical streaks in subsurface horizons. These streaks

[1] The soil must be moistened if dry at the time of examination.

represent organic matter being moved downward in the profile. When soil is rubbed between the fingers, the organic matter will leave a dark stain on the fingers.

c. Organic pans (see paragraph 45*c* of the main text). This is evidenced by a thin layer of hardened soil at a depth of 12 to 30 inches below the mineral surface.

Section 2 - Hydric Soils of the United States

4. The list of hydric soils of the United States ~~(Table D1)~~ was developed by the National Technical Committee for Hydric Soils (NTCHS), a panel consisting of representatives of the Soil Conservation Service (SCS), Fish and Wildlife Service, Environmental Protection Agency, Corps of Engineers, Auburn University, University of Maryland, and Louisiana State University. Keith Young of SCS was committee chairman.

5. The NTCHS developed the following definition of hydric soils:

~~A hydric soil is a soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favor the growth and regeneration of hydrophytic vegetation (U.S. Department of Agriculture (USDA) Soil Conservation Service 1985, as amended by the NTCHS in December 1986).~~

USER NOTES: The hydric soil definition, criteria, and hydric soil list (Table D1) published in the 1987 Corps Manual are obsolete. Current hydric soil definition, criteria, and lists are available over the World Wide Web from the U.S.D.A. Natural Resources Conservation Service (NRCS). (HQUSACE, 27 Aug 91, 6 Mar 92)

Criteria for hydric soils

6. Based on the above definition, the NTCHS developed the following criteria for hydric soils, and all soils appearing on the list will meet at least one criterion:

a. ~~All Histosols[1] except Folists;~~

b. ~~Soils in Aquic suborders, Aquic subgroups, Albolls suborder, Salorthids great group, or Pell great groups of Vertisols that are:~~

[1] Soil taxa conform to USDA-SCS (1975).

(1) Somewhat poorly drained and have water table less than 0.5 ft from the surface for a significant period (usually a week or more) during the growing season, or

(2) Poorly drained or very poorly drained and have either:

(a) A water table at less than 1.0 ft from the surface for a significant period (usually a week or more) during the growing season if permeability is equal to or greater than 6.0 in/hr in all layers within 20 inches; or

(b) A water table at less than 1.5 ft from the surface for a significant period (usually a week or more) during the growing season if permeability is less than 6.0 in/hr in any layer within 20 inches; or

c. Soils that are ponded for long duration or very long duration during part of the growing season; or

d. Soils that are frequently flooded for long duration or very long duration during the growing season.

7. The hydric soils list was formulated by applying the above criteria to soil properties documented in USDA-SCS (1975) and the SCS Soil Interpretation Records (SOI-5).

Use of the list

8. The list of hydric soils of the United States (Table D1) is arranged alphabetically by soil series. Unless otherwise specified, all phases of a listed soil series are hydric. In some cases, only those phases of a soil series that are ponded, frequently flooded, or otherwise designated as wet are hydric. Such phases are denoted in Table D1 by the following symbols in parentheses after the series name:

F - flooded

FF - frequently flooded

P - ponded

W - wet

D - depressional

9. Drained phases of some soil series retain their hydric properties even after drainage. Such phases are identified in Table D1 by the symbol "DR" in parentheses following the soil series name. In such cases, both the drained and un-

~~drained phases of the soil series are hydric.~~ *CAUTION: Be sure that the profile description of the mapping unit conforms to that of the sampled soil. Also, designation of a soil series or phase as hydric does not necessarily mean that the area is a wetland. An area having a hydric soil is a wetland only if positive indicators of hydrophytic vegetation and wetland hydrology are also present.*

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13. ABSTRACT ***(Maximum 200 words)***

This document presents approaches and methods for identifying and delineating wetlands for purposes of Section 404 of the Clean Water Act. It is designed to assist users in making wetland determinations using a multiparameter approach. Except where noted in the manual, this approach requires positive evidence of hydrophytic vegetation, hydric soils, and wetland hydrology for a determination that an area is a wetland. The multiparameter approach provides a logical, easily defensible, and technical basis for wetland determinations. Technical guidelines are presented for wetlands, deepwater aquatic habitats, and nonwetlands (uplands).

Hydrophytic vegetation, hydric soils, and wetland hydrology are also characterized, and wetland indicators of each parameter are listed.

Methods for applying the multiparameter approach are described. Separate sections are devoted to preliminary data gathering and analysis, method selection, routine determinations, comprehensive determinations, atypical situations, and problem areas. Three levels of routine determinations are described, thereby affording significant flexibility in method selection.

(Continued)

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Four appendices provide supporting information. Appendix A is a glossary of technical terms used in the manual. Appendix B contains data forms for use with the various methods. Appendix C, developed by a Federal interagency panel, contains a list of all plant species known to occur in wetlands of the region. Each species has been assigned an indicator status that describes its estimated probability of occurring in wetlands of the region. Morphological, physiological, and reproductive adaptations that enable a plant species to occur in wetlands are also described, along with a listing of some species having such adaptations. Appendix D describes the procedure for examining the soil for indicators of hydric soil conditions, and includes a national list of hydric soils developed by the National Technical Committee for Hydric Soils.

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US Army Corps of Engineers®
Engineer Research and Development Center

Wetlands Regulatory Assistance Program

Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Alaska Region (Version 2.0)

U.S. Army Corps of Engineers

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Environmental Laboratory

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Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Alaska Region (Version 2.0)

U.S. Army Corps of Engineers

U.S. Army Engineer Research and Development Center
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Final report

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Washington, DC 20314-1000

Abstract: This document is one of a series of Regional Supplements to the Corps of Engineers Wetland Delineation Manual, which provides technical guidance and procedures for identifying and delineating wetlands that may be subject to regulatory jurisdiction under Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act. The development of Regional Supplements is part of a nationwide effort to address regional wetland characteristics and improve the accuracy and efficiency of wetland-delineation procedures. This supplement is applicable to the Alaska Region, which is defined as the entire State of Alaska.

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Preface

This document is one of a series of Regional Supplements to the Corps of Engineers Wetland Delineation Manual. It was developed by the U.S. Army Engineer Research and Development Center (ERDC) at the request of Headquarters, U.S. Army Corps of Engineers (USACE), with funding provided through the Wetlands Regulatory Assistance Program (WRAP).

This document was developed in cooperation with the Alaska Regional Working Group, whose members contributed their time and expertise to the project over a period of many months. Working Group meetings were held in Anchorage, AK, on 3–5 February 2004, 16–17 November 2004, and 30 November–1 December 2005. Members of the Regional Working Group and contributors to this document were:

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1 Introduction

Purpose and use of this regional supplement

This document is one of a series of Regional Supplements to the Corps of Engineers Wetland Delineation Manual (hereafter called the Corps Manual). The Corps Manual provides technical guidance and procedures, from a national perspective, for identifying and delineating wetlands that may be subject to regulatory jurisdiction under Section 404 of the Clean Water Act (33 U.S.C. 1344) or Section 10 of the Rivers and Harbors Act (33 U.S.C. 403). According to the Corps Manual, identification of wetlands is based on a three-factor approach involving indicators of hydrophytic vegetation, hydric soil, and wetland hydrology. Indicators are generally site-specific but should be evaluated in a broader context including landscape position, human influences, and other factors. This Regional Supplement presents wetland indicators, delineation guidance, and other information specific to the Alaska Region.

This Regional Supplement is part of a nationwide effort to address regional wetland characteristics and improve the accuracy and efficiency of wetland-delineation procedures. Regional differences in climate, geology, soils, hydrology, plant and animal communities, and other factors are important to the identification and functioning of wetlands. These differences cannot be considered adequately in a single national manual. The development of this supplement follows National Academy of Sciences recommendations to increase the regional sensitivity of wetland-delineation methods (National Research Council 1995). The intent of this supplement is to bring the Corps Manual up to date with current knowledge and practice in the region and not to change the way wetlands are defined or identified. The procedures given in the Corps Manual, in combination with wetland indicators and guidance provided in this supplement, can be used to identify wetlands for a number of purposes, including resource inventories, management plans, and regulatory programs. The determination that a wetland is subject to regulatory jurisdiction under Section 404 or Section 10 must be made independently of procedures described in this supplement.

This Regional Supplement is designed for use with the current version of the Corps Manual (Environmental Laboratory 1987) and all subsequent

versions. Where differences in the two documents occur, this Regional Supplement takes precedence over the Corps Manual for applications in the Alaska Region. Table 1 identifies specific sections of the Corps Manual that are replaced by this supplement. Other guidance and procedures given in this supplement and not listed in Table 1 are intended to augment the Corps Manual but not necessarily to replace it. The Corps of Engineers has final authority over the use and interpretation of the Corps Manual and this supplement in Alaska.

Table 1. Sections of the Corps Manual replaced by this Regional Supplement for applications in Alaska.

Item	Replaced Portions of the Corps Manual (Environmental Laboratory 1987)	Replacement Guidance (this Supplement)
Hydrophytic Vegetation Indicators	Paragraph 35, all subparts, and all references to specific indicators in Part IV.	Chapter 2
Hydric Soil Indicators	Paragraphs 44 and 45, all subparts, and all references to specific indicators in Part IV.	Chapter 3
Wetland Hydrology Indicators	Paragraph 49(b), all subparts, and all references to specific indicators in Part IV.	Chapter 4
Growing Season Definition	Glossary	Chapter 4, Growing Season; Glossary
Hydrology Standard for Highly Disturbed or Problematic Wetland Situations	Paragraph 48, including Table 5 and the accompanying User Note in the online version of the Manual	Chapter 5, Wetlands that Periodically Lack Indicators of Wetland Hydrology, Procedure item 3(e)

Indicators and procedures given in this Supplement are designed to identify wetlands as defined jointly by the Corps of Engineers (33 CFR 328.3) and Environmental Protection Agency (40 CFR 230.3). Wetlands are a subset of the “waters of the United States” that may be subject to regulation under Section 404. One key feature of the definition of wetlands is that, under normal circumstances, they support “a prevalence of vegetation typically adapted for life in saturated soil conditions.” Many waters of the United States are unvegetated and thus are excluded from the Corps/EPA definition of wetlands, although they may still be subject to Clean Water Act regulatory jurisdiction (33 CFR 328.3a). Other potential waters of the United States in Alaska include, but are not limited to, tidal

waters, lakes, rivers, streams, mud flats, and similar areas. Delineation of these waters is based on the high tide line, the “ordinary high water mark” (33 CFR 328.3e), or other criteria and is beyond the scope of this Regional Supplement.

Amendments to this document will be issued periodically in response to new scientific information and user comments. Between published versions, Headquarters, U.S. Army Corps of Engineers, may provide updates to this document and any other supplemental information used to make wetland determinations under Section 404. Wetland delineators should use the most recent approved versions of this document and supplemental information. See the Corps of Engineers Headquarters regulatory web site for information and updates (http://www.usace.army.mil/inet/functions/cw/cecwo/reg/). The Corps of Engineers has established an interagency National Advisory Team for Wetland Delineation whose role is to review new data and make recommendations for needed changes in wetland-delineation procedures to Headquarters, U.S. Army Corps of Engineers. Items for consideration by the Team, including full documentation and supporting data, should be submitted to:

National Advisory Team for Wetland Delineation
Regulatory Branch (Attn: CECW-CO)
U.S. Army Corps of Engineers
441 G Street, N.W.
Washington, DC 20314-1000

Applicable region

This supplement is applicable to the Alaska Region, which is defined herein as the entire State of Alaska. The whole State was identified for development of this supplement in part because of its geographic isolation from the rest of the United States and in part by its climate, which is typical of high latitudes. Alaska is characterized by a humid temperate climate along the southeastern coast and a polar climate across the rest of the State (Bailey 1998). The polar climate is controlled mainly by polar and arctic air masses. In general, temperatures are low, winters are severe, and annual precipitation is low, much of it occurring during summer. Although day length during summer can be long, the intensity of solar radiation and potential for evapotranspiration are relatively low. Soils are usually frozen during the winter and the growing season is short.

The humid temperate climate of southeastern Alaska is influenced by both polar and tropical air masses and is characterized by warmer temperatures and abundant precipitation. Summers tend to be cool and moist, and the annual temperature range is relatively narrow due to the proximity of the ocean (Bailey 1995, 1998). Wetland indicators presented in this supplement are applicable across the entire State.

Physical and biological characteristics of the region

The Alaska Region encompasses a vast area that extends over 2,400 miles (3,860 km) east to west and over 1,400 miles (2,250 km) north to south. Alaska's land surface covers more than 586,000 square miles (1,517,700 km^2), most of which is located north of 60° N latitude and extends well above the Arctic Circle. Climate, geology, and landforms are highly variable across the region. Northern portions of Alaska are underlain by continuous permafrost, which becomes discontinuous, isolated, and fades away toward the south. Plant communities are also spatially variable, ranging from the grass, sedge, lichen, and dwarf-shrub communities of the arctic tundra to the coniferous rainforests of southeastern Alaska.

Figure 1 provides a generalized map of the subregions of Alaska. Subregions are used in this Regional Supplement to provide additional information that may be helpful in applying wetland indicators in particular areas. Four of these subregions correspond to the following Land Resource Regions (LRR) in Alaska recognized by the USDA Natural Resources Conservation Service (2004): Aleutian Alaska, Interior Alaska, Northern Alaska, and Western Alaska. The fifth LRR (Southern Alaska) has been split into two subregions – Southcentral Alaska and Southeast Alaska – based on differences in vegetation and climate. Detailed descriptions of the subregions of Alaska can be found in U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (2004).

Types and distribution of wetlands

Wetlands are more abundant in Alaska than in any other region of the United States. According to the National Wetlands Inventory, wetlands (including shallow subtidal habitats in coastal areas) occupy more than 174 million acres (70 million ha) and comprise more than 43 percent of the State's surface area (Hall et al. 1994). Nearly 99 percent of Alaska's wetlands are classified as palustrine, of which approximately 67 percent are scrub/shrub, 25 percent are emergent, and 8 percent are forested.



Figure 1. Subregions of Alaska. The entire Aleutian Island chain (not shown) is included in the Aleutian Alaska subregion.

Alaska's wetlands are as varied as its landscapes. They include salt marshes, bogs, muskegs, fresh marshes, swamps, and wet and moist tundra. Wetland abundance varies considerably by subregion and locale. Wetlands occupy an average of 61 percent of Northern and Western Alaska (approximately 93 million acres or 38 million ha of wetlands). They are least abundant in the Brooks Range (approximately 22 percent wetlands) and most abundant (up to 83 percent of the land area) in the arctic foothills and coastal plain, and in the Yukon-Kuskokwim and Selawik-Kobuk deltas. Vast expanses of treeless tundra underlain by permafrost dominate the area. More than half of all of Alaska's wetlands are located in the Northern and Western subregions.

In contrast, only about 13 percent of the land area in Southcentral, Southeast, and Aleutian Alaska consists of wetlands (9 million acres or 3.7 million ha). These subregions contain about 5 percent of Alaska's total wetland resource. Wetlands are less abundant in the mountains (less than 3 percent wetlands) and more abundant in the southeastern lowlands (34.5 percent wetlands) and in the Cook Inlet-Susitna lowlands (28 percent wetlands). Slope wetlands are common in the Southeast due to abundant precipitation and shallow bedrock. More than one-third of the wetlands in these subregions are forested.

Approximately 44 percent of Interior Alaska is wetlands (total of 71 million acres or 29 million ha), with the greatest wetland abundances in the Kanuti flats (76.5 percent wetlands), the Koyukuk-Innoko lowlands (71.1 percent), and the Tanana-Kuskokwim lowlands (60.9 percent). Interior Alaska contains approximately 40 percent of the State's total wetland acreage, including millions of acres of black spruce (*Picea mariana*) muskeg and floodplain wetlands dominated by deciduous shrubs and emergent plants. Wetlands are common on north-facing slopes where shallow permafrost traps water near the surface. Seventy-four percent of the wetland area in the subregion is classified as scrub/shrub, 13 percent is forested, and 13 percent is emergent (Hall et al. 1994).

2 Hydrophytic Vegetation Indicators

Introduction

In wetlands, the presence of water for long periods during the growing season exerts a controlling influence on the vegetation and dictates the kinds of plants that can establish and maintain themselves. Therefore, certain characteristics of the vegetation are strong evidence for the presence of wetlands on a site. The Corps Manual uses a plant-community approach to evaluate vegetation. Hydrophytic vegetation decisions are based on the assemblage of plant species growing on a site, rather than the presence or absence of particular indicator species. In general, hydrophytic vegetation is present when the plant community is dominated by species that can tolerate prolonged inundation or soil saturation during the growing season.

Many factors besides site wetness affect the composition of the plant community in an area, including regional climate, local weather patterns, topography, soils, past and present land use, and plant distributional patterns at various spatial scales. Community composition reflects the adaptive capabilities of the plant species and individuals present, superimposed on a complex spatial pattern of hydrologic, edaphic, and other environmental conditions. Disturbance factors, such as floods, fires, drought, or recent site modifications, are also important. They can set back or alter the course of plant succession, and may even change the hydrophytic status of the community. For example, intense fires in wetlands underlain by shallow permafrost and dominated by species such as black spruce can burn both the standing vegetation and the peat layer that insulates and helps maintain the permafrost layer. Thawing of the permafrost, as a result of intense burns, can result in improved soil drainage in some settings and can shift vegetation composition from hydrophytic to non-hydrophytic in one or more growing seasons. This shift in vegetation can last 50 to 70 years in Interior Alaska's black spruce communities before the insulating moss layer develops sufficiently to re-establish both the permafrost layer and original plant community (Viereck et al. 1986). Wetland determinations in such areas depend, in part, on the investigator's assessment of the permanence of the changes in site conditions using all available information and best professional judgment.

In most cases, hydrophytic vegetation decisions are based on the wetland indicator status (Reed 1988 or current approved list) of plant species in the community. Species in the facultative categories (FACW, FAC, and FACU) are recognized as occurring in both wetlands and uplands to varying degrees. Many facultative species have adaptive strategies allowing them to inhabit various landscape positions across the moisture gradient. Most wetlands are dominated by species rated OBL, FACW, and FAC. However, certain uncommon wetland types in Alaska may support primarily FACU species, such as paper birch (*Betula papyrifera*) or field horsetail (*Equisetum arvense*). These situations arise in part due to the broad tolerances of certain plant species that allow them to be widely distributed across the moisture gradient (i.e., ecological plasticity) or to the existence of ecotypes (i.e., populations of a species that are better adapted for life in wetlands than most members of the species). Hydrophytic vegetation indicators and procedures presented in this chapter are designed to identify the majority of wetland plant communities in Alaska. However, some wetland communities may lack any of these indicators. These situations are considered in Chapter 5 (Difficult Wetland Situations in Alaska).

Guidance on vegetation sampling

General guidance

Guidance on sampling of vegetation for wetland-delineation purposes is given in the Corps Manual for both the Routine and Comprehensive methods. Those procedures are intended to be flexible and often need to be modified for application in a given region or on a particular site. The following guidance on vegetation sampling is intended to supplement the Corps Manual for applications in Alaska.

Vegetation sampling done as part of a wetland delineation is designed to characterize the site in question rapidly without the need for detailed scientific study or statistical methods. A balance must be struck between the need to accomplish the work quickly and the need to characterize the site's heterogeneity accurately and at an appropriate scale.

The first step is to stratify the site so that the major landscape forms can be evaluated separately. This may be done using an aerial photograph or topographic map ahead of time or by walking over the site sufficiently to identify vegetation units associated with key landscape forms. In general,

routine wetland determinations are based on visual estimates of percent cover of plant species that can be made either (1) within the vegetation unit as a whole or (2) within one or more sampling plots established in representative locations within each unit. Percent cover estimates are more accurate and repeatable if taken within a defined plot. This also facilitates field verification of another delineator's work. The sizes and shapes of plots, if used, may be modified as appropriate to adapt to site conditions and should be recorded on the field data form. Near the wetland boundary, it may be necessary to adjust plot size or shape to avoid overlapping the boundary and extending into an adjacent community having different vegetation, soils, or hydrologic conditions. If the site is topographically diverse, procedures for wetland/non-wetland mosaics may be needed (see Chapter 5).

If it is not possible to locate one or a few plots in a way that adequately represents the landscape unit being sampled, then percent cover can be estimated by walking the unit and visually estimating the coverage of each species over a broader area. If additional quantification of cover estimates is needed, point-intercept sampling along transects (see Appendix B) may be used to characterize the vegetation within a landscape unit, as long as soil and hydrologic conditions are uniform across the area.

Definitions of strata

Vegetation strata help facilitate plant sampling and ensure that plants of all sizes are considered in the hydrophytic vegetation determination. The structure of vegetation varies greatly in wetland communities across the state. Throughout much of Alaska, short-statured woody plants are an important part of many communities, such as muskegs, bogs, and tundra wetlands. Important information about the wetland status of the community can be lost when short woody plants are combined into the herb stratum for sampling, as suggested in the Corps Manual. Therefore, the following strata are suggested for use in Alaska. This system places short woody shrubs in the sapling/shrub stratum and limits the herb stratum to only herbaceous vascular plant species. Unless otherwise noted, any stratum with less than 5 percent total plant cover during the peak of the growing season may be combined with another stratum for sampling purposes. Generally, a sparse tree stratum would be combined with the sapling/shrub stratum, and vice versa. A sparse herb stratum may be combined with the sapling/shrub stratum. Non-vascular plant species

(e.g., mosses, liverworts) are not used in hydrophytic vegetation decisions except in certain disturbed or problematic situations (see Chapter 5).

1. *Tree stratum* – Consists of woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.
2. *Sapling/shrub stratum* – Consists of woody plants less than 3 in. DBH, regardless of height.
3. *Herb stratum* – Consists of all herbaceous (non-woody) plants, regardless of size.

Hydrophytic vegetation indicators

The Corps Manual defines hydrophytic vegetation as the community of macrophytes that occurs in areas where inundation or soil saturation is either permanent or of sufficient frequency and duration to exert a controlling influence on the plant species present. Hydrophytic vegetation in Alaska is identified by using the indicators described in this section.

Indicators of hydrophytic vegetation involve looking up the wetland indicator status of plant species on the wetland plant list (Reed 1988 or current list). To use the indicators, at least 80 percent of the total vegetation cover on the plot must be of species that have been correctly identified and have an assigned wetland indicator status. For species with no regional indicator (designated NI) or those species whose occurrence in Alaska was not known at the time the plant list was developed (designated NO), do not use the species to calculate hydrophytic vegetation indicators. In general, species that are not listed on the wetland plant list are assumed to be upland (UPL) species. However, recent changes in plant nomenclature and distributions have resulted in a number of species that are not listed by Reed (1988) but are not necessarily UPL plants. Examples include *Gaultheria shallon*, *Menziesia ferruginea*, *Prunus padus*, *Vaccinium parvifolium*, and *Viola epipsila* ssp. *repens*. Procedures described in Chapter 5, Wetlands that Lack Indicators of Hydrophytic Vegetation, can be used if it is believed that individual FACU, NI, NO, or unlisted plant species are functioning as hydrophytes on a particular site.

The following indicators should be applied in the sequence presented. Hydrophytic vegetation is present if any of the indicators is satisfied. One of the indicators has the additional requirement that indicators of hydric soil and wetland hydrology must also be present. All of the indicators are applicable throughout Alaska.

The Dominance Test (Indicator 1) and Prevalence Index (Indicator 2) are the basic hydrophytic vegetation indicators in Alaska. The vegetation is hydrophytic if either test is satisfied. The dominance test is most appropriate when a few plant species are much more abundant than the other species in the community. The dominance test can be unreliable, however, when only one or two dominants are present or when strata are very different in total plant cover. The prevalence index is a more comprehensive analysis of the plant community because it accounts for all species present, not just a few dominants. It is particularly suited to communities with moderate cover values for several species, or where one stratum contains much less plant cover than another stratum (e.g., in bogs containing scattered trees). When determining dominance, consideration should be given to the maturity of herbaceous species. Cover values may be biased toward woody species in early and late-season determinations. Most wetlands in Alaska have plant communities that will meet one or both of these indicators and they are the only indicators that need to be used in most situations. However, some unusual wetland communities may fail both indicators due to the prevalence of FACU species even on clearly wet sites. In those cases, if indicators of hydric soil and wetland hydrology are both present, then the vegetation should be reevaluated using Indicator 3 (Morphological Adaptations). Finally, certain disturbed or problematic wetland situations may lack any of these indicators and are described in Chapter 5. The procedure for using hydrophytic vegetation indicators is as follows:

1. Apply Indicators 1 (Dominance Test) and/or 2 (Prevalence Index).
    a. If either indicator is satisfied, then the vegetation is hydrophytic and no further vegetation analysis is required.
    b. If neither indicator is satisfied and indicators of hydric soil and/or wetland hydrology are absent, then hydrophytic vegetation is absent unless the site meets requirements for a problematic wetland situation (see Chapter 5).
    c. If neither indicator is satisfied but indicators of hydric soil and wetland hydrology are both present, proceed to Step 2.
2. Apply Indicator 3 (Morphological Adaptations). This step assumes that at least one indicator of hydric soil and one primary or two secondary indicators of wetland hydrology are present.
    a. If Indicator 3 is satisfied, then the vegetation is hydrophytic.

b. If Indicator 3 is not satisfied, then hydrophytic vegetation is absent unless the site meets the requirements for a problematic wetland situation (Chapter 5).

Indicator 1: Dominance test

Description: More than 50 percent of the dominant plant species across all strata are rated OBL, FACW, or FAC.

User Notes: Use the 50/20 rule described below to select dominant species from each stratum of the community. Combine dominant species across strata and apply the dominance test to the combined list. Once a species is selected as a dominant, its cover value is not used in the dominance test; each dominant species is treated equally. Thus, a plant community with seven dominant species across all strata would need at least four dominant species that are OBL, FACW, or FAC to be considered hydrophytic by this indicator. Woody species that are dominant in two strata should be counted twice in the dominance test. It is recommended that all plant species making up at least 80 percent of the total vegetation cover on the plot be identified and their absolute cover values listed on the data form.

Procedure for Selecting Dominant Species by the 50/20 Rule: Dominant plant species are the most abundant species in the community; they contribute more to the character of the community than do the other non-dominant species present. The "50/20 rule" is a repeatable and objective procedure for selecting dominant plant species and is recommended when data are available for all species in the community. The rule can also be used to guide visual sampling of plant communities in rapid wetland determinations.

Dominant species are chosen independently from each stratum of the community. In general, dominants are the most abundant species that individually or collectively account for more than 50 percent of the total coverage of vegetation in the stratum, plus any other species that, by itself, accounts for at least 20 percent of the total. For the purposes of this regional supplement, absolute percent cover is the recommended abundance measure for plants in all vegetation strata. See Table 2 for an example application of the 50/20 rule in evaluating a plant community.

Table 2. Example of the selection of dominant species by the 50/20 rule and determination of hydrophytic vegetation by the dominance test.

Stratum	Species Name	Wetland Indicator Status	Absolute Percent Cover	Dominant?
Herb	*Matteuccia struthiopteris*	FACW	40	Yes
	Impatiens noli-tangere	FACW	20	Yes
	Equisetum arvense	FACU	10	No
	Ribes hudsonianum	FAC	10	No
	Thalictrum sparsiflorum	FACU	10	No
	Calamagrostis canadensis	FAC	5	No
	Dryopteris dilatata	FACU	5	No
	Oplopanax horridus	FACU	5	No
	Streptopus amplexifolius	FAC	5	No
		Total cover	110	
		50/20 Thresholds: 50% of total cover = 55% 20% of total cover = 22%		
Sapling/shrub	*Salix alaxensis*	FAC	80	Yes
	Populus balsamifera	FACU	10	No
	Alnus sinuata	FAC	10	No
		Total cover	100	
		50/20 Thresholds: 50% of total cover = 50% 20% of total cover = 20%		
Tree	*Populus balsamifera*	FACU	10	Yes
Hydrophytic Vegetation Determination	Total number of dominant species across all strata = 4. Percent of dominant species that are OBL, FACW, or FAC = 3/4 = 75%. Therefore, this community is hydrophytic by Indicator 1 (Dominance Test).			

Steps in selecting dominant species by the 50/20 rule are as follows:

1. Estimate the absolute percent cover of each species in the first stratum. Since the same data may be used to calculate the prevalence index, the data should be recorded as absolute cover and not converted to relative cover.
2. Rank all species in the stratum from most to least abundant.
3. Calculate the total coverage of all species in the stratum (i.e., sum their individual percent cover values). Absolute cover estimates do not necessarily sum to 100 percent.
4. Select plant species from the ranked list, in decreasing order of coverage, until the cumulative coverage of selected species *exceeds* 50 percent of the total coverage for the stratum. If two or more species are equal in coverage (i.e., they are tied in rank), they should all be selected. The selected plant

species are all considered to be dominants. All dominants must be identified to species.

5. In addition, select any other species that, by itself, is at least 20 percent of the total percent cover in the stratum. Any such species is also considered to be a dominant and must be accurately identified.
6. Repeat steps 1–5 for any other stratum present. Combine the lists of dominant species across all strata. Note that a species may be dominant in more than one stratum (e.g., a woody species may be dominant in both the tree and sapling/shrub strata).

Indicator 2: Prevalence index

Description: The prevalence index is 3.0 or less.

User Notes: If practical, all species in the plot should be identified and recorded on the data form. At a minimum, at least 80 percent of the total vegetation cover on the plot (summed across all strata) must be of species that have been correctly identified and have assigned wetland indicator statuses (Reed (1988) or current list) or are upland (UPL) species.

Procedure for Calculating a Plot-Based Prevalence Index: The prevalence index is a weighted-average wetland indicator status of all plant species in the sampling plot or other sampling unit, where each indicator status category is given a numeric code (OBL = 1, FACW = 2, FAC = 3, FACU = 4, and UPL = 5) and weighting is by abundance (absolute percent cover). It is a more comprehensive analysis of the hydrophytic status of the community than one based on just a few dominant species. The method was described by Wentworth et al. (1988) and modified by Wakeley and Lichvar (1997). It uses percent cover estimates for each plant species in the plot, with the constraint that at least 80 percent of the total vegetation cover on the plot must be of species that have been correctly identified and have an assigned wetland indicator status (including UPL). For any species that occurs in more than one stratum, cover estimates are summed across strata. The following procedure is used to calculate a plot-based prevalence index:

1. Identify and estimate the absolute percent cover of each species in each stratum of the community. Sum the cover estimates for any species that is present in more than one stratum.
2. Organize all species (across all strata) into groups according to their wetland indicator status (i.e., OBL, FACW, FAC, FACU, or UPL) and sum their

cover values within groups. Do not include species that were not identified or have an NI or NO status.

3. Calculate the prevalence index using the following formula:

$$PI = \frac{A_{OBL} + 2A_{FACW} + 3A_{FAC} + 4A_{FACU} + 5A_{UPL}}{A_{OBL} + A_{FACW} + A_{FAC} + A_{FACU} + A_{UPL}}$$

where:

PI = Prevalence index
A_{OBL} = Summed percent cover values of obligate (OBL) plant species
A_{FACW} = Summed percent cover values of facultative wetland (FACW) plant species
A_{FAC} = Summed percent cover values of facultative (FAC) plant species
A_{FACU} = Summed percent cover values of facultative upland (FACU) plant species
A_{UPL} = Summed percent cover values of upland (UPL) plant species.

The prevalence index should range between 1 and 5. See Table 3 for an example calculation of the prevalence index using the same data as in Table 2. The following web link provides free public-domain software for simultaneous calculation of the 50/20 rule, dominance test, and prevalence index: http://www.crrel.usace.army.mil/rsgisc/wetshed/wetdatashed.htm.

Indicator 3: Morphological adaptations

Description: The plant community passes Indicator 1 (Dominance Test) or Indicator 2 (Prevalence Index) after reconsideration of the indicator status of certain plants that exhibit morphological adaptations for life in wetlands.

User Notes: Some hydrophytes in Alaska develop easily recognized physical characteristics, or morphological adaptations, when they occur in wetland areas. These adaptations may help them to survive prolonged inundation or saturation in the root zone, or they may simply be a consequence of living under such wet conditions. The most common morphological responses to wetland conditions in Alaska are changes in growth form of certain plants, such as stunting or reduced vigor due to stress.

Table 3. Example of the prevalence index using the same data as in Table 2.

Indicator Status Group	Species Name	Percent Cover by Species	Total Cover by Group	Multiply by:[1]	Product
OBL species	None	0	0	1	0
FACW species	*Matteuccia struthiopteris* *Impatiens noli-tangere*	40 20	60	2	120
FAC species	*Ribes hudsonianum* *Calamagrostis canadensis* *Streptopus amplexifolius* *Salix alaxensis* *Alnus sinuata*	10 5 5 80 10	110	3	330
FACU species	*Equisetum arvense* *Thalictrum sparsiflorum* *Dryopteris dilatata* *Oplopanax horridus* *Populus balsamifera*[2]	10 10 5 5 20	50	4	200
UPL species	None	0	0	5	0
Sum			220 (A)		650 (B)
Hydrophytic Vegetation Determination		Prevalence Index = B/A = 650/220 = 2.95 Therefore, this community is hydrophytic by Indicator 2 (Prevalence Index).			

[1] Where OBL = 1, FACW = 2, FAC = 3, FACU = 4, and UPL = 5.

[2] This species was recorded in two strata (see Table 2) so the cover estimates were summed across strata.

Morphological adaptations may develop on FACU species when they occur in wetlands, indicating that those individuals are capable of functioning as hydrophytes. Examples of growth form responses for common species encountered during wetland determinations in Alaska are given in Table 4.

Table 4. Stress/vigor examples for four species frequently encountered during wetland determinations in Alaska.

Species	Growth Form Response
Paper birch (*Betula papyrifera*)	Stressed trees growing in wet conditions tend to be stunted, have multiple trunks, have an “apple tree”-like growth form, are reduced in size, and many times have a rotten core in the tree trunk.
White spruce (*Picea glauca*)	Under wet conditions, the needles are farther apart, branching is less bushy, and the growth form more narrow in shape.
Black spruce (*Picea mariana*)	Under wet conditions, trees have a shorter stature, asymmetrical shape, narrower growth form, and reduced volume for their age. On drier sites, the growth form is large and has an appearance similar to white spruce.
Sitka spruce (*Picea sitchensis*)	Under wet conditions, the main growth response is stunting.

To apply this indicator, these morphological features must be observed on more than 50 percent of the individuals of a FACU species living in an area where indicators of hydric soil and wetland hydrology are present. Follow this procedure:

1. Confirm that the morphological feature is present mainly in the potential wetland area and is not also common on the same species in the surrounding non-wetlands. This determination may be accomplished over a broad area and is not limited to the project site.
2. For each FACU species that exhibits morphological adaptations, estimate the percentage of individuals that have the features. Record this percentage on the data form.
3. If more than 50 percent of the individuals of a FACU species have morphological adaptations for life in wetlands, that species is considered to be a hydrophyte and its indicator status on that plot should be re-assigned as FAC. All other species retain their published indicator statuses. Record any supporting information on the data sheet, including a description of the morphological adaptation(s) present and any other observations of the growth habit of the species in adjacent wetland and non-wetland locations (photo documentation is recommended).
4. Reapply the Dominance Test (Indicator 1) and/or Prevalence Index (Indicator 2) using a FAC indicator status for this species. The vegetation is hydrophytic if either indicator is satisfied.

3 Hydric Soil Indicators

Introduction

The National Technical Committee for Hydric Soils (NTCHS) 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). Nearly all hydric soils exhibit characteristic morphologies that result from repeated periods of saturation or inundation for more than a few days. Saturation or inundation, when combined with microbial activity in the soil, causes the depletion of oxygen. This anaerobiosis promotes certain biogeochemical processes, such as the accumulation of organic matter and the reduction, translocation, or accumulation of iron and other reducible elements. These processes result in distinctive characteristics that persist in the soil during both wet and dry periods, making them particularly useful for identifying hydric soils in the field.

This chapter presents indicators that are designed to help identify and delineate hydric soils in Alaska. Indicators are not intended to replace or relieve the requirements contained in the definition of a hydric soil. Therefore, a soil that meets the definition of a hydric soil is hydric whether or not it exhibits indicators. This list of indicators is dynamic; changes and additions are anticipated with new research and field testing. Indicators presented in this chapter are a subset of the NTCHS *Field Indicators of Hydric Soils in the United States* (USDA Natural Resources Conservation Service 2006 or current version) that are commonly found in Alaska. Any change to the NTCHS *Field Indicators of Hydric Soils in the United States* represents a change to this subset of indicators for Alaska. Wetland delineators should use the most current version of the indicators, which can be found on the NRCS hydric soils web site (http://soils.usda.gov/use/hydric). To use the indicators properly, a basic knowledge of soil/landscape relationships is necessary.

All of the indicators presented in this Supplement are applicable statewide although some are more common in certain subregions. The User Notes for each indicator provide information specific to each subregion. It is important to note that boundaries between subregions are actually broad

transition zones and that soil and landscape conditions do not change abruptly at the boundary.

The indicators are used to help identify the hydric soil component of wetlands; however, some hydric soils do not have any of the currently listed indicators. The absence of any listed indicator does not preclude the soil from being hydric. Guidance for identifying hydric soils that lack indicators can be found in this chapter (see the sections on documenting the site and its soils) and in Chapter 5 (Difficult Wetland Situations in Alaska).

Notes on Alaska soils

The following background information on soil development in Alaska and guidance for soil sampling was adapted from USDA Natural Resources Conservation Service (2005a).

Organic matter accumulation

Saturated or inundated soils. Since the efficiency of soil microbes is considerably lower in a saturated and anaerobic environment, less organic matter and organic carbon is consumed by the microbes. Organic matter and carbon begin to accumulate. The result is the development of thick organic surfaces on the soil (Figure 2) or dark organic-rich surface mineral layers.



Figure 2. A saturated organic soil. In this profile, saturated organic material extends from the soil surface to a depth below 24 in. (60 cm). Scale is in centimeters.

Non-saturated or non-inundated soils. Cool temperatures and acid conditions result in the slow decomposition of organic matter. Therefore, many well-drained soils in Alaska, under aerobic conditions, have thick organic surface layers called Folists or folistic epipedons. These layers are not an indication of diminished microbial activity in a saturated anaerobic environment. Folistic layers are organic accumulations that do not saturate for more than 30 days and, in many cases, do not saturate during most years. Most folistic layers are comprised of poorly decomposed organic material and usually are found in forested areas with greater than 10 percent slopes. Folistic surface layers may overlie rock, a mineral layer, or saturated organic layers. Saturated organics, if underlying an unsaturated organic layer, will usually be more decomposed and have a greasy feel when rubbed between the fingers. It may be necessary to involve a soil scientist with local knowledge to distinguish folistic surface layers from saturated organic layers.

Iron reduction, translocation, and accumulation

Saturated or inundated soils. In an anaerobic environment, soil microbes reduce ferric iron (Fe^{+3}) to ferrous iron (Fe^{+2}). Areas in the soil where iron is reduced develop characteristic bluish-gray or greenish-gray colors known as *gley*. Ferric iron is insoluble but ferrous iron easily enters the soil solution and is moved or translocated to other areas of the soil. Areas that have lost iron develop characteristic gray or reddish-gray colors and are known as *redox depletions*. If a soil reverts to an aerobic state, iron that is in solution will oxidize and become concentrated in patches, often along root channels and other soil pores. These areas of oxidized iron are called *redox concentrations*. Since water movement in these saturated or inundated soils can be multi-directional, redox depletions and concentrations can occur anywhere in the soil (Figure 3). Zones that are iron-depleted due to saturation and reduction normally occur as irregularly shaped or discontinuous patches and zones. Redox concentrations occur either as discontinuous patches or are found along root

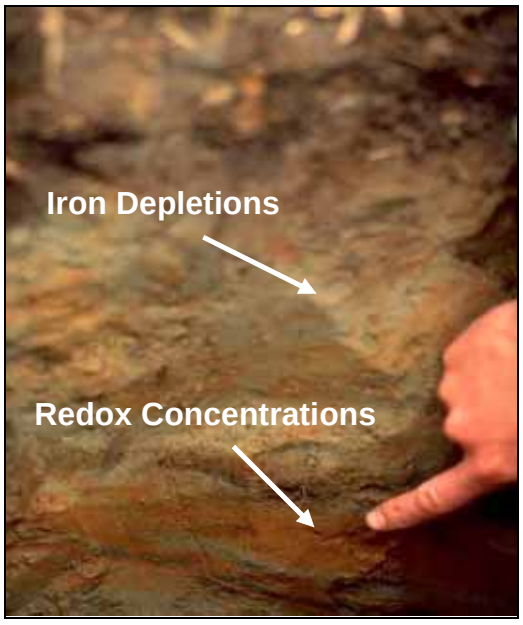


Figure 3. Redox depletions and redox concentrations in a hydric soil.

channels and other pores. Soils that are saturated and contain ferrous iron at the time of sampling may change color upon exposure to the air, as ferrous iron is rapidly converted to ferric iron in the presence of oxygen. Such soils are said to have a *reduced matrix* (Vepraskas 1992).

Non-saturated or non-inundated soils. In well-drained, aerated soils, iron translocation is also a normal process. Infiltrating water moves downward through the soil and, together with the presence of organic acids, leaches or washes iron from mineral layers near the top of the soil. The iron moves in solution downward and accumulates in lower layers. As the near-surface layers are continually leached, their colors become similar to those of iron depletions. The accumulation of iron in the lower horizons may result in colors similar to redox concentrations. This coloration is most pronounced in Spodosols.

Spodosols (Figure 4) form in relatively acidic soil material. Spodosols can be either hydric or non-hydric. They are most common in forested areas or upper mountain slopes in southern Alaska but also occur elsewhere. Organic carbon, iron, and aluminum are leached from a layer near the soil surface. This layer, known as the E horizon, has a bleached light-gray appearance and consists of relatively clean particles of sand and silt. The materials leached from the E horizon are deposited lower in the soil in the spodic horizon (e.g., Bhs or Bs horizon). If sufficient iron has been leached and redeposited, the spodic horizon will have a strong reddish color. In some Spodosols, both E horizon and spodic horizon colors can be confused with the redox depletions and concentrations that result from anaerobic soil conditions.

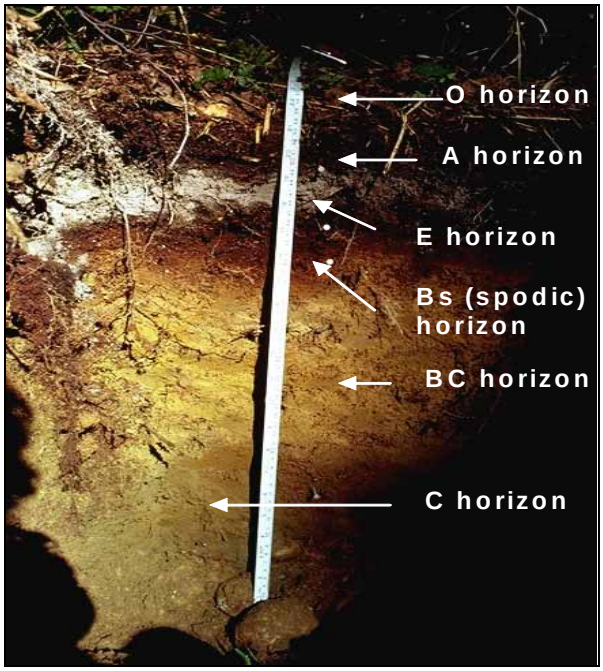


Figure 4. Example of a non-hydric Spodosol.

Normally, E horizon and spodic horizon materials are present in the soil in relatively continuous horizontal bands (Figure 4). Chemical weathering in an aerated soil is accomplished by the downward movement of water;

therefore, the layers or horizons are relatively parallel to the soil surface and consistent across the soil. Transitions are relatively abrupt between the organic surface, the leached E horizon, and the iron-enriched B horizon. Below the B horizon, the transition becomes more gradual with the red hue of the iron-enriched B horizon gradually changing to the yellower hue of the underlying C horizon.

If E horizons are thin or there are extensive plant roots, however, they may be discontinuous. Tree throw and cryoturbation can also mix and break the horizons of aerated upland soils (Figure 5), so care should be taken to examine all site characteristics before concluding that a soil is hydric.



Figure 5. A well-drained Spodosol with strong E and Bh (spodic) horizons. Horizons have been broken and mixed by tree throw. Care is needed not to confuse these with redox depletions and redox concentrations caused by soil saturation and anaerobiosis.

Sulfate reduction

Sulfur is one of the last elements to be reduced by microbes in an anaerobic environment. The microbes convert SO_4^{-2} to H_2S, or hydrogen sulfide. This results in a very pronounced "rotten egg" odor in some soils that are inundated or saturated for very long periods. In non-saturated or non-inundated soils, sulfate is not reduced and there is no rotten egg odor.

Confusing redox concentrations

Some soils have obvious redox concentrations but the site has little or no evidence of wetland hydrology or vegetation. These include the following situations:

Seasonal-frost-affected soils. Seasonal frost is prevalent in areas with little snow cover or where wind commonly removes the snow cover. The seasonal frost forms a nearly impermeable layer similar to permafrost. During break-up, melt water perches on the seasonal frost layer, often resulting in near-surface saturation or ponding. The seasonal frost then

degrades within one to two weeks and the soil's normal permeability resumes. The saturated conditions often result in redoximorphic features in the soil (Figure 6). True gley colors rapidly change to non-gley hues once oxidation is present, although redox concentrations remain.



Figure 6. Redox concentrations formed as a result of melt water perching on seasonal frost.

Many of these soils are hydric, although they occur on landscape positions that are normally considered to be well-drained uplands. It is critical to observe carefully and note all other site characteristics, including indicators of hydrophytic vegetation and wetland hydrology, before classifying the area as either wetland or non-wetland.

Thawed permafrost-affected soils. In most soils affected by permafrost, the permafrost forms a restrictive layer that will perch water. In many such soils, the active layer above the permafrost table is saturated long enough during the growing season so that reduced conditions occur. Redoximorphic features and hydric soil indicators are often present (Figure 7).



Figure 7. Thawed permafrost-affected soil. Redox concentrations remain 25 years after drainage improved.

If a natural or cultural activity, such as wildfire or land clearing, disturbs the surface organic layer, the temperature of a permafrost-affected soil may increase. This increase can result in enough thawing that the restrictive permafrost layer is either lowered in the soil profile or completely removed. If the soil occurs in an upland position and has no other restrictive layers, drainage can improve significantly. Similar to soils affected by

seasonal frost, gley colors will alter to non-gley hues, but redox concentrations will persist. Therefore, hydric soil indicators may be present even though wetland hydrology has been lost. It is critical to observe carefully and note all other site characteristics, including vegetation and hydrology, before making the wetland determination.

Cautions

A soil that is artificially drained or protected (for instance, by dikes or levees) is still hydric if the soil in its undisturbed state would meet the definition of a hydric soil. To be determined hydric, these soils should generally have one or more of the indicators.

Morphological features of hydric soils indicate that saturation and anaerobic conditions have existed under either contemporary or recent hydrologic conditions. Features that do not reflect contemporary or recent hydrologic conditions of saturation and anaerobiosis are relict features. Typically, contemporary and recent hydric soil features have diffuse boundaries; relict hydric soil features have abrupt boundaries (Vepraskas 1992). When soil morphology seems inconsistent with the landscape, vegetation, or observable hydrology, it may be necessary to obtain the assistance of an experienced soil or wetland scientist to determine whether soil features are relict.

Procedures for sampling soils

Observe and document the site

The common temptation is to excavate a small hole in the soil, note the presence of any indicators, make a decision, and leave. Before any decision is made, however, the overall site and how it interacts with the soil should be considered.

The questions below, while not required to identify a hydric soil, should be considered at any site. Always look at the landscape features of the immediate site and compare them to the surrounding areas. Try to contrast the features of wet and dry sites that are in close proximity. When observing slope features, look first at the area immediately around the sampling point. For example, a nearly level bench or depression at the sampling point may be more important to site wetness than the overall landform on which it occurs. By understanding how water moves across the site, the

reasons for the presence or absence of hydric soil indicators should be clear.

If one or more of the hydric soil indicators given later in this chapter is present, then the soil is hydric. If no hydric soil indicators are present, the additional site information below may be useful in documenting whether the soil is indeed non-hydric or if it might represent a "problem" hydric soil.

- *Hydrology*–Is standing water observed on the site or is water observed in the soil pit? What is the water-table depth in the area?
- *Slope*–Is the site level or nearly level so that surface water does not run off readily, or is it steeper where surface water would run off from the soil?
- *Slope shape*–Is the surface concave, where water would tend to collect and possibly pond on the soil surface? On hillsides, are there convergent slopes, where surface or groundwater may be directed toward a central stream or swale, or is the surface or slope shape convex, causing water to run off or disperse?
- *Landform*–Is the soil on a low terrace or floodplain that is subject to seasonal high water tables or flooding? Is it at the toe of a slope where runoff may tend to collect or groundwater may discharge at or near the surface?
- *Soil materials*–Is there a restrictive layer in the soil that would slow or prevent the infiltration of water? This could include permafrost, consolidated bedrock, a layer of silt, substantial clay content, or dense glacial till. Alternatively, is there relatively loose soil material (sand, gravel, or rocks) or fractured bedrock that would allow the soil to drain readily?
- *Vegetation*–Does the vegetation at the site indicate wetter conditions than at other nearby sites, or is it similar to that found on nearby non-wetland sites?

Observe and document the soil

To document a hydric soil, first remove all loose leaves, needles, or bark from the soil surface. Do not remove the organic surface layers of the soil, which usually consist of dead moss and other plant remains in varying stages of decomposition. Dig a hole and describe the soil profile to a depth of at least 20 in. (50 cm) from the soil surface, unless bedrock is found at a

shallower depth. Use the completed soil profile description to determine which indicators have been matched.

In general, the hole should be dug to the depth needed to document an indicator or to confirm the absence of indicators. Deeper examination of the soil may be required when field indicators are not easily seen within 20 in. (50 cm) of the surface. It is always recommended that soils be excavated and described as deep as necessary to make reliable interpretations. For example, examination to less than 20 in. (50 cm) may suffice in soils with surface horizons of saturated organic material. Conversely, the excavation depth will often need to be greater than 20 in. (50 cm) in soils with thick dark surface horizons because the upper horizons of these soils, due to the masking effect of organic material, often contain no easily visible redoximorphic features. At many sites, it is necessary to make exploratory observations to 40 in. (1 m) or more. These observations should be made with the intent of documenting and understanding the variability in soil properties and hydrologic relationships on the site.

Whenever possible, excavate the soil deep enough to determine if there are layers or materials present that might restrict soil drainage. This will help to understand why the soil may or may not be hydric.

To determine if a hydric soil indicator is present, it is critical to know exactly where to begin looking. All of the indicators require the presence of certain soil colors or features within specified depths from the soil surface. For the purpose of identifying hydric soils in Alaska, the soil surface begins at the top of the first mineral layer (underneath any and all organic material) except for the application of Indicators A1 (Histosol or Histel) and A2 (Histic Epipedon). For A1 and A2, the soil surface starts just below the living, green moss layer. The majority of Alaska soils have an organic surface layer.

All colors noted in this supplement refer to moist Munsell colors. Soil colors specified in the indicators do not have decimal points; however, intermediate colors do occur between Munsell chips. Soil chroma should not be rounded to qualify as meeting an indicator. For example, a soil matrix with a chroma between 2 and 3 should be listed as having a chroma of 2+. This soil material does not have a chroma of 2 and would not meet any indicator that requires a chroma of 2 or less.

Particular attention should be paid to changes in microtopography over short distances. Small changes in slope configuration may result in repetitive sequences of hydric/non-hydric soils, and the delineation of individual areas of hydric and non-hydric soils may be difficult. Often the dominant condition, either hydric or non-hydric, is the only reliable interpretation. The shape of the local landform can greatly affect the movement of water through the landscape. Significant changes in parent material or lithologic discontinuities in the soil can also affect the hydrologic properties of the soil. After a sufficient number of exploratory excavations have been made to understand the soil/hydrology relationships at the site, subsequent excavations can be limited to the depth needed to identify hydric soil indicators.

Take photos of both the soil and the overall site. There may be no opportunity to return for more data.

Use of existing soil data

Soil surveys

Soil surveys are available for many areas of Alaska and can provide useful information regarding soil properties and soil moisture conditions for an area. Soil surveys in Alaska, however, vary considerably in the mapping scale and the amount of ground-truthing used to document the survey. A list of available soil surveys is located at http://www.ak.nrcs.usda.gov/technical/soils/soilsurveys.html and soil maps and data are available online at http://websoilsurvey.nrcs.usda.gov/. Soil survey maps divide the landscape into areas called map units. The most detailed surveys in the state are mapped at a scale of 1:24,000. At this scale, the smallest soil areas delineated are about 5 acres (2 ha) in size. Several of the Alaska soil surveys are mapped at scales ranging from 1:63,360 to 1:250,000. The smallest areas delineated in these surveys range from 25–100 acres (10–40 ha) in size. Map units usually contain more than one soil type or component. They often contain several minor components or inclusions of soils with properties that may be similar to or quite different from the major component. Those soils that are hydric are noted in the *Hydric Soils List* published separately from the soil survey report. Soil survey information can be valuable for planning purposes, but it is not site-specific and does not preclude the need for an on-site investigation.

The *Exploratory Soil Survey of Alaska* provides coverage of the entire state at a scale of 1:1,000,000. The minimum size of areas delineated ranges from thousands to tens of thousands of acres. The *Exploratory Soil Survey of Alaska* provides a good overview of the major soil types in the various regions of the state. It does not provide any information for hydric soil determinations.

Hydric soils lists

Hydric soils lists are developed for each of the "detailed" or 1:24,000-scale soil surveys in Alaska. Using criteria approved by the NTCHS, these lists rate each soil component as either hydric or non-hydric based on soil property data. If the soil is rated as hydric, information is provided regarding which hydric criterion is met and on what landform the soil typically occurs. The hydric soils list should be used as a tool, indicating that hydric soil will likely be found within a given area. However, not all areas within a map unit or polygon identified as having hydric soils may be hydric.

The hydric soils lists available for individual 1:24,000 scale soil surveys are known as *Local Hydric Soil Lists*. They are available from NRCS offices and over the internet from the Soil Data Mart (http://soildatamart.nrcs.usda.gov/). Local Hydric Soils Lists have been compiled into a National Hydric Soils List available at http://soils.usda.gov/use/hydric/. However, use of Local Hydric Soils Lists is preferred since they are more current and reflect local variations in soil properties.

Hydric soil indicators

Many of the hydric soil indicators were developed specifically for wetland-delineation purposes. During the development of these indicators, soils in the interior of wetlands were not always examined; therefore, there are wetlands that lack any of the approved hydric soil indicators in their wettest interior portions. Wetland delineators and other users of the hydric soil indicators should concentrate their sampling efforts near the wetland edge and, if these soils are hydric, assume that soils in the interior of the wetland are also hydric even if they lack an indicator.

The following indicators are intended for use in all soils regardless of texture. Unless otherwise indicated, all mineral layers above any of the indicators must have a dominant chroma of 2 or less, or the layer(s) with dominant chroma of more than 2 must be less than 6 in. (15 cm) thick to

meet any hydric soil indicator. Nodules and concretions are not considered to be redox concentrations unless otherwise noted.

Indicator A1: Histosol or Histel

Technical Description: Classifies as a Histosol (except Folists) or as a Histel (except Folistels).

User Notes: Histosols are soils usually having 16 in. (40 cm) or more of saturated organic material measured from the soil surface (Figure 8). Histels are simply Histosols that have permafrost in the soil profile, so some part of the organic material may be permanently frozen. Peak periods for observing saturation in each subregion are given below. Organic surfaces without evidence of saturation are excluded if not artificially drained (Folists and Folistels).



Figure 8. Example of a Histosol. This soil has saturated organic materials extending from the soil surface to a depth of more than 24 in. (60 cm). Scale is in centimeters.

The best evidence of saturation is the presence of a water table within the organic layer during at least part of the growing season. Saturation should be observable during peak periods within each subregion (see below) or

may be inferred from wetland hydrology indicators outside of the peak period. Thin mineral strata may be observed within the organic layer. In some locations, ash deposits may overlie the organic material. These soils may or may not contain permafrost.

Aleutian Alaska. Saturation is likely to be observed throughout the year. Saturated organic deposits commonly occur in depressions and flats.

Interior Alaska. Saturation is most likely during May and late July—September. Saturated organic deposits commonly occur in groundwater discharge zones in depressions and flats and extensively across backslopes where restrictive layers (e.g., permafrost, glacial till) in the soil perch water.

Northern Alaska. Saturation is most likely during June–August. Saturated organic deposits commonly occur on coastal plains, in depressions, on slopes in the foothills, and on floodplains (Figure 9) where restrictive layers (e.g., permafrost, glacial till) in the soil perch water.



Figure 9. Soils with thick, saturated organic surfaces normally occur in concave or plain landform positions. Areas may range in size from very small depressions on backslopes to large fens and bogs. Usually a restrictive layer, such as glacial till or permafrost, impedes the downward movement of water.

Southcentral Alaska. Saturation is most likely to be observed during April–May and September–October. Saturated organic deposits commonly occur in groundwater discharge zones along toeslopes and footslopes where restrictive layers (e.g., glacial till) in the soil perch water. This indicator also occurs in depressions and along tidal fringes.

Southeast Alaska. Saturation is most likely to be observed during April–May and September–October. Saturated organic deposits commonly occur in groundwater discharge zones and where restrictive layers (e.g., bedrock, glacial till) in the soil perch water.

Western Alaska. Saturation is most likely during May–September. Saturated organic deposits commonly occur in groundwater discharge zones in depressions and flats, and extensively across backslopes where restrictive layers (e.g., permafrost, glacial till) in the soil perch water.

Indicator A2: Histic Epipedon

Technical Description: A histic epipedon underlain by mineral soil material with chroma of 2 or less.

User Notes: Most histic epipedons are surface horizons 8 in. (20 cm) or more thick of saturated organic material (Figure 10). The intent of this indicator is to identify saturated organic accumulations generally 8 to 16 in. (20–40 cm) thick that are not as thick as those described in Indicator A1 (Histosol or Histel). A histic epipedon must be saturated in all or part of the layer at some time in most years. The best evidence of saturation is the presence of a water table during at least part of the growing season. Saturation should be observable during peak periods within each subregion (see Indicator A1) or may be inferred from wetland hydrology indicators outside of the peak period.

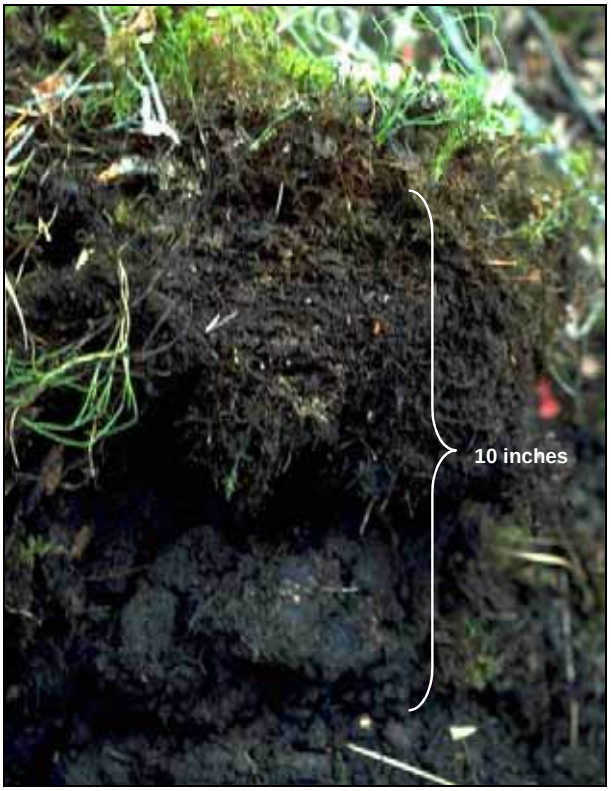


Figure 10. A histic epipedon consisting of saturated organic material overlying mineral soil. In this example, the saturated organic material extends from the soil surface to a depth of approximately 10 in. (25 cm).

Thin mineral strata may be observed within the organic layers. In some locations, ash deposits may overlie the organic material. These soils may or may not contain permafrost. Organic surfaces without evidence of saturation are excluded if not artificially drained.

Indicator A4: Hydrogen Sulfide

Technical Description: A hydrogen sulfide odor within 12 in. (30 cm) of the soil surface.

User Notes: These soils are usually permanently saturated and anaerobic at or near the surface. Any time the excavated soil smells of hydrogen sulfide (rotten egg odor), sulfur is currently being reduced and the soil is definitely in an anaerobic state. In some soils, the odor is well pronounced; in others, it is very fleeting as the gas dissipates rapidly. If in doubt, quickly open several small holes in the area of concern to determine if a hydrogen sulfide odor is present.

Indicator A12: Thick Dark Surface

Technical Description: A layer at least 6 in. (15 cm) thick with a depleted or gleyed matrix that has 60 percent or more chroma of 2 or less starting below 12 in. (30 cm) of the surface. The layer(s) above the depleted or gleyed matrix must have a value of 2.5 or less and a chroma of 1 or less to a depth of at least 12 in. (30 cm) and value of 3 or less and chroma of 1 or less in any remaining layers above the depleted or gleyed matrix. Any sandy material above the depleted or gleyed matrix must have at least 70 percent of the visible soil particles covered, coated, or similarly masked with organic material.

User Notes: Accumulation of organic carbon in mineral soil layers results in dark colors. Thicker dark surfaces are common in depressional areas where moisture accumulates and plant growth is enhanced. The thicker dark surfaces do not necessarily indicate saturation. However, if saturation does occur, the thick dark surface may mask or hide evidence of reduction near the soil surface. Look for two things. One is evidence of a depleted or gleyed matrix below the dark surface material (see the Glossary for definitions of depleted and gleyed matrix). The other is a source of saturation. This may include a restrictive layer that perches precipitation and snowmelt, a nearby spring or seep, or a snowfield that persists late into the summer (see Indicator TA5 – Alaska Alpine Swales).

Use of this indicator requires close observation and an understanding of landform position and local sources of hydrology.

This indicator is used for soils with thick, very dark surface mineral horizons that mask reduction features (Figure 11). Visible evidence of gley may only be observable deeper in the soil. Look below 12 in. (30 cm) for evidence of a depleted or gleyed matrix.

Since some soils with thick dark surfaces are Spodosols, extreme care must be taken not to confuse grayish colored E horizon material with depleted colors. In addition, glacial deposits or marine sediments underlie some Alaska soils. These parent materials have base colors that can easily be confused with gleyed colors. Look for redox concentrations along root channels and other soil pores (see Indicator A14 – Alaska Redox) and/or gleyed root channels (see Indicator A15 – Alaska Gleyed Pores) below 12 in. (30 cm).



Figure 11. A depleted matrix begins at approximately 14 in. (35 cm) below a dark surface mineral layer. Scale is in centimeters.

Aleutian Alaska. This indicator is not known to occur in the subregion.

Interior Alaska. Saturation is most likely to be observed during April–May and September–October. This is a common indicator on mountain slopes where restrictive layers in the soil perch seasonal water tables. This indicator does not occur in permafrost-affected soils.

Northern Alaska. Saturation is most likely to be observed during June–August. This is a common indicator on mountain slopes where restrictive layers in the soil perch seasonal water tables.

Southcentral Alaska. Saturation is most likely to be observed during April–May and September–October. This is a common indicator on mountain slopes where restrictive layers in the soil perch seasonal water tables.

Southeast Alaska. This indicator is not known to occur in the subregion.

Western Alaska. Saturation is most likely to be observed during April–May and September–October. This is a common indicator on mountain slopes where restrictive layers in the soil perch seasonal water tables. This indicator does not occur in permafrost-affected soils.

Indicator A13: Alaska Gleyed

Technical Description: A mineral layer with a dominant hue of N, 10Y, 5GY, 10GY, 5G, 10G, 5BG, 10BG, 5B, 10B, or 5PB and with a value of 4 or more (i.e., a gleyed matrix) in more than 50 percent of the matrix. The layer starts within 12 in. (30 cm) of the mineral surface and is underlain within 60 in. (1.5 m) by soil material with hue of 5Y or redder in the same type of parent material.

User Notes: This indicator has two requirements. First, within 12 in. (30 cm) of the soil surface, a layer having one or more of the specified gleyed colors is present. These colors can be found on the gleyed 1 and gleyed 2 pages of the Munsell color book (Gretag/Macbeth 2000) (see Figure A2). Second, below these gleyed colors, the color of similar soil material is hue 5Y or redder (i.e., 2.5Y, 10YR, 7.5YR, etc.). If the gleyed colors extend beyond a depth of 60 in. (1.5 m), the true color of the parent material cannot be determined. In that case, try applying Indicator A14 (Alaska Redox). The presence of gleyed colors indicates that the soil has undergone reduction. The requirement for 5Y or redder colors lower in the profile is to ensure that the gleyed colors are not simply the basic color of the soil parent material. This indicator proves that the near-surface gleyed colors are not natural soil material colors, and that they are the result of reduced conditions. When comparing near-surface and underlying colors, make sure that the type of soil material is the same (Figures 12 and 13). Many soils in Alaska are composed of two or more types of material (e.g., silty loess overlying gravelly glacial till or sand-and-gravel river deposits).



Figure 12. The bluish color of the soil material on the left (from the upper portion of the soil profile) indicates reduced conditions. The dark color of the soil material on the right (from lower in the same soil profile) is the color of the parent material and not the result of saturation.

Tidal sediments, lacustrine sediments, loess, and some glacial tills have base colors that appear as gleyed. On closer examination, their colors will normally not fit on the gley color pages. Information specific to each subregion follows:

Aleutian Alaska. This indicator is commonly found in tidal flats and estuaries, and upland depressions. It may be difficult to apply due to predominance of volcanic ash.

Interior Alaska. This indicator is commonly found along transition zones between fens and bogs and adjacent uplands, in groundwater discharge areas, and depressional areas within low floodplains. Saturation may be the result of a local riparian water table or water perched on restrictive layers, especially permafrost, within the soil.

Northern Alaska. This indicator is commonly found in depressions on floodplains, tidal flats, and foothills, and drainage channels on foothills. Saturation may be a result of local riparian water tables or water perched on permafrost.



Figure 13. The bluish band between 4 and 8 in. (10–20 cm) indicates the presence of reduced soil material. The underlying material below 8 in. (20 cm) reflects both the color of the parent material and soil weathering under aerobic conditions. Scale is in centimeters.

Southcentral Alaska. This indicator is commonly found along transition zones between fens and bogs and adjacent uplands, groundwater discharge areas, and depressional areas within low floodplains. Saturation may be the result of a local riparian water table or water perched on restrictive layers within the soil.

Southeast Alaska. This indicator is commonly found along hill and mountain slopes. Saturation is usually the result of water perched on glacial till.

Western Alaska. This indicator is commonly found along transition zones between fens or bogs and the adjacent uplands, in groundwater

discharge areas, and broad depressional areas within low floodplains and in deltaic areas. Saturation may be the result of a local riparian water table or water perched on restrictive layers, including permafrost, within the soil.

Indicator A14: Alaska Redox

Technical Description: A mineral layer that has a dominant hue of 5Y with a chroma of 3 or less, or a gleyed matrix, with 10 percent or more distinct or prominent redox concentrations occurring as pore linings with a value and chroma of 4 or more. The layer starts within 12 in. (30 cm) of the soil surface.

User Notes: These soils have a layer within 12 in. (30 cm) of the mineral surface that meets the specified color requirements. See the Glossary for the definition of gleyed matrix. These colors can be found on the 5Y page or the gleyed 1 or gleyed 2 pages of the Munsell soil color book (Gretag/ Macbeth 2000). The layer must also contain at least 10 percent by volume redox concentrations (reddish-orange iron coatings) along pores (Figure 14). Redox concentrations are required to prove that the gleyed colors are not parent material colors.



Figure 14. The matrix color meets the requirements of a gleyed matrix. Reddish-orange redox concentrations occur along root channels and other pores.

In soils that have been reduced, one of the first areas where oxygen will be reintroduced is along root channels and other pores. As oxidation occurs in these areas, characteristic reddish-orange redox concentrations (value and chroma of 4 or more) form. These concentrations stand out in contrast to the matrix color of the soil layer.

When applying this indicator, first note the dominant color(s) of the soil layer to see if it matches the colors indicated. Then break open pieces of the soil and look for reddish-orange redox concentrations along pores and root channels (Figures 15 and 16). If these features are present, it indicates that the soil has been reduced during periods of wetness and, while in a drier state, has undergone oxidation.

Aleutian Alaska. This indicator is commonly found in tidal flats and upland depressions. Identification may be difficult due to the predominance of volcanic ash.

Interior Alaska. This indicator is commonly found on most landforms. Saturation may be the result of fluctuating water tables in riparian zones or fluctuating water tables perched on slowly permeable materials, especially permafrost.



Figure 15. Gleyed matrix colors and reddish-orange iron concentrations. Concentrations are along root channels.



Figure 16. Gleyed matrix color and redox concentrations surrounding root channels. Scale is in centimeters.

Northern Alaska. This indicator is commonly found along foothills and micro-high positions (patterned ground) on coastal plains. Saturation is usually the result of a fluctuating water table perched on seasonal frost or permafrost.

Southcentral Alaska. This indicator is commonly found in depressions on most landforms. Saturation may be the result of fluctuating water tables in riparian zones or fluctuating water tables perched on slowly permeable sediments.

Southeast Alaska. This indicator is commonly found near uplifted beaches and estuaries with loamy glaciofluvial parent materials. Saturation is usually the result of a fluctuating water table perched on slowly permeable sediments.

Western Alaska. This indicator is commonly found on most landforms. Saturation may be the result of fluctuating water tables in riparian zones or fluctuating water tables perched on slowly permeable materials.

Indicator A15: Alaska Gleyed Pores

Technical Description: A mineral layer that has 10 percent or more hue of N, 10Y, 5GY, 10GY, 5G, 10G, 5BG, 10BG, 5B, 10B, or 5PB with value of 4 or more along root channels or other pores and that starts within 12 in. (30 cm) of the soil surface. The matrix has a dominant hue of 5Y or redder.

User Notes: This indicator is intended to look for subtle evidence of active reduction in a soil. Due to the presence of organic carbon along root channels, visible evidence of reduction will first occur there (Figure 17). The evidence is thin coatings meeting the specified color requirements. These colors can be found on the gleyed 1 and gleyed 2 pages of the Munsell soil color book (Gretag/Macbeth 2000) (see Figure A2). Care must be taken to observe all of the color variations in the soil and not just the dominant soil color. Break pieces of soil open and closely look along the root channels. Many of these will be very thin or fine. A hand lens may be helpful.

In a soil layer that is turning anaerobic, reduced conditions occur first where the soil microbes have an ample supply of organic carbon. Colder soils, as in Alaska, normally have low organic carbon, so microbes congregate along channels containing dead roots. It is along these channels that gley colors first appear.

Aleutian Alaska. This indicator is commonly found in tidal flats and upland depressions. It may be difficult to apply due to predominance of volcanic ash.

Interior Alaska. This indicator is commonly found in riparian areas and in depressions on most landforms where water tables perch on slowly permeable sediments, primarily permafrost. Where water tables fluctuate, redox concentrations may also be present.

Northern Alaska. This indicator is commonly found along floodplains subject to fluctuating water tables and/or ponding.

Southcentral Alaska. This indicator is commonly found in riparian areas and in depressions on most landforms where water tables perch on slowly permeable sediments. Where water tables fluctuate, redox concentrations may also be present.



Figure 17. Reduction occurs first along root channels where organic carbon is concentrated. Note gleyed colors along root channels.

Southeast Alaska. This indicator may occur in any saturated mineral soil and may be found across all landforms.

Western Alaska. This indicator is commonly found in riparian areas and in depressions on most landforms where water tables perch on slowly permeable material. Where water tables fluctuate, redox concentrations may also be present.

Hydric soil indicators for problem soils

The following indicators are not currently recognized for general application by the NTCHS and are intended for use only in problem wetland situations in Alaska that have evidence of wetland hydrology and hydrophytic vegetation, and are believed to meet the definition of a hydric soil, but lack recognized indicators of a hydric soil. To use these indicators, follow the procedure described in the section on Problematic Hydric Soils

in Chapter 5. If any of the following indicators is observed, it is recommended that the NTCHS be notified by following the protocol described in the "Comment on the Indicators" section of *Field Indicators of Hydric Soils in the United States* (USDA Natural Resources Conservation Service 2006).

Indicator TA4: Alaska Color Change

Technical Description: A mineral layer 4 in. (10 cm) or more thick starting within 12 in. (30 cm) of the surface that has a matrix value of 4 or more and chroma of 2 or less and that within 30 minutes becomes redder by one or more Munsell unit in hue and/or chroma when exposed to air.

User Notes: The soil should be at or near saturation when examined. If the soil matrix is sufficiently reduced and has gley colors, reduced iron (Fe^{+2}) in the soil can begin to oxidize (Fe^{+3}) upon exposure to the air (Figures 18 and 19). Care must be taken to obtain an accurate color of the soil sample immediately upon excavation. The colors should be examined again after several minutes. Do not allow the sample to begin drying, as drying will also result in a color change. Care must be taken to observe the colors closely. As always, do not obtain colors while wearing sunglasses. Colors must be obtained in the field under natural light and not under artificial light. Look for the presence of other indicators.

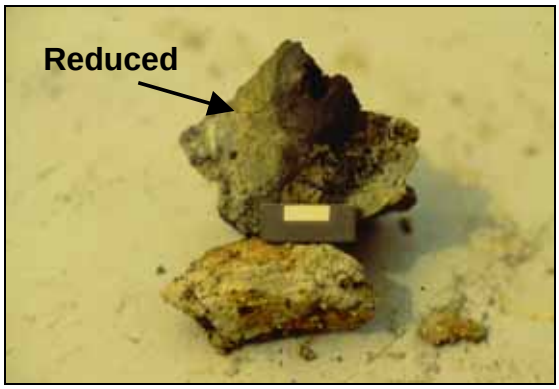


Figure 18. This soil exhibits colors associated with reducing conditions. Scale is 1 cm.

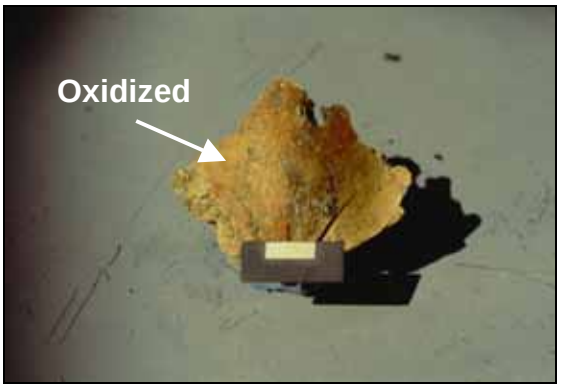


Figure 19. The same soil as in Figure 18 after exposure to the air and oxidation has occurred.

Aleutian Alaska. Saturation is likely to be observed throughout the year.

Interior Alaska. Saturation is most likely during May and late July–September.

Northern Alaska. Saturation is most likely during June–August.

Southcentral Alaska. Saturation is most likely during April–May and September–October.

Southeast Alaska. Saturation is most likely during April–May and September–October.

Western Alaska. Saturation is most likely during May–September.

Indicator TA5: Alaska Alpine Swales

Technical Description: On concave landforms, the presence of a surface mineral layer 4 in. (10 cm) or more thick having hue of 10YR or yellower, value of 2.5 or less, and chroma of 2 or less. The dark surface layer is at least twice as thick as the mineral surface layer of soils in the adjacent convex micro-positions.

User Notes: Soils with this indicator occur in concave positions in alpine and subalpine areas where moisture accumulates (Figure 20). Here the source of hydrology is melt water from the adjacent snowpack that persists well into the growing season. The landscape is usually a complex micro-topography of concave depressions and adjacent micro-highs. Soils should be examined in both landscape positions and compared. If both positions have a mineral surface of the same color, but the layer is at least twice as thick in the concave position, the soil in the concave position is considered hydric. Make sure that there is reasonable evidence of the hydrology source. This includes either direct observation of the melting snowpack or aerial imagery that shows snowpack at that location earlier in the growing season.

Aleutian Alaska. This indicator is not known to occur in this subregion.

Interior Alaska. Saturation is most likely to be observed during late May through early July. This is a common indicator in concave micro-positions on mountain slopes and plains where snow accumulates during the winter.

Northern Alaska. Saturation is most likely to be observed during late May through mid-July. This is a common indicator in concave micro-positions on mountain slopes and plains where snow accumulates during the winter.



Figure 20. The arrows indicate concave micro-positions where water from snowmelt accumulates during late spring and early summer.

Southcentral Alaska. Saturation is most likely to be observed during late May through early July. This is a common indicator in concave micro-positions on mountain slopes and plains where snow accumulates during the winter.

Southeast Alaska. This indicator is unknown in this subregion, but may exist in alpine areas.

Western Alaska. Saturation is most likely to be observed during late May through June. This is a common indicator in concave micro-positions on mountain slopes and plains where snow accumulates during the winter.

Indicator: Alaska Redox with 2.5Y Hue

Technical Description: A mineral layer that has a dominant hue of 2.5Y with a chroma of 3 or less, with 10 percent or more distinct or prominent redox concentrations occurring as pore linings with a value and chroma of 4 or more. The layer starts within 12 in. (30 cm) of the soil surface.

User Notes: Hue of 2.5Y is excluded from the Alaska Redox indicator (A14). This is to avoid confusion with non-hydric soils that have a hue of 2.5Y resulting from the color of the parent material and contain relict redox concentrations. Examples include soils formed in glacial tills and loess, especially if they were affected by seasonal frost or permafrost in the past. There are, however, areas where a hue of 2.5Y, chroma of 3 or less, and the presence of redox concentrations do indicate a hydric soil. For example, such soils are often found on the fringes of wetlands as they transition to upland areas.

Indicator: Alaska Gleyed without Hue 5Y or Redder Underlying Layer

Technical Description: A mineral layer with a dominant hue of N, 10Y, 5GY, 10GY, 5G, 10G, 5BG, 10BG, 5B, 10B, or 5PB and with value of 4 or more (a gleyed matrix) in more than 50 percent of the matrix. The layer starts within 12 in. (30 cm) of the mineral surface.

User Notes: Alaska Gleyed (A13) requires that the gleyed zone be underlain by similar soil material having a hue of 5Y or redder. This requirement is intended to eliminate confusion with non-hydric soils that have parent material colors similar to gleyed colors. There are areas, however, where continuously saturated conditions result in gleyed colors that are present to considerable depth in the soil profile. Such soils are continuously reduced and lack redox concentrations. See the Glossary for the definition of a gleyed matrix.

4 Wetland Hydrology Indicators

Introduction

Wetland hydrology indicators are used in combination with indicators of hydric soil and hydrophytic vegetation to determine whether an area is a wetland under the Corps Manual. Indicators of hydrophytic vegetation and hydric soil generally reflect a site's medium- to long-term wetness history. They provide readily observable 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. If hydrology has not been altered, vegetation and soils provide the strongest evidence that wetland hydrology is present (National Research Council 1995). Wetland hydrology indicators provide evidence that the site has a *continuing* wetland hydrologic regime and that hydric soils and hydrophytic vegetation are not relicts of a past hydrologic regime. Wetland hydrology indicators confirm that an episode of inundation or soil saturation occurred recently, but may provide little additional information about the timing, duration, or frequency of such events (National Research Council 1995).

Hydrology indicators are the most ephemeral of wetland indicators. Those involving direct observation of surface water or saturated soils are often present only during the normal wet portion of the growing season and may be absent during the dry season or during drier-than-normal years. On the other hand, some indicators may be present on non-wetland sites during spring break-up, immediately after a heavy rain, or during a period of unusually high precipitation, river stages, runoff, or snowmelt. Normal seasonal variations in rainfall, temperature, and other climatic conditions should always be considered in interpreting hydrology indicators. Hydrology indicators help to confirm the presence of a continuing wetland hydrologic regime; however, the lack of an indicator is not evidence for the absence of wetland hydrology. Wetland situations that may lack hydrology indicators are discussed further in Chapter 5 (Difficult Wetland Situations in Alaska).

Areas that have hydrophytic vegetation and hydric soils generally also have wetland hydrology unless the hydrologic regime has changed due to natural events or human activities (National Research Council 1995). Therefore, when wetland hydrology indicators are absent from an area that has hydric soils and hydrophytic vegetation, additional information may be needed to determine whether or not wetland hydrology is present. If the original site visit was made during the dry season or a drier-than-normal year, it may be necessary to revisit the site during the wet season or in a normal year and check again for hydrology indicators. In addition, aerial photography or remote sensing data, stream gauge data, runoff estimates, scope-and-effect equations for ditches and subsurface drain lines, or groundwater modeling are tools that may help to determine whether wetland hydrology is present when indicators are equivocal or lacking (e.g., USDA Natural Resources Conservation Service 1997). Finally, on highly disturbed or problematic sites, direct hydrologic monitoring may be needed. The U. S. Army Corps of Engineers (2005) provides a technical standard for monitoring hydrology on such sites. This standard requires 14 or more consecutive days of flooding or ponding, or a water table 12 in. (30 cm) or less below the soil surface, during the growing season at a minimum frequency of 5 years in 10 (50 percent or higher probability) (National Research Council 1995) unless an alternative standard has been established for a particular region or wetland type. See Chapter 5 for further information on these techniques.

Growing season

Beginning and ending dates of the growing season are needed to evaluate certain wetland hydrology indicators, such as visual observations of flooding, ponding, or shallow water tables on potential wetland sites. In addition, growing season dates are needed in the event that recorded hydrologic data, such as stream gauge or water-table monitoring data, must be analyzed to determine whether wetland hydrology is present on highly disturbed or problematic sites.

In the absence of locally or regionally developed methods to determine growing season dates, the U.S. Army Corps of Engineers (2005) suggests a procedure based on the median dates (i.e., 5 years in 10, or 50 percent probability) of 28 °F (-2.2 °C) air temperatures in spring and fall, based on long-term records gathered at National Weather Service meteorological stations and reported in WETS tables by the NRCS National Water and Climate Center (http://www.wcc.nrcs.usda.gov/climate/wetlands.html). However, this

approach is often impractical in Alaska due to the scarcity of meteorological stations and differences in elevation, aspect, and other conditions between project sites and the locations of existing weather stations.

Depletion of oxygen and the chemical reduction of nitrogen, iron, and other elements in saturated soils is the result of biological activity occurring in plant roots and soil microbial populations (National Research Council 1995). Therefore, in Alaska, the preferred approach to determine growing season dates involves direct observation of vegetation green-up, growth, and maintenance as an indicator of biological activity occurring both above and below ground. Two alternative procedures to evaluate vegetation activity are given below. The first, based on observations made during one or more site visits, is preferred when data are available. The second, based on remote-sensing data gathered during the 1990s for broad ecoregions in Alaska, may be used in the absence of site-specific and year-specific information. Growing season determinations are subject to review and approval by the Corps of Engineers Alaska District.

1. The growing season has begun on a site in a given year when two or more different non-evergreen vascular plant species growing in the wetland or surrounding areas exhibit one or more of the following indicators of biological activity:
    a. Emergence of herbaceous plants from the ground
    b. Appearance of new growth from vegetative crowns (e.g., in graminoids, bulbs, and corms)
    c. Coleoptile/cotyledon emergence from seed
    d. Bud burst on woody plants (i.e., some green foliage is visible between spreading scales)
    e. Emergence or elongation of leaves of woody plants
    f. Emergence or opening of flowers

    The end of the growing season is indicated when woody deciduous species lose their leaves and/or the last herbaceous plants cease flowering and their leaves become dry or brown, generally in the fall due to cold temperatures or reduced moisture availability. Early plant senescence due to the initiation of the summer dry season in some areas does not necessarily indicate the end of the growing season and alternative procedures should be used (see item 2 below).

This determination should not include evergreen species. Observations should be made in the wetland or in surrounding areas subject to the same climatic conditions (e.g., similar elevation and aspect); however, soil moisture conditions may differ. Supporting data should be reported on the data form, in field notes, or in the delineation report, and should include the species observed (if identifiable), their abundance and location relative to the potential wetland, and type of biological activity observed. A one-time observation of biological activity during a single site visit is sufficient, but is not required unless growing season information is necessary to evaluate particular wetland hydrology indicators. However, if long-term hydrologic monitoring is planned, then plant growth, maintenance, and senescence should be monitored for continuity over the same period. If appropriate, the observed growing season dates should be discussed in relation to the median dates of vegetation green-up and senescence as described in item 2 below, or in relation to the median dates of 28 °F air temperatures in spring and fall as reported in WETS tables for the nearest appropriate weather station.

2. Growing season dates for broad areas can be estimated by calculating the median dates of the onset of vegetation green-up in spring and of vegetation senescence in fall using a normalized difference vegetation index (NDVI) derived from very high resolution radiometer measurements as described by Markon (2001) (http://agdcftp1.wr.usgs.gov/pub/projects/lcc/ak_avhrr/pheno_ofr_final.pdf). For each of 20 ecoregions in Alaska (Figure 21), Markon (2001) reported the Julian dates of initial vegetation green-up ("Minday") and senescence ("Lastday") for each year from 1991 to 1997. The medians of these annual values (Table 5) may be used to estimate growing season beginning and ending dates when on-site observations of vegetation growth and development are not available.

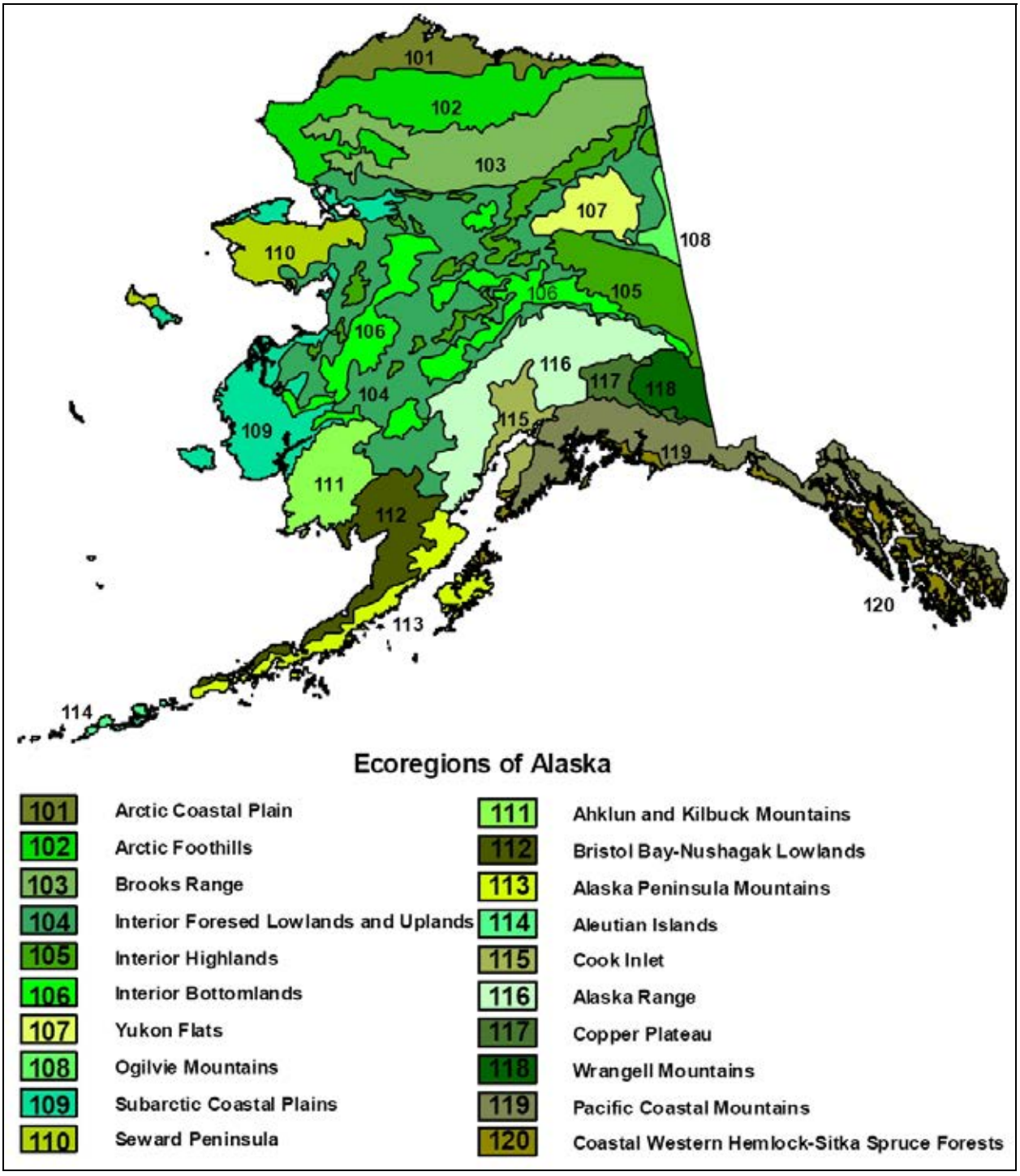


Figure 21. Ecoregions of Alaska, from Markon (2001).

Table 5. Median beginning and ending dates of the growing season for ecoregions in Alaska, derived from Markon (2001).

Ecoregion[1]	Beginning of Growing Season ('Minday')		End of Growing Season ('Lastday')	
	Julian Date	Calendar Date[2]	Julian Date	Calendar Date[2]
101 Arctic Coastal Plain	171	Jun 20	261	Sep 18
102 Arctic Foothills	158	Jun 7	264	Sep 21
103 Brooks Range	150	May 30	267	Sep 24
104 Interior Forested Lowlands and Uplands	123	May 3	276	Oct 3
105 Interior Highlands	124	May 4	275	Oct 2
106 Interior Bottomlands	122	May 2	277	Oct 4
107 Yukon Flats	110	Apr 20	276	Oct 3
108 Ogilvie Mountains	110	Apr 20	276	Oct 3
109 Subarctic Coastal Plains	143	May 23	276	Oct 3
110 Seward Peninsula	153	Jun 2	274	Oct 1
111 Ahklun and Kilbuck Mountains	136	May 16	275	Oct 2
112 Bristol Bay – Nushagak Lowlands	115	Apr 25	277	Oct 4
113 Alaska Peninsula Mountains	135	May 15	274	Oct 1
114 Aleutian Islands	--[3]	--[3]	--[3]	--[3]
115 Cook Inlet	128	May 8	278	Oct 5
116 Alaska Range	144	May 24	276	Oct 3
117 Copper Plateau	122	May 2	276	Oct 3
118 Wrangell Mountains	131	May 11	272	Sep 29
119 Pacific Coastal Mountains[4]	149	May 29	270	Sep 27
120 Coastal Western Hemlock – Sitka Spruce Forests[4]	119	Apr 29	271	Sep 28

[1] See Figure 21.

[2] Calendar dates shown are for non-leap years. For a leap year, subtract one day (e.g., for Ecoregion 101, the growing season would begin on June 19 in a leap year).

[3] There were no data available for Ecoregion 114 – Aleutian Islands. Growing season dates for Ecoregion 112 may be substituted when onsite data are lacking.

[4] Ecoregions 119 and 120 are intermingled in Southeast Alaska. Generally, 1,600 ft (500 m) in elevation separates the two ecoregions. Use growing season dates for Ecoregion 119 above 1,600 ft elevation and dates for Ecoregion 120 below 1,600 ft elevation. Annual variability may occur as the snow recedes from lower elevations at different rates.

Wetland hydrology indicators

In this chapter, wetland hydrology indicators are presented in four groups. Indicators in Group A are based on the direct observation of surface water or groundwater during a site visit. Group B consists of evidence that the site was flooded or ponded recently, although the site may not be inundated currently. These indicators include water marks, drift deposits, sediment deposits, and similar features. Group C consists of other evidence that the soil is saturated currently or was saturated recently. Some of these indicators, such as oxidized rhizospheres surrounding living roots or the presence of reduced iron in the profile, indicate that the soil has been saturated for an extended period. Group D consists of landscape characteristics and vegetation and soil features 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.

Within each group, indicators are divided into two categories – *primary* and *secondary* – based on their estimated reliability in the region. One primary indicator from any group is sufficient to conclude that wetland hydrology is present; the area is a wetland if indicators of hydric soil and hydrophytic vegetation are also present. In the absence of a primary indicator, two or more secondary indicators from any group are required to conclude that wetland hydrology is present. Indicators of wetland hydrology include, but are not necessarily limited to, those listed in Table 6 and described on the following pages. Other evidence of wetland hydrology may also be used with appropriate documentation.

In this supplement, wetland hydrology indicators that have depth requirements (e.g., Indicator A2 – High Water Table) are evaluated from the mineral soil surface or the top of any organic soil layer, whichever is shallower. Organic layers consist of dead and decomposing plant matter, excluding freshly fallen plant litter, and do not include any living material (e.g., a living mat of mosses, lichens, etc.). The organic layer, if present, can be either saturated or unsaturated and of any thickness. Therefore, on some sites, the surface for hydric soil determinations (see Chapter 3) and wetland hydrology determinations may differ.

Table 6. List of wetland hydrology indicators for Alaska.

Indicator	Category	
	Primary	Secondary
Group A – Observation of Surface Water or Saturated Soils		
A1 – Surface water	X	
A2 – High water table	X	
A3 – Saturation	X	
Group B – Evidence of Recent Inundation		
B1 – Water marks	X	
B2 – Sediment deposits	X	
B3 – Drift deposits	X	
B4 – Algal mat or crust	X	
B5 – Iron deposits	X	
B6 – Surface soil cracks	X	
B7 – Inundation visible on aerial imagery	X	
B8 – Sparsely vegetated concave surface	X	
B15 – Marl deposits	X	
B9 – Water-stained leaves		X
B10 – Drainage patterns		X
Group C – Evidence of Current or Recent Soil Saturation		
C1 – Hydrogen sulfide odor	X	
C2 – Dry-season water table	X	
C3 – Oxidized rhizospheres along living roots		X
C4 – Presence of reduced iron		X
C5 – Salt deposits		X
Group D – Evidence from Other Site Conditions or Data		
D1 – Stunted or stressed plants		X
D2 – Geomorphic position		X
D3 – Shallow aquitard		X
D4 – Microtopographic relief		X
D5 – FAC-neutral test		X

Group A – Observation of Surface Water or Saturated Soils

Indicator A1: Surface water

Category: Primary

General Description: This indicator consists of the direct, visual observation of surface water (flooding or ponding) during a site visit (Figure 22).



Figure 22. Wetland with surface water present.

Cautions and User Notes: Care must be used in applying this indicator because surface water may be present in non-wetland areas immediately after a rainfall event, during spring break-up, or during periods of unusually high precipitation, runoff, tides, or river stages. Surface water observed during the non-growing season may be an acceptable indicator if experience and professional judgment suggest that wet conditions normally extend into the growing season for sufficient duration in most years. Surface water may be absent from a wetland during the normal dry season or during periods of drought. Even under normal rainfall conditions, some wetlands do not become inundated or saturated every year (i.e., wetlands are inundated or saturated at least 5 out of 10 years, or 50 percent or higher probability in a given year). In addition, inundation may be infrequent, brief, or entirely lacking in groundwater-dominated wetland systems.

Indicator A2: High water table

Category: Primary

General Description: This indicator consists of the direct, visual observation of the water table 12 in. (30 cm) or less below the surface in a soil pit, auger or probe hole, or shallow monitoring well (Figure 23).



Figure 23. High water table observed in a soil pit.

Cautions and User Notes: Sufficient time must be allowed for water to infiltrate into a newly dug hole and to stabilize at the water-table level. The required time will vary depending upon soil texture. In some cases, the water table can be determined by examining the wall of the soil pit and identifying the upper level at which water is seeping into the pit. A water table within 12 in. of the surface observed during the non-growing season may be an acceptable indicator if experience and professional judgment suggest that wet conditions normally extend into the growing season for sufficient duration in most years. If this is questionable and other hydrology indicators are absent, a follow-up visit during the growing season may be needed. Care must be used in interpreting this indicator because water-table levels normally vary seasonally and are a function of both recent and long-term precipitation and seasonal frost conditions. Even under normal rainfall conditions, some wetlands do not become inundated or saturated every year (i.e., wetlands are inundated or saturated at least 5 out of 10 years, or 50 percent or higher probability in a given year). For an accurate determination of the water-table level, the soil pit, auger hole, or

well should not penetrate any restrictive soil layer capable of perching water near the surface.

Indicator A3: Saturation

Category: Primary

General Description: Visual observation of saturated soil conditions 12 in. (30 cm) or less from the soil surface as indicated by water glistening on the surfaces and broken interior faces of soil samples removed from the pit or auger hole (Figure 24). This indicator must be associated with an existing water table located immediately below the saturated zone; however, this requirement is waived under episaturated conditions if there is a restrictive soil layer or bedrock within 12 in. (30 cm) of the surface.



Figure 24. Water glistens on the surface of a saturated soil sample.

Cautions and User Notes: Glistening is evidence that the soil sample was taken either below the water table or within the saturated capillary fringe above the water table. Recent rainfall events and the proximity of the water table at the time of sampling should be considered in applying and interpreting this indicator. Water observed in soil cracks or on the faces of soil aggregates (peds) does not meet this indicator unless ped interiors are also saturated. Examine both the walls of the soil pit (Figure 25) and material removed from the pit for evidence of saturation. Samples should not be shaken or squeezed to force water from soil pore spaces. A water table is not required below the saturated zone under episaturated conditions if the restrictive layer or bedrock is present within 12 in. (30 cm) of the surface. Note the restrictive layer in the soils section of the data form. The restrictive layer may be at the surface.



Figure 25. Water glistens on the walls of a soil pit.

Group B – Evidence of Recent Inundation

Indicator B1: Water marks

Category: Primary

General Description: Water marks are discolorations or stains on bark of woody vegetation, rocks, bridge pillars, buildings, fences, or other fixed objects as a result of inundation (Figures 26 and 27).

Cautions and User Notes: When several water marks are present, the highest reflects the maximum extent of inundation. Water marks indicate a water-level elevation and can be extrapolated from nearby objects across lower elevation areas. Use caution with water marks that may have been caused by extreme or infrequent flooding events or by brief, temporary flooding during the spring break-up period.



Figure 26. Water marks (dark stains) on a boulder (upper edge indicated by the arrow).



Figure 27. Water marks on paper birch.

Indicator B2: Sediment deposits

Category: Primary

General Description: Sediment deposits are thin layers or coatings of fine-grained mineral material (e.g., silt or clay) or organic matter (e.g., pollen), sometimes mixed with other detritus, remaining on plant stems or leaves, rocks, and other objects after surface water recedes (Figure 28).

Cautions and User Notes: Sediment deposits may remain for a considerable period before being removed by precipitation or subsequent inundation. Sediment deposits on vegetation or other objects indicate the minimum inundation level. This level can be extrapolated across lower elevation areas. Use caution with sediment left after infrequent high flows or very brief flooding events. This indicator does not include thick accumulations of sand or gravel in or adjacent to fluvial channels that may reflect historic flow conditions or recent extreme events. Use caution in areas where silt and other material trapped in the snowpack may be deposited directly on the ground surface during spring thaw.



Figure 28. Deposits of gray sediment on sedges in a tidal channel.

Indicator B3: Drift deposits

Category: Primary

General Description: Drift deposits consist of rafted debris that has been deposited on the ground surface or entangled in vegetation or other fixed objects. Debris consists of remnants of vegetation (e.g., branches, stems, and leaves), man-made litter, or other waterborne materials. Drift material may be deposited at or near the high water line in ponded or flooded areas, piled against the upstream side of trees, rocks, and other fixed objects, or widely distributed within the dewatered area (Figure 29).

Cautions and User Notes: Deposits of drift material are often found adjacent to streams or other sources of flowing water in wetlands. They also occur in tidal marshes, along lake shores, and in other ponded areas.



Figure 29. Drift deposit of leaves in a seasonally ponded wetland.

Drift lines indicate the minimum water level attained during a flooding event; the maximum level of inundation is generally higher than that indicated by a drift line. The elevation of a drift line can be extrapolated across lower elevation areas. Use caution with drift lines that may have been caused by extreme, infrequent, or very brief flooding events.

Indicator B4: Algal mat or crust

Category: Primary

General Description: This indicator consists of a mat or dried crust of algae, perhaps mixed with other detritus, left on or near the soil surface after dewatering.

Cautions and User Notes: Algal deposits include those produced by green algae (Chlorophyta) and blue-green algae (cyanobacteria). They may be attached to low vegetation or other fixed objects, or may cover the soil surface (Figure 30). Dried crusts of blue-green algae may crack and curl at plate margins (Figure 31). Algal deposits are usually seen in seasonally ponded areas, lake fringes, and low-gradient stream margins. They reflect prolonged wet conditions sufficient for algal growth and development. Algal mats or crusts are not common but can be found throughout Alaska.



Figure 30. Algal deposit on the soil surface in a *Juncus*-dominated marsh.



Figure 31. Dried crust of blue-green algae on the soil surface.

Indicator B5: Iron deposits

Category: Primary

General Description: This indicator consists of a thin orange or yellow crust or gel of oxidized iron on the soil surface or on objects near the surface.

Cautions and User Notes: Iron deposits form in areas where reduced iron discharges with groundwater and oxidizes upon exposure to air. The oxidized iron forms a film or sheen on standing water (Figure 32) and an orange or yellow deposit (Figures 33 and 34) on the ground surface after dewatering. Iron sheen on water can be distinguished from an oily film by touching with a stick or finger; iron films are crystalline and will crack into angular pieces.



Figure 32. Iron sheen on the water surface may be deposited as an orange or yellow crust after dewatering.



Figure 33. Iron deposit (orange area) in a ponded depression.



Figure 34. Iron deposit (reddish-orange color) on the soil surface in a dewatered wetland.

Indicator B6: Surface soil cracks

Category: Primary

General Description: Surface soil cracks consist of shallow cracks that form when fine-grained mineral or organic soil material dries and shrinks, often creating a network of cracks or small polygons (Figures 35 and 36).



Figure 35. Surface cracks in a mineral soil in a seasonally ponded wetland.



Figure 36. Surface cracks in an organic soil near Anchorage.

Cautions and User Notes: Surface soil cracks are usually seen in fine sediments in seasonally ponded depressions, lake fringes, and floodplains. Use caution, however, as they may also occur in temporary ponds and

puddles in non-wetlands. This indicator should not be confused with patterned-ground features caused by frost action in Interior, Northern, and Western Alaska.

Indicator B7: Inundation visible on aerial imagery

Category: Primary

General Description: One or more recent aerial photographs or satellite images show the site to be inundated.

Cautions and User Notes: Recent aerial imagery should be used to evaluate this indicator. Older imagery may be useful if there has been no known hydrologic change (e.g., change in river course, tectonic activity, or human alteration) since the date of the photograph. If available, it is recommended that multiple years of photography be evaluated. Care must be used in applying this indicator because surface water may be present on a non-wetland site immediately after a heavy rain, during spring break-up, or during periods of unusually high precipitation, runoff, tides, or river stages. WETS tables provided by the NRCS National Water and Climate Center (http://www.wcc.nrcs.usda.gov/climate/wetlands.html) may be used to determine whether rainfall prior to the photo date was normal, greater than normal, or less than normal based on long-term records at National Weather Service stations. Even under normal rainfall conditions, some wetlands do not become inundated every year (i.e., wetlands are inundated or saturated at least 5 out of 10 years, or 50 percent or higher probability in a given year). Surface water observed during the non-growing season may be an acceptable indicator if experience and professional judgment suggest that wet conditions normally extend into the growing season for sufficient duration in most years. Surface water may be absent from a wetland during the normal dry season or during periods of drought. Normal seasonal and annual variations in water levels should be considered in interpreting this indicator.

Indicator B8: Sparsely vegetated concave surface

Category: Primary

General Description: On concave land surfaces (e.g., depressions and swales), the ground surface is either unvegetated or sparsely vegetated (less than 5 percent ground cover) due to long-duration ponding during the growing season (Figure 37).



Figure 37. A sparsely vegetated, seasonally ponded depression.

Cautions and User Notes: Ponding during the growing season can limit the establishment and growth of ground-layer vegetation. Sparsely vegetated concave surfaces should contrast with vegetated slopes and convex surfaces in the same area. A woody overstory of trees or shrubs may or may not be present. Use caution to avoid confusing this indicator with small bare areas resulting from patterned-ground processes in Northern, Interior, and Western Alaska.

Indicator B15: Marl deposits

Category: Primary

General Description: This indicator consists of the presence of marl on the soil surface.

Cautions and User Notes: Marl deposits consist mainly of calcium carbonate precipitated from standing water through the action of algae or

diatoms. Marl appears as a tan or whitish deposit on the soil surface after dewatering (Figure 38) and may form thick deposits in some areas. Subsurface marl layers do not qualify for this indicator. Marl deposits are found mainly in Northern Alaska.



Figure 38. Marl deposit (tan-colored areas) and iron sheen in a subarctic fen.

Indicator B9: Water-stained leaves

Category: Secondary

General Description: Water-stained leaves are fallen leaves or needles that have turned grayish or blackish in color due to inundation for long periods.

Cautions and User Notes: Water-stained leaves are generally found in depressions, flats, or along stream margins in forested or shrub-dominated wetlands (Figure 39). Water-stained leaves maintain their blackish or grayish colors when dry. They should contrast strongly with fallen leaves in nearby non-wetland landscape positions.



Figure 39. Water-stained leaves.

Indicator B10: Drainage patterns

Category: Secondary

General Description: This indicator consists of flow patterns visible on the soil surface or eroded into the soil, low vegetation bent over in the direction of flow, absence of leaf litter or small woody debris due to flowing water, scouring of soil from around plant roots, and similar evidence that water flowed across the ground surface.

Cautions and User Notes: Drainage patterns are usually seen in areas where water flows broadly over the surface and is not confined to a channel, such as in areas adjacent to streams, slope wetlands, vegetated swales, and tidal flats (Figures 40 and 41). Use caution in areas affected by extreme or abnormal flooding events or by brief, temporary flooding during the spring break-up period.



Figure 40. Drainage patterns in a slope wetland.



Figure 41. Vegetation bent over in the direction of water flow across a stream terrace.

Group C – Evidence of Current or Recent Soil Saturation

Indicator C1: Hydrogen sulfide odor

Category: Primary

General Description: A hydrogen sulfide (rotten egg) odor within 12 in. (30 cm) of the soil surface.

Cautions and User Notes: Hydrogen sulfide is a gas produced by soil microbes in response to prolonged soil saturation. For hydrogen sulfide to be detectable, the soil must be saturated at the time of sampling and must have been saturated long enough to become highly reduced. These soils are often permanently saturated and anoxic at or near the surface. To apply this indicator, dig a pit no deeper than 12 in. to avoid release of hydrogen sulfide from deeper in the profile. Hydrogen sulfide odor serves as both an indicator of hydric soil and wetland hydrology. This one observation proves that the soil meets the definition of a hydric soil (i.e., anaerobic in the upper part), plus has an ongoing wetland hydrologic regime. Often these soils have a high water table (wetland hydrology indicator A2), but the hydrogen sulfide odor provides further proof that the soil has been saturated for an extended period of time.

Indicator C2: Dry-season water table

Category: Primary

General Description: Visual observation of the water table between 12 and 24 in. (30–60 cm) below the surface for mineral soils, or between 12 and 40 in. (30–100 cm) for organic soils, during the normal dry season or during a drier-than-normal year.

Cautions and User Notes: Due to normal seasonal fluctuations, water tables in wetlands often drop below 12 in. during the dry season. For sites with mineral soils in Alaska, an observed water table within 24 in. during the dry season, or during an unusually dry year, is strong evidence for a water table within 12 in. during the normal wet portion of the growing season. For organic soils, a dry-season water table within 40 in. indicates a normal wet-season water table within 12 in. A soil auger may be needed to evaluate this indicator. Sufficient time must be allowed for water to infiltrate into a newly dug hole and to stabilize at the water-table level. The

required time will vary depending upon soil texture. In some cases, the water table can be determined by examining the wall of the soil pit and identifying the upper level at which water is seeping into the pit. For an accurate determination of the water-table level, the soil pit, auger hole, or well should not penetrate any restrictive soil layer capable of perching water near the surface. See Chapter 5 (section on Wetlands that Periodically Lack Indicators of Wetland Hydrology) to determine dry-season dates and for procedures to evaluate normal rainfall and snowpack.

Indicator C3: Oxidized rhizospheres along living roots

Category: Secondary

General Description: Presence of a layer containing 2 percent or more iron-oxide coatings or plaques on the surfaces of living roots and/or iron-oxide coatings or linings on soil pores immediately surrounding living roots within 12 in. (30 cm) of the soil surface (Figure 42).

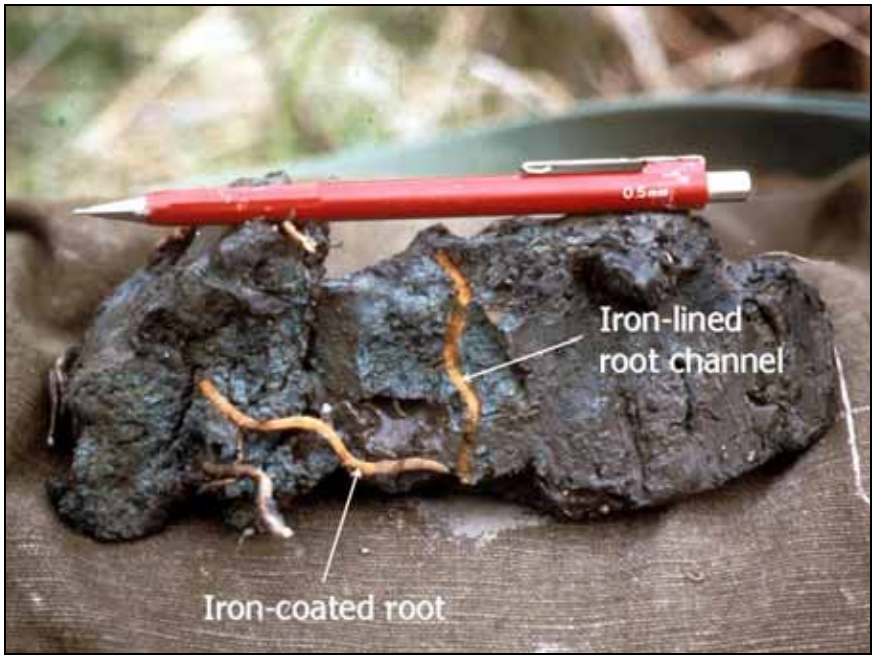


Figure 42. Iron-oxide plaque (orange coating) on a living root. Iron oxide also coats the channel or pore from which the root was removed.

Cautions and User Notes: Oxidized rhizospheres are the result of oxygen leakage from living roots into the surrounding anoxic soil, causing oxidation of ferrous iron present in the soil solution. They are evidence of saturated and reduced soil conditions during the plant's lifetime. Iron concentrations or plaques may form on the immediate root surface or may

coat the soil pore adjacent to the root. In either case, the oxidized iron must be associated with living roots to indicate contemporary wet conditions and to distinguish these features from other pore linings. Care must be taken to distinguish iron-oxide coatings from organic matter associated with plant roots. Viewing with a hand lens may help distinguish mineral from organic material. Iron coatings sometimes show concentric layers in cross section and may transfer iron stains to the fingers when rubbed. Note the location and abundance of oxidized rhizospheres in the soil profile description or remarks section of the data form. There is no minimum thickness requirement for the layer containing oxidized rhizospheres. Oxidized rhizospheres must occupy at least 2 percent of the volume of the layer.

This indicator is assigned a Secondary rating in Alaska because of the potential for relict oxidized rhizospheres, still associated with living roots, in areas where the permafrost layer has thawed due to recent climate change or fires that have destroyed the insulating moss layer. Thawing of the permafrost can cause a drop in the water table and the loss of wetland hydrology. However, oxidized rhizospheres may persist until the death of the plants that produced them.

Indicator C4: Presence of reduced iron

Category: Secondary

General Description: Presence of a layer containing reduced (ferrous) iron in the upper 12 in. (30 cm) of the soil profile, as indicated by a positive reaction to a ferrous iron test or by the presence of a soil that changes color upon exposure to the air.

Cautions and User Notes: The reduction of iron occurs as a result of microbial activity in soils that have been saturated long enough to become anoxic and chemically reduced. Ferrous iron is converted back to oxidized forms when saturation ends and the soil reverts to an aerobic state. Therefore, the presence of ferrous iron usually indicates that the soil is saturated at the time of sampling and has been saturated for an extended period of time. The presence of ferrous iron can be verified with alpha, alpha-dipyridyl dye (Figure 43) or by observing a soil that changes color upon exposure to air (i.e., reduced matrix) (Figure 44). A positive reaction to alpha, alpha-dipyridyl dye should occur over more than 50 percent of the soil layer in question. The dye does not react when wetlands are dry;



Figure 43. When alpha, alpha-dipyridyl dye is applied to a soil containing reduced (ferrous) iron, a positive reaction is indicated by a pink or red coloration to the treated area.



Figure 44. In a reduced matrix, the rapid oxidation of ferrous iron in a freshly exposed soil sample (left side) results in a color change after exposure to the air for several minutes (right side).

therefore, a negative test result is not evidence that the soil is not reduced at other times of year. Soil samples should be tested or examined immediately after opening the soil pit because ferrous iron may oxidize and colors change soon after the sample is exposed to the air. To evaluate a color change, first determine soil color on a freshly broken sample from the newly opened pit, then repeat the color measurement on the same sample after a few minutes. Soils that contain little weatherable iron may not react even when saturated and reduced. There are no minimum thickness requirements or initial color requirements for the soil layer in question.

Indicator C5: Salt deposits

Category: Secondary

General Description: Salt deposits are whitish or brownish deposits of salts that accumulate on the ground surface through the capillary action of groundwater.

Cautions and User Notes: Salt deposits occur in areas of seasonal moisture deficit where evaporation brings capillary water to the surface (Figure 45). They often occur on floodplain terraces after surface water has receded and the water table is near the surface, such as along the Tanana and Susitna Rivers. Salt deposits are not known to occur in Southeast Alaska. Use caution in disturbed areas where salt water or brine has been deposited on the surface through runoff from surface sources, such as gravel piles.



Figure 45. Salt deposits on the soil surface.

Group D – Evidence from Other Site Conditions or Data

Indicator D1: Stunted or stressed plants

Category: Secondary

General Description: This indicator is present if individuals of the same species growing in the potential wetland are clearly of smaller stature, less vigorous, or stressed compared with individuals growing in nearby non-wetland situations (Figure 46).

Cautions and User Notes: Some plant species in Alaska grow in both wetlands and non-wetlands but may exhibit obvious stunting or stress in wet situations (e.g., *Picea mariana*). Use caution in areas where stunting of plants on non-wetland sites may be caused by low soil fertility, excessively drained soils, cold temperatures, shallow permafrost, or other factors. For this indicator to be present, a majority of individuals in the stand must be stunted or stressed. The comparison with individuals in non-wetland situations may be accomplished over a broad geographic area and is not limited to the project site.



Figure 46. Black spruce in the wetland (foreground) are stressed and stunted compared with spruce in the adjacent non-wetland (background).

Indicator D2: Geomorphic position

Category: Secondary

General Description: This indicator is present if the area in question is located in a localized depression or other concave surface, within a minor drainage or on an active floodplain, at the toe of a slope, on the low-elevation fringe of a pond or other water body, or in an area where ground-water discharges (Figures 47 and 48).

Cautions and User Notes: Excess water from precipitation and snowmelt naturally accumulates in certain geomorphic positions in the landscape, particularly in low-lying areas such as depressions, drainages, toe slopes, and fringes of water bodies. With the exceptions noted below, these areas in Alaska often exhibit wetland hydrology.

Exceptions: This indicator does not include depressional areas in karst topography in Southeast Alaska, which often drain freely. Furthermore, there are areas throughout Alaska where concave topography exists on rapidly permeable soils (e.g., outwash plains with sand and gravel substrates) that do not have wetland hydrology unless the water table is near the surface.



Figure 47. Certain geomorphic positions, such as this estuarine fringe in Southeast Alaska, are evidence of wetland hydrology.



Figure 48. Depressions and toe slopes are common wetland landscape positions in Alaska.

Indicator D3: Shallow aquitard

Category: Secondary

General Description: This indicator consists of the presence of an aquitard within 24 in. (60 cm) of the soil surface that is potentially capable of perching water within 12 in. (30 cm) of the surface.

Cautions and User Notes: An aquitard is a relatively impermeable soil layer or bedrock that slows the downward infiltration of water and can produce a perched water table. Potential aquitards include permafrost (Figure 49), dense glacial till, lacustrine deposits, iron-cemented layers, and clay layers. In some cases, the aquitard may be at the surface and cause water to pond on the surface. Soil layers that are only seasonally frozen do not qualify as aquitards unless they are observed to perch water for long periods during the growing season in most years.



Figure 49. Water perched over permafrost at 16 in. (40 cm) and seasonal frost at 9 in. (22 cm) saturates this soil above 9 in. (22 cm). Note the reduced soil colors. Picture taken at the Toolik Lake Field Research Station, North Slope, on 18 July 2006. Scale in centimeters.

Indicator D4: Microtopographic relief

Category: Secondary

General Description: This indicator consists of the presence of microtopographic features that are found in areas of seasonal inundation or shallow water tables, such as hummocks, flarks and strangs, tussocks, frost circles, or pedestals, with microhighs less than 36 in. (90 cm) above the base soil level.

Cautions and User Notes: These features are the result of vegetative and geomorphic processes in wetlands and produce characteristic micro-topographic diversity in some wetland systems (Figures 50 and 51). Microtopographic lows are either inundated or have shallow water tables for long periods each year. Microtopographic highs may or may not have wetland hydrology, but usually are small, narrow, or fragmented, often occupying less than half of the surface area. If indicators of hydrophytic vegetation or hydric soil are absent from microhighs, see the procedure for wetland/non-wetland mosaics in Chapter 5. This indicator does not include uneven topography due to vegetation-covered rocks, logs, or other debris, or features caused by trampling, such as caribou trails.



Figure 50. Microtopographic relief due to a shallow water table in a forested wetland near Sitka.

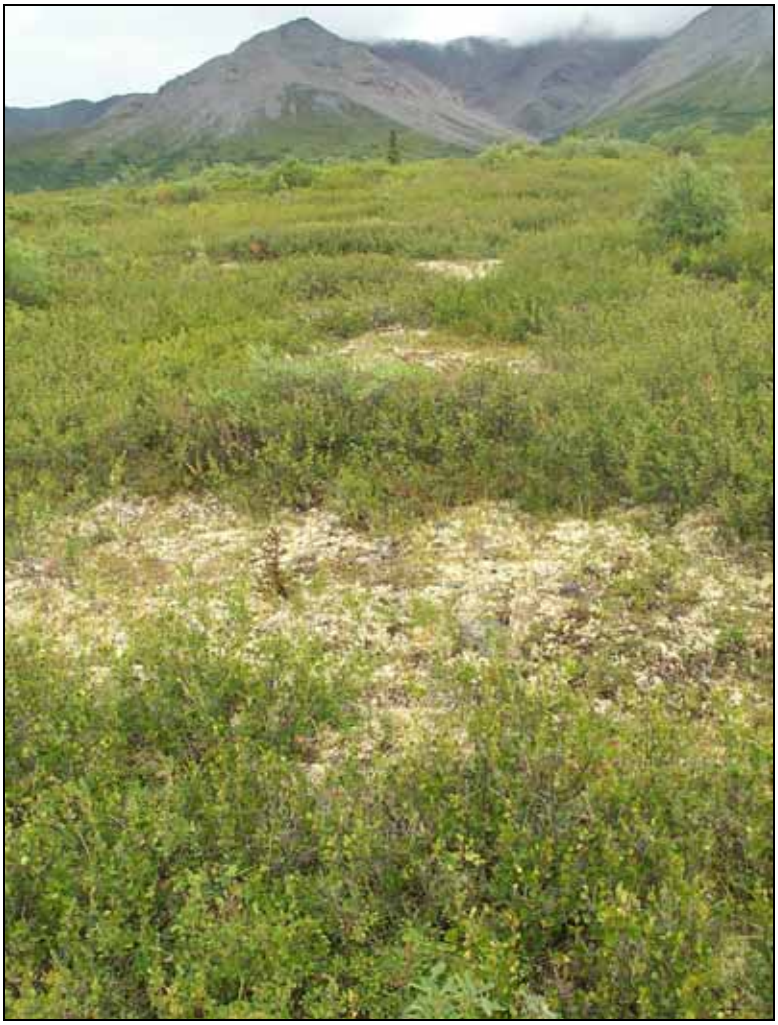


Figure 51. Frost circles in Denali National Park. Light-colored areas are microhighs dominated by lichens. Microlows are dominated by dwarf birch (*Betula nana*) and sedges.

Indicator D5: FAC-neutral test

Category: Secondary

General Description: The plant community passes the FAC-neutral test.

Cautions and User Notes: The FAC-neutral test is performed by compiling a list of dominant plant species across all strata in the community, and dropping from the list any species with a Facultative (FAC) indicator status. The FAC-neutral test is met if more than 50 percent of the remaining dominant species are rated FACW and/or OBL (see Figure 52 for an example calculation of the FAC-neutral test).

Step 1: Use the 50/20 rule to select dominant species from each stratum of the community.

Step 2: Combine dominant species from all strata into a single list. Determine the wetland indicator status for each dominant species (Reed 1988 or current list). For example:

Dominant Species	Stratum	Indicator Status
Picea mariana	Tree	FACW
Vaccinium vitis-idaea	Sapling/Shrub	FAC
Ledum groenlandicum	Sapling/Shrub	FACW
Carex bigelowii	Herb	FAC
Pyrola rotundifolia	Herb	FACU

Step 3: Drop the FAC species and sort the remaining species into two groups: FACW and OBL species, and FACU and UPL species:

FACW and OBL Species	FACU and UPL Species
Picea mariana	*Pyrola rotundifolia*
Ledum groenlandicum	

Step 4: Count the number of species in each group. If the number of dominant species that are FACW and OBL is greater than the number of dominant species that are FACU and UPL, the site passes the FAC-neutral test. In the example, two species (*Picea mariana* and *Ledum groenlandicum*) are FACW and/or OBL, and only one species (*Pyrola rotundifolia*) is FACU or UPL. Therefore, the site passes the FAC-neutral test.

Figure 52. Procedure and example of the FAC-neutral test.

This indicator can be used in communities that contain no FAC dominants. If there are an equal number of dominants that are OBL and FACW versus FACU and UPL, nondominant species should be considered. Dominant species in each stratum are identified by using the 50/20 rule (see Chapter 2, Hydrophytic Vegetation Indicator 1 – Dominance Test).

5 Difficult Wetland Situations in Alaska

Introduction

Some wetlands can be difficult to identify because wetland indicators may be missing at times due to natural processes or recent disturbances. This chapter provides guidance for making wetland determinations in difficult-to-identify wetland situations in Alaska. It includes regional examples of problem area wetlands and atypical situations as defined in the Corps Manual, as well as other situations that can make wetland delineation more challenging. Problem area wetlands are defined as naturally occurring wetland types that periodically lack indicators of hydrophytic vegetation, hydric soil, or wetland hydrology due to normal seasonal or annual variability. In addition, some problem area wetlands may permanently lack certain indicators due to the nature of the soils or plant species on the site. Atypical situations are defined as wetlands in which vegetation, soil, or hydrology indicators are absent due to recent human activities or natural events. In addition, this chapter addresses certain procedural problems (e.g., wetland/non-wetland mosaics) that can make wetland determinations in Alaska difficult or confusing. The chapter is organized into the following sections:

- Wetlands that Lack Indicators of Hydrophytic Vegetation
- Problematic Hydric Soils
- Wetlands that Periodically Lack Indicators of Wetland Hydrology
- Wetland/Non-Wetland Mosaics

The list of difficult wetland situations presented in this chapter is not intended to be exhaustive and other problematic situations may exist in the State. See the Corps Manual for general guidance. Furthermore, more than one wetland factor (i.e., vegetation, soil, and/or hydrology) may be disturbed or problematic on a given site. In general, *wetland determinations on difficult or problematic sites must be based on the best information available to the field inspector, interpreted in light of his or her professional experience and knowledge of the ecology of wetlands in the region*.

Wetlands that lack indicators of hydrophytic vegetation

Description of the problem

Some wetlands in Alaska are difficult to identify because their plant communities contain a prevalence of FACU species, causing them to fail the dominance test and prevalence index. In addition, some wetlands contain species that were assigned no indicator (NI), were not known to occur in Alaska (NO), or were not listed on the Alaska plant list. Unlisted species generally are assumed to be UPL; however, some species are unlisted due to recent taxonomic changes or lack of information about their affinities for wetlands. Some wetland communities that contain FACU, NI, NO, or unlisted species may exhibit other indicators of hydrophytic vegetation (e.g., morphological adaptations), but others may not. Examples of FACU species that may dominate in certain wetland situations include paper birch, white spruce, Sitka spruce, devil's club (*Oplopanax horridus*), and field horsetail. Sometimes these FACU species occur on hummocks, slightly elevated above the general soil level, where they can avoid the physiological effects of prolonged saturation in the root zone. Other FACU and UPL herbs and shrubs may co-occur with these species on hummocks. At other times, they may be more generally distributed across the wet area. Wetlands along creeks in the Anchorage basin, for example, are often dominated by paper birch growing on hummocks with field horsetail growing more widely in the understory. The following procedure can be used to identify hydrophytic vegetation in wetlands that lack hydrophytic vegetation indicators.

Disturbance by fire or other factors is another reason that indicators of hydrophytic vegetation may be absent in certain wetland situations in Alaska. In some cases, fire or other disturbances may remove or significantly alter the vascular plant community but leave the non-vascular community (i.e., mosses, liverworts, etc.) relatively unaffected, particularly in wet landscape positions. In the Anchorage and Fairbanks areas of Southcentral and Interior Alaska, Lichvar et al. (2007) identified several species of wetland-specialist bryophytes that can help identify hydrophytic vegetation on sites where the vascular flora is missing or altered. The method described in item 3d of the following procedure is restricted to areas normally dominated by black spruce in Southcentral and Interior Alaska, and should not be used to overrule other evidence of a hydrophytic plant community. The method may also be applicable in other parts of the State but has not been tested there.

Procedure

The following procedure can be used to determine whether hydrophytic vegetation is present in areas dominated by FACU, NI, NO, or unlisted plant species, or in areas where the vascular plant community has been disturbed by fire or other factors. This procedure should be applied only where indicators of hydric soil and wetland hydrology are present, unless one or both of these factors is also disturbed or problematic, but no indicators of hydrophytic vegetation are evident. The following procedure is recommended:

1. Verify that at least one indicator of hydric soil and one primary or two secondary indicators of wetland hydrology are present. If indicators of either hydric soil or wetland hydrology are absent, the area is likely non-wetland unless soil and/or hydrology are also disturbed or problematic. If indicators of hydric soil and wetland hydrology are present (or are absent due to disturbance or other problem situations), proceed to step 2.
2. Verify that the area is in a landscape position that is likely to collect or concentrate water. Appropriate settings include the following. If the landscape setting is appropriate, proceed to step 3.
   a. Concave surface (e.g., depression or swale)
   b. Active floodplain or low terrace
   c. Level or nearly level area (e.g., 0- to 3-percent slope)
   d. Toe slope or an area of convergent slopes
   e. Fringe of another wetland or water body
   f. Area with a restrictive soil layer or aquitard within 24 in. (60 cm) of the surface
   g. Area where groundwater discharges (e.g., a seep)
   h. Other (explain in field notes why this area is likely to be inundated or saturated for long periods)
3. Use one or more of the following approaches to determine whether the site has hydrophytic vegetation. In the remarks section of the data form or in the delineation report, explain the rationale for concluding that the plant community is hydrophytic even though indicators of hydrophytic vegetation described in Chapter 2 were not observed.
   a. *Direct hydrologic observations.* Verify that the plant community occurs in an area subject to prolonged inundation or soil saturation (evidenced by a shallow water table) during the growing season. This can be done by visiting the site at 2- to 3-day intervals during the portion of the growing season when surface water is most likely to be present or water tables are normally high. Hydrophytic vegetation is

considered to be present, and the site is a wetland, if surface water is present and/or a water table 12 in. (30 cm) or less from the surface is present for 14 or more consecutive days during the growing season during a period when antecedent precipitation has been normal or drier than normal. If necessary, microtopographic highs and lows should be evaluated separately. The normality of the previous winter's snowpack and current year's rainfall should be considered in interpreting field results, as well as the likelihood that wet conditions will occur on the site at least every other year (for more information, see the section on Wetlands that Periodically Lack Indicators of Wetland Hydrology in this chapter).

b. *Reference sites.* If indicators of hydric soil and wetland hydrology are present or problematic on a site with vegetation dominated by FACU, NI, NO, or unlisted species, the site may be considered to be a wetland if the landscape setting, topography, soils, and vegetation are substantially the same as those on nearby wetland reference areas. Hydrologic characteristics of wetland reference areas should be documented through long-term monitoring or by repeated application of the procedure described in item 3a above. Reference sites should be minimally disturbed and provide long-term access. Soils, vegetation, and hydrologic conditions should be thoroughly documented and the data kept on file in the District or field office.

c. *Supporting Documentation.* Published and unpublished scientific literature may be used to support a decision to treat specific FACU, NI, NO, or unlisted species as hydrophytes or certain plant communities as hydrophytic. Preferably, this documentation should discuss the species' natural distribution along the moisture gradient, its capabilities and adaptations for life in wetlands, wetland types in which it is typically found, or other wetland species with which it is commonly associated.

d. *Wetland Non-Vascular Plants*. In Southcentral and Interior Alaska, in areas that normally support black spruce but the vascular flora has been altered or removed by fire or other disturbance, the presence and abundance of certain wetland-specialist bryophytes can be used to determine whether the vegetation is hydrophytic. Hydrophytic vegetation is present if more than 50 percent of the total coverage of bryophytes consists of species known to be highly associated with wetlands (Table 7). Additional information and sampling guidance is given in Appendix C. Use the following procedure:

Table 7. Bryophytes that are highly associated with wetlands in Interior and Southcentral Alaska

Aulacomnium palustre	*Polytrichum strictum*
Blepharostoma trichophyllum (hepatic)	*Sphagnum angustifolium*
Calliergon stramineum	*Sphagnum fuscum*
Calypogeia sphagnicola (hepatic)	*Sphagnum papillosum*
Drepanocladus spp.	*Sphagnum russowii*
Meesia triquetra	*Sphagnum squarrosum*
Meesia uliginosa	*Sphagnum warnstorfii*
Mylia anomala (hepatic)	*Tomenthypnum nitens*
Pohlia proligera	

(1) Estimate the absolute percent cover of each species of bryophyte (i.e., mosses, liverworts, and hornworts) within one or more 10- by 10-in. (25- by 25-cm) square plots placed at the base of any hummocks, if present. Calculate the total bryophyte cover by summing the absolute cover values for all species in the plot; therefore, total coverage can exceed 100 percent. Not all species need to be identified, if they are not wetland specialists. Lichens and fungi should not be included.
(2) Identify the wetland-specialist bryophytes present (Table 7) and sum their cover values within plots.
(3) Divide the summed cover value of wetland-specialist bryophytes by the total bryophyte cover in the plot and multiply by 100 to convert to a percentage. Average these percentages across plots, if needed.
(4) If more than 50 percent of the total bryophyte cover consists of wetland specialists, then the vegetation is hydrophytic.

Problematic hydric soils

Description of the problem

Some soils that meet the hydric soil definition may not exhibit any of the indicators presented in Chapter 3. These problematic hydric soils exist for a number of reasons and require additional information, such as landscape position, presence or absence of restrictive soil layers, or information about hydrology, for proper identification. This section describes several soil situations in Alaska that are considered hydric if additional

requirements are met. In some cases, the lack of hydric soil indicators is due to conditions that inhibit the development of redoximorphic features despite prolonged soil saturation and anoxia. In addition, recently developed wetlands may lack hydric soil indicators because insufficient time has passed for their development. Examples of problematic hydric soils in Alaska include, but are not limited to, the following:

1. **Soils with low organic-carbon content.** Soil microbes require the presence of sufficient organic carbon in a soil to thrive. If little or no organic carbon is present in a saturated soil, microbial activity will often be insufficient to produce noticeable hydric soil indicators. This is especially true in young or recently formed soils. Examples include recently formed sandy and gravelly soils (Figure 53).



Figure 53. Low organic-matter content and coarse gravelly materials can make identification of hydric soil indicators difficult.

2. **Soils with low weatherable-iron content.** A soil may contain little or no weatherable iron-bearing material due to the mineralogy of the parent material in which it formed. Gley colors, iron depletions, redox concentrations, and reaction to alpha, alpha-dipyridyl dye all require the presence of weatherable iron. If sufficient weatherable iron-bearing material is lacking in a saturated soil, these hydric soil indicators will be very weak or absent. Examples include soils formed in some types of volcanic ash or from diorite parent materials.
3. **Soils with pH of 7.2 or higher.** The formation of redox concentrations and depletions requires that soluble iron be present in the soil. Iron readily enters into solution in acidic soils. In soils with higher pH, less iron enters into solution. As a result, redox concentrations may be very faint and difficult to observe in a soil with higher pH. Examples include soils in the Copper River Basin that have high pH due to the influence of parent material (Figure 54).



Figure 54. Gley colors and redox concentrations are relatively faint due to the high pH of the soil materials in this profile from the Copper River Basin.

4. **Recently developed wetlands.** Recently developed wetlands include mitigation sites, wetland management areas (e.g., for waterfowl), other wetlands intentionally or unintentionally produced by human activities, and naturally occurring wetlands that have not been in place long enough to develop hydric soil indicators. These soils should be considered hydric if they are ponded, flooded, or saturated for 14 or more consecutive days during the growing season in most years based on actual data and not on estimated soil properties.

Procedure

Soils that meet the definition of a hydric soil but do not exhibit any of the indicators described in Chapter 3 can be identified by the following recommended procedure. This procedure should be used only where indicators of hydrophytic vegetation and wetland hydrology are present, unless one or both factors are also disturbed or problematic, but indicators of hydric soil are not evident.

1. Verify that one or more indicators of hydrophytic vegetation are present or that the vegetation is disturbed or problematic. If so, proceed to step 2.
2. Verify that at least one primary indicator of wetland hydrology is present, or that hydrology indicators are absent due to disturbance or other problems. In this procedure, secondary indicators are not considered to be sufficient evidence of wetland hydrology. If at least one primary indicator of wetland hydrology is present (or indicators are absent due to disturbance or other problem situations), proceed to step 3.
3. Thoroughly describe and document the soil profile and landscape setting. Verify that the area is in a landscape position that is likely to collect or concentrate water. Appropriate settings include the following. If the landscape setting is appropriate, proceed to step 4.
    a. Concave surface (e.g., depression or swale)
    b. Active floodplain or low terrace
    c. Level or nearly level area (e.g., 0- to 3-percent slope)
    d. Toe slope or an area of convergent slopes
    e. Fringe of another wetland or water body
    f. Area with a restrictive soil layer or aquitard within 24 in. (60 cm) of the surface
    g. Area where groundwater discharges (e.g., a seep)
    h. Other (explain in field notes why this area is likely to be inundated or saturated for long periods)

4. Use one or more of the following approaches to determine whether the soil is hydric. In the remarks section of the data form or in the delineation report, explain why it is believed that the soil lacks any of the NTCHS hydric soil indicators described in Chapter 3 and why it is believed that the soil meets the definition of a hydric soil.
   a. Determine whether one or more of the following indicators of problematic hydric soils is present (see Chapter 3 for descriptions of these indicators). If one or more indicators is present, then the soil is hydric.
      (1) Alaska Color Change (TA4)
      (2) Alaska Alpine Swales (TA5)
      (3) Alaska Redox with 2.5Y Hue
      (4) Alaska Gleyed without Hue 5Y or Redder Underlying Layer
   b. Determine whether one or more of the following problematic hydric soil situations is present. If so, then the soil is hydric.
      (1) Soil has low organic-matter content (e.g., recently deposited sandy or gravelly soils)
      (2) Soil has low weatherable-iron content
      (3) Soil has high pH (7.2 or higher)
      (4) Area is a recently developed wetland
   c. If the soil is saturated at the time of sampling, alpha, alpha-dipyridyl dye can be used in the following procedure to determine if reduced (ferrous) iron is present. If ferrous iron is present as described below, then the soil is hydric.

      Alpha, alpha-dipyridyl is a dye that reacts with reduced iron. In some cases, it can be used to provide evidence that a soil is hydric when it lacks other hydric soil indicators. The soil is likely to be hydric if application of alpha, alpha-dipyridyl dye to mineral soil material in at least 60 percent of a layer at least 4 in. (10 cm) thick within a depth of 12 in. (30 cm) from the soil surface results in a positive reaction within 30 seconds evidenced by a pink or red coloration to the dye during the growing season.

      Using a dropper, apply a small amount of dye to a freshly broken ped face to avoid any chance of a false positive test due to iron contamination from digging tools. Look closely at the treated soil for evidence of color change. If in doubt, apply the dye to a sample of known upland soil and compare the reaction to the sample of interest. A positive reaction will not be present in soils that lack iron. The lack of a positive reaction to the dye does not preclude the presence of a hydric

soil. Specific information about the use of alpha, alpha-dipyridyl can be found in NRCS Hydric Soils Technical Note 8 (http://soils.usda.gov/use/hydric/ntchs/tech_notes/note8.html).

d. Using gauge data, water-table monitoring data, or repeated direct hydrologic observations, determine whether the soil is ponded or flooded, or the water table is 12 in. (30 cm) or less from the surface, for 14 or more consecutive days during the growing season in most years (50 percent or higher probability) (U. S. Army Corps of Engineers 2005). If so, then the soil is hydric. Furthermore, any soil that meets the NTCHS hydric soil technical standard (NRCS Hydric Soils Technical Note 11, http://soils.usda.gov/use/hydric/ntchs/tech_notes/index.html) is hydric.

Wetlands that periodically lack indicators of wetland hydrology

Description of the problem

Wetlands are areas that are flooded or ponded, or have soils that are saturated with water, for long periods during the growing season in most years. Saturation in the root zone leads to anaerobic conditions and the unique vegetation and soil characteristics that are used to identify wetlands in the field. If the site is visited during a time of normal precipitation amounts and it is inundated or the water table is near the surface, then the wetland hydrology determination is straightforward. However, many wetlands dry out for part of the year, particularly around their margins where they grade into the surrounding non-wetlands. Furthermore, some wetlands may inundate or saturate only briefly, or not at all, in some years, although they exhibit obvious wetland hydrology during most years in a long-term record.

Wetland hydrology determinations are based on indicators, many of which were designed to be used during drier periods when the direct observation of surface water or a shallow water table is not possible. However, some wetlands may lack any of the listed hydrology indicators, particularly during the normal dry season or in a drier-than-normal year. The evaluation of wetland hydrology requires special care on any site where indicators of hydrophytic vegetation and hydric soil are present but hydrology indicators appear to be absent. This evaluation should consider the timing of the site visit in relation to normal seasonal and annual hydrologic variability, and whether antecedent snowpack and rainfall conditions have been

normal. This section describes a number of approaches that can be used to determine whether wetland hydrology is present on sites where indicators of hydrophytic vegetation and hydric soil are present but hydrology indicators may be lacking due to normal variations in rainfall or runoff, human activities that destroy hydrology indicators, and other factors.

Procedure

The following recommended procedure may be used whenever wetland hydrology indicators appear to be absent on a site containing hydrophytic vegetation and hydric soil. Note that some of these approaches require meteorological data that may not be available for some sites due to the distance between weather stations in Alaska, the relatively low elevation of most stations, and the effects of topography on local weather patterns.

1. Verify that indicators of hydrophytic vegetation and hydric soil are present, or are absent due to disturbance or other problem situations. If these conditions are present, proceed to step 2.
2. Verify that the area is in a landscape position that is likely to collect or concentrate water. Appropriate settings include the following. If the landscape setting is appropriate, proceed to step 3.
   a. Concave surface (e.g., depression or swale)
   b. Active floodplain or low terrace
   c. Level or nearly level area (e.g., 0- to 3-percent slope)
   d. Toe slope or an area of convergent slopes
   e. Fringe of another wetland or water body
   f. Area with a restrictive soil layer or aquitard within 24 in. (60 cm) of the surface
   g. Area where groundwater discharges (e.g., a seep)
   h. Other (explain in field notes why this area is likely to be inundated or saturated for long periods)
3. Use one or more of the following approaches to determine whether wetland hydrology is present and the site is a wetland. In the remarks section of the data form or in the delineation report, explain the rationale for concluding that wetland hydrology is present even though indicators of wetland hydrology described in Chapter 4 were not observed.
   a. *Site visits during the dry season*. Determine whether the site visit occurred during the normal annual "dry season." The dry season, as used in this supplement, is the period of the year when water tables normally fall to low levels in response to decreased precipitation and/or increased evapotranspiration, usually during the summer. It

also includes the beginning of the recovery period in late summer. The following are approximate average dates of the dry season for various areas within the State (within areas, actual dates vary by locale and year):

Aleutian Alaska – no significant dry season
Southeast Alaska – no significant dry season
Southcentral Alaska (Anchorage basin) – mid-May through late July
Interior Alaska – mid-May through late July
Western Alaska – mid-May through late July
Northern Alaska – no significant dry season due to the extended period of thaw

Another source of information that can be used to determine dry seasons is the Web-Based Water-Budget Interactive Modeling Program (WebWIMP) (http://climate.geog.udel.edu/~wimp/). WebWIMP will calculate the approximate dates of wet and dry seasons for any terrestrial location based on average monthly precipitation and estimated evapotranspiration. In general, the dry season in a typical year is indicated when potential evapotranspiration exceeds precipitation (indicated by negative values of DIFF in the WebWIMP output), resulting in drawdown of soil moisture storage (negative values of DST) and/or a moisture deficit (positive values of DEF, also called the unmet atmospheric demand for moisture). Actual dates for the dry season vary by locale and year.

In many wetlands, direct observation of flooding, ponding, or a shallow water table would be unexpected during the dry season. Wetland hydrology indicators, if present, would most likely be limited to indirect evidence, such as water marks, drift deposits, or surface cracks. In some situations, hydrology indicators may be absent during the growing season. If the site visit occurred during the dry season on a site that contains hydric soils and hydrophytic vegetation and no evidence of hydrologic manipulation (e.g., no drainage ditches, dams, levees, water diversions, etc.), consider the site to be a wetland. If necessary, re-visit the site during the normal wet season and check again for the presence or absence of wetland hydrology indicators. If wetland hydrology indicators are absent during the wet portion of the

growing season in a normal or wetter-than-normal rainfall year, the site is probably non-wetland.

b. *Years with unusually low winter snowpack*. Determine whether the site visit occurred following a winter with unusually low snowpack. In portions of Alaska where the snowpack persists throughout the winter, water availability in spring and early summer depends on winter water storage in the form of snow and ice. Therefore, springtime water availability in a given year can be evaluated by comparing the liquid equivalent of snowfall over the previous winter (e.g., September through April) against 30-year averages calculated for National Weather Service meteorological stations (http://lwf.ncdc.noaa.gov/oa/ncdc.html) or for NRCS SNOTEL sites (http://www.wcc.nrcs.usda.gov/factpub/ads/ads_ak.html). This procedure may not be reliable in areas where the snowpack is not persistent and water is released intermittently throughout the winter.

   In years when winter snowpack is appreciably less than the long-term average, wetlands that depend on snowmelt as an important water source may not flood, pond, or develop shallow water tables and may not exhibit other wetland hydrology indicators. Under these conditions, a site that contains hydric soils and hydrophytic vegetation and no evidence of hydrologic manipulation (e.g., no drainage ditches, dams, levees, water diversions, etc.) should be considered to be a wetland. If necessary, re-visit the site following a winter with normal snowpack conditions and check again for hydrology indicators.

c. *Periods with below-normal rainfall*. Determine whether the amount of rainfall that occurred in the 2–3 months preceding the site visit was normal, above normal, or below normal based on the normal range reported in WETS tables. In areas where the snowpack does not persist over winter, or for sampling dates later in the growing season, WETS tables provided by the NRCS National Water and Climate Center (http://www.wcc.nrcs.usda.gov/climate/wetlands.html) can be used to determine whether rainfall in a given month was normal, above normal, or below normal based on long-term weather records. To determine whether precipitation was normal prior to the site visit, actual rainfall in the current month and previous 2–3 months should be compared with the normal ranges for each month given in the WETS table (USDA Natural Resources Conservation Service 1997, Sprecher and Warne 2000). The lower and upper limits of the normal range are indicated by the

columns labeled “30% chance will have less than” and “30% chance will have more than.” In Alaska, however, weather stations are widely scattered and data may not be available in some areas.

When precipitation has been below normal, wetlands may not flood, pond, or develop shallow water tables during the typical wet portion of the growing season and may not exhibit other indicators of wetland hydrology. Under these conditions, a site that contains hydric soils and hydrophytic vegetation and no evidence of hydrologic manipulation (e.g., no drainage ditches, dams, levees, water diversions, etc.) should be considered to be a wetland. If necessary, re-visit the site during a period of normal rainfall and check again for hydrology indicators.

d. *Reference sites*. If indicators of hydric soil and hydrophytic vegetation are present on a site that lacks wetland hydrology indicators, the site may be considered to be a wetland if the landscape setting, topography, soils, and vegetation are substantially the same as those on nearby wetland reference areas. Wetland reference areas should have documented hydrology established through long-term monitoring (see item *e* below) or by repeated application of the procedure described in item 3a on page 85 (Direct Hydrologic Observations) of the procedure for Wetlands that Lack Indicators of Hydrophytic Vegetation in this chapter. Reference sites should be minimally disturbed and provide long-term access. Soils, vegetation, and hydrologic conditions should be thoroughly documented and the data kept on file in the District or field office.
e. *Long-term hydrologic monitoring*. On sites where the hydrology has been manipulated by man (e.g., with ditches, dams, levees, water diversions, land grading) or where natural events (e.g., change in river course, tectonic activity) have altered conditions such that hydrology indicators may be missing or misleading, direct monitoring of surface and groundwater may be needed to determine the presence or absence of wetland hydrology. The U. S. Army Corps of Engineers (2005) provides minimum standards for the design, construction, and installation of water-table monitoring wells, and for the collection and interpretation of groundwater monitoring data, in cases where direct hydrologic measurements are needed to determine whether wetlands are present on highly disturbed or problematic sites. This standard calls for 14 or more consecutive days of flooding, ponding, or a water table 12 in. (30 cm) or less below the surface during the growing season

at a minimum frequency of 5 years in 10 (50 percent or higher probability), unless a different standard has been established for a particular geographic area or wetland type. A disturbed or problematic site that meets this standard has wetland hydrology. This standard is not intended (1) to overrule an indicator-based wetland determination on a site that is not disturbed or problematic, or (2) to test or validate existing or proposed wetland indicators.

Wetland/non-wetland mosaics

Description of the problem

In this supplement, "mosaic" refers to 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. The horizontal distance from trough to ridge may be 1 ft (30 cm) or less in some areas, such as those with plants growing in tussocks, to 10 ft (3 m) or more in broadly hummocky areas. Ridges and hummocks are often non-wetland but are interspersed throughout a wetland matrix having clearly hydrophytic vegetation, hydric soils, and wetland hydrology.

Examples of wetland/non-wetland mosaics include many strangmoor/patterned bog systems with flarks (depressions, flooded in spring) and strangs (linear, knee-high ridges, usually oriented at right angles to the original flow of water over the area), frost circles, patterned ground, and other types of periglacial microtopography. Wetland/non-wetland mosaics also occur in areas of discontinuous permafrost (e.g., north-facing slopes, and burned areas in permafrost-affected regions) and on discharge slopes in Southcentral Alaska. In the Anchorage area, wetlands adjacent to streams often contain hummocks associated with the root crowns of trees, and black spruce bogs may contain many knee-high hummocks, usually less than 40 in. (1 m) across the tops.

Wetland components of a mosaic are often not difficult to identify. The problem for the wetland 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 following sampling approach is designed to estimate the percentage of wetland in the mosaic. From this, the number of acres of wetland on the site can be calculated, if needed.

Procedure

First, identify and flag all contiguous areas of either wetland or non-wetland on the site that are large enough to be delineated and mapped separately. The remaining area should be mapped as "wetland/non-wetland mosaic" and the approximate percentage of wetland within the area determined by the following procedure.

1. Establish one or more continuous line transects across the mosaic area, as needed. Measure the total length of each transect. A convenient method is to stretch a measuring tape along the transect and leave it in place while sampling. If the site is shaped appropriately and multiple transects are used, they should be arranged in parallel with each transect starting from a random point along one edge of the site. However, other arrangements of transects may be needed for oddly shaped sites.
2. Use separate data forms for the swale or trough and for the ridges or hummocks. Sampling of vegetation, soil, and hydrology should follow the general procedures described in the Corps Manual and this supplement. Plot sizes and shapes for vegetation sampling must be adjusted to fit the microtopographic features on the site. Plots intended to sample the troughs should not overlap adjacent hummocks, and vice versa. Only one or two data forms are required for each microtopographic position, and do not need to be repeated for similar features or plant communities.
3. Identify every wetland boundary in every trough or swale encountered along each transect. Each boundary location may be marked with a pin flag or simply recorded as a distance along the stretched tape.
4. Determine the total distance along each transect that is occupied by wetland and non-wetland until the entire length of the line has been accounted for. Sum these distances across transects, if needed. Determine the percentage of wetland in the wetland/non-wetland mosaic by the following formula.

$$\%\ wetland = \frac{Total\ wetland\ distance\ along\ all\ transects}{Total\ length\ of\ all\ transects} \times 100$$

An alternative approach involves point-intercept sampling at fixed intervals along transects across the area designated as wetland/non-wetland mosaic. This method avoids the need to identify wetland boundaries in each swale, and can be carried out by pacing rather than stretching a measuring tape across the site. The investigator uses a compass or other means to follow the selected transect line. At a fixed

number of paces (e.g., every two steps) the wetland status of that point is determined by observing indicators of hydrophytic vegetation, hydric soil, and wetland hydrology. Again, a completed data form is not required at every point but at least one representative swale and hummock should be documented with completed forms. After all transects have been sampled, the result is a number of wetland sampling points and a number of non-wetland points. Estimate the percentage of wetland in the wetland/non-wetland mosaic by the following formula:

$$\%\ wetland = \frac{Number\ of\ wetland\ points\ along\ all\ transects}{Total\ number\ of\ points\ sampled\ along\ all\ transects} \times 100$$

If high-quality aerial photography is available for the site, a third approach to estimating the percentage of wetland in a wetland/non-wetland mosaic is to use a dot grid, planimeter, or geographic information system (GIS) to determine the percentage of ridges (non-wetlands) and swales (wetlands) through photo interpretation of topography and vegetation patterns. This technique requires onsite verification that most ridges qualify as non-wetlands and most swales qualify as wetlands. In addition, with the agreement of the District, the landowner, and other stakeholders, the percentage of wetland in a wetland/non-wetland mosaic can be determined by concurrence on a visual estimate in the field.

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Appendix A: Glossary

This glossary is intended to supplement those given in the Corps Manual and other available sources. See the following publications for terms not listed here:

- Corps Manual (Environmental Laboratory 1987, or current version) (http://el.erdc.usace.army.mil/wetlands/pdfs/wlman87.pdf).
- Field Indicators of Hydric Soils in the United States (USDA Natural Resources Conservation Service 2006, or current version) (http://soils.usda.gov/use/hydric/).
- National Soil Survey Handbook, Part 629 (USDA Natural Resources Conservation Service 2005b) (ftp://ftp-fc.sc.egov.usda.gov/NSSC/Soil_Survey_Handbook/629_glossary.pdf).

Absolute cover. In vegetation sampling, the percentage of the ground surface that is covered by the aerial portions (leaves and stems) of a plant species when viewed from above. Due to overlapping plant canopies, the sum of absolute cover values for all species in a community or stratum may exceed 100 percent. In contrast, "relative cover" is the absolute cover of a species divided by the total coverage of all species in that stratum, expressed as a percent. Relative cover cannot be used to calculate the prevalence index.

Aquitard. A layer of soil or rock that retards the downward flow of water and is capable of perching water above it. For the purposes of this supplement, the term aquitard also includes the term aquiclude, which is a soil or rock layer that is incapable of transmitting significant quantities of water under ordinary hydraulic gradients.

Contrast. The color difference between a redox concentration and the dominant matrix color. Differences are classified as faint, distinct, or prominent and are defined in the glossary of USDA Natural Resources Conservation Service (2006) and illustrated in Table A1.

Table A1. Tabular key for contrast determinations using Munsell notation

Hues are the same (Δ h = 0)			Hues differ by 2 (Δ h = 2)		
Δ Value	Δ Chroma	Contrast	Δ Value	Δ Chroma	Contrast
0	≤1	Faint	0	0	Faint
0	2	Distinct	0	1	Distinct
0	3	Distinct	0	≥2	Prominent
0	≥4	Prominent	1	≤1	Distinct
1	≤1	Faint	1	≥2	Prominent
1	2	Distinct	≥2	---	Prominent
1	3	Distinct			
1	≥4	Prominent			
≤2	≤1	Faint			
≤2	2	Distinct			
≤2	3	Distinct			
≤2	≥4	Prominent			
3	≤1	Distinct			
3	2	Distinct			
3	3	Distinct			
3	≥4	Prominent			
≥4	---	Prominent			
Hues differ by 1 (Δ h = 1)			*Hues differ by 3 or more (Δ h ≥ 3)*		
Δ Value	Δ Chroma	Contrast	Δ Value	Δ Chroma	Contrast
0	≤1	Faint	Color contrast is prominent, except for low chroma and value.		Prominent
0	2	Distinct			
0	≥3	Prominent			
1	≤1	Faint			
1	2	Distinct			
1	≥3	Prominent			
2	≤1	Distinct			
2	2	Distinct			
2	≥3	Prominent			
≥3	---	Prominent			

Note: If both colors have values of ≤3 and chromas of ≤2, the color contrast is *Faint* (regardless of the difference in hue).

Adapted from USDA Natural Resources Conservation Service (2002)

Cryoturbation. The churning and mixing of soil horizons by frost processes (Williams and Smith 1989).

Depleted matrix. The volume of a soil horizon or subhorizon from which iron has been removed or transformed by processes of reduction and translocation to create colors of low chroma and high value. A, E, and calcic horizons may have low chromas and high values and may therefore be mistaken for a depleted matrix. However, they are excluded from the concept of depleted matrix unless common or many, distinct or prominent redox concentrations as soft masses or pore linings are present. In some places the depleted matrix may change color upon exposure to air (reduced matrix); this phenomenon is included in the concept of depleted matrix. The following combinations of value and chroma identify a depleted matrix:

- Matrix value of 5 or more and chroma of 1, with or without redox concentrations occurring as soft masses and/or pore linings, or
- Matrix value of 6 or more and chroma of 2 or 1, with or without redox concentrations occurring as soft masses and/or pore linings, or
- Matrix value of 4 or 5 and chroma of 2, with 2 percent or more distinct or prominent redox concentrations occurring as soft masses and/or pore linings, or
- Matrix value of 4 and chroma of 1, with 2 percent or more distinct or prominent redox concentrations occurring as soft masses and/or pore linings (USDA Natural Resources Conservation Service 2006).

Common (2 to less than 20 percent) to many (20 percent or more) redox concentrations (USDA Natural Resources Conservation Service 2002) are required in soils with matrix colors of 4/1, 4/2, and 5/2 (Figure A1). Redox concentrations include iron and manganese masses and pore linings (Vepraskas 1992). See “contrast” in this glossary for the definitions of “distinct” and “prominent.”



Figure A1. Illustration of values and chromas that require 2 percent or more distinct or prominent redox concentrations and those that do not, for hue 10YR, to meet the definition of a depleted matrix. *Due to inaccurate color reproduction, do not use this page to determine soil colors in the field.* Background image from the Munsell Soil Color Charts reprinted courtesy of Munsell Color Services Lab, a part of X-Rite, Inc.

Distinct. See Contrast.

Episaturation. Condition in which the soil is saturated with water at or near the surface, but also has one or more unsaturated layers below the saturated zone. The zone of saturation is perched on top of a relatively impermeable layer.

Folistels. Histels that are saturated with water for less than 30 cumulative days during normal years and are not artificially drained. See *Soil Taxonomy* (USDA Natural Resources Conservation Service 1999) for a complete definition.

Folistic epipedon. Generally defined as an organic layer that is saturated for less than 30 days cumulative and is 6 in. (15 cm) or more thick. See *Soil Taxonomy* (USDA Natural Resources Conservation Service 1999) for a complete definition.

Gleyed matrix. A gleyed matrix has one of the following combinations of hue, value, and chroma and the soil is not glauconitic (Figure A2):

- 10Y, 5GY, 10GY, 10G, 5BG, 10BG, 5B, 10B, or 5PB with value of 4 or more and chroma of 1; or
- 5G with value of 4 or more and chroma of 1 or 2; or
- N with value of 4 or more (USDA Natural Resources Conservation Service 2006).



Figure A2. For hydric soil determinations, a gleyed matrix has the hues and chroma identified in this illustration with a value of 4 or more. *Due to inaccurate color reproduction, do not use this page to determine soil colors in the field.* Background image from the Munsell Soil Color Charts reprinted courtesy of Munsell Color Services Lab, a part of X-Rite, Inc.

Growing season. In Alaska, growing season dates are determined by evaluating vegetation green-up, maintenance, and senescence at the site location, based on direct observation or remote-sensing methods (see Growing Season in Chapter 4). Growing season determinations for wetland delineation purposes are subject to Corps of Engineers review and approval.

Histels. Organic soils that contain permafrost. See *Soil Taxonomy* (USDA Natural Resources Conservation Service 1999) for a complete definition.

Permafrost. A thickness of soil or other superficial deposits, or even bedrock, which has been colder than 0 °C for two or more years (Muller 1945).

Prominent. See Contrast.

Reduced matrix. Soil matrix that has a low chroma in situ due to the presence of reduced iron, but whose color changes in hue or chroma when exposed to air as Fe^{+2} is oxidized to Fe^{+3} (Vepraskas 1992).

Saturation. For wetland delineation purposes, a soil layer is saturated if virtually all pores between soil particles are filled with water (National Research Council 1995, Vepraskas and Sprecher 1997). This definition includes part of the capillary fringe above the water table (i.e., the tension-saturated zone) in which soil water content is approximately equal to that below the water table (Freeze and Cherry 1979).

Seasonal frost. Any material, including soil, which has a temperature of 0 °C or below for a period of less than one year.

Tree throw. The churning and mixing of soil horizons caused by the uplifted roots of wind-felled trees.

Appendix B: Point-Intercept Sampling Procedure for Determining Hydrophytic Vegetation

The following procedure for point-intercept sampling is an alternative to plot-based sampling methods to estimate the abundance of plant species in a community. Advantages of point-intercept sampling include better quantification of plant species abundance and reduced bias compared with visual estimates of cover. The method is useful in communities with high species diversity, and in areas where vegetation is patchy or heterogeneous, making it difficult to identify representative locations for plot sampling. Disadvantages include the increased time required for sampling and the need for vegetation units large enough to permit the establishment of one or more transect lines within them. Furthermore, plant species that are uncommon on the site may not be detected. The approach also assumes that soil and hydrologic conditions are uniform across the area where transects are located. In particular, transects should not cross the wetland boundary. Point-intercept sampling is generally used with a transect-based prevalence index (see below) to determine whether vegetation is hydrophytic.

In point-intercept sampling, plant occurrence is determined at points located at fixed intervals along one or more transects established in random locations within the plant community or vegetation unit. If a transect is being used to sample the vegetation near a wetland boundary, the transect should be placed parallel to the boundary and should not cross either the wetland boundary or into other communities. Usually a measuring tape is laid on the ground and used for the transect line. Transect length depends upon the size and complexity of the plant community and may range from 100 to 300 ft (30 to 90 m) or more. Plant occurrence data are collected at fixed intervals along the line, for example every 2 ft (0.6 m). At each interval, a “hit” on a species is recorded if a vertical line at that point would intercept the stem or foliage of that species. Only one “hit” is recorded for a species at a point even if the same species would be intercepted more than once at that point. Vertical intercepts can be determined using a long pin or rod protruding into and through the various vegetation layers, a sighting device (e.g., for the canopy), or an imaginary vertical line.

The total number of "hits" for each species along the transect is then determined. The result is a list of species and their frequencies of occurrence along the line (Mueller-Dombois and Ellenberg 1974, Tiner 1999). Species are then categorized by wetland indicator status (i.e., OBL, FACW, FAC, FACU, or UPL), the total number of hits determined within each category, and the data used to calculate a transect-based prevalence index. The formula is similar to that given in Chapter 2 for the plot-based prevalence index (see Indicator 2), except that frequencies are used in place of cover estimates. The community is hydrophytic if the prevalence index is 3.0 or less. To be valid, more than 80 percent of "hits" on the transect must be of species that have been identified correctly and placed in an indicator category.

The transect-based prevalence index is calculated using the following formula:

$$PI = \frac{F_{OBL} + 2F_{FACW} + 3F_{FAC} + 4F_{FACU} + 5F_{UPL}}{F_{OBL} + F_{FACW} + F_{FAC} + F_{FACU} + F_{UPL}}$$

where:

PI = prevalence index
F_{OBL} = frequency of obligate (OBL) plant species
F_{FACW} = frequency of facultative wetland (FACW) plant species
F_{FAC} = frequency of facultative (FAC) plant species
F_{FACU} = frequency of facultative upland (FACU) plant species
F_{UPL} = frequency of upland (UPL) plant species.

Appendix C: Using Non-Vascular Plants to Identify Hydrophytic Vegetation

Sampling of non-vascular plants may be needed when the vascular plant community has been altered or removed by fire or other factors. The use of non-vascular plants in hydrophytic vegetation decisions is discussed in Chapter 5, section on Wetlands that Lack Indicators of Hydrophytic Vegetation. Non-vascular plants, defined here as bryophytes (mosses, liverworts, hornworts), lichens, and fungi, form extensive ground cover in boreal forest, alpine, and polar ecosystems in Alaska (Figures C1 and C2). The non-vascular flora of Alaska is diverse and the identification of species can at times be challenging, even to experts, due to ephemeral or missing fruiting structures and minute differences in morphological characteristics. However, Laursen et al. (2005) and Lichvar et al. (2007) have developed a list of common and relatively easy-to-identify species that are highly associated with wetlands in black spruce communities in the Anchorage and Fairbanks areas of Southcentral and Interior Alaska. The Corps Manual does not specifically include non-vascular plant species in hydrophytic vegetation decisions. However, in this Regional Supplement, the presence and abundance of certain wetland-specialist non-vascular plants are used to help identify hydrophytic vegetation in certain disturbed or problematic wetland situations (see Chapter 5).

Lichvar et al. (2007) identified non-vascular plant species that were strongly associated with wetlands in black spruce communities and, when sufficiently abundant, constitute a nearly “test positive” indicator of hydrophytic vegetation. All of the identified species were bryophytes (Table 7). Wetland-specialist bryophytes were defined as those having 67 percent or higher frequency of occurrence in these wetland types. When one or more of these species comprise more than 50 percent of the total bryophyte cover, the non-vascular plant indicator has a greater than 90 percent probability of association with wetlands. A procedure for identifying hydrophytic vegetation based on the presence and abundance of wetland-specialist bryophytes is described in Chapter 5.



Figure C1. Complex spatial arrangement of non-vascular plant species in the ground layer of a black spruce forest near Anchorage.



Figure C2. Close-up view of non-vascular plant species in the ground layer.

Sampling Wetland-Specialist Bryophytes. To determine whether hydrophytic vegetation is present using the non-vascular plant layer, areal cover estimates are recorded for all bryophytes within a plot. Due to the sorting of different species on the tops of hummocks versus the swales, sampling of bryophytes is restricted to the swales located between and at the base of hummocks using a 10- by 10-in. (25- by 25-cm) quadrat. To ensure that the sampling plots adequately capture species diversity, three quadrats are suggested, placed around the base of the hummocks, if space is available. Data from these three plots can be combined and averaged (see Chapter 5).

Appendix D: Data Form

WETLAND DETERMINATION DATA FORM – Alaska Region

Project/Site: _____ Borough/City: _____ Sampling Date: _____

Applicant/Owner: _____ Sampling Point: _____

Investigator(s): _____ Landform (hillside, terrace, hummocks, etc.): _____

Local relief (concave, convex, none): _____ Slope (%): _____

Subregion: _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No _____

Are Vegetation _____, Soil _____, 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 _____ No _____ Hydric Soil Present? Yes _____ No _____ Wetland Hydrology Present? Yes _____ No _____	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** _____

Remarks:

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

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:			

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
6.			
Total Cover:			

50% of total cover: _____ 20% of total cover: _____

Herb Stratum			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
Total Cover:			

50% of total cover: _____ 20% of total cover: _____

Plot size (radius, or length x width)_____ % Bare Ground _____

% Cover of Wetland Bryophytes _____ Total Cover of Bryophytes _____ (Where applicable)

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals: (A)		(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** _____ **No** _____

Remarks:

SOIL

Sampling Point: _____

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol or Histel (A1)
- ___ Histic Epipedon (A2)
- ___ Hydrogen Sulfide (A4)
- ___ Thick Dark Surface (A12)
- ___ Alaska Gleyed (A13)
- ___ Alaska Redox (A14)
- ___ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3]:

- ___ Alaska Color Change (TA4)[4]
- ___ Alaska Alpine Swales (TA5)
- ___ Alaska Redox With 2.5Y Hue
- ___ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ___ Other (Explain in Remarks)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.

[4]Give details of color change in Remarks.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-stained Leaves (B9)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Salt Deposits (C5)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No _____ Depth (inches): _____

Water Table Present? Yes _____ No _____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No _____ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

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1. REPORT DATE *(DD-MM-YYYY)*	**2. REPORT TYPE**	**3. DATES COVERED** *(From - To)*
September 2007	Final report	

4. TITLE AND SUBTITLE

Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Alaska Region (Version 2.0)

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)

U.S. Army Corps of Engineers

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

U.S. Army Engineer Research and Development Center
Environmental Laboratory
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

8. PERFORMING ORGANIZATION REPORT NUMBER

ERDC/EL TR-07–24

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

U.S. Army Corps of Engineers
Washington, DC 20314-1000

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT

Approved for public release; distribution in unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT

This document is one of a series of Regional Supplements to the Corps of Engineers Wetland Delineation Manual, which provides technical guidance and procedures for identifying and delineating wetlands that may be subject to regulatory jurisdiction under Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act. The development of Regional Supplements is part of a nationwide effort to address regional wetland characteristics and improve the accuracy and efficiency of wetland-delineation procedures. This supplement is applicable to the Alaska Region, which is defined as the entire State of Alaska.

15. SUBJECT TERMS

Delineation	Plant communities	Vegetation
Hydrology	Soil	Wetlands

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**			**19b. TELEPHONE NUMBER** *(include area code)*
UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED		129	

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std. 239.18

EXHIBIT CX 05
Corps Notice of Violation

DEPARTMENT OF THE ARMY
ALASKA DISTRICT, U.S. ARMY CORPS OF ENGINEERS
REGULATORY DIVISION
P.O. BOX 6898
JBER, AK 99506-0898

October 14, 2021

Regulatory Division
POA-2021-00513

Alaska Department of Transportation
and Public Facilities
Attention: Mr. Benjamin Storey
Post Office Box 112506
Juneau, Alaska 99811

Dear Mr. Storey:

This is a Notice of Violation involving the unauthorized placement of dredged and/or fill material into waters of the United States (U.S.), including wetlands. The unauthorized work consisted of the excavation and discharge of accumulated sediments into wetlands and a tributary to wetlands within the vicinity of an existing roadway drainage culvert.

The unauthorized work was performed within Section 32, T. 40 S., R. 66 E., Copper River Meridian; Latitude 58.358732º N., Longitude 134.545416º W.; within the Old Glacier Highway Alaska Department of Transportation and Public Facilities right-of-way, near the entrance to the Vista Del Sol Subdivision, in Juneau, Alaska.

Section 404 of the Clean Water Act requires that a Department of the Army (DA) permit be obtained for the placement dredged and/or fill material into waters of the U.S., including jurisdictional wetlands, prior to conducting the work (33 U.S. Code 1344).

The activity described above required a permit from the Corps. The Corps reviewed its records and concluded a DA permit was not obtained. Therefore, the work is in violation of Section 301 of the Clean Water Act.

The Corps is conducting an investigation to determine the appropriate course of action required to resolve this violation. Please respond to the following questions and provide any information you believe should be considered in our investigation:

a. What was the purpose of the work?

b. When did the work commence and when was it completed?

d. What was the distance excavated to restore drainage capacity of the culvert?

e. What type of material (e.g., sand, gravel, rock, concrete, asphalt, construction debris, etc.) was placed on site? For each type of material identified, estimate the volume (cubic yards) of material placed on site.

f. Provide an estimate of the total surface area (acres or square feet) of fill material placed in waters of the U.S., including wetlands.

g. Who is responsible for conducting the work? If you hired a contractor, provide the name(s), address(es), and telephone number(s) of the contractor(s)?

h. Describe how the work was performed, including the types of heavy equipment and/or machinery used to place fill material in waters of the U.S., including wetlands.

i. Have you obtained any State and/or local permits for the work on site? If yes, provide the name(s) and telephone number(s) of the agency contacts.

j. Explain why a DA permit application was not filed with the Corps for the discharge of dredged and/or fill material in waters of the U.S., including wetlands, for work on site?

k. Please include any other information you wish to provide concerning the history of the activity on site.

The requested information must be received within ten days from your receipt of this letter. No further unauthorized work is to be performed in areas subject to the Corps' jurisdiction.

Nothing in this letter shall be construed as excusing you from compliance with other Federal, State, or local statutes, ordinances, or regulations which may affect this work.

Please refer to file number POA-2021-00513, Gastineau Channel, in future correspondence or if you have any questions concerning this Notice of Violation.

Please contact Randal Vigil via email at Randal.P.Vigil@usace.army.mil, by mail at PO Box 22270, Juneau, AK 99802, or by phone at (907) 201-5022, if you have questions.

Sincerely,

Benjamin N. Soiseth
Chief, Southeast Section

EXHIBIT CX 06
Respondent's Response to Corps Notice of Violation

THE STATE of ALASKA
GOVERNOR MIKE DUNLEAVY

Department of Transportation and Public Facilities

SOUTHCOAST REGION
Design & Engineering Services
Preconstruction

P.O. Box 112506
Juneau, Alaska 99811-2506
Main: (907) 465-1799
Fax: (907) 465-2030
TTY-TDD: (800) 770-8973
dot.state.ak.us

November 5, 2021

Department of the Army
Alaska District, USACE
Regulatory Division
P.O. Box 6898
JBER, AK 99506-0898

RE: POA-2021-00513

Dear Agency Representative:

This letter is in response to a Notice of Violation dated October 14, 2021 involving the unauthorized placement of dredged and/or fill material into waters of the United States (U.S.), including wetlands. The unauthorized work consisted of the excavation and discharge of accumulated sediments into wetlands and a tributary to wetlands within the vicinity of an existing roadway drainage culvert located within Section 32, T. 40 S., R. 66 E., Copper River Meridian; Latitude 58.358732º N., Longitude 134.545416º W.; within the Old Glacier Highway right-of-way near the entrance to the Vista Del Sol Subdivision, in Juneau, Alaska..

The original questions are provided below along with their answer in italics (the original letter skipped over the (c.) list):

a. What was the purpose of the work? *To restore flow to pre-disaster conditions by removing accumulated sediment and debris that accrued from flooding events which occurred in December of 2020. Work was approved and funded through FEMA.*

b. When did the work commence and when was it completed? *August 24-26, 2021*

d. What was the distance excavated to restore drainage capacity of the culvert? *Approximately 35-feet from edge of culvert outlet to fence (Site HDR 3370). Approximately 4-foot by 6-foot sump at culvert outlets.*

e. What type of material (e.g., sand, gravel, rock, concrete, asphalt, constructiondebris, etc.) was placed on site? For each type of material identified, estimate the volume (cubic yards) of material placed on site. *No additional material was placed on site. Existing material was moved to establish flow from culvert.*

f. Provide an estimate of the total surface area (acres or square feet) of fill materialplaced in waters of the U.S., including wetlands. *Approximately 310 square feet. No additional material was placed in waters, existing material was moved around area.*

g. Who is responsible for conducting the work? If you hired a contractor, providethe name(s), address(es), and telephone number(s) of the contractor(s)? *DOT&PF Southcoast Region, Maintenance & Operations personnel completed the ditching; Juneau Area Foreman is Spencer Gates, (907) 465-1787 or (907) 723-9950. Wayne Smith Trucking completed a water-jet cleaning of culvert, (907) 321-3227. HDR, Inc. provided inspection and recording services, Tory Jackson (720) 318-0008.*

h. Describe how the work was performed, including the types of heavy equipmentand/or machinery used to place fill material in waters of the U.S., including wetlands. *A sump was dug but it became inoperative, so a spillway was created in order to recreate channel. As ditching progressed forward, the material was side-cast adjacent in order to create a pad for the heavy equipment to traverse across the wetlands.*

i. Have you obtained any State and/or local permits for the work on site? If yes,provide the name(s) and telephone number(s) of the agency contacts. *No other permits were obtained.*

j. Explain why a DA permit application was not filed with the Corps for the discharge of dredged and/or fill material in waters of the U.S., including wetlands, forwork on site? *Unfortunately DOT&PF Environmental Section was unaware of the project due to the FEMA agency connection and its role in completing their own independent environmental review, and due to the urgency in completing the work in response to the disaster. Had I been made aware then, I would have submitted a pre-construction notification to the USACE under Nationwide Permit 3(b) – Maintenance to obtain authorization for the work.*

k. Please include any other information you wish to provide concerning the historyof the activity on site. *No previous history of maintenance work at the subject site, hence the need for the subject action.*

Sincerely,

Benjamin Storey
Regional Environmental Manager
Southcoast Region, DOT&PF

Attachments: FEMA Debris Tracking Notes/Photos

DOT&PF Southcoast Region 2020 Storm Response - Daily Debris Tracking

M&O Station: Juneau **FEMA ID AK2021-1**

Route Name: Glacier Highway

Location Description: Glacier Hwy MP 0.34 - MP 0.74

Function Code: Glacier Hwy J1-J4 Fred Meyer JNSERJ1J4

Category ☑ A ☐ B ☐ C

Date: 8/24/21

Employee	Classification	RG	OT
Spencer Gates	Operator		
Richard Asplund	Operator		
Carlos Alonso Martinez	Operator		
Clark Mondich	Operator		
Linda Palmer	Operator		
Lisa Palmer	Operator		
John Somerlot	Operator	10	
Randall Sutak	Operator	10	
Joseph Davis	Operator		
Cody Shaw	Operator		
Robert Henricksen	Operator		

WORK DESCRIPTION (select all that apply)

Note: lat & long are to 4 decimals (111.1111)

Type of Work		lat	long
☐	Debris Clearance start		
	finish		
☑	Debris Removal start	58.3599N	134.5530W
	finish	58.3591N	134.5431W
☐	Ditching start		
	finish		
☐	Fish Culvert cleaned start		
	finish		
☐	Fish Culvert cleaned start		
	finish		
☐	Other (describe below) start		
	finish		

Culverts Cleaned: 7

other description

Equipment Incl Rentals	hours	miles	operator
32038 VME Loader Whl			Select
36245 IHC dump trk			Select
36723 CSE Loader Whl			Select
38364 IHC dump trk			Select
38847 Ford F350 Pickup			Select
39551 Vol Loader Whl			Select
39555 Fort F350 Pickup			Select
40099 Ford F350 Pickup			Select
40622 10 yd Mac			Select
40623 10 yd Mac			Select
40780 CAT 420 Backhoe			Select
51089 CSE Excavator	5.00		John
Other Vehicles: 51530 Jet Trailer	9.00		Randall
Other Vehicles: 38847 Ford f-350 Utility bed		9.00	Randall
Other Vehicles:			Select
Other Vehicles:			Select
Other Vehicles:			Select
Rental:			Select
Rental:			Select

Debris Type

☑ Soil/Rock
☐ Vegetation/Trees
☐ Other

Other description:

DEBRIS DISPOSAL LOCATION

Temporary

GPS coords lat long

location description

quantity (CY):

Permanent

GPS coords lat long

location description

quantity (CY):

To save, in the upper left corner click on **File** and select **Save As**. Save file with location name & current date.

Southcoast Flooding FEMA CAT A

Daily Notes-CAT A Documentation

August 24th, 2021
Juneau, AK
Glacier Hwy: Between Fred Meyer and Mile7 DOT Building

Sites

- HDR Site 3393
- HDR Site 3370
- HDR Site 3390
- HDR Site 3379
- New Point- 58.359860N 134.553033W (Near HDR Site 3393)
- New Point- 58.358846N 134.547528W (Near HDR Site 3370)
- New Point- 58.358863N 134.547128W (Near HDR Site 3370)

Equipment and Hours

- 51530 Jet Trailer 9hrs
- 38847 Ford F350 Pickup Truck 9miles
- 51089 Mini Excavator 5hrs

People and Hours

- John Somerlot- 10hrs
- Randy Sutak- 10hrs

Culverts Cleaned- 7

Material Removed: Soil/rocks

DOT&PF Southcoast Region 2020 Storm Response - Daily Debris Tracking

M&O Station: Juneau | **FEMA ID AK2021-1**

Route Name: Glacier Highway

Location Description: Glacier Hwy MP 0.34 - MP 0.74

Function Code: Glacier Hwy J1-J4 Fred Meyer JNSERJ1J4

Category: [✓] A [ ] B [ ] C

Date: 8/25/21

Employee	Classification	RG	OT
Spencer Gates	Operator		
Richard Asplund	Operator		
Carlos Alonso Martinez	Operator		
Clark Mondich	Operator		
Linda Palmer	Operator		
Lisa Palmer	Operator		
John Somerlot	Operator	10	
Randall Sutak	Operator		
Joseph Davis	Operator		
Cody Shaw	Operator		
Robert Henricksen	Operator	10	

WORK DESCRIPTION (select all that apply)

Note: lat & long are to 4 decimals (111.1111)

Type of Work		lat	long
[ ]	Debris Clearance start		
	finish		
[✓]	Debris Removal start	58.3599N	134.5530W
	finish	58.3589N	134.5418W
[ ]	Ditching start		
	finish		
[ ]	Fish Culvert cleaned start		
	finish		
[ ]	Fish Culvert cleaned start		
	finish		
[ ]	Other (describe below) start		
	finish		

Culverts Cleaned: 3

other description:

Equipment Incl Rentals	hours	miles	operator
32038 VME Loader Whl			Select
36245 IHC dump trk			Select
36723 CSE Loader Whl			Select
38364 IHC dump trk			Select
38847 Ford F350 Pickup			Select
39551 Vol Loader Whl			Select
39555 Fort F350 Pickup		10.00	Robert
40099 Ford F350 Pickup			Select
40622 10 yd Mac			Select
40623 10 yd Mac			Select
40780 CAT 420 Backhoe			Select
51089 CSE Excavator	8.00		John
Other Vehicles: 51530 Jet Trailer			Select
Other Vehicles: 38847 Ford f-350 Utility bed			Select
Other Vehicles:			Select
Other Vehicles:			Select
Other Vehicles:			Select
Rental:			Select
Rental:			Select

Debris Type

[✓] Soil/Rock
[ ] Vegetation/Trees
[ ] Other

Other description:

DEBRIS DISPOSAL LOCATION

Temporary

GPS coords lat: long:

location description:

quantity (CY):

Permanent

GPS coords lat: long:

location description:

quantity (CY):

To save, in the upper left corner click on **File** and select **Save As**. Save file with location name & current date.

Southcoast Flooding FEMA CAT A

Daily Notes-CAT A Documentation

August 25th, 2021
Juneau, AK
Glacier Hwy: Between Fred Meyer and Mile7 DOT Building

Sites

- HDR Site 3390
- New Point- 58.359860N 134.553033W (Near HDR Site 3393)
- HDR Site 3370
- HDR Site 3379
- New Point- 58.358933N 134.541798W (Near HDR Site 3396)
- New Point- 58.3359043N 134.543620W (Near HDR Site 3379)

Equipment and Hours

- 39555 Ford F350 Pickup Truck 10miles
- 51089 Mini Excavator 8hrs
- Chain Saw 1hrs

People and Hours

- John Somerlot- 10hrs
- Robert Henricksen- 10hrs

Contracts:

- Wayne Smith- Vac Truck

Culverts Cleaned- 3

Material Removed: Soil/rocks

08/25/2021 Photos Juneau, AK Site 3370









08/25/2021 Photos Juneau, AK Site 3370



DOT&PF Southcoast Region 2020 Storm Response - Daily Debris Tracking

M&O Station: Juneau | **FEMA ID AK2021-1**

Route Name: Glacier Highway

Location Description: Glacier Hwy MP 0.66 - MP 0.87

Function Code: Glacier Hwy J1-J4 Fred Meyer JNSERJ1J4

Category: [✓] A [ ] B [ ] C

Date: 8/26/21

Employee	Classification	RG	OT
Spencer Gates	Operator		
Richard Asplund	Operator		
Carlos Alonso Martinez	Operator		
Clark Mondich	Operator		
Linda Palmer	Operator		
Lisa Palmer	Operator		
John Somerlot	Operator	10	
Randall Sutak	Operator		
Joseph Davis	Operator		
Cody Shaw	Operator		
Robert Henricksen	Operator	10	

WORK DESCRIPTION (select all that apply)

Note: lat & long are to 4 decimals (111.1111)

Type of Work		lat	long
[ ]	Debris Clearance start		
	finish		
[✓]	Debris Removal start	58.3590N	134.5436W
	finish	58.3590N	134.5378W
[ ]	Ditching start		
	finish		
[ ]	Fish Culvert cleaned start		
	finish		
[ ]	Fish Culvert cleaned start		
	finish		
[ ]	Other (describe below) start		
	finish		

Culverts Cleaned: 7

other description:

Equipment Incl Rentals	hours	miles	operator
32038 VME Loader Whl			Select
36245 IHC dump trk			Select
36723 CSE Loader Whl			Select
38364 IHC dump trk			Select
38847 Ford F350 Pickup			Select
39551 Vol Loader Whl	4.00		John
39555 Fort F350 Pickup		8.00	Robert
40099 Ford F350 Pickup			Select
40622 10 yd Mac	2.00		John
40623 10 yd Mac			Select
40780 CAT 420 Backhoe			Select
51089 CSE Excavator	10.00		John
Other Vehicles: 51530 Jet Trailer			Select
Other Vehicles: 38847 Ford f-350 Utility bed			Select
Other Vehicles:			Select
Other Vehicles:			Select
Other Vehicles:			Select
Rental:			Select
Rental:			Select

Debris Type

[✓] Soil/Rock
[ ] Vegetation/Trees
[ ] Other

Other description:

DEBRIS DISPOSAL LOCATION

Temporary

GPS coords lat: 58.359145N long: 134.541353W

location description: HDR Site 3396, Material placed on downhill side to access culverts for clean out.

quantity (CY): 80.00

Permanent

GPS coords lat: long:

location description:

quantity (CY):

To save, in the upper left corner click on **File** and select **Save As**. Save file with location name & current date.

Southcoast Flooding FEMA CAT A

Daily Notes-CAT A Documentation

August 26th, 2021
Juneau, AK
Glacier Hwy: Between Fred Meyer and Mile7 DOT Building

Sites

- HDR Site 3390
- HDR Site 3379
- New Point- 58.358933N 134.541798W (Near HDR Site 3396)
    - 24" of rusted/busted culvert outlet cut off
- HDR Site 3396
- New Point- 58.358935N 134.539729W
- HDR Site 3389
- HDR Site 3395

Equipment and Hours

- 39555 Ford F350 Pickup Truck 8miles
- 51089 Mini Excavator 10hrs
- 40622 10yd Mack Truck 4hrs
- 8 loads placed at HDR Site 3396 for excavator access culvert cleanouts
- 39551 Volvo Loader 2hrs
- Metal Saw Cutter 0.5hrs

People and Hours

- John Somerlot- 10hrs
- Robert Henricksen- 10hrs

Contracts:

- Wayne Smith- Vac Truck

Culverts Cleaned- 7

Material Removed: Soil/rocks

EXHIBIT CX 07
Complainant's CWA Section 308 Information Request

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 155
Seattle, WA 98101

ENFORCEMENT &
COMPLIANCE ASSURANCE
DIVISION

Reply To: 20-C04

RETURN RECEIPT REQUESTED

Mr. D. Lance Mearig
Southcoast Region Director
Alaska Department of Transportation and Public Facilities
P.O. Box 112506
Juneau, Alaska 99811-2506

Re: INFORMATION REQUEST - Alaska Department of Transportation and Public Facilities
City and Borough of Juneau, Alaska

Dear Mr. Mearig:

The U.S. Environmental Protection Agency (EPA), Region 10, is seeking information regarding culvert maintenance activities along the Old Glacier Highway Right-of-Way (ROW), including near Egan Drive, in Juneau, Alaska ("Sites") conducted by the Alaska Department of Transportation and Public Facilities ("Respondent"). The enclosed Information Request is being issued to Respondent pursuant to Section 308 of the Clean Water Act (CWA), 33 U.S.C. § 1318.

The CWA prohibits the discharge of dredged and/or fill material into waters of the United States, except as authorized by a permit issued pursuant to CWA Section 404, 33 U.S.C. § 1344, by the U.S. Army Corps of Engineers ("Corps"). The Corps' records do not identify any permits issued to Respondent authorizing discharges of dredged and/or fill material into waters of the United States associated with culvert maintenance activities at the Sites.

On May 6, 2022, EPA and the Corps conducted a joint inspection with Respondent regarding certain culvert and drainage maintenance activities, which may have occurred at approximately 19 culvert locations along the Old Glacier Highway ROW, including near Egan Drive. The inspection was in response to an October 14, 2021, Notice of Violation (POA-2021-00513; Gastineau Channel) issued to Respondent by the Corps regarding unauthorized discharges of dredged and/or fill material into wetlands and other waters of the United States.

Section 308 of the CWA, 33 U.S.C. § 1318, authorizes EPA to require the submission of records, reports and other information for the purpose of determining whether any violations of the CWA have occurred, and to carry out any other provisions of the CWA. By this letter, Respondent is required to provide information and documents in accordance with the enclosed Information Request (Enclosure 1) within **30 days** of your receipt of this letter.

To aid EPA's timely review of your responses, EPA requests that you submit responses to this Information Request via an electronic submission. You can electronically submit your responses via email. For large electronic document files, refer to Instruction A.7 in Enclosure 1. When you are ready to submit your response, contact Mark Jen at jen.mark@epa.gov or (907) 271-3411 to initiate the

electronic file transfer. You will receive a system generated email that will allow you to upload your electronic responsive documents to this Information Request.

Please ensure the Statement of Certification (Enclosure 2) is signed by you or a duly authorized officer or agent of Respondent and returned with the response to this Information Request. This document should be provided electronically with your response to this Information Request.

Failure to respond fully and truthfully to this Information Request in a timely manner may subject you to an enforcement action for civil penalties pursuant to Section 309 of the CWA, 33 U.S.C. § 1319. In addition, provision of false, fictitious, or fraudulent statements or representations may subject you to criminal penalties under 18 U.S.C. § 1001. The information provided in response to this Information Request may be used by EPA in administrative, civil, or criminal proceedings.

For more information about the CWA Section 404 regulations and requirements, please visit EPA's webpage: https://www.epa.gov/cwa-404/enforcement-under-cwa-section-404.

Thank you for your cooperation in this important matter. For questions concerning this Information Request, please contact Mark Jen, Case Officer, at jen.mark@epa.gov or (907) 271-3411. For legal questions, please have your attorney contact Patrick Johnson, Assistant Regional Counsel, at johnson.patrick@epa.gov or (907) 271-3914.

Sincerely,

JEFFERY KENKNIGHT

Digitally signed by JEFFERY KENKNIGHT
Date: 2022.06.29 15:31:56 -07'00'

Jeff KenKnight, Chief
Water Enforcement and Field Branch

Enclosures

cc: Ms. Vicky Roberts
Deputy Director, Alaska Department of Transportation and Public Facilities

Mr. Greg Lockwood
Preliminary Design and Environmental Chief, Alaska Department of Transportation and Public Facilities

Mr. Benjamin Storey
Regional Environmental Manager, Alaska Department of Transportation and Public Facilities

Mr. Scott Gray
Maintenance & Operations Superintendent, Alaska Department of Transportation and Public Facilities

Mr. Marcus Zimmerman
Regional Maintenance Chief, Alaska Department of Transportation and Public Facilities

Mr. Randy Vigil
Project Manager, U.S. Army Corps of Engineers

Mr. Benjamin Soiseth
Southeast Section Chief, U.S. Army Corps of Engineers

Ms. Shannon Johnson
South Branch Chief, U.S. Army Corps of Engineers

Mr. Jon Wendel
Environmental Program Manager, Alaska Department of Environmental Conservation

Ms. Kate Kanouse
Southeast Regional Supervisor, Alaska Department of Fish and Game

Enclosure 1

CWA INFORMATION REQUEST

This information is requested pursuant to Section 308 of the Clean Water Act (CWA), 33 U.S.C. § 1318.

A. INSTRUCTIONS

1. Provide a separate narrative response to each question and subpart of a question in this Information Request. Identify and mark each answer with the number of the question (and subpart, if applicable) to which it corresponds.

2. For each question, provide a copy of each document relied on or referred to in the preparation of the response or that contains information responsive to the question.

3. Indicate on each document produced in response to this Information Request, or in another reasonable manner, the number of the question to which it corresponds.

4. If requested information or documents are not known or are not available to you at the time of your response to this Information Request, but later become known or available to you, you must supplement your response(s) to EPA. Moreover, if you find at any time after submission of your response that any portion is or becomes false, incomplete, or misrepresents the facts, you must provide EPA with a corrected response as soon as possible.

5. Provide the name, title, and business contact information for each person who prepared or was consulted in the preparation of your response. If you have reason to believe that there may be persons able to provide a more detailed or complete response to any question contained herein, or who may be able to provide additional responsive documents, provide the name, title, and business contact information for each such person and the additional information or documents that they may have.

6. The information requested herein must be provided whether or not you regard part or all of it as a trade secret or confidential business information. You may assert a confidentiality claim covering part or all of the information submitted, pursuant to Section 308 of the CWA, 33 U.S.C. § 1318, and 40 C.F.R. Part 2, by labeling such information at the time it is submitted to EPA as "trade secret," "proprietary," "company confidential," or other suitable notice.

   Information covered by such a claim will be disclosed by EPA only to the extent and by the procedures set forth in statutes and 40 C.F.R. Part 2, Subpart B. Note that certain categories of information are not entitled to confidential treatment. Unless you make a claim at the time you submit the information in the manner described in 40 C.F.R. § 2.203(b), it may be made available to the public by EPA without further notice to you. See also 41 Fed. Reg. 36902 (Sept. 1, 1976)

7. To aid electronic recordkeeping efforts, EPA prefers that you provide all documents responsive to this Information Request in electronic format in accordance with (a) through (f), below. These electronic submissions are in lieu of hard copy. EPA uses a service (*GoAnywhere*) to receive large amounts of electronic information. When Respondent has compiled responsive documents and is ready to submit its information, contact Mark Jen, Case Officer at jen.mark@epa.gov or (907) 271-3411 and he will initiate the electronic file transfer request. You will then receive a

system generated email requesting access to upload your electronic documents responsive to this information request.

a) Provide all responsive documents in Portable Document Format (PDF) or similar format, unless otherwise requested in specific questions. If the PDFs are scanned images, perform at least Optical Character Recognition (OCR) for "image over text" to allow the document to be searchable. Submitters providing secured PDFs should also provide unsecured versions for EPA use in repurposing text.

b) When specific questions request data in electronic spreadsheet form, provide the data and corresponding information in editable Excel format, and not in image format. If Excel formats are not available, then the format should allow for data to be used in calculations by a standard spreadsheet program such as Excel.

c) Provide a table of contents for electronic documents submitted so that each document can be accurately identified in relation to your response to a specific question. We recommend the use of electronic file folders organized by question number.

d) Documents claimed as confidential business information (CBI) must begin with the file name CBI, followed by the rest of the file name. This will facilitate appropriate records management and appropriate handling and protection of the CBI. Please also mark each page that is confidential business information as such.

e) Include a statement certifying the attached files have been scanned for viruses and indicate what program was used.

f) Upload the files to GoAnywhere in .zip format. If the .zip file is larger than 10GB, create smaller .zip files (part 1, part 2, part3, etc.).

B. DEFINITIONS

All terms used in this Information Request have their ordinary meaning unless such terms are defined in this Information Request; CWA Section 502, 33 U.S.C. § 1362 or 33 C.F.R. Parts 323 and 328. For purposes of this Information Request:

1. The terms "you" or "Respondent" mean Alaska Department of Transportation and Public Facilities, and its officers, directors, managers, partners, employees, contractors, and agents, as applicable.

2. "Sites" mean the culverts, ditches, and drainages in wetland areas maintained and operated by Respondent located along the Old Glacier Highway ROW, including near Egan Drive, in the City and Borough of Juneau, Alaska.

3. "Document" means any object that records, stores, or presents information, and includes writings, records, or information of any kind, formal or informal, whether wholly or partially handwritten or typed, whether in computer format, memory, or storage device, or in hard copy, including any form or format of these. If in computer format, each such document shall be provided in translation to a form useable and readable by EPA, with all necessary documentation and support. Include all attachments to or enclosures with any responsive document.

4. The term "work activity" means any and all construction, maintenance, excavation, diversion, clearing, grading, ditching, ponding, side casting, filling, dredging, discharging, redistribution, and placement of rock, sand, gravel, concrete, soils, overburden, woody slash/debris, garbage or any other fill material, dredged material, or other pollutant within the meaning of Section 502(6) of the CWA, 33 U.S.C. §1362(6).

C. INFORMATION REQUEST

Provide the following information. Unless otherwise specified, provide all responsive information for the time period between July 1, 2017 and the date of this Information Request.

1. Identify and describe all "work activity" conducted at the "Sites." For each discrete work activity, include in your description the following information:

   a) locations of the work activity by a geographic coordinate system in latitude and longitude (e.g., decimal-degrees);

   b) approximate commencement and completion dates for each work activity;

   c) approximate surface area (acres or square feet) and/or length, height/depth, and width (acres or square feet) disturbed;

   d) approximate volume (cubic yards) of dredged material excavated and dredged and/or fill material discharged;

   e) the purpose and need for the work activities;

   f) the person(s) authorizing the work activity and their contact information;

   g) the person(s) performing the work activity and their contact information;

   h) the person(s) receiving payment for the work and their contact information;

   i) the person(s) providing payment for the work activity, the amount paid, and their contact information;

   j) the machinery and equipment used to perform the work activity and its ownership and whether the machinery or equipment was rented by you or operated by another person authorized by you; and

   k) the sequence of work activities conducted on Site.

2. Define on an aerial image, map or survey of the Site all locations by a geographic coordinate system in latitude and longitude (e.g., decimal-degrees) where any dredged and/or fill material was placed and where any other work activity has taken place. On the same map, to the extent known, identify and delineate any evaluation of the wetlands and other waters of the United States that you and/or your consultant have conducted.

3. Identify and describe all current and future culvert maintenance plans by you and/or other person(s) at the Sites.

4. Provide copies of any and all correspondences, authorizations, or permits obtained from any Federal, State, or local government agency authorizing development of the Sites or pertaining in any way to the discharges of dredged and/or fill material described above.

5. Provide copies of any and all correspondences or permission documents obtained from appropriate landowners authorizing development of the Sites or pertaining in any way to the discharges of dredged and/or fill material described above.

6. If you have not applied for a permit, provide a detailed explanation of your reasons for not obtaining a CWA Section 404 permit prior to beginning the dredging and/or filling activities at the Sites.

7. Identify and submit copies of all reports, memorandums, photographs, sketches, plans, and as-built drawings related to the planning of the work activities at the Sites, particularly those prepared by your consultant, HDR Alaska, Inc., Wayne Smith Trucking, Alaska Department of Transportation and Public Facilities, the Alaska Department of Fish and Game, and the Federal Emergency Management Agency.

8. Provide any additional information that may be relevant to resolving this matter.

Enclosure 2

STATEMENT OF CERTIFICATION

Alaska Department of Transportation and Public Facilities

Site: Old Glacier Highway Right-of-Way, including near Egan Drive
City and Borough of Juneau, Alaska

I certify that the enclosed responses to EPA's Information Request issued to Alaska Department of Transportation and Public Facilities are true, accurate, and complete. I certify that the portions of these responses which I did not personally prepare were prepared by persons acting on behalf of Alaska Department of Transportation and Public Facilities under my supervision and at my instruction, and that the information provided is true, accurate, and complete. I am aware that there are significant penalties for submitting false information in response to this Information Request, including the possibility of fines and imprisonment.

_____
Signature

_____
Printed Name

_____
Title

_____
Date

EXHIBIT CX 08
Respondent's Response to Complainant's Information Request

THE STATE of ALASKA
GOVERNOR MIKE DUNLEAVY

Department of Transportation and Public Facilities

SOUTHCOAST REGION
Design & Engineering Services
Preconstruction

P.O. Box 112506
Juneau, Alaska 99811-2506
Main: (907) 465-1799
Fax: (907) 465-2030
TTY-TDD: (800) 770-8973
dot.state.ak.us

POA-2021-00513, Gastineau Channel
Response to Request for Information (20-C04)

Introduction:
This information is being provided in response to a request for information (RFI) issued by the Environmental Protection Agency (EPA) under the authority of Section 308 of the Clean Water Act. The request was made to gather information regarding unauthorized dredging and discharge of fill material at 19 sites along Old Glacier Highway and Egan Drive in Juneau, Alaska. Work at a number of these sites was completed by the DOT&PF in response to a natural disaster that occurred in December 2020 to prevent further degradation and destruction of the roadway by the storm.

Work at two sites outlined in the RFI (Sites 3, and 17) was not completed by the DOT&PF. Further, we have no records of authorizing a private party to conduct the work. The DOT&PF has made efforts to obtain information regarding the work completed at these sites. However, the DOT&PF is unable to provide all of the information requested in the RFI due to the fact that we were not present for those specific items.

1: Identify and describe all "work activity" conducted at the sites.

Site 1: Unauthorized Work performed by a private party
The DOT&PF has no record of performing work or authorizing a private party to conduct work at this site. As such, no information can be provided on this work area. There have been unverified reports by DOT&PF staff that a private utility company was conducting work in this area prior to DOT&PF staff mobilizing for the storm response. However, no contact information has been recorded for this private party.

Site 2: Culvert Maintenance
a. Location: 58.35971°N 134.552372°W
b. Work Period: Work started and completed on 8/24/2021
c. Fill area: 54 sq. ft.
d. Fill volume: 6 cu. yd.
e. Purpose and Need: This work was needed to repair damage to the site from the December 2020 storm.
f. Person Authorizing: Lance Mearig, Director
g. Person Performing: Spencer Gates, Maintenance Foreman

h. Person Receiving Payment: n/a
i. Person Issuing Payment: n/a
j. Machinery: Work was performed using an excavator and a jet trailer owned by the DOT&PF.
k. Work Sequencing: An excavator was tracked to the culvert outlet, bedload material was removed and sidecast to unplug the culvert. The culvert was then jetted to remove bedload material from within the culvert.

Site 3: Unauthorized work performed by a private party.

The DOT&PF has no record of performing work or authorizing a private party to conduct work at this site. As such, no information can be provided on this work area. There have been unverified reports by DOT&PF staff that a private utility company was conducting work in this area prior to DOT&PF staff mobilizing for the storm response. However, no contact information has been recorded for this private party.

Site 4: Culvert Maintenance

a. Location: 58.35986°N 134.55303°W
b. Work Period: Work started and completed on 8/24/2021
c. Fill area: 36 sq. ft.
d. Fill volume: 4 cu. yd.
e. Purpose and Need: This work was needed to repair damage to the site from the December 2020 storm.
f. Person Authorizing: Lance Mearig, Director
g. Person Performing: Spencer Gates, Maintenance Foreman
h. Person Receiving Payment: n/a
i. Person Issuing Payment: n/a
j. Machinery: Work was performed using an excavator and a jet trailer owned by the DOT&PF.
k. Work Sequencing: An excavator was tracked to the culvert outlet, bedload material was removed and sidecast to unplug the culvert. The culvert was then jetted to remove bedload material from within the culvert.

Site 5: Culvert Maintenance

a. Location: 58.35971°N 134.55237°W
b. Work Period: Work started and completed on 8/24/2021
c. Fill area: 36 sq. ft.
d. Fill volume: 2 cu. yd.
e. Purpose and Need: This work was needed to repair damage to the site from the December 2020 storm.
f. Person Authorizing: Lance Mearig, Director
g. Person Performing: Spencer Gates, Maintenance Foreman
h. Person Receiving Payment: n/a
i. Person Issuing Payment: n/a
j. Machinery: Work was performed using an excavator and a jet trailer owned by the DOT&PF.
k. Work Sequencing: An excavator was tracked to the culvert outlet, bedload material was removed. The culvert was then jetted to remove bedload material from within the culvert. No material appears to have been sidecast at this location.

Site 6: Culvert Maintenance and Flood Control

a. Location: 58.35899°N 134.545645°W
b. Work Period: Work started and completed on 8/24/2021
c. Fill area: 600 sq. ft.
d. Fill volume: 67 cu. yd.
e. Purpose and Need: This work was needed to repair damage to the site from the December 2020 storm.
f. Person Authorizing: Lance Mearig, Director
g. Person Performing: Spencer Gates, Maintenance Foreman
h. Person Receiving Payment: n/a
i. Person Issuing Payment: n/a
j. Machinery: Work was performed using an excavator and a jet trailer owned by the DOT&PF.
k. Work Sequencing: Fill material was discharged to allow excavator access to the site, culvert outlet was then unplugged. Material from the culvert was sidecast into adjacent area. The stream channel downstream was then reestablished to prevent flooding. This material was also sidecast. The culvert was then jetted to remove bedload material from within the culvert.

Site 7: Culvert Maintenance

a. Location: 58.35907°N 134.543115°W
b. Work Period: Work started and completed on 8/25/2021
c. Fill area: 84 sq. ft.
d. Fill volume: 14 cu. yd.
e. Purpose and Need: This work was needed to repair damage to the site from the December 2020 storm.
f. Person Authorizing: Lance Mearig, Director
g. Person Performing: Spencer Gates, Maintenance Foreman
h. Person Receiving Payment: n/a
i. Person Issuing Payment: n/a
j. Machinery: Work was performed using an excavator owned by the DOT&PF and a vac truck operated by Wayne Smith Trucking.
k. Work Sequencing: An excavator was tracked to the culvert outlet, bedload material was removed and sidecast to unplug the culvert. Bedload material was then removed from the culvert using the vac truck. This material was also either removed by trucking or sidecast.

Site 8a: Culvert Maintenance

a. Location: 58.358933°N 134.541798°W
b. Work Period: Work started and completed on 8/25/2021
c. Fill area: 24 sq. ft.
d. Fill volume: 3 cu. yd.
e. Purpose and Need: This work was needed to repair damage to the site from the December 2020 storm.
f. Person Authorizing: Lance Mearig, Director
g. Person Performing: Spencer Gates, Maintenance Foreman
h. Person Receiving Payment: n/a
i. Person Issuing Payment: n/a
j. Machinery: Work was performed using an excavator owned by the DOT&PF and a vac truck operated by Wayne Smith Trucking.

k. Work Sequencing: An excavator was tracked to the culvert outlet, bedload material was removed and sidecast to unplug the culvert. Bedload material was then removed from the culvert using the vac truck. This material was also either removed by trucking or sidecast.

Site 8b: Culvert Access

a. Location: 58.359175°N 134.565019°W
b. Work Period: Work started and completed on 8/26/2021
c. Fill area: 64 sq. ft.
d. Fill volume: 80 cu. yd.
e. Purpose and Need: This work was needed to repair damage to the site from the December 2020 storm.
f. Person Authorizing: Lance Mearig, Director
g. Person Performing: Spencer Gates, Maintenance Foreman
h. Person Receiving Payment: n/a
i. Person Issuing Payment: n/a
j. Machinery: Work was performed using an excavator owned by the DOT&PF.
k. Work Sequencing: Fill material was discharged to allow excavator to access culvert outlet at Site 9.

Site 9: Culvert Maintenance

a. Location: 58.359145°N 134.541353°W
b. Work Period: Work started and completed on 8/26/2021
c. Fill area: 72 sq. ft.
d. Fill volume: 4 cu. yd.
e. Purpose and Need: This work was needed to repair damage to the site from the December 2020 storm.
f. Person Authorizing: Lance Mearig, Director
g. Person Performing: Spencer Gates, Maintenance Foreman
h. Person Receiving Payment: n/a
i. Person Issuing Payment: n/a
j. Machinery: Work was performed using an excavator owned by the DOT&PF and a vac truck operated by Wayne Smith Trucking.
k. Work Sequencing: An excavator was tracked to the culvert outlet, bedload material was removed and sidecast to unplug the culvert.

Site 10: Culvert Maintenance

a. Location: 58.358935°N 134.539729°W
b. Work Period: Work started and completed on 8/26/2021
c. Fill area: 90 sq. ft.
d. Fill volume: 10 cu. yd.
e. Purpose and Need: This work was needed to repair damage to the site from the December 2020 storm.
f. Person Authorizing: Lance Mearig, Director
g. Person Performing: Spencer Gates, Maintenance Foreman
h. Person Receiving Payment: n/a
i. Person Issuing Payment: n/a
j. Machinery: Work was performed using an excavator owned by the DOT&PF and a vac truck operated by Wayne Smith Trucking.

k. Work Sequencing: An excavator was tracked to the culvert outlet, bedload material was removed to unplug the culvert. No material appears to have been sidecast at this location.

Site 11: No work completed

No work was completed by the DOT&PF at this site. It is evident from the attached photographs that no work was completed by any party at this culvert.

Site 12a: Culvert Maintenance

a. Location: 58.359017°N 134.5378°W
b. Work Period: Work started and completed on 8/26/2021
c. Fill area: 18 sq. ft.
d. Fill volume: 2 cu. yd.
e. Purpose and Need: This work was needed to repair damage to the site from the December 2020 storm.
f. Person Authorizing: Lance Mearig, Director
g. Person Performing: Spencer Gates, Maintenance Foreman
h. Person Receiving Payment: n/a
i. Person Issuing Payment: n/a
j. Machinery: Work was performed using an excavator owned by the DOT&PF.
k. Work Sequencing: An excavator was tracked to the culvert inlet, bedload material was removed and sidecast to unplug the culvert.
l. Notes: Wetlands and other waters do not appear to be present at the culvert inlet. If no wetlands are present adjacent to the stream, this work is authorized under Nationwide Permit 3a.

Site 12b: Culvert Maintenance and Flood Control

a. Location: 58.359017°N 134.5378°W
b. Work Period: Work started and completed on 8/26/2021
c. Fill area: 480 sq. ft.
d. Fill volume: 106 cu. yd.
e. Purpose and Need: This work was needed to repair damage to the site from the December 2020 storm.
f. Person Authorizing: Lance Mearig, Director
g. Person Performing: Spencer Gates, Maintenance Foreman
h. Person Receiving Payment: n/a
i. Person Issuing Payment: n/a
j. Machinery: Work was performed using an excavator owned by the DOT&PF and a vac truck operated by Wayne Smith Trucking.
k. Work Sequencing: An excavator was tracked to the culvert outlet, bedload material was removed and sidecast to unplug the culvert. Bedload material was then removed from the culvert using the vac truck. The stream channel downstream was then reestablished to prevent flooding. This material was also sidecast into adjacent area.
l. Notes: This area is forested and slightly elevated above the surrounding terrain. As such, sidecast material may or may not have been discharged into wetlands.

Site 13: Culvert Maintenance

a. Location: 58.358857°N 134.535650°W
b. Work Period: Work started and completed on 8/30/2021
c. Fill area: 72 sq. ft.

d. Fill volume: 4 cu. yd.
e. Purpose and Need: This work was needed to repair damage to the site from the December 2020 storm.
f. Person Authorizing: Lance Mearig, Director
g. Person Performing: Spencer Gates, Maintenance Foreman
h. Person Receiving Payment: n/a
i. Person Issuing Payment: n/a
j. Machinery: Work was performed using an excavator owned by the DOT&PF.
k. Work Sequencing: An excavator was tracked to the culvert outlet, bedload material was removed and sidecast to create a sump in which material from within the culvert could be later deposited via vac truck.

Site 14: Culvert Maintenance

a. Location: 58.358857°N 134.536660°W
b. Work Period: Work started on 8/30/2021 and completed on 8/31/2021
c. Fill area: 96 sq. ft.
d. Fill volume: 7 cu. yd.
e. Purpose and Need: This work was needed to repair damage to the site from the December 2020 storm.
f. Person Authorizing: Lance Mearig, Director
g. Person Performing: Spencer Gates, Maintenance Foreman
h. Person Receiving Payment: n/a
i. Person Issuing Payment: n/a
j. Machinery: Work was performed using an excavator owned by the DOT&PF.
l. Work Sequencing: An excavator was tracked to the culvert outlet, bedload material was removed and sidecast to create a sump in which material from within the culvert could be later deposited via vac truck.

Site 15: Culvert Maintenance

a. Location: 58.358796°N 134.533084°W
b. Work Period: Work started on 8/30/2021 and completed on 8/31/2021
c. Fill area: 72 sq. ft.
d. Fill volume: 4 cu. yd.
e. Purpose and Need: This work was needed to repair damage to the site from the December 2020 storm.
f. Person Authorizing: Lance Mearig, Director
g. Person Performing: Spencer Gates, Maintenance Foreman
h. Person Receiving Payment: n/a
i. Person Issuing Payment: n/a
j. Machinery: Work was performed using an excavator owned by the DOT&PF.
k. Work Sequencing: An excavator was tracked to the culvert outlet, bedload material was removed and sidecast to create a sump in which material from within the culvert could be later deposited via vac truck.

Site 16: Culvert Maintenance

a. Location: 58.358796°N 134.533084°W
b. Work Period: Work started on 8/30/2021 and completed on 8/31/2021
c. Fill area: 36 sq. ft.
d. Fill volume: 4 cu. yd.

e. Purpose and Need: This work was needed to repair damage to the site from the December 2020 storm.
f. Person Authorizing: Lance Mearig, Director
g. Person Performing: Spencer Gates, Maintenance Foreman
h. Person Receiving Payment: n/a
i. Person Issuing Payment: n/a
j. Machinery: Work was performed using an excavator owned by the DOT&PF.
k. Work Sequencing: An excavator was tracked to the culvert inlet, bedload material was removed and sidecast to create a sump in which material from within the culvert could be later deposited via vac truck..

Site 17: No work completed

No work was completed by the DOT&PF at this site. This area is outside of DOT&PF right-of-way.

Sites 18 & 19: Ditch Reestablishment

a. Location Start: 58.3590°N 134.5644°W | End: 58.3603°N 134.5676°W
b. Work Period: Work started on 9/8/2021 and completed on 9/9/2021
c. Excavation Length: 800 ft.
d. Excavation Volume: 820 cu. yd.
e. Purpose and Need: This work was needed to repair damage to the site from the December 2020 storm.
f. Person Authorizing: Lance Mearig, Director
g. Person Performing: Spencer Gates, Maintenance Foreman
h. Person Receiving Payment: n/a
i. Person Issuing Payment: n/a
j. Machinery: Work was performed using an excavator owned by the DOT&PF.
k. Work Sequencing: An excavator removed material from the roadside ditch and loaded it into a dumptruck for offsite disposal.
l. Notes: Section 404 of the Clean Water Act does not give the federal government authority to regulate mechanical excavation in wetlands, should any be present at this work site. Any discharges into wetlands associated with reshaping this drainage ditch would be authorized under USACE Nationwide Permit 41.

2: Provide a map of work sites.

Attachment 1 includes a map of the work sites that includes all data requested. No delineation of wetlands was performed by the DOT&PF or our consultants.

3: Identify and describe all current and future culvert maintenance plans by you or other persons at the sites.

The DOT&PF does not have any prescribed maintenance plans at the sites. Maintenance issues are resolved as they arise. A need to replace the culverts conveying water across Old Glacier Highway has been identified, but no project has been programmed in the Alaska State Transportation Improvement Plan to fulfill that need.

4: Provide copies of all correspondences, authorization, or permits obtained from local, state, or federal agencies authorizing development at the site.

The DOT&PF did not obtain any local or state permits to authorize the work as there were no requirements to do so. The Declaration of Disaster Emergency issued on December 5, 2020, by Governor Dunleavy exempts the DOT&PF from obtaining any authorizations typically required for such work from state agencies. In this case, this exempted the DOT&PF from obtaining fish habitat permits for the work. The Declaration of Disaster Emergency and verification from the Alaska Department of Fish & Game (ADF&G) that the DOT&PF was exempt from permitting requirements is include as Attachment 2. The DOT&PF did not obtain any federal permits for the work.

5: Provide copies of documents authorizing access to private land at the sites.

The DOT&PF did not enter into any agreements to access private land at the sites.

6: Explain your reasons for not obtaining a CWA Section 404 permit prior to commencing work at the sites.

As you are aware, this disaster caused widespread damage in northern Southeast Alaska and took the lives of two Haines residents. Responses to disasters of this magnitude are complex, with a multitude of different recovery projects being performed concurrently. In this case, the DOT&PF failed to communicate the nature of the work at the sites internally. In addition, the gubernatorial exemption from state permitting requirements led to confusion regarding the federal permitting requirements associated with the sites.

The Southcoast Region of the DOT&PF has an outstanding record of working collaboratively with the U.S. Army Corps of Engineers to permit projects that involve Waters of the U.S., including wetlands. We will continue to work in concert with the USACE to fulfill our permitting obligations on this, as well as work to avoid internal communication failures on future projects.

7: Submit copies of all documents related to the planning of the work activities at the sites.

Attachment 3 provides copies of all daily work tracking forms related to work activities at the sites. No other reports, memorandums, photographs, sketches, plans, or as-built drawings were developed related to the planning of work at the sites.

8: Provide any additional information relevant to resolving this matter.

Attachment 4 provides photographs of work at the sites.

Attachment 1:

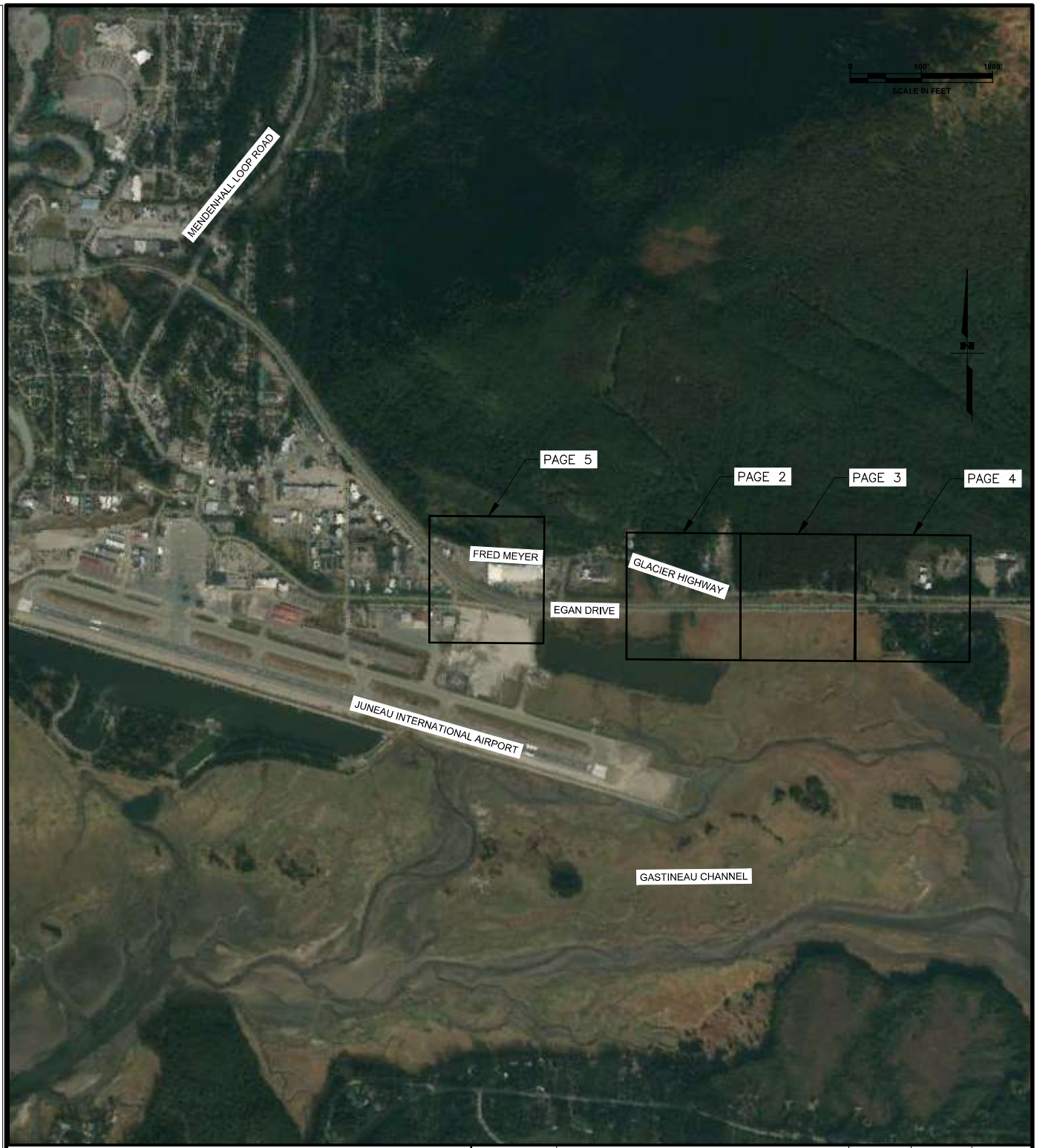
Worksite Map

DESIGNED BY
CHECKED BY
DRAFTED BY

SCALE

DATE TIME
6/24/2022 12:17 PM

DRAWING LOCATION
C:\PWORKING\WEST01\D2405736\NOV.DWG



CITY, BOROUGH, STATE
JUNEAU, JUNEAU, ALASKA

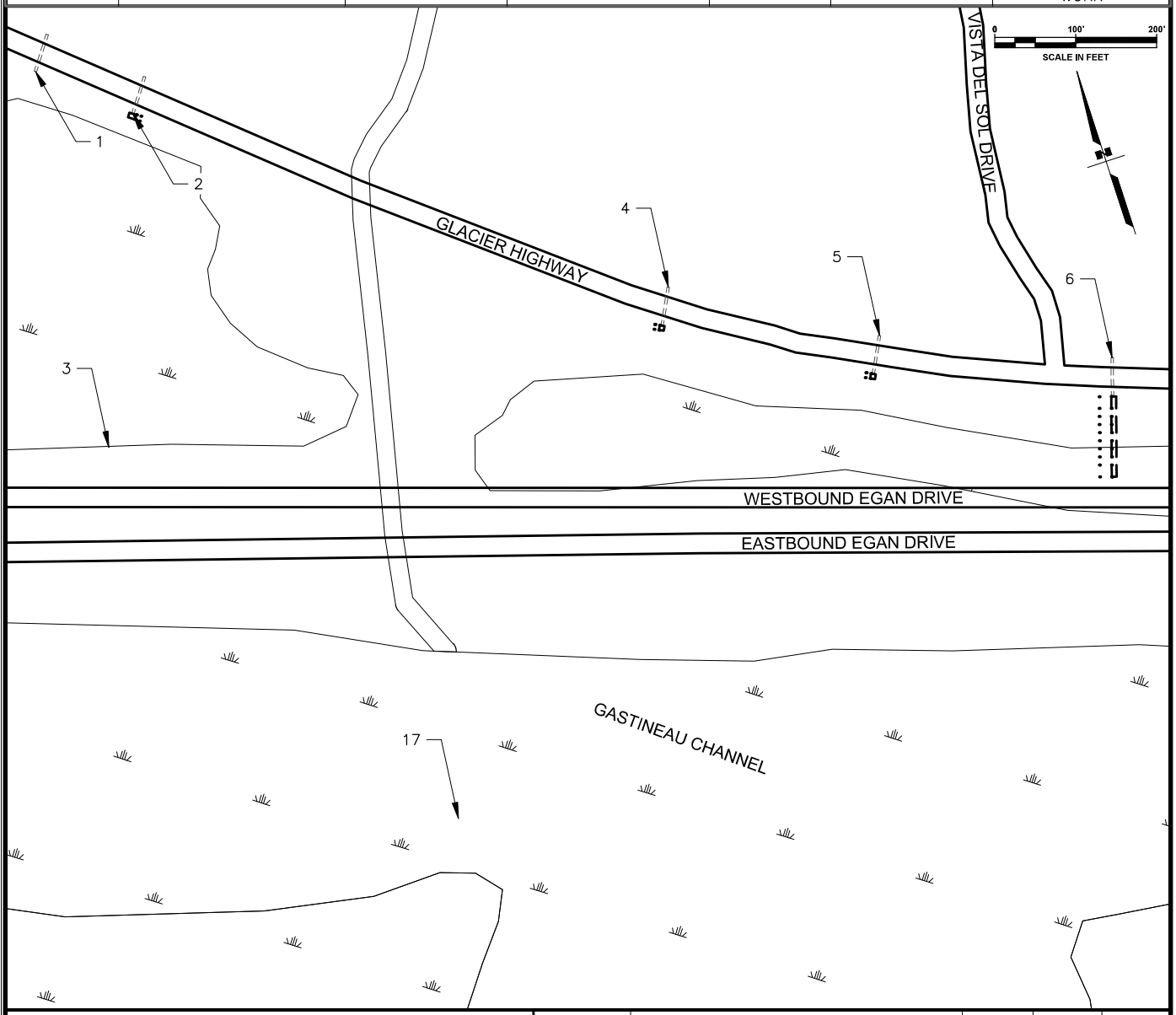
DIRECTION TO SITE:
TURN NORTH ON OLD DAIRY ROAD FROM EGAN DRIVE. TURN EAST ON GLACIER HIGHWAY. SITE LOCATION IS AFTER VISTA DEL SOL DRIVE. MILE POINT 0.59 GLACIER HIGHWAY.

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	N/A	2021	1	2

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES

APPLICANT: DOT&PF
FILE: POA-2021-00513
WATERWAY:
SEC. 32 T40S R66E COPPER RIVER MERIDIAN
LAT.: 58.35899
LONG.: -134.545645

LOCATION	LAT./LONG.	DATE RANGE	CUT/FILL VOLUME (CY)	FILL AREA (SQFT)	PERMITS	REMARKS
1	N/A	BEFORE 8/24/21				NOT PRESENT FOR WORK
2	58.35971N° 134.552372W°	08/24/2021	6'Wx9'Lx3'D = 6	54		OUTLET
3	N/A	BEFORE 8/24/21				NOT PRESENT FOR WORK
4	58.35986N° 134.55303W°	08/24/2021	6'Wx6'Lx3'D = 4	36		OUTLET
5	58.35971N° 134.55237W°	08/24/2021	6'Wx6'Lx1.5'D = 2	36		OUTLET
6	58.35899N° 134.545645W°	08/24/2021	6'Wx100'Lx~3'D = 67	600		OUTLET
17	N/A	BEFORE 8/24/21				NOT PRESENT FOR WORK



CITY, BOROUGH, STATE
JUNEAU, JUNEAU, ALASKA

DIRECTION TO SITE:
TURN NORTH ON OLD DAIRY ROAD FROM EGAN DRIVE. TURN EAST ON GLACIER HIGHWAY. SITE LOCATION IS AFTER VISTA DEL SOL DRIVE. MILE POINT 0.59 GLACIER HIGHWAY.

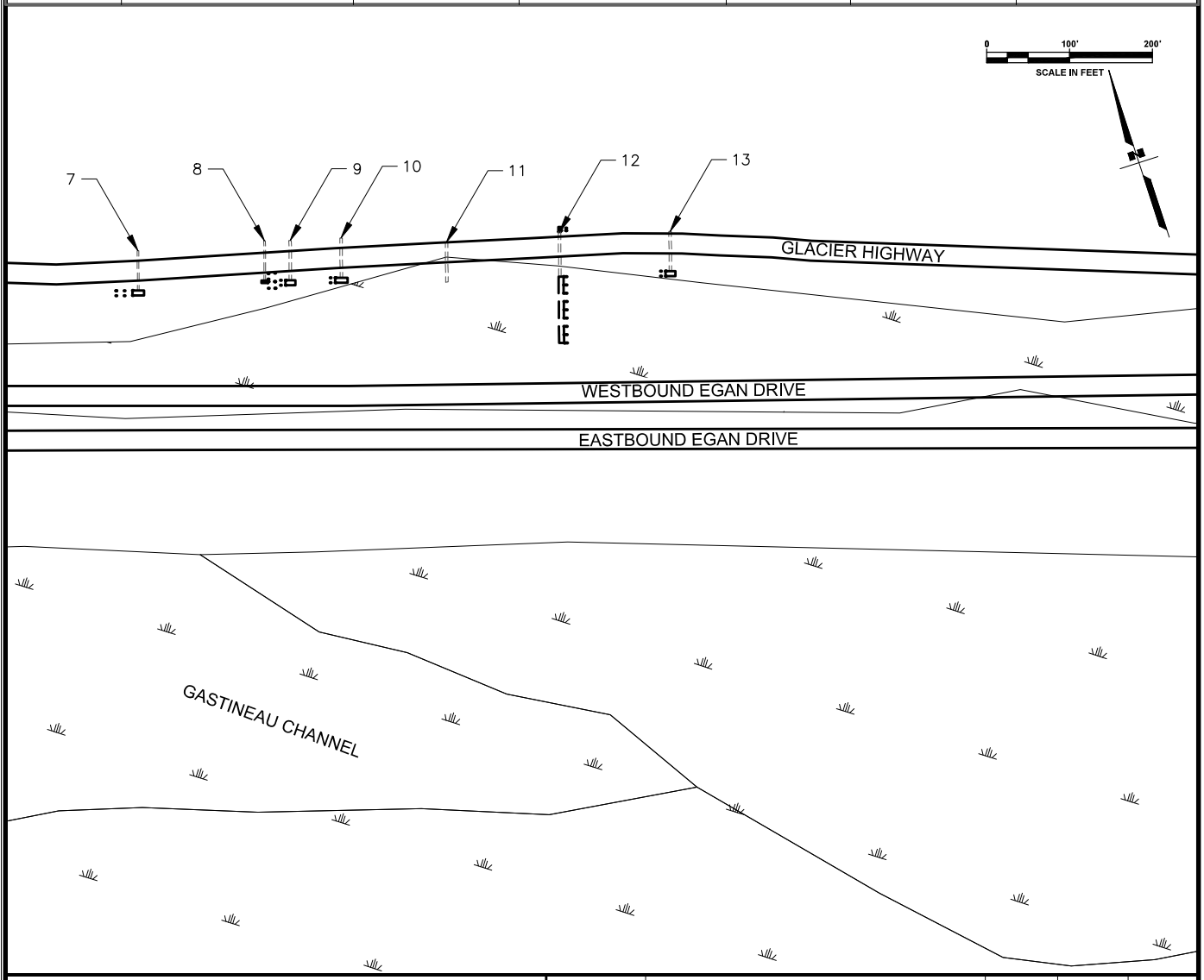
STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	N/A	2021	2	2

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES

APPLICANT: DOT&PF
FILE: POA-2021-00513
WATERWAY:
SEC. 32 T40S R66E COPPER RIVER MERIDIAN
LAT.: 58.35899
LONG.: -134.545645

DESIGNED BY
CHECKED BY
DRAFTED BY
SCALE
DATE TIME 6/24/2022 12:17 PM
DRAWING LOCATION C:\PWWORKING\WEST01\D2405736\NOV.DWG

LOCATION	LAT./LONG.	DATE RANGE	CUT/FILL VOLUME (CY)	FILL AREA (SQFT)	PERMITS	REMARKS
7	58.35907N° 134.543115W°	08/25/2021	6'Wx14'Lx4.5'D = 14	84		OUTLET
8	58.358933N°134.541798W°	08/25/2021	3'Wx8'Lx~3.4'D = 3	24		OUTLET
	58.359175N°134.565019W°	08/26/2021	8x 10CY TRUCKS= 80	64		FILL ONLY–BROUGHT IN TO ACCESS OUTLET
9	58.359145N°134.541353W°	08/26/2021	6'Wx12'Lx1.5'D = 4	72		OUTLET
10	58.358935N°134.539729W°	08/26/2021	6'Wx15'Lx3'D = 10	90		OUTLET
11	58.359551N° 134.54002W°	N/A	N/A	N/A	N/A	NO WORK DONE
12	58.359017N° 134.5378W°	08/26/2021	3'Wx6'Lx3'D = 2	18		INLET
	58.359017N° 134.5378W°		6'Wx80'Lx~6'D = 106	480		OUTLET
13	58.358857N°134.535660W°	08/30/2021	6'Wx12'Lx1.5'D = 4	72		OUTLET



CITY, BOROUGH, STATE
JUNEAU, JUNEAU, ALASKA

DIRECTION TO SITE:
TURN NORTH ON OLD DAIRY ROAD FROM EGAN DRIVE. TURN EAST ON GLACIER HIGHWAY. SITE LOCATION IS AFTER VISTA DEL SOL DRIVE. MILE POINT 0.59 GLACIER HIGHWAY.

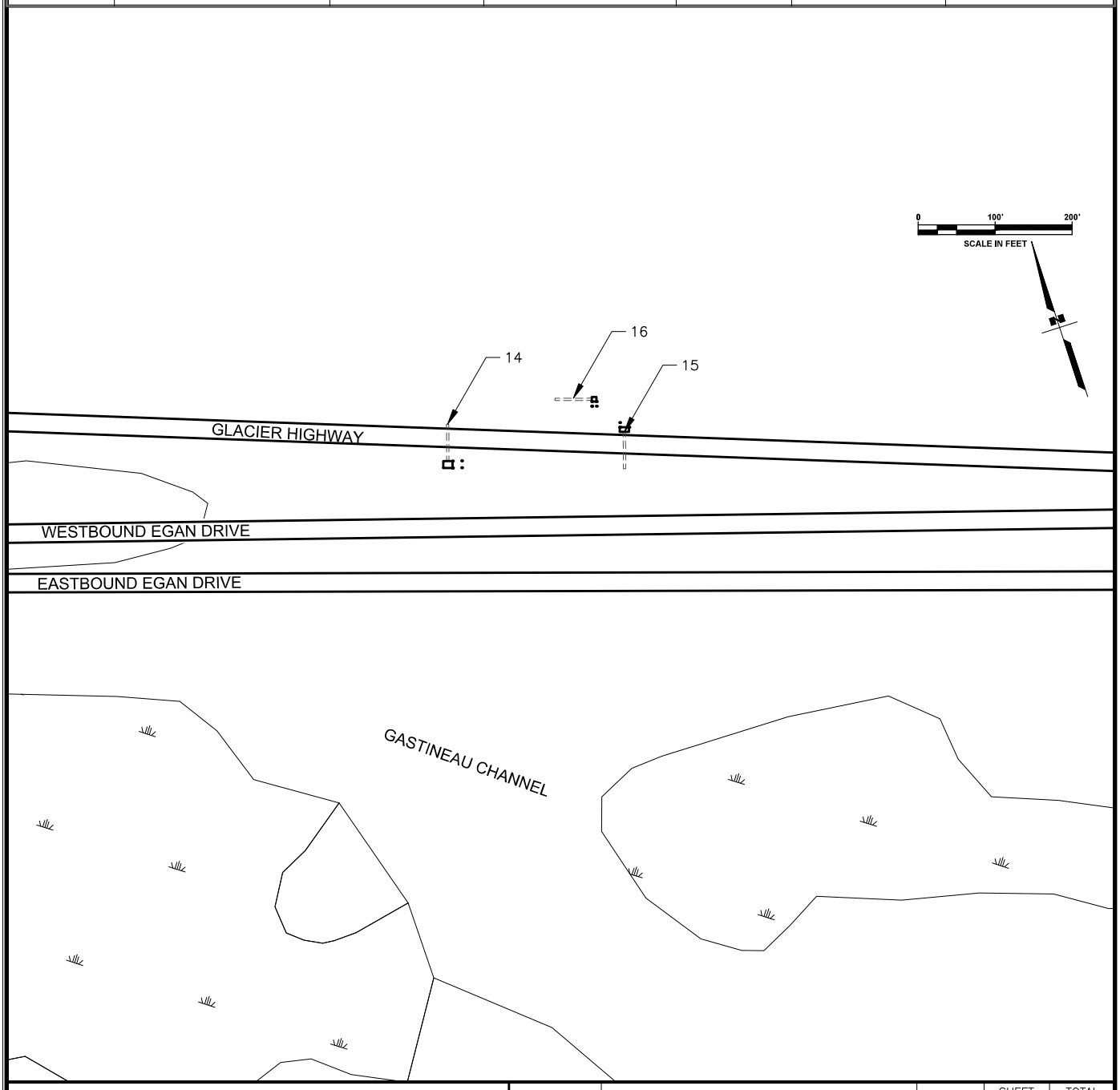
STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	N/A	2021	3	2

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES

APPLICANT: DOT&PF
FILE: POA–2021–00513
WATERWAY:
SEC. 32 T40S R66E COPPER RIVER MERIDIAN
LAT.: 58.35899
LONG.: –134.545645

DESIGNED BY
CHECKED BY
DRAFTED BY
SCALE
DATE TIME 6/24/2022 12:17 PM
DRAWING LOCATION C:\PWWORKING\WEST01\D2405736\NOV.DWG

LOCATION	LAT./LONG.	DATE RANGE	CUT/FILL VOLUME (CY)	FILL AREA (SQFT)	PERMITS	REMARKS
14	58.358857N°134.535660W°	8/30/2021–8/31/2021	8'Wx12'Lx~2'D = 7	96		OUTLET
15	58.358796N°134.533084W°		6'Wx12'Lx1.5'D = 4	72		OUTLET
16	58.358796N°134.533084W°		6'Wx6'Lx3'D = 4	36		INLET



CITY, BOROUGH, STATE
JUNEAU, JUNEAU, ALASKA

DIRECTION TO SITE:
TURN NORTH ON OLD DAIRY ROAD FROM EGAN DRIVE. TURN EAST ON GLACIER HIGHWAY. SITE LOCATION IS AFTER VISTA DEL SOL DRIVE. MILE POINT 0.59 GLACIER HIGHWAY.

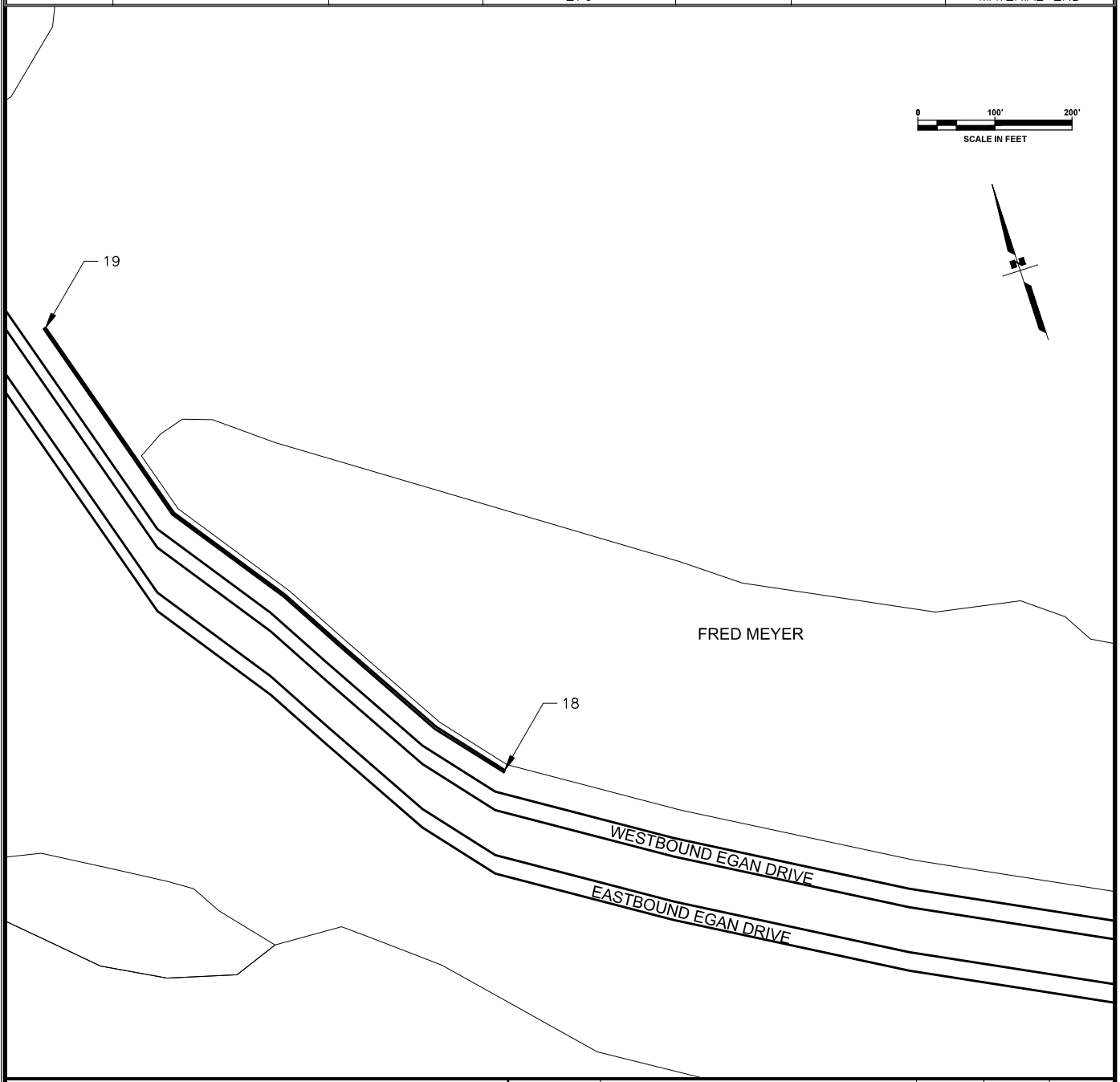
STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	N/A	2021	4	2

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES

APPLICANT: DOT&PF
FILE: POA–2021–00513
WATERWAY:
SEC. 32 T40S R66E COPPER RIVER MERIDIAN
LAT.: 58.35899
LONG.: –134.545645

DESIGNED BY
CHECKED BY
DRAFTED BY
SCALE
DATE TIME 6/24/2022 12:17 PM
DRAWING LOCATION C:\PWWORKING\WEST01\D2405736\NOV.DWG

LOCATION	LAT./LONG.	DATE RANGE	CUT/FILL VOLUME (CY)	FILL AREA (SQFT)	PERMITS	REMARKS
18	58.360490N°134.567736W°	9/8/2021–9/9/2021	55x 10CY TRUCKS = 550	N/A		REMOVAL OF MATERIAL START
19			27x 10CY TRUCKS = 270	N/A		REMOVAL OF MATERIAL END



CITY, BOROUGH, STATE
JUNEAU, JUNEAU, ALASKA

DIRECTION TO SITE:
TURN NORTH ON OLD DAIRY ROAD FROM EGAN DRIVE. TURN EAST ON GLACIER HIGHWAY. SITE LOCATION IS AFTER VISTA DEL SOL DRIVE. MILE POINT 0.59 GLACIER HIGHWAY.

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	N/A	2021	5	2

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND PUBLIC FACILITIES

APPLICANT: DOT&PF
FILE: POA–2021–00513
WATERWAY:
SEC. 32 T40S R66E COPPER RIVER MERIDIAN
LAT.: 58.35899
LONG.: –134.545645

DESIGNED BY
CHECKED BY
DRAFTED BY
SCALE
DATE TIME 6/24/2022 12:17 PM
DRAWING LOCATION C:\PWWORKING\WEST01\D2405736\NOV.DWG

Attachment 2:

Disaster Declaration Information

STATE OF ALASKA
DECLARATION OF DISASTER EMERGENCY

WHEREAS, beginning November 30, 2020, a complex weather system producing record rainfall, which continues, and has triggered landslides, mudslides, and flooding across Southeast Alaska; and

WHEREAS, the most severe impacts were multiple large-volume landslides and widespread flooding within the City of Haines and surrounding areas of the Haines Borough, resulting in several missing persons, several destroyed and severely-damaged homes, community evacuations and sheltering of residents and at-risk persons, severe damage to local roads and highways, and severe impacts to community water, power, and communication utilities; and;

WHEREAS, additional storm-related mudslide, landslide, and flooding damages have been reported in the communities of Gustavus, Hoonah, Hyder, Juneau, Petersburg, Skagway, Tenakee Springs, and Wrangell so far, and a full assessment of all damages throughout the affected area has not yet been completed; and,

WHEREAS, the following conditions exist as a result of this disaster: robust interagency search and rescue operations, and other immediate State response assistance needed to alleviate threats; severe damage to highways, roads, drainage systems, power supply, and communications networks; citizens stranded by floodwaters and landslides necessitating rescue; evacuation of residents; damage to personal and real property; damage to local road systems blocking access to communities and residents, necessitating emergency protective measures and temporary repairs; and,

WHEREAS, additional rainfall is expected over the next week that could remobilize saturated and unstable slopes, and likely cause additional landslide and flooding impacts, and these factors will likely hamper on-going rescue, relief, and recovery efforts, as well as endanger responders; and,

WHEREAS, the Haines Borough and City of Gustavus have each issued local declarations of disaster emergency as a result of this storm, and have sought state and/or federal disaster assistance to recover from this event, and

WHEREAS, the severity and magnitude of this emergency are beyond the timely and effective response and recovery capability of local resources, and there are insufficient regularly appropriated local funds to cover these requirements.

THEREFORE, on this 5th day of December 2020, under the authority granted by Alaska Statute 26.23.020(c), I hereby declare that a condition of disaster emergency exists in the entire Southeast Region of Alaska to include Haines Borough, Municipality of Skagway Borough, City and Borough of Juneau, City and Borough of Wrangell, Petersburg Borough, City and Borough of Sitka, Ketchikan Gateway Borough, and the Annette Island, Chatham, and Southeast Island Regional Education Attendance Areas (REAAs), and this condition is of sufficient severity and magnitude to warrant a disaster declaration in order to provide assistance. In addition, as an appropriate life-safety decision, I hereby suspend compliance with all state environmental permitting requirements, in accordance with the authority granted by AS 26.23.220 (g)(1), for the duration of the effective date of this proclamation.

FURTHER, the Commissioner of the Department of Military and Veterans Affairs (DMVA) is hereby authorized to utilize funds made available for these purposes that are considered necessary for disaster assistance, to include disaster Public Assistance and necessary administrative and disaster management expenses. State funds are proposed to be spent under AS 26.23.020(i) and (k) and AS 26.23.050. The Commissioner of DMVA, or his designee, is the designated State Coordinator; and is further authorized to task, as necessary, State departments and agencies in accordance with the State Emergency Operations Plan; and is further authorized to exercise, as necessary, the provisions provided under Alaska Statutes 26.23.020(g)(1), (2), (3), (5), (6), (7) and (9).

FURTHER, I specifically order the suspension of those provisions of Alaska Statutes and regulations relating to any requirement for the Department of Transportation and Public Facilities to: (a) obtain a lease from another state agency prior to entry upon the land; (b) obtain a permit, including land use permits and right-of-way permits, from another state agency prior to entry upon land; (c) obtain water use permits or rights, including temporary rights, from another state agency prior to utilizing such resources; (d) obtain fish habitat permits or special area permits, from another state agency; (e) obtain wastewater disposal permits, from another state agency; (f) obtain Section 106 Reviews pursuant to the National Historic Preservation Act of 1966 from another state agency; provided that the foregoing suspensions do not apply to any specific provision the suspension of which would create a violation of federal law or a violation of a requirement for the provision of federal emergency funding, and the foregoing suspensions may be supplemented by my further order to the director of the Division of Homeland Security and Emergency Management and the Commissioner of the Department of Transportation and Public Facilities.

By: 

Mike Dunleavy
Governor

From: Kanouse, Kate M (DFG)
To: Storey, Benjamin M (DOT)
Cc: Riberio, Tyler S (DOT); Fritz, Evan (DFG)
Subject: Re: Emergency repair efforts in Haines
Date: Monday, December 7, 2020 10:14:20 AM
Attachments: image001.png
12.05.2020-Disaster-Declaration-Southeast-Storm.pdf

Hi Ben -

Good news, the Governor's recent disaster declaration (attached) relieves DOT of seeking ADF&G authorization before working in fish streams and special areas across Southeast. Please track all work completed, and we will follow-up with written permits once you get a handle on things. I cc'd Evan as he is most familiar with Hoonah. Thanks for checking-in!

Kate

From: Storey, Benjamin M (DOT) <benjamin.storey@alaska.gov>
Sent: Monday, December 7, 2020 10:04 AM
To: Kanouse, Kate M (DFG) <kate.kanouse@alaska.gov>
Cc: Albrecht, Gregory T (DFG) <greg.albrecht@alaska.gov>; Riberio, Tyler S (DOT) <tyler.riberio@alaska.gov>; Krull, Dylan P (DFG) <dylan.krull@alaska.gov>
Subject: RE: Emergency repair efforts in Haines

Kate,

May this authority extend to other communities in Southeast that are also facing similar situations? I just got a request from Hoonah M&O to remove material from Dalton Creek (see below and attached photos).

Email request:

Hi Ben attached is pictures of Dalton creek here in Hoonah that filled in during last week rain storm. We need to get in and dig some of the gravel out that has filled in that has the culvert full of rock. On the upstream end of the culvert we would use the material that is dug out to build a ramp that would give us better access in the future. On the downstream side of the culvert the drainage is wide for the size of the creek, our plan is to dig a channel for the creek to flow in and place the material along the sides of the creek to allow for future material washing down stream. I am not sure how well you can see in the downstream picture that the rock that washed through in last weeks event has completely filled it the wide stream bed. I think “Dalton Creek” may be classified as a fish creek. I hope we can get permission to clean this up soon. It will not take much more material to completely block off the flow of water in the pipe. There is water and sewer main lines above the culvert, if the culvert plugs up completely it will take out our main road to the airport and these utility pipes.
Thank you
Kenny

Please let us know if you need any further information,

Ben

From: Kanouse, Kate M (DFG) <kate.kanouse@alaska.gov>
Sent: Friday, December 4, 2020 11:54 AM
To: Storey, Benjamin M (DOT) <benjamin.storey@alaska.gov>
Cc: Albrecht, Gregory T (DFG) <greg.albrecht@alaska.gov>; Riberio, Tyler S (DOT) <tyler.riberio@alaska.gov>; Krull, Dylan P (DFG) <dylan.krull@alaska.gov>

Subject: Re: Emergency repair efforts in Haines

Hi Ben -

Thanks for the notification, I meant to call you yesterday and touch base.

Under emergency authority at AS 16.05.891, I authorize DOT&PF staff to complete work in cataloged anadromous fish streams necessary to maintain critical infrastructure damaged from the recent storm and subsequent landslides and flooding in Haines. When time allows, please provide a description of the work performed at each site/stream so we may issue a fish habitat permit for the work. ADF&G reserves the right to require site modifications for ensuring efficient fish passage at stream crossings and fish habitat stability.

Kate

From: Storey, Benjamin M (DOT) <benjamin.storey@alaska.gov>

Sent: Friday, December 4, 2020 10:41 AM

To: Kanouse, Kate M (DFG) <kate.kanouse@alaska.gov>

Cc: Albrecht, Gregory T (DFG) <greg.albrecht@alaska.gov>; Riberio, Tyler S (DOT) <tyler.riberio@alaska.gov>

Subject: Emergency repair efforts in Haines

Kate,

M&O is out surveying damaged areas today and will be reporting back on future needs at what locations.

Tyler Riberio is the analyst in charge of keeping the environmental record documented as we move forward, and so he'll also be reaching out to y'all should we need to coordinate on permitting any work within anadromous waters.

Thank you for the assistance with this matter,

Ben

Benjamin M. Storey
Regional Environmental Manager/PQI Archaeology
DOT&PF, Southcoast Region
6860 Glacier Highway
Juneau, AK 99811
Phone: 907.465.4509 | Mail: P.O. Box 112506, Juneau, Alaska 99811-2506



The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried out by DOT&PF pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated November 3, 2017 and executed by FHWA and DOT&PF.

Attachment 3:

Planning Documents

Southcoast Flooding FEMA CAT A

Daily Notes-CAT A Documentation

August 24th, 2021
Juneau, AK
Glacier Hwy: Between Fred Meyer and Mile7 DOT Building

Sites

- HDR Site 3393
- HDR Site 3370
- HDR Site 3390
- HDR Site 3379
- New Point- 58.359860N 134.553033W (Near HDR Site 3393)
- New Point- 58.358846N 134.547528W (Near HDR Site 3370)
- New Point- 58.358863N 134.547128W (Near HDR Site 3370)

Equipment and Hours

- 51530 Jet Trailer 9hrs
- 38847 Ford F350 Pickup Truck 9miles
- 51089 Mini Excavator 5hrs

People and Hours

- John Somerlot- 10hrs
- Randy Sutak- 10hrs

Culverts Cleaned- 7

Material Removed: Soil/rocks

DOT&PF Southcoast Region 2020 Storm Response - Daily Debris Tracking

M&O Station: Juneau **FEMA ID AK2021-1**

Route Name: Glacier Highway

Location Description: Glacier Hwy MP 0.34 - MP 0.74

Function Code: Glacier Hwy J1-J4 Fred Meyer JNSERJ1J4

Category ☑ A ☐ B ☐ C

Date: 8/24/21

Employee	Classification	RG	OT
Spencer Gates	Operator		
Richard Asplund	Operator		
Carlos Alonso Martinez	Operator		
Clark Mondich	Operator		
Linda Palmer	Operator		
Lisa Palmer	Operator		
John Somerlot	Operator	10	
Randall Sutak	Operator	10	
Joseph Davis	Operator		
Cody Shaw	Operator		
Robert Henricksen	Operator		

WORK DESCRIPTION (select all that apply)

Note: lat & long are to 4 decimals (111.1111)

Type of Work		lat	long
☐	Debris Clearance start		
	finish		
☑	Debris Removal start	58.3599N	134.5530W
	finish	58.3591N	134.5431W
☐	Ditching start		
	finish		
☐	Fish Culvert cleaned start		
	finish		
☐	Fish Culvert cleaned start		
	finish		
☐	Other (describe below) start		
	finish		

Culverts Cleaned: 7

other description

Equipment Incl Rentals	hours	miles	operator
32038 VME Loader Whl			Select
36245 IHC dump trk			Randall
36723 CSE Loader Whl			Randall
38364 IHC dump trk			Randall
38847 Ford F350 Pickup			Randall
39551 Vol Loader Whl			Randall
39555 Fort F350 Pickup			Randall
40099 Ford F350 Pickup			Randall
40622 10 yd Mac			Randall
40623 10 yd Mac			Randall
40780 CAT 420 Backhoe			Randall
51089 CSE Excavator	5.00		Randall
Other Vehicles: 51530 Jet Trailer	9.00		Randall
Other Vehicles: 38847 Ford f-350 Utility bed		9.00	Randall
Other Vehicles:			Randall
Other Vehicles:			Randall
Other Vehicles:			Randall
Rental:			Randall
Rental:			Select

Debris Type

☑ Soil/Rock
☐ Vegetation/Trees
☐ Other

Other description:

DEBRIS DISPOSAL LOCATION

Temporary

GPS coords lat long

location description

quantity (CY):

Permanent

GPS coords lat long

location description

quantity (CY):

To save, in the upper left corner click on **File** and select **Save As**. Save file with location name & current date.

Southcoast Flooding FEMA CAT A

Daily Notes-CAT A Documentation

August 25th, 2021
Juneau, AK
Glacier Hwy: Between Fred Meyer and Mile7 DOT Building

Sites

- HDR Site 3390
- New Point- 58.359860N 134.553033W (Near HDR Site 3393)
- HDR Site 3370
- HDR Site 3379
- New Point- 58.358933N 134.541798W (Near HDR Site 3396)
- New Point- 58.3359043N 134.543620W (Near HDR Site 3379)

Equipment and Hours

- 39555 Ford F350 Pickup Truck 10miles
- 51089 Mini Excavator 8hrs
- Chain Saw 1hrs

People and Hours

- John Somerlot- 10hrs
- Robert Henricksen- 10hrs

Contracts:

- Wayne Smith- Vac Truck

Culverts Cleaned- 3

Material Removed: Soil/rocks

DOT&PF Southcoast Region 2020 Storm Response - Daily Debris Tracking

M&O Station: Juneau **FEMA ID AK2021-1**

Route Name: Glacier Highway

Location Description: Glacier Hwy MP 0.34 - MP 0.74

Function Code: Glacier Hwy J1-J4 Fred Meyer JNSERJ1J4

Category ☑ A ☐ B ☐ C

Date: 8/24/21

Employee	Classification	RG	OT
Spencer Gates	Operator		
Richard Asplund	Operator		
Carlos Alonso Martinez	Operator		
Clark Mondich	Operator		
Linda Palmer	Operator		
Lisa Palmer	Operator		
John Somerlot	Operator	10	
Randall Sutak	Operator	10	
Joseph Davis	Operator		
Cody Shaw	Operator		
Robert Henricksen	Operator		

WORK DESCRIPTION (select all that apply)

Note: lat & long are to 4 decimals (111.1111)

Type of Work		lat	long
☐	Debris Clearance start		
	finish		
☑	Debris Removal start	58.3599N	134.5530W
	finish	58.3591N	134.5431W
☐	Ditching start		
	finish		
☐	Fish Culvert cleaned start		
	finish		
☐	Fish Culvert cleaned start		
	finish		
☐	Other (describe below) start		
	finish		

Culverts Cleaned: 7

other description

Equipment Incl Rentals	hours	miles	operator
32038 VME Loader Whl			Select
36245 IHC dump trk			Select
36723 CSE Loader Whl			Select
38364 IHC dump trk			Select
38847 Ford F350 Pickup			Select
39551 Vol Loader Whl			Select
39555 Fort F350 Pickup			Select
40099 Ford F350 Pickup			Select
40622 10 yd Mac			Select
40623 10 yd Mac			Select
40780 CAT 420 Backhoe			Select
51089 CSE Excavator	5.00		John
Other Vehicles: 51530 Jet Trailer	9.00		Randall
Other Vehicles: 38847 Ford f-350 Utility bed		9.00	Randall
Other Vehicles:			Select
Other Vehicles:			Select
Other Vehicles:			Select
Rental:			Select
Rental:			Select

Debris Type

☑ Soil/Rock
☐ Vegetation/Trees
☐ Other

Other description:

DEBRIS DISPOSAL LOCATION

Temporary

GPS coords lat long

location description

quantity (CY):

Permanent

GPS coords lat long

location description

quantity (CY):

To save, in the upper left corner click on **File** and select **Save As**. Save file with location name & current date.

Southcoast Flooding FEMA CAT A

Daily Notes-CAT A Documentation

August 26th, 2021
Juneau, AK
Glacier Hwy: Between Fred Meyer and Mile7 DOT Building

Sites

- HDR Site 3390
- HDR Site 3379
- New Point- 58.358933N 134.541798W (Near HDR Site 3396)
    - 24" of rusted/busted culvert outlet cut off
- HDR Site 3396
- New Point- 58.358935N 134.539729W
- HDR Site 3389
- HDR Site 3395

Equipment and Hours

- 39555 Ford F350 Pickup Truck 8miles
- 51089 Mini Excavator 10hrs
- 40622 10yd Mack Truck 4hrs
- 8 loads placed at HDR Site 3396 for excavator access culvert cleanouts
- 39551 Volvo Loader 2hrs
- Metal Saw Cutter 0.5hrs

People and Hours

- John Somerlot- 10hrs
- Robert Henricksen- 10hrs

Contracts:

- Wayne Smith- Vac Truck

Culverts Cleaned- 7

Material Removed: Soil/rocks

DOT&PF Southcoast Region 2020 Storm Response - Daily Debris Tracking

M&O Station: Juneau **FEMA ID AK2021-1**

Route Name: Glacier Highway

Location Description: Glacier Hwy MP 0.34 - MP 0.74

Function Code: Glacier Hwy J1-J4 Fred Meyer JNSERJ1J4

Category ☑ A ☐ B ☐ C

Date: 8/24/21

Employee	Classification	RG	OT
Spencer Gates	Operator		
Richard Asplund	Operator		
Carlos Alonso Martinez	Operator		
Clark Mondich	Operator		
Linda Palmer	Operator		
Lisa Palmer	Operator		
John Somerlot	Operator	10	
Randall Sutak	Operator	10	
Joseph Davis	Operator		
Cody Shaw	Operator		
Robert Henricksen	Operator		

WORK DESCRIPTION (select all that apply)

Note: lat & long are to 4 decimals (111.1111)

Type of Work		lat	long
☐	Debris Clearance start		
	finish		
☑	Debris Removal start	58.3599N	134.5530W
	finish	58.3591N	134.5431W
☐	Ditching start		
	finish		
☐	Fish Culvert cleaned start		
	finish		
☐	Fish Culvert cleaned start		
	finish		
☐	Other (describe below) start		
	finish		

Culverts Cleaned: 7

other description

Equipment Incl Rentals	hours	miles	operator
32038 VME Loader Whl			Select
36245 IHC dump trk			Select
36723 CSE Loader Whl			Select
38364 IHC dump trk			Select
38847 Ford F350 Pickup			Select
39551 Vol Loader Whl			Select
39555 Fort F350 Pickup			Select
40099 Ford F350 Pickup			Select
40622 10 yd Mac			Select
40623 10 yd Mac			Select
40780 CAT 420 Backhoe			Select
51089 CSE Excavator	5.00		John
Other Vehicles: 51530 Jet Trailer	9.00		Randall
Other Vehicles: 38847 Ford f-350 Utility bed		9.00	Randall
Other Vehicles:			Select
Other Vehicles:			Select
Other Vehicles:			Select
Rental:			Select
Rental:			Select

Debris Type

☑ Soil/Rock
☐ Vegetation/Trees
☐ Other

Other description:

DEBRIS DISPOSAL LOCATION

Temporary

GPS coords lat long

location description

quantity (CY):

Permanent

GPS coords lat long

location description

quantity (CY):

To save, in the upper left corner click on **File** and select **Save As**. Save file with location name & current date.

Southcoast Flooding FEMA CAT A

Daily Notes-CAT A Documentation

August 30th, 2021
Juneau, AK
Glacier Hwy: Between Fred Meyer and Mile7 DOT Building

Sites

- New Point- 58.358857N 134.535660W
- New Point- 58.358796N 134.533084W
- New Point- 58.358890N 134.530390W
- New Point- 58.358914N 134.529363W

Equipment and Hours

- 39555 Ford F350 Pickup Truck 4miles
- 51089 Mini Excavator 3hrs

People and Hours

- Robert Henricksen- 4hrs
- Cody Shaw- 4hrs

Culverts Cleaned- 0

- Made sumps for culverts to be jetted later

Material Removed: Soil/rocks and Vegetation/trees

DOT&PF Southcoast Region 2020 Storm Response - Daily Debris Tracking

M&O Station: Juneau **FEMA ID AK2021-1**

Route Name: Glacier Highway

Location Description: Glacier Hwy MP 0.34 - MP 0.74

Function Code: Glacier Hwy J1-J4 Fred Meyer JNSERJ1J4

Category ☑ A ☐ B ☐ C

Date: 8/24/21

Employee	Classification	RG	OT
Spencer Gates	Operator		
Richard Asplund	Operator		
Carlos Alonso Martinez	Operator		
Clark Mondich	Operator		
Linda Palmer	Operator		
Lisa Palmer	Operator		
John Somerlot	Operator	10	
Randall Sutak	Operator	10	
Joseph Davis	Operator		
Cody Shaw	Operator		
Robert Henricksen	Operator		

WORK DESCRIPTION (select all that apply)

Note: lat & long are to 4 decimals (111.1111)

Type of Work		lat	long
☐	Debris Clearance start		
	finish		
☑	Debris Removal start	58.3599N	134.5530W
	finish	58.3591N	134.5431W
☐	Ditching start		
	finish		
☐	Fish Culvert cleaned start		
	finish		
☐	Fish Culvert cleaned start		
	finish		
☐	Other (describe below) start		
	finish		

Culverts Cleaned: 7

other description

Equipment Incl Rentals	hours	miles	operator
32038 VME Loader Whl			Select
36245 IHC dump trk			Select
36723 CSE Loader Whl			Select
38364 IHC dump trk			Select
38847 Ford F350 Pickup			Select
39551 Vol Loader Whl			Select
39555 Fort F350 Pickup			Select
40099 Ford F350 Pickup			Select
40622 10 yd Mac			Select
40623 10 yd Mac			Select
40780 CAT 420 Backhoe			Select
51089 CSE Excavator	5.00		John
Other Vehicles: 51530 Jet Trailer	9.00		Randall
Other Vehicles: 38847 Ford f-350 Utility bed		9.00	Randall
Other Vehicles:			Select
Other Vehicles:			Select
Other Vehicles:			Select
Rental:			Select
Rental:			Select

Debris Type

☑ Soil/Rock
☐ Vegetation/Trees
☐ Other

Other description:

DEBRIS DISPOSAL LOCATION

Temporary

GPS coords lat long

location description

quantity (CY):

Permanent

GPS coords lat long

location description

quantity (CY):

To save, in the upper left corner click on **File** and select **Save As**. Save file with location name & current date.

Southcoast Flooding FEMA CAT A

Daily Notes-CAT A Documentation

August 31st, 2021
Juneau, AK
Glacier Hwy: Between Fred Meyer and Mile7 DOT Building

Sites

- New Point- 58.358857N 134.535660W

Equipment and Hours

- 39555 Ford F350 Pickup Truck 1mile

People and Hours

- Robert Henricksen- 1hrs
- Cody Shaw- 1hrs

Contracts:

- Wayne Smith- Vac Truck

Culverts Cleaned- 1
Material Removed: Soil/rocks

Channel Vista Drive: Mpt 0.05-0.34

Sites

- HDR Site 3394
- HDR Site 3399 *Site 3399 and 3367 are the same pipe- 3399 is the inlet, 3367 is the outlet*
- HDR Site 3367 *Site 3399 and 3367 are the same pipe- 3399 is the inlet, 3367 is the outlet*
- HDR Site 3385
- New Point- 58.321685N 134.455791W
- HDR Site 3384

Equipment and Hours

- 39555 Ford F350 Pickup Truck 8Miles
- 51089 CSE Excavator 8hrs
- 36245International 10yd 8hrs
- 35590 Trailer for hauling Excavator 8hrs

People and Hours

- Robert Henricksen- 9hrs
- Cody Shaw- 9hrs
- Linda Palmer- 4hr

Contracts:

- Wayne Smith- Vac Truck

Culverts Cleaned- 5

50 CY temporary location HDR Site 3373 58.319585N 134.452899W
Material Removed: Soil/rocks

DOT&PF Southcoast Region 2020 Storm Response - Daily Debris Tracking

M&O Station: Juneau **FEMA ID AK2021-1**

Route Name: Glacier Highway

Location Description: Glacier Hwy MP 0.34 - MP 0.74

Function Code: Glacier Hwy J1-J4 Fred Meyer JNSERJ1J4

Category ☑ A ☐ B ☐ C

Date: 8/24/21

Employee	Classification	RG	OT
Spencer Gates	Operator		
Richard Asplund	Operator		
Carlos Alonso Martinez	Operator		
Clark Mondich	Operator		
Linda Palmer	Operator		
Lisa Palmer	Operator		
John Somerlot	Operator	10	
Randall Sutak	Operator	10	
Joseph Davis	Operator		
Cody Shaw	Operator		
Robert Henricksen	Operator		

WORK DESCRIPTION (select all that apply)

Note: lat & long are to 4 decimals (111.1111)

Type of Work		lat	long
☐	Debris Clearance start		
	finish		
☑	Debris Removal start	58.3599N	134.5530W
	finish	58.3591N	134.5431W
☐	Ditching start		
	finish		
☐	Fish Culvert cleaned start		
	finish		
☐	Fish Culvert cleaned start		
	finish		
☐	Other (describe below) start		
	finish		

Culverts Cleaned: 7

other description

Equipment Incl Rentals	hours	miles	operator
32038 VME Loader Whl			Select
36245 IHC dump trk			Select
36723 CSE Loader Whl			Select
38364 IHC dump trk			Select
38847 Ford F350 Pickup			Select
39551 Vol Loader Whl			Select
39555 Fort F350 Pickup			Select
40099 Ford F350 Pickup			Select
40622 10 yd Mac			Select
40623 10 yd Mac			Select
40780 CAT 420 Backhoe			Select
51089 CSE Excavator	5.00		John
Other Vehicles: 51530 Jet Trailer	9.00		Randall
Other Vehicles: 38847 Ford f-350 Utility bed		9.00	Randall
Other Vehicles:			Select
Other Vehicles:			Select
Other Vehicles:			Select
Rental:			Select
Rental:			Select

Debris Type

☑ Soil/Rock
☐ Vegetation/Trees
☐ Other

Other description:

DEBRIS DISPOSAL LOCATION

Temporary

GPS coords lat long

location description

quantity (CY):

Permanent

GPS coords lat long

location description

quantity (CY):

To save, in the upper left corner click on **File** and select **Save As**. Save file with location name & current date.

Southcoast Flooding FEMA CAT A

Daily Notes-CAT A Documentation

September 8th, 2021
Juneau, AK

Glacier Hwy: Mpt 0.24 and Channel Vista Drive: MPT 0.15

Sites

- HDR Site 3388
- Point 58.316507N 134.449736W
- HDR Site 3385

Equipment and Hours

- 39555 Ford F350 Pickup Truck 20hrs
- 35590 Trailer 1hr
- 51089 Excavator 4hrs
- 40622 Mack 10yd 1hr

People and Hours

- Robert Henricksen- 5hrs
- Cody Shaw- 5hrs

Contracts:

- Wayne Smith- Vac Truck (5hrs)

Culverts Cleaned: 2

Material Removed: Soil/rocks

Glacier Hwy: MPt 0.11-0.25

Sites

- HDR Site 3366
- HDR Site3372
- HDR Site 3376

Equipment and Hours

- 39555 Ford F350 Pickup Truck 10miles
- 40780 CAT 420 Backhoe 1hr

People and Hours

- Robert Henricksen- 5hrs
- Cody Shaw- 5hrs

Glacier Hwy: MPt 0.11-0.25 (Continued)

Contracts:

- Wayne Smith- Vac Truck (3hrs)

Culverts Cleaned: 3

Material Removed: Soil/rocks

Eagan Drive: Infront of Fred Meyer

Sites

- GPS: 58.358497N 134.560843W to 58.359972N 134.566914W

Equipment and Hours

- 38847 Pickup Truck 15miles
- 35590 Trailer 1hr
- 40622 Mack 10yd 1.5hr
- 40623 Mack 10yd 9hr
- 36245 International 10yd 7hr
- 38364 International 10yd 9hr

Rented Equipment

- 13548- JD 135 Excavator- Tyler Rental 1day

People and Hours

- Richard Asplund- 10hrs
- Clark Mondich- 10hrs
- Linda Palmer- 10hrs
- Lisa Palmer- 10hrs

Material Removed: Soil/rocks and Vegetation

Debris moved to permanent location: 550 CY 58.356863N 134.557224W Across from Fred Meyer

55 10yd loads

DOT&PF Southcoast Region 2020 Storm Response - Daily Debris Tracking

M&O Station: Juneau **FEMA ID AK2021-1**

Route Name: Glacier Highway

Location Description: Glacier Hwy MP 0.34 - MP 0.74

Function Code: Glacier Hwy J1-J4 Fred Meyer JNSERJ1J4

Category ☑ A ☐ B ☐ C

Date: 8/24/21

Employee	Classification	RG	OT
Spencer Gates	Operator		
Richard Asplund	Operator		
Carlos Alonso Martinez	Operator		
Clark Mondich	Operator		
Linda Palmer	Operator		
Lisa Palmer	Operator		
John Somerlot	Operator	10	
Randall Sutak	Operator	10	
Joseph Davis	Operator		
Cody Shaw	Operator		
Robert Henricksen	Operator		

WORK DESCRIPTION (select all that apply)

Note: lat & long are to 4 decimals (111.1111)

Type of Work		lat	long
☐	Debris Clearance start		
	finish		
☑	Debris Removal start	58.3599N	134.5530W
	finish	58.3591N	134.5431W
☐	Ditching start		
	finish		
☐	Fish Culvert cleaned start		
	finish		
☐	Fish Culvert cleaned start		
	finish		
☐	Other (describe below) start		
	finish		

Culverts Cleaned: 7

other description

Equipment Incl Rentals	hours	miles	operator
32038 VME Loader Whl			Select
36245 IHC dump trk			Select
36723 CSE Loader Whl			Select
38364 IHC dump trk			Select
38847 Ford F350 Pickup			Select
39551 Vol Loader Whl			Select
39555 Fort F350 Pickup			Select
40099 Ford F350 Pickup			Select
40622 10 yd Mac			Select
40623 10 yd Mac			Select
40780 CAT 420 Backhoe			Select
51089 CSE Excavator	5.00		John
Other Vehicles: 51530 Jet Trailer	9.00		Randall
Other Vehicles: 38847 Ford f-350 Utility bed		9.00	Randall
Other Vehicles:			Select
Other Vehicles:			Select
Other Vehicles:			Select
Rental:			Select
Rental:			Select

Debris Type

☑ Soil/Rock
☐ Vegetation/Trees
☐ Other

Other description:

DEBRIS DISPOSAL LOCATION

Temporary

GPS coords lat long

location description

quantity (CY):

Permanent

GPS coords lat long

location description

quantity (CY):

To save, in the upper left corner click on **File** and select **Save As**. Save file with location name & current date.

Southcoast Flooding FEMA CAT A

Daily Notes-CAT A Documentation

September 9th, 2021
Juneau, AK

Glacier Hwy: Mpt 0.24- Design North

Sites

- HDR Site 3388
- Point 58.316507N 134.449736W

Equipment and Hours

- 38364 IHC Dump Truck 1hr
- 35590 Trailer 2hr
- 36245 International 10yd 2hrs
- RENTED Excavator 13548 2hrs

People and Hours

- Richard A.- 2hrs
- Linda Palmer- 2hrs
- Lisa Palmer- 1hr

Material Removed: Soil/rocks

Glacier Hwy: MPt 0.11-0.25

Sites

- HDR Site 3366
- HDR Site3372
- HDR Site 3376

Equipment and Hours

- 39555 Ford F350 Pickup Truck 7miles
- 50189 Excavator 5.5hrs
- 40622 Mack 10yd 5.5hrs
- Trailer 2hrs

People and Hours

- Robert Henricksen- 7.5hrs
- Cody Shaw- 7.5hrs

Glacier Hwy: MPt 0.11-0.25 (Continued)

Contracts:

- Wayne Smith- Vac Truck (3hrs)

Material Removed: Soil/rocks

Debris moved to permanent location: 10 CY 58.356863N 134.557224W Across from Fred Meyer

50 CY DOT&PF Mile 7 Building

6 10yd loads total

Eagan Drive: Infront of Fred Meyer

Sites

- GPS: 58.358497N 134.560843W to 58.359972N 134.566914W

Equipment and Hours

- 35590 Trailer 1hr
- 40623 Mack 10yd 8hr
- 36245 International 10yd 7hr
- 38364 International 10yd 6hr
- 13548 RENTED Excavator 7hrs

Rented Equipment

- 13548- JD 135 Excavator- Tyler Rental 1day

People and Hours

- Richard Asplund- 8hrs
- Clark Mondich- 7hrs
- Linda Palmer- 8hrs
- Lisa Palmer- 9hrs

Material Removed: Soil/rocks and Vegetation

Debris moved to permanent location: 270 CY 58.356863N 134.557224W Across from Fred Meyer

27 10yd loads

DOT&PF Southcoast Region 2020 Storm Response - Daily Debris Tracking

M&O Station: Juneau **FEMA ID AK2021-1**

Route Name: Glacier Highway

Location Description: Glacier Hwy MP 0.34 - MP 0.74

Function Code: Glacier Hwy J1-J4 Fred Meyer JNSERJ1J4

Category ☑ A ☐ B ☐ C

Date: 8/24/21

Employee	Classification	RG	OT
Spencer Gates	Operator		
Richard Asplund	Operator		
Carlos Alonso Martinez	Operator		
Clark Mondich	Operator		
Linda Palmer	Operator		
Lisa Palmer	Operator		
John Somerlot	Operator	10	
Randall Sutak	Operator	10	
Joseph Davis	Operator		
Cody Shaw	Operator		
Robert Henricksen	Operator		

WORK DESCRIPTION (select all that apply)

Note: lat & long are to 4 decimals (111.1111)

Type of Work		lat	long
☐	Debris Clearance start		
	finish		
☑	Debris Removal start	58.3599N	134.5530W
	finish	58.3591N	134.5431W
☐	Ditching start		
	finish		
☐	Fish Culvert cleaned start		
	finish		
☐	Fish Culvert cleaned start		
	finish		
☐	Other (describe below) start		
	finish		

Culverts Cleaned: 7

other description

Equipment Incl Rentals	hours	miles	operator
32038 VME Loader Whl			Select
36245 IHC dump trk			Select
36723 CSE Loader Whl			Select
38364 IHC dump trk			Select
38847 Ford F350 Pickup			Select
39551 Vol Loader Whl			Select
39555 Fort F350 Pickup			Select
40099 Ford F350 Pickup			Select
40622 10 yd Mac			Select
40623 10 yd Mac			Select
40780 CAT 420 Backhoe			Select
51089 CSE Excavator	5.00		John
Other Vehicles: 51530 Jet Trailer	9.00		Randall
Other Vehicles: 38847 Ford f-350 Utility bed		9.00	Randall
Other Vehicles:			Select
Other Vehicles:			Select
Other Vehicles:			Select
Rental:			Select
Rental:			Select

Debris Type

☑ Soil/Rock
☐ Vegetation/Trees
☐ Other

Other description:

DEBRIS DISPOSAL LOCATION

Temporary

GPS coords lat long

location description

quantity (CY):

Permanent

GPS coords lat long

location description

quantity (CY):

To save, in the upper left corner click on **File** and select **Save As**. Save file with location name & current date.

Attachment 4:

Site Photographs

Site 1 Outlet- North View



Site 1 Outlet- South View



Site 1 Outlet- East View



Site 1 Outlet- North View Closeup



Site 2 Outlet- North view



Site 2 Outlet- South View



Site 2 Outlet East View



Site 4 Outlet- South View



Site 4 Outlet West View



Site 4 Outlet- North View



Site 5 Outlet- South View



Site 5 Outlet- South Close view



Site 5 Outlet- North View



Site 5 Outlet- Outlet closeup



Site 6 Outlet- Ditching



Site 6 Outlet- North View



Site 6 Outlet- Ditching



Site 6 Outlet- Ditching Closeup



Site 7 Outlet- Sump



Site 7 Outlet- South View



Site 7 Outlet Debris



Site 8- 24” pipe material removed



Site 8 Outlet- South View



Site 8 Outlet- Excavator Access



Site 9 Inlet- East View



Site 9 Outlet- Jetting



Site 9 Outlet- South View



Site 10 Outlet- South View



Site 10 Outlet- North View



Site 10 Outlet- West view



Site 11- No Work Done



Site 12 Outlet- North View



Site 12 Outlet- Jetting



Site 12 Inlet- Debris Removal



Site 13 Outlet- Material in Culvert



Site 13 Outelt- South View



Site 14 Outlet- South View



Site 14 Outlet- Close up



Site 14 Outlet- South View



Site 15 Inlet- Close up



Site 15 Inlet- South View



Site 16 Inlet- East View



Site 16 Outlet- South View



Site 16 Inlet- Debris Removal



Site 16 Inlet- Debris Removal



Site 18 & 19 Ditching Start



Site 18 & 19 Ditching Start



Site 18 & 19 Ditching Start



Site 18 & 19 Ditching Start



Site 18 & 19 Ditching End



Site 18 & 19 Ditching End



Site 18 & 19 Ditching End



Site 18 & 19 Ditching Middle



EXHIBIT CX 09
Corps Referral Letter to Complainant

DEPARTMENT OF THE ARMY
ALASKA DISTRICT, U.S. ARMY CORPS OF ENGINEERS
REGULATORY DIVISION
P.O. BOX 22270
JUNEAU, AK 998022270

December 7, 2022

Regulatory Division
POA-2018-00155

Ms. Michele “Mickey” Jencius
Surface Water Enforcement Section Chief
1200 Sixth Avenue, Suite 900, (20-C04)
Seattle, Washington 98101

Dear Ms. Jencius:

This regards the U.S. Army Corps of Engineers (USACE), Section 404, Clean Water Act, Regulatory Program file number POA-2018-00155, Gastineau Channel, concerning the unauthorized discharge of dredged and fill material in waters of the United States, including wetlands. The unauthorized work was done by the Alaska Department of Transportation and Public Facilities (ADOT&PF) and consisted of the excavation and discharge of accumulated sediments into wetlands and a tributary to those wetlands within the vicinity of the existing roadway drainage culverts.

The unauthorized work is located within Section 32, T. 40 S., R. 66 E., Copper River Meridian; USGS Quad Map Juneau B-2; Latitude 58.358732 º N., Longitude 134.545416 º W.; within the Old Glacier Highway ADOT&PF right-of-way, between the ADOT&PF facility and the entrance to the Vista Del Sol Subdivision, in Juneau, Alaska.

On October 13, 2021, the USACE determined that neither a Section 404(f) exemption applied nor was the work authorized by a permit. Consequently, the work is in violation of Section 301 of the Clean Water Act. The USACE sent the ADOT&PF a Notice of Violation on October 14, 2021.

Based on our review of the information gathered during our initial investigation, it is our determination that this violation meets the criteria for referral in our current Field Level Agreement between the Alaska District U.S. Army Corps of Engineers and the Environmental Protection Agency (Region 10) Concerning the Coordination of Federal Enforcement actions Under Section 404 of the Clean Water Act.

In accordance with your December 6, 2022, request, we are forwarding this case to you for action as the lead enforcement agency. Please keep us advised as to your action on this matter.

Please contact Randal Vigil by email at Randal.P.Vigil@usace.army.mil, by mail at the address above, or by phone at (907) 201-5022, if you have questions.

Sincerely,

Shannon L. Johnson

Shannon L. Johnson
Chief, South Branch

EXHIBIT CX 10
2010 Consent Decree

IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF ALASKA

UNITED STATES OF AMERICA, Plaintiff, v. STATE OF ALASKA, DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES, Defendant, v. KACHEMAK HERITAGE LAND TRUST, A party in interest.	Case No. 3:10-cv-00115-JWS **JUDGMENT ON CONSENT DECREE**

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INTRODUCTION

A. Plaintiff, the United States of America, on behalf of the United States Environmental Protection Agency ("EPA"), filed the Complaint in this matter against the State of Alaska, Department of Transportation & Public Facilities ("DOT&PF"), alleging that DOT&PF violated Section 301(a) of the Clean Water Act ("CWA" or "Act"), 33 U.S.C. § 1311(a).

B. The Complaint alleges that DOT&PF violated CWA Section 301 by: (1) failing to comply with a Federal Storm Water Construction General Permit, which was applicable during the pendency of the construction activities identified in the Complaint; and (2) discharging dredged or fill material and/or controlling and directing the discharge of dredged or fill material into waters of the United States at 10 sites located on the Kenai Peninsula, Alaska (the "Section 404 Sites") as more fully described in the Complaint, without authorization through the United States Army Corps of Engineers (the "Corps").

C. DOT&PF neither admits nor denies the allegations in the Complaint and nothing in this Decree shall constitute or be construed as an admission of liability, fact or law, or of any wrongdoing on the part of DOT&PF.

D. The United States and DOT&PF have consented to the entry of this Decree without trial of any issues.

E. The parties to this Consent Decree agree that this Decree is not intended to be used in subsequent litigation to establish either a point of law or fact; provided, however, that the foregoing shall in no way affect the binding nature of this Decree or the parties' respective obligations pursuant to this Decree, nor shall the parties be precluded from establishing the

existence or content of this Decree in either subsequent litigation or subsequent proceedings in this lawsuit where the terms or existence of the Decree may be at issue, including, without limitation, any action to enforce the terms of this Decree. This Decree does not create any rights, implied or otherwise, in any third parties not specifically identified.

F. These parties recognize, and this Court finds by entering this Decree, that the parties have negotiated this Decree in good faith, that implementation of this Decree will avoid prolonged and complicated litigation between these parties, and that it is fair, reasonable, and in the public interest.

G. Kachemak Heritage Land Trust ("KHLT") is a non-profit organization established to preserve, for public benefit, land with significant natural, recreational, or cultural values on the Kenai Peninsula.

H. KHLT was not involved with the activities of DOT&PF that gave rise to the allegations in the Complaint, but has consented to be added as a party to this case and be bound by this Consent Decree solely for purposes of performing its obligations under Section VI below, Mitigation Contribution for Environmental Protection.

I. The alleged Section 404 violations arose in connection with work initiated by DOT&PF to address damage caused by two 100-year floods that occurred in October and November, 2002.

J. The parties desire to resolve the alleged Section 404 violations without affecting the processing of DOT&PF's CWA Section 404 permit application for the replacement of the Ninilchik Bridge, to which the normal permitting procedures will be applied without special consideration given to the alleged violations being resolved in this Consent Decree.

THEREFORE, before the taking of any testimony upon the pleadings, without further adjudication or admission of any issue of fact or law, and upon consent and agreement of the parties, it is hereby ORDERED, ADJUDGED and DECREED as follows:

I. JURISDICTION AND VENUE

1. This Court has jurisdiction over the subject matter of these actions and over the parties pursuant to 28 U.S.C. §§ 1331, 1345, and 1355, and Section 309(b) of the CWA, 33 U.S.C. § 1319(b).

2. Venue is proper in the District of Alaska pursuant to CWA Section 309(b), 33 U.S.C. § 1319(b), and 28 U.S.C. §§ 1391(b) and (c), because Defendant is the state government located in this District, the subject properties are located in this District, and the causes of action alleged herein arose in this District.

3. The Complaint states claims upon which relief can be granted pursuant to Sections 301, 309, 402 and 404, of the CWA, 33 U.S.C. §§ 1311, 1319, 1342, and 1344.

II. DEFINITIONS

4. Except as specifically provided in this Decree, definitions for the terms used in this Decree shall be incorporated from the Clean Water Act and the regulations promulgated pursuant to that Act. Whenever terms listed below are used in this Decree the following definitions apply:

a. "404 Permit" means a Clean Water Act section 404, 33 U.S.C. § 1344, permit issued by the Corps.

b. "Action Item" means a condition that requires action to be taken to achieve or maintain compliance with the requirements of the CGP, as defined herein, and this Consent Decree.

c. "Active Project" means any Project for which DOT&PF has filed a Notice of Intent for coverage under a CGP, as defined herein, but has not yet filed a Notice of Termination with the relevant permitting authority.

d. "AK-CESCL Training Program" means Alaska Certified Erosion and Sediment Control Lead Storm Water Training Program developed under a Memorandum of Understanding among the Associated General Contractors of Alaska, Associated Builders and Contractors of Alaska, DOT&PF, the Corps, Alaska Department of Environmental Conservation ("ADEC"), Alaska Department of Natural Resources, Alaska Railroad Corporation, and the Municipality of Anchorage. An outline of the AK-CESCL training course is attached as Appendix A.

e. "Best Management Practices" or "BMPs" shall have the meaning ascribed to it in the CGP.

f. "CGP" means either the Federal Storm Water Construction General Permits issued by EPA and published on July 1, 2003 (68 Fed. Reg. 39087 - 39091) and any reissuance or modification thereof, or a stormwater construction general permit issued by ADEC after the state is delegated NPDES permitting authority for stormwater discharges, whichever is applicable.

g. "CGP Inspection Report" means the self-inspection report required by Paragraph 7.c. of this Consent Decree.

h. "CWA" means the Clean Water Act as amended under 33 U.S.C. §§ 1251-1387 (2009).

i. "Construction Activities" refers to construction activities regulated under the CGP, and includes the disturbance of soils associated with clearing, grading, or excavating activities, or other construction-related activities.

j. "Contractor" means the general contractor retained by DOT&PF for performance of the construction contract at a Project who is in operational control of day-to-day Construction Activities at the project.

k. "Contractor's Superintendent" means the Contractor's employee or representative charged with the supervision or completion of construction at a Project.

l. "Contractor's SWPPP Manager" means the Contractor's employee or representative who conducts CGP inspections at an Active Project, pursuant to the CGP and this Consent Decree.

m. "DOT&PF Project Engineer" means an employee or representative who is the authorized representative of the DOT&PF contracting officer and is responsible for the administration of the construction contract at a Project.

n. "DOT&PF Regional Stormwater Specialist" means a DOT&PF employee or representative who provides compliance assistance related to the CGP within a specified DOT&PF region.

o. "DOT&PF Stormwater Inspector" means a DOT&PF employee or representative who conducts inspections as required by a CGP and this Consent Decree.

p. "Interim Stormwater Training" means the erosion and sediment control training available from DOT&PF that is provided to newly employed, transferred, assigned, or contracted DOT&PF Regional Stormwater Specialists, Project Engineers, and Stormwater Inspectors, as required by Paragraph 5.a. of this Consent Decree. An outline of the Interim Stormwater Training course is attached as Appendix B.

q. "Project" means any location in the State of Alaska that is subject to Construction Activities by DOT&PF, where

(1) DOT&PF has operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or

(2) DOT&PF has operational control as defined in the CGP of day-to-day activities which are necessary to ensure compliance with a SWPPP or other CGP conditions.

r. "Sites" means the thirteen (13) locations specified in the Complaint at which DOT&PF allegedly committed violations of the CWA.

s. "Section 402 Sites" means the three (3) locations specified in the Complaint at which DOT&PF allegedly violated CWA sections 301 and 402, 33 U.S.C. §§ 1311, 1342.

t. "Section 404 Sites" means the ten (10) locations specified in the Complaint at which DOT&PF allegedly violated CWA sections 301 and 404, 33 U.S.C. §§ 1311, 1344.

u. "Seasonal Thaw" means the annual recurrence of snow and ice melting at a Project after a prolonged period of freezing conditions.

v. "SWPPP" means a Storm Water Pollution Prevention Plan as described in the CGP.

III. COMPLIANCE PROGRAM

5. Training:

a. *Training for DOT&PF*. All DOT&PF Regional Stormwater Specialists, Project Engineers, and Stormwater Inspectors will attend and be certified in the AK-CESCL training described in Appendix A or demonstrate completion of a course that meets or exceeds the requirements of the AK-CESCL Training Program, within six (6) months of date of entry of this Decree, and before performing their duties related to this Consent Decree at any Project. However, if they have not received AK-CESCL training, newly employed, transferred, assigned, or contracted DOT&PF Regional Stormwater Specialists and Project Engineers assigned to any Project must, at a minimum, receive Interim Stormwater Training (which may be web-based modules) before performing their duties related to this Consent Decree at any Project, and within ninety (90) days of their employment or contract with DOT&PF. An outline of the Interim Stormwater Training course is attached as Appendix B. Newly employed, transferred, assigned, or contracted DOT&PF Regional Stormwater Specialists and Project Engineers must attend and be certified in the AK-CESCL Training Program within six (6) months of their new employment, transfer, contract or assignment. All DOT&PF Stormwater Inspectors shall receive AK-CESCL or equivalent training, as provided by Paragraph 5.d., prior to performing their duties related to this Consent Decree at any Project and no later than six (6) months of their new employment, transfer, contract or assignment. All DOT&PF Regional Stormwater Specialists, Project Engineers, and Stormwater Inspectors assigned to any Project must be re-certified in the AK-

CESCL Training Program or equivalent every three (3) years, prior to performing their duties under this Consent Decree.

b. *Training for Contractors.* DOT&PF standard contract specifications shall provide that Contractor's Superintendents and Contractor's SWPPP Managers shall have current AK-CESCL or equivalent certification before performing their duties at any Project. DOT&PF standard contract specifications shall provide that current certification requires either recertification every three (3) years under the AK-CESCL Training Program or comparable recertification under an equivalent course as set forth in Paragraph 5.d.

c. *Modification to AK-CESCL Training Program.* Any major modification to the AK-CESCL Training Program described in this Decree must receive the approval of the EPA's NPDES Compliance Officer specified in Paragraph 35 (Notification). An outline of the AK-CESCL Training Program, entitled Course Elements, is attached at Appendix A. Major modifications are the (a) elimination of any training module, (b) decrease in the number of training hours required for certification, (c) lowering of testing requirements, (d) extending the time for re-certification, or (e) inclusion of a new module such that any other module is substantially (fifty per cent (50%) or more) reduced. DOT&PF must notify EPA within thirty (30) days of any major modification to the AK-CESCL Training Program. If EPA objects to any modification, that objection will be in writing and will provide the reasons that the modification has not been approved. If EPA does not object in writing to the modification within thirty (30) days of notification, the modification will be deemed approved. All other changes are deemed minor and are not subject to EPA approval. Any major modification to the AK-CESCL Training

Program must be documented in DOT&PF's annual report to EPA along with an updated outline of the AK-CESCL Training Program.

d. *Equivalent AK-CESCL Certification.* For purposes of this Decree, a current certification from one of the following erosion and sediment control training programs is equivalent to the AK-CESCL Training Program certification: Washington Department of Ecology Certified Erosion and Sediment Control Lead; CPESC, Inc's Certified Professional in Erosion and Sediment Control; and CISEC Inc.'s Certified Inspector in Sediment and Erosion Control.

6. Construction and SWPPP Requirements:

a. *SWPPP*:

(1) The name of the person(s) who prepares a SWPPP must appear on the SWPPP, together with the date of the pre-construction inspection, if applicable.

(2) The DOT&PF Project Engineer must sign and certify the SWPPP as approved for every Project prior to commencement of Construction Activities at a Project.

(3) Any SWPPP amendment for a Project must be dated and approved in writing by an AK-CESCL - or equivalently - certified individual, as provided by Paragraph 5. The SWPPP must also include the approving individual's name and AK-CESCL (or equivalent) certification expiration date.

(4) For each Project, the approved and most recently amended SWPPP, including project reports and certifications that are required under the CGP, documentation of training for personnel who conduct CGP inspections, and Delayed Action Item Reports (if any) that are required under this Consent Decree must be maintained at the Project or

be locally available as required by the CGP and made available for review by inspectors with authority under the CGP.

b. *BMP Manual*: Each SWPPP and each SWPPP amendment must contain a reference to the BMP manual or publication used as a source for each BMP described in the SWPPP, along with schematics or descriptions of the BMP. If no BMP manual or publication was used to select or design a given BMP, then the SWPPP must say so and include a description of the design and placement of the BMP.

c. *Seasonal Stabilization*: After commencement of Construction Activities, each Active Project shall be stabilized with appropriate sediment and erosion control BMPs prior to Seasonal Thaw.

7. Inspection Program:

a. *Pre-construction Inspections*: For all Projects awarded to a contractor ninety (90) days or more after the entry of this Decree by the district court, the following pre-construction inspection requirements shall apply prior to commencing Construction Activities. In the DOT&PF Central Region, at Projects that are accessible by a contiguous road system from DOT&PF's Anchorage office, a pre-construction inspection must be completed at each Project equal to or greater than one (1) acre. For all other Projects in the DOT&PF Central Region, a pre-construction inspection must be completed at each Project that is equal to or greater than five (5) acres. A pre-construction inspection must also be completed at each Project equal to or greater than five (5) acres in the DOT&PF Northern Region and Southeast Region. Each pre-construction inspection must identify or verify: opportunities to phase construction activities at

the Project; appropriate BMPs and their sequencing for the Project; and, which sediment controls to install at the Project prior to commencing Construction Activities.

b. *Inspections*: All self-inspections required by the CGP shall be conducted by the DOT&PF Stormwater Inspector and Contractor's SWPPP Manager at a frequency allowed by the CGP, as set forth in the SWPPP. Inspections shall only be conducted by AK-CESCL – or equivalently – certified personnel as outlined in Paragraph 5 of this Consent Decree. The DOT&PF Stormwater Inspector and Contractor's SWPPP Manager shall conduct all inspections jointly, unless impracticable. For the purposes of this subparagraph, the term "impracticable" includes but is not limited to the conduct of joint inspections during winter shutdown at Projects at locations that require access by aircraft. If a joint inspection is not practicable, and the CGP Inspection Report contains one or more Action Items, then the report must be submitted to the party not conducting the inspection within three (3) days of the inspection date. If a joint inspection is not practicable, and CGP Inspection Report contains no Action Items, then the report must be submitted to the party not conducting the inspection as soon as practicable. Inspections must include all of the areas of the Project that are required by the CGP to be included in the self-inspection.

c. *Inspection Reports*: At all Active Projects, DOT&PF and its contractors shall conduct and document self-inspections required by the CGP using the inspection report form ("CGP Inspection Report Form") in Appendix C. For CGP inspections and reports to comply with the Consent Decree, each CGP Inspection Report Form in Appendix C must be filled out with the following information:

(1) the inspection date;

(2) the names, AK-CESCL (or equivalent) certification number (where applicable), and AK-CESCL (or equivalent) expiration date for the DOT&PF Stormwater Inspector and Contractor's SWPPP Manager conducting the inspection;

(3) a statement that all Project areas disturbed by Construction Activities, areas used for storage of materials that are exposed to precipitation, and areas where pollutants may enter a storm water conveyance system have been inspected (if any Project area(s) was not inspected, then the inspection report must list those areas using either station numbers or other locational identifiers);

(4) weather information for the period since the last inspection (or since commencement of Construction Activities if the first inspection) including a best estimate of the beginning of each storm event, duration of each storm event, approximate amount of rainfall for each storm event (in inches), and whether any discharges occurred;

(5) weather information and a description of any discharges occurring at the time of the inspection;

(6) location(s) of discharges of sediment or other pollutants from the site, along with either the station number or other locational identifiers;

(7) location(s) of BMPs that need to be maintained, along with either the station number or other locational identifiers associated with each observation;

(8) location(s) of BMPs that failed to operate as designed or proved inadequate for a particular location, along with either the station number or other locational identifiers associated with each observation;

(9) location(s) where additional BMPs are needed that did not exist at the time of inspection, along with either the station number or other locational identifiers associated with each observation;

(10) any and all necessary BMP Action Items (*e.g.*, maintenance needs, replacement needs, or SWPPP amendments), along with a specified date (prior to the next storm event unless impracticable) when Action Items will be completed; and

(11) a certification of the inspection report by the DOT&PF Project Engineer and Contractor's Superintendent.

d. *Modifications to the Inspection Report*: DOT&PF may modify the CGP Inspection Report Form, provided the proposed modifications to the CGP Inspection Report Form ensure that the form includes at least the eleven (11) elements listed in Paragraph 7.c. Except as provided below, DOT&PF must notify the NPDES Compliance Officer in Paragraph 35 (Notification) prior to any proposed modifications to the CGP Inspection Report Form. If EPA objects to any modification, that objection will be in writing and will provide the reasons for which the modification has not been approved. If EPA does not object to the modification within thirty (30) days from the date of notification, the modification is deemed approved. All modifications to the CGP Inspection Report Form must be documented in DOT&PF's annual report to EPA along with a copy of the modified CGP Inspection Report Form. A modification under this subparagraph means any change to the eleven (11) elements listed in Paragraph 7.c. However, under this subparagraph, an addition to the CGP Inspection Report Form that does not limit or otherwise reduce the information listed in Paragraph 7.c., is not a modification requiring prior notice to EPA or EPA approval.

8. Project Maintenance:

a. *Deadline for Completing Action Items*: Except as otherwise provided herein, each of the Action Items identified in a CGP Inspection Report shall be completed by no later than the date(s) identified in that inspection report. The deadline for completion of each Action Item shall be selected to protect water quality and to comply with the CGP's requirement that BMP replacement or maintenance must occur prior to the next storm event unless impracticable. If the deadline for an Action Item is later determined to be impracticable, a Delayed Action Item Report must be completed as provided in Paragraph 8.b., below.

b. *Delayed Action Item Reports*: When an Action Item is delayed, a Delayed Action Item Report Form (using the form attached in Appendix D) must document and explain the impracticable circumstances for the delay in completion of that Action Item. This requirement shall not in any way be construed to preclude any of the other requirements of this Consent Decree or the CGP.

c. *Modifications to Delayed Action Item Report Form*: After the effective date of this Decree, DOT&PF may request a modification to the Delayed Action Item Report Form (*see* Appendix D) one time per year. A request for a modification to the Delayed Action Item Report Form must be sent to the NPDES Compliance Officer identified in Paragraph 35 (Notification). The NPDES Compliance Officer will have thirty (30) days to object to a modification. An objection must be in writing and provide specific reasons why a request for modification was not approved. If the NPDES Compliance Officer does not object to a modification in writing within thirty (30) days to DOT&PF, the modification is deemed approved. A modification under this subparagraph means any change to the Delayed Action

Item Report Form in Appendix D. However, under this subparagraph, an addition to the Delayed Action Item Report Form that does not limit or otherwise reduce the information required under the Delayed Action Item Report Form is not a modification requiring EPA approval.

9. Reporting:

a. *Endangerment Reports*: DOT&PF must provide to the NPDES Compliance Officer in Paragraph 35 (Notification), oral 24-hour reports and five-day written reports identifying each instance of noncompliance with the CGP that may endanger health or the environment, pursuant to the "Twenty-four Hour Reporting" provisions described in the CGP. In addition to the information required by the CGP, each oral and written report shall include the name of the Project at which the noncompliance occurred and the tracking number assigned to DOT&PF at the Project. Certification requirements described in Paragraph 36 do not apply to endangerment reports.

b. *Notices of Intent.* DOT&PF shall submit to the NPDES Compliance Officer specified in Paragraph 35 (Notification) a copy of each CGP Notice of Intent filed with the relevant permitting authority within seven (7) days of filing that Notice of Intent.

c. *Annual Report*: DOT&PF must submit to the NPDES Compliance Officer in Paragraph 35 (Notification) an Annual Report certifying DOT&PF's compliance with all requirements under the Consent Decree in the previous calendar year and/or identifying all violations of the Consent Decree during the previous calendar year. The first Annual Report, due in 2011, shall be received by EPA no later than March 31, 2011. In subsequent years of this Decree, Annual Reports shall be received by EPA no later than March 1 of the applicable calendar year. The Annual Report must be submitted in hard copy, on compact disc, or

electronically as an attachment to electronic mail. If a certification of compliance is to be provided (in the absence of any noncompliance), this certification must include statements by DOT&PF individually certifying compliance with Paragraphs 5 through 9(b). If EPA determines that the Annual Report is deficient in any respect, EPA will notify DOT&PF in writing. DOT&PF shall have the opportunity to cure any defects, but must do so no later than thirty (30) days after receiving notice of any deficiencies. The Annual Report shall include all of the following seven (7) items related to activities carried out by DOT&PF during the previous calendar year.

(1) A worksheet identifying all instances of non-compliance with the Consent Decree. A copy of the worksheet to be used is attached hereto as Appendix E. To satisfy this portion of the Annual Report requirements, a worksheet must be filled out in its entirety, and must include specific information necessary to explain each instance of non-compliance.

(2) A worksheet identifying and providing information for all Active Projects during the previous calendar year. A copy of the worksheet to be used is attached hereto as Appendix F. The worksheet must be filled out in its entirety with all relevant Project information to satisfy this portion of the Annual Report requirements.

(3) A copy of any modified CGP Inspection Report Form, as required in 7.d., above.

(4) A copy of a modified Delayed Action Item Report Form, as required in 8.c., above.

(5) An outline of the current AK-CESCL course.

(6) The dates and location of any DOT&PF-sponsored AK-CESCL training courses.

(7) Copies of all Delayed Action Item Report Forms for all Active Projects.

Within six (6) months from the date of receipt of the Annual Report, if EPA determines that the Annual Report is deficient in any respect, EPA shall notify DOT&PF in writing of the deficiencies. If no written notice of deficiencies is issued by EPA to DOT&PF within the prescribed time period, the Annual Report shall be deemed approved.

IV. CIVIL PENALTY

10. Civil Penalty: By no later than October 1, 2010, and subject to Section VII (Obligation Subject to Appropriation) of this Consent Decree, DOT&PF shall pay to the United States a civil penalty of One Hundred Forty-Thousand Dollars ($140,000.00), for the alleged violations of Section 402 of the CWA.

11. Payments to be Made Solely by DOT&PF: DOT&PF shall be responsible for payment of the civil penalty paid under this Consent Decree and shall not seek payments, reimbursement, indemnification or insurance coverage for this civil penalty from any contractor, subcontractor, third party, or agency of the United States.

12. Method of Payment: The One Hundred Forty-Thousand Dollars ($140,000.00) penalty shall be made payable to the "Treasurer of the United States" by Electronic Funds Transfer ("EFT" or wire transfer) to the United States Department of Justice lock box bank, referencing DOJ 90-5-1-1-08977 and the CDCS File Number_____. A copy of the wire

transfer confirmation shall be forwarded to the United States at the addresses specified in Paragraph 35 (Notification).

V. INJUNCTIVE RELIEF - REVEGETATION

13. Subject to Section VII (Obligation Subject to Appropriation) of this Consent Decree, DOT&PF shall perform revegetation under the terms and conditions stated in Appendix G appended hereto and incorporated herein by reference.

VI. MITIGATION CONTRIBUTION FOR ENVIRONMENTAL PROTECTION

14. By no later than October 1, 2010, and subject to Section VII (Obligation Subject to Appropriation) of this Consent Decree, DOT&PF shall pay to the Kachemak Heritage Land Trust ("KHLT") the sum of Eight Hundred Fifty-Thousand Dollars ($850,000.00) for KHLT to acquire and permanently conserve riparian areas, for the preservation of water quality and salmon habitat, on the Anchor River, Ninilchik River, Deep Creek, or Stariski Creek watersheds on the Kenai Peninsula, Alaska. It is the intent of the parties to maximize the amount of funds that can be applied solely to the acquisition and permanent conservation of the riparian areas for the preservation of water quality and salmon habitat; however, the parties acknowledge that certain expenses and administrative costs are necessary to accomplish the acquisitions and conservation. Such expenses may be applied to: (1) reasonable pre-acquisition expenses that apply directly to the property acquisitions and permanent conservation, including but not limited to negotiations, appraisals, surveys, title insurance, closing costs, attorney's fees and travel; and (2) perpetual management and stewardship costs, which shall be calculated according to KHLT Resolution Number 2010-08 (attached hereto as Appendix H). In addition, KHLT may charge pre-acquisition administrative costs to the Eight Hundred Fifty-Thousand Dollars ($850,000.00)

according to the calculations and limit set forth in KHLT Resolution Number 2010-09 (attached hereto as Appendix I). DOT&PF shall not be responsible in any manner for defining, determining, or monitoring the amount of KHLT's monitoring or administrative costs.

15. To ensure that the properties proposed to be acquired and conserved by KHLT as specified in Paragraph 14 above are acceptable to the United States: (1) not more than ninety (90) days after entry of this Consent Decree, KHLT shall arrange a meeting among representatives of EPA, DOT&PF, and KHLT to discuss how best to preserve water quality and salmon habitat through KHLT's purchase and conservation of properties with the Eight Hundred Fifty-Thousand Dollars ($850,000.00); and (2) KHLT shall provide EPA's Wetlands Compliance Officer in Paragraph 35 (Notification) with advance notice, and the opportunity to comment on and/or object to any potential property purchase by KHLT. If EPA objects to a potential purchase within thirty (30) days of the notice provided by KHLT and those objections are not resolved to EPA's satisfaction, then that potential purchase shall not be completed. In addition, KHLT shall provide DOT&PF with advance notice of any potential property purchase by KHLT. DOT&PF shall have the opportunity to comment on and/or object to KHLT's potential purchases that would affect transportation. If DOT&PF objects to such a potential purchase within thirty (30) days of the notice provided by KHLT and those objections are not resolved to DOT&PF's satisfaction, then that potential purchase shall not be completed. DOT&PF shall not unreasonably withhold its consent.

16. So that all of the property acquired by KHLT with any portion of the Eight Hundred Fifty-Thousand Dollars ($850,000.00) remains protected in perpetuity, KHLT shall ensure that permanent deed restrictions preventing development of any part of the transferred

property that does not promote the conservation of the riparian areas, and specifically preventing usage of the property in a manner that could impair or interfere with the preservation of water quality or salmon habitat on the property, become effective upon the transfer of all of the properties to KHLT.

17. If KHLT ceases to retain ownership of any of the properties that it acquires with any portion of the Eight Hundred Fifty-Thousand Dollars ($850,000.00), then KHLT shall ensure that, upon transfer of the lots to a new owner, KHLT or a similar conservation organization shall receive permanent conservation easements on the transferred property. The deed restrictions on the properties acquired by KHLT shall not prevent KHLT from selling or donating the property to a similar conservation organization, so long as upon transfer of the lots, KHLT or a similar conservation organization shall receive permanent conservation easements preventing development on any part of the transferred property that does not promote the conservation of the riparian areas, and specifically preventing usage of any of the property in a manner that could impair or interfere with the preservation of water quality or salmon habitat on the properties.

18. Within six (6) weeks of the acquisition of any property by KHLT with any portion of the Eight Hundred Fifty-Thousand Dollars ($850,000.00), KHLT shall provide the United States and DOT&PF with a written report that:

a. depicts the property acquired by KHLT;

b. specifies the amount spent to acquire the property and the amount allotted to manage the property in order to preserve the water quality and salmon habitat in perpetuity;

c. includes copies of the documents that memorialize the acquisition of the property and the permanent deed restrictions that prevent the impairment of, or interference with, the preservation of water quality and salmon habitat on the property; and

d. describes the water quality and salmon habitat values of the property upon KHLT's acquisition.

19. KHLT shall make all reasonable efforts to use the Eight Hundred Fifty-Thousand Dollars ($850,000.00) as described in Paragraphs 14-18 above within five (5) years after the entry of this Consent Decree. In the event that KHLT does not use the Eight Hundred Fifty-Thousand Dollars ($850,000.00) within five (5) years after the Effective Date of this Consent Decree, then:

a. KHLT shall ensure that any remaining funds are paid into the registry of the Court;

b. the United States and DOT&PF shall identify pursuant to the procedures in Section XI (Dispute Resolution) of this Consent Decree an alternative for off-site mitigation; and

c. the funds shall be spent on that mitigation alternative.

20. With regard to DOT&PF's payment of the Eight Hundred Fifty-Thousand Dollars ($850,000.00) to KHLT, DOT&PF certifies the truth and accuracy of each of the following:

a. as of the date of executing this Consent Decree, DOT&PF is not required to make the payment by agreement, grant, or as injunctive relief awarded in any other action in any forum;

b. DOT&PF was not planning or intending to make any such payment other than in settlement of the claims resolved in this Consent Decree;

c. DOT&PF has not received, and is not negotiating to receive, credit for the payment in any other enforcement action; and

d. DOT&PF will not receive any reimbursement for any portion of the payment from any other person or entity.

VII. OBLIGATIONS SUBJECT TO APPROPRIATION

21. It is the expectation of the United States and DOT&PF that DOT&PF will obtain funding to fulfill its obligations under this Consent Decree. DOT&PF agrees to utilize its best efforts to obtain sufficient funding through the State of Alaska budgetary process to fulfill its obligations under this Consent Decree.

22. If funds to fulfill any of DOT&PF's obligations under this Decree are not approved though the State of Alaska budgetary process, or if DOT&PF fails to timely perform any obligation set forth herein based on a lack of appropriated funds, the United States and DOT&PF shall attempt informally in accordance with Paragraph 60 (Informal Dispute Resolution) to address potential adjustments to DOT&PF's obligations under this Decree that require the payment or appropriation of such funds. If no agreement is reached between the United States and DOT&PF, then the United States may, in its sole discretion, move the Court to vacate all or any portion of this Decree. DOT&PF's failure to secure sufficient funds through the State of Alaska shall not be a defense to the United States' motion to vacate all or any portions of this Decree. If the Decree is vacated, then the claims in the Complaint shall be revived, and DOT&PF shall not assert, plead, or raise in any fashion on behalf of any party any defense or

avoidance based on the running of any statute of limitations, laches, or other principle concerning the timeliness of commencing a civil action with respect to any claims in the Complaint.

VIII. GENERAL PROVISIONS

23. Continuing Jurisdiction of the Court: The Court shall retain jurisdiction to enforce the terms and conditions of this Decree, to resolve disputes arising hereunder, and for such other action as may be necessary or appropriate for construction or execution of the Decree. During the pendency of the Consent Decree, the United States or DOT&PF may apply to the Court for any relief necessary to construe and effectuate the Consent Decree.

24. Parties Bound: In accordance with the provisions of Federal Rules of Civil Procedure 65, the provisions of this Decree shall apply to and be binding upon the United States, DOT&PF, and KHLT.

25. Not an Admission: Nothing in this Consent Decree shall constitute an admission of fact or law by the United States or DOT&PF.

26. Costs of Suit: Each party to this Consent Decree shall bear its own costs and attorneys' fees in this action.

27. DOT&PF Responsibility: Without imposing individual liability, the obligations of this Consent Decree shall apply to and be binding upon DOT&PF, its officers, directors, agents, employees and servants, and their successors and assigns, and any other entities or persons otherwise bound by law. DOT&PF shall make available on the internet a copy of this Consent Decree to all officers, directors, agents, employees and servants, and their successors and assigns, whose duties might reasonably include compliance with any provision of this

Decree. DOT&PF also shall make available on the internet a copy of this Consent Decree to all Contractors and any other contractors that DOT&PF retains to comply with or meet the objectives of this Decree. In any action to enforce this Decree, DOT&PF shall not assert as a defense to a finding of liability the failure of any person, firm, or corporation acting in concert or participation with DOT&PF to take any actions necessary to comply with this Decree, unless DOT&PF establishes that the failure resulted from a Force Majeure Event as set forth in Section XII, below; provided, however, that DOT&PF may assert such failure as a mitigating factor for the purposes of any related civil penalty, injunctive relief, or other remedy sought against DOT&PF; provided, further, that the United States may assert that such failure should not be considered as a mitigating factor.

28. No Warranty by the Plaintiff: The United States does not, by its consent to entry of this Decree, warrant or aver in any manner that DOT&PF's compliance with this Decree will result in compliance with the provisions of applicable federal or state laws, regulations, or CGP or 404 Permit conditions. DOT&PF shall remain responsible for compliance with this Decree, the Clean Water Act, any permit, and any other applicable state, federal, or local law or regulation.

29. Final Judgment: Upon approval and entry of this Decree by the Court, this Decree shall constitute a final judgment between and among the United States and DOT&PF.

30. Purpose of Decree: This Decree is intended to settle the claims brought against DOT&PF in the Complaint. All obligations in this Decree shall have the objective of causing DOT&PF to be and remain in full compliance with the Act, the regulations and permits issued pursuant to the Act, as well as state laws, regulations, and permits authorized pursuant to the Act.

31. Right of Entry: Until termination of this Decree, the United States and its representatives, contractors, consultants, and attorneys shall each have the authority to enter at all reasonable times and upon presentation of credentials, any Project in the State of Alaska or any location at which records relating to this Decree are kept for the purposes of:

a. monitoring DOT&PF's compliance with this Decree;

b. verifying any data or information submitted by DOT&PF pursuant to this Decree;

c. reviewing and copying any records required to be kept by DOT&PF pursuant to this Decree; and

d. inspecting and evaluating DOT&PF's revegetation activities.

32. No Limitation on Other Rights of Entry: Nothing in Paragraph 31 (Right of Entry) or any other provision of this Decree shall be construed to limit any statutory right of entry or access or other information gathering authority pursuant to any federal, state, or local law.

33. Preservation of Records:

a. In addition to complying with any other applicable local, state, or federal records preservation requirements, until one (1) calendar year after termination of this Decree, DOT&PF shall preserve at least one (1) legible copy of all Records in its possession, custody, or control. For the purposes of this paragraph, the period of preservation for any Records required to be created or maintained by a specific portion of this Decree shall be one (1) calendar year after the date of termination of that portion of this Decree, pursuant to Paragraph 41 (Termination of Decree).

b. For the purposes of this paragraph, "Records" shall mean any record, report, information, document, or photograph required to be created or maintained pursuant to the requirements set forth in: (i) this Decree; (ii) the applicable CGP; (iii) the CGP stormwater requirements of the Clean Water Act; or (iv) applicable federal, state, and local laws and regulations regarding document preservation, including, without limitation, the Alaska Construction Manual and the State of Alaska's document retention requirements.

c. Within thirty (30) days of retaining or employing any agent, consultant, or contractor for the purpose of carrying out the terms of this Decree, DOT&PF shall enter into an agreement with any such agent, consultant, or contractor requiring such person to provide to DOT&PF a copy of all Records.

d. Upon request by the United States, DOT&PF shall deliver any such Records to EPA. DOT&PF may assert that certain Records are privileged under the attorney-client privilege or any other privilege recognized by federal law. If DOT&PF asserts such a privilege, it shall provide the United States with the following: (1) the title of the Records; (2) the date of the Records; (3) the name and title of the author of the Records; (4) the name and title of each addressee and recipient; (5) a description of the subject of the Records; and (6) the privilege asserted by DOT&PF. However, no documents, reports, records, photographs, or other information required to be created or generated pursuant to this Consent Decree shall be withheld on the grounds that they are privileged.

34. Authority to Sign Decree: The undersigned representatives of DOT&PF and KHLT certify that each is authorized to enter into this Decree on behalf of that party and to

execute and legally bind the party to the terms and conditions of this Decree, and that each meets the requirements for authorized signatory found in 40 C.F.R. § 122.22.

35. Notification:

a. When written notification or communication is required by the terms of this Decree, such notification or communication shall be addressed to the following individuals at the addresses specified below (or to such other addresses as may be designated by written notice to the parties):

As to the United States:

For DOJ:

Chief, Environmental Defense Section
Environment & Natural Resources Division
U.S. Department of Justice
P.O. Box 23986
Washington, D.C. 20026-3986
Ph: 202.514.2219
Fax: 202.514.8865

Mark A. Nitczynski, Attorney
U.S. Department of Justice
1961 Stout Street – 8th Floor
Denver, CO 80294
mark.nitczynski@usdoj.gov
Ph: 303.844.1498
Fax: 303.844.1350

Chief, Environmental Enforcement Section
Environment & Natural Resources Division
U.S. Department of Justice
P.O. Box 7611
Washington, D.C. 20044-7611
Ph: 202.514.5271
Fax: 202.514.0097

David F. Askman, Attorney
U.S. Department of Justice
1961 Stout Street - 8th Floor
Denver, CO 80294
david.askman2@usdoj.gov
Ph: 303.844.1381
Fax: 303.844.1350

For EPA:

Ankur Tohan
Assistant Regional Counsel
U.S. EPA, Region 10
1200 6th Ave, Suite 900 (ORC-158)
Seattle, Washington 98101
tohan.ankur@epa.gov
Ph: 206.553.1796
Fax: 206.553.0163

Kristine Karlson
NPDES Compliance Officer
U.S. EPA, Region 10
1200 6th Ave, Suite 900 (OCE-133)
Seattle, Washington 98101
karlson.kristine@epa.gov
Ph: 206.553.0290
Fax: 206.553.1280

Phil North
Wetlands Compliance Officer
U.S. EPA, Region 10
Kenai River Center
514 Funny River Road
Soldotna, Alaska 99669
north.phil@epa.gov
Ph: 907.714.2483
Fax: 907.260.5992

As to DOT&PF:

DOT&PF Chief Engineer
Attn: Roger Healy
Division of Design & Engineering Services
State of Alska, DOT&PF
PO Box 112500
3132 Channel Drive
roger.healy@alaska.gov
Juneau, AK 99811-2500
Ph: 907.465.6958

For the 404 Portions only:
Regional Preconstruction Engineer
Attn: K. Kim Rice
State of Alaska, DOT&PF
PO Box 196900
Anchorage, AK 99510-6900
kkim.rice@alaska.gov
Ph: 907.269.0588

With copies to:

Chief Assistant Attorney General – Transportation Section
Attn: James Cantor
Alaska Department of Law
1031 W. 4th Street, Suite 200
Anchorage, AK 99501
jim.cantor@alaska.gov
Ph: 907.269.5165

As to KHLT (with respect to the Notification requirements in Section VI only):

Marie McCarty
Executive Director
Kachemak Heritage Land Trust
315 Klondike Avenue
Homer, AK 99603
marie@kachemaklandtrust.org
Ph: 907.235.5263

b. Notifications to or communications with DOT&PF or the United States shall be deemed submitted on the date they are postmarked and sent by certified mail, return receipt requested or by date/time stamp if submitted by electronic mail. Notifications may be made by overnight or U.S. Express mail with delivery confirmation.

36. Certification of Reports and Submissions: Except as otherwise expressly provided in this Decree, any report or other document submitted by DOT&PF pursuant to this Decree which makes any representation concerning compliance or noncompliance with any requirement of this Decree shall be certified by an authorized officer of DOT&PF. The certification shall be in the following form:

> I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.
>
> Signature: _____
> Name: _____
> Title: _____
> Date: _____

37. Entire Agreement: This Decree is the final, complete, and exclusive agreement between the parties. The parties acknowledge that there are no inducements, promises, representations, agreements, or understandings relating to the settlement other than those expressly contained in this Decree.

38. Modification: The deadlines set forth in this Decree may be modified by this Court in accordance with Section XI (Dispute Resolution) or by written agreement of the

affected parties and notification to the Court. Modifications by agreement of the affected parties shall be effective ten (10) days after the date the notice is filed with the Court unless otherwise ordered by the Court. With respect to all other provisions of this Decree, except as expressly provided in Paragraphs 5, 7, 8, and Section XI (Dispute Resolution), there shall be no modification of this Decree without written agreement of the affected parties to this Decree and approval by the Court. Unanticipated or increased costs or expenses associated with the implementation of actions called for by this Decree and economic hardship or changed financial circumstances shall not serve as a basis for modifications of this Decree.

39. Public Notice: The parties acknowledge and agree that the final approval and entry of this Decree is subject to the requirements of 28 C.F.R. § 50.7, which provides that notice of proposed consent decrees be given to the public and that the public shall have at least thirty (30) days in which to make any comments. The United States may withhold or withdraw its consent to this Decree based on such comments.

40. Agreement to Entry of Decree: The United States agrees not to move for entry of this Consent Decree until ninety (90) days after DOT&PF signs the Decree. DOT&PF agrees not to oppose entry of this Decree by this Court or to challenge any provision of this Decree.

41. Termination of Decree:

a. *Termination of Section III Requirements:* No sooner than three (3) years after entry of this Decree, DOT&PF may request the United States' consent to termination of any or all of the requirements in Section III (Compliance Program) of this Decree, including any or all of the requirements in Paragraph 5 (Training), Paragraph 6 (Construction and SWPPP

Requirements), Paragraph 7 (Inspection Program), Paragraph 8 (Project Maintenance), and Paragraph 9 (Reporting).

b. *Termination of Other Consent Decree Requirements:* No sooner than four (4) years after entry of this Decree, DOT&PF may request the United States' consent to termination of any or all of (i) the requirements in Section V (Injunctive Relief – Revegetation); (ii) the requirements of Section VI (Mitigation Contribution for Environmental Protection); and/or (iii) the remainder of this Consent Decree.

c. In seeking the United States' consent under this Paragraph 41, DOT&PF shall certify and demonstrate that as of the date of making its request to terminate:

(1) DOT&PF has paid all monies, civil penalties, interest, and stipulated penalties due under this Decree;

(2) DOT&PF is in compliance with each portion of the Consent Decree for which DOT&PF seeks termination;

(3) For each portion of the Decree for which DOT&PF seeks termination, as of the date DOT&PF provides any request to terminate, (i) EPA has not provided DOT&PF with any Notice of Dispute regarding that portion of the Decree invoking the Dispute Resolution provisions of this Decree which dispute is still pending and (ii) there are no unresolved matters subject to dispute resolution pursuant to Section XI (Dispute Resolution) regarding that portion of the Decree; and

(4) No enforcement action under this Decree is pending regarding the portion of the Consent Decree for which DOT&PF seeks termination. For the purposes of this

provision, an enforcement action means any CWA § 309(a) order issued, or any administrative or judicial action that EPA files, to enforce any CWA provision referenced in this Decree.

d. The United States shall notify DOT&PF in writing within thirty (30) days of receiving a request to terminate by DOT&PF whether it does or does not object to the termination of the Decree or any portion of it. If the United States consents to the request to terminate, then the parties shall jointly file a motion to terminate with the Court. In that event, the Court shall enter an order terminating this Decree, or the specific portion thereof. If the United States does not object to DOT&PF's request to terminate within thirty (30) days of receiving a request to terminate, DOT&PF may file a motion to terminate this Decree, or any portion thereof. The motion shall contain a certification that DOT&PF has fulfilled the conditions in Paragraph 41.c., as of the date of DOT&PF's request for termination under subparagraphs 41(a) or 41(b).

e. If the United States objects to DOT&PF's request to terminate within thirty (30) days of receiving it, the parties will work together for a period of at least thirty (30) days in an effort to informally resolve any disputes. The Decree shall remain in effect pending resolution of the dispute by the parties, or, ultimately, the Court.

f. If the parties are unable to informally resolve a dispute regarding termination under this paragraph, then DOT&PF may file a motion to terminate with the Court in accordance with the applicable Federal Rules of Civil Procedure and local rules of the District Court. If the Court finds based on a preponderance of the evidence that DOT&PF has fulfilled the conditions in Paragraph 41.c., as of the date of DOT&PF's request for termination under

subparagraphs 41(a) or 41(b), it shall order this Decree, or the specific portion thereof, terminated.

g. Any dispute involving DOT&PF's right to terminate the Decree, or any portion thereof, shall not be subject to the dispute resolution process of Section XI (Dispute Resolution).

IX. EFFECT OF DECREE

42. Scope of Consent Decree: This Consent Decree shall constitute a complete and final settlement of all civil claims for injunctive relief and civil penalties alleged in the Complaint against DOT&PF under CWA Section 301 concerning the Sites.

43. Covenants Not to Sue by Plaintiff: In consideration of the payment of the penalty required by Paragraph 10 (Civil Penalty) and compliance by DOT&PF with the terms of Paragraphs 5 through 9 (Compliance Program) of this Decree, the United States hereby covenants not to sue or take administrative action against DOT&PF pursuant to the Clean Water Act or any state law authorized pursuant to 33 U.S.C. § 1342(b) for civil violations or alleged civil violations of the conditions, limitations, and requirements of the CGP at the Section 402 Sites as alleged in the Complaint through the date of lodging of this Decree. In consideration of compliance by DOT&PF with the terms of Paragraph 13 (Injunctive Relief - Revegetation) and Paragraphs 14 through 20 (Mitigation Contribution for Environmental Protection) of this Decree, the United States hereby covenants not to sue or take administrative action against DOT&PF pursuant to the Clean Water Act for civil violations or alleged civil violations of Clean Water Act sections 301 and 404, 33 U.S.C. §§ 1311, 1344, at the Section 404 Sites as alleged in the Compliant through the date of lodging of this Decree.

44. No Effect on Third Parties: This Decree does not limit or affect the rights of DOT&PF or of the United States against any third parties not party to this Decree, nor does it limit the rights of third parties not party to this Decree against DOT&PF, except as otherwise provided by law. This Decree shall not be construed to create rights in, or grant any cause of action to, any third party not party to this Decree.

45. United States' Reservations of Rights:

a. The United States reserves all rights not expressly waived in this Decree.

b. The United States reserves all rights and remedies, legal and equitable, available to enforce the provisions of this Decree and applicable law.

c. The United States reserves the right to seek and obtain criminal sanctions against any person, including DOT&PF.

d. The United States reserves the right to undertake any action against any person, including DOT&PF in response to conditions which may present an imminent and substantial endangerment to the public health or welfare or the environment.

46. DOT&PF's Reservation of Rights: Except as provided by the express terms of this Decree, DOT&PF reserves any rights or defenses available to it in any future action brought by the United States pursuant to the Clean Water Act or any other statutes, regulations, or rules.

47. Not a Permit Modification: This Decree is neither a permit nor a modification of existing permits under any federal, state, or local law, and in no way relieves DOT&PF of its responsibilities to comply with any applicable federal, state, or local law, regulation, or permit.

48. Injunction Regarding Future Discharges: Except as in accordance with this Consent Decree, DOT&PF is enjoined from discharging dredged or fill material into waters of

the United States at any of the Section 404 Sites, unless such discharge complies with the provisions of the CWA and its implementing regulations.

49. Effect of Nationwide Permit 32: The parties acknowledge that Nationwide Permit 32, found at 61 Fed. Reg. 65,913 (Dec. 13, 1996), authorizes the fill that was placed in response to the October and November, 2002, 100-year flood events at the Section 404 Sites to remain in place, subject to the conditions provided in the Nationwide Permit and this Consent Decree. The parties further acknowledge that Nationwide Permit 32 (61 Fed. Reg. 65,913) authorizes the discharge of dredged or fill material insofar as such discharge is necessary to complete the work required to be performed pursuant to this Consent Decree at the Section 404 Sites. Any such discharge of dredged or fill material necessary for work required by Appendix G, Revegetation Plan, of the Consent Decree shall be subject to the conditions of the Nationwide Permit and this Consent Decree.

50. Agency Discretion: Nothing in this Consent Decree shall limit the otherwise existing ability of EPA to modify, suspend, revoke or deny any CGP issued under Section 402 of the CWA, 33 U.S.C. § 1342. Nothing in this Consent Decree shall limit the otherwise existing ability of the United States Army Corps of Engineers to issue, modify, suspend, revoke, or deny any individual, nationwide, or regional general 404 Permit, nor shall this Consent Decree limit the EPA's otherwise existing ability to exercise its authority pursuant to Section 404(c) of the CWA, 33 U.S.C. §1344(c).

X. STIPULATED PENALTIES

51. Stipulated Penalty Amounts: If the United States determines that DOT&PF has failed to fully or timely comply with the following requirements of this Decree, and subject to

Section VII (Obligation Subject to Appropriation) of this Consent Decree, DOT&PF shall pay stipulated penalties in the following amounts:

a. for a failure to timely train DOT&PF Regional Stormwater Specialists, Project Engineers, and Stormwater Inspectors assigned to a Project in accordance with Paragraph 5(a), $750.00 per person for each missed deadline. This $750.00 per person violation shall continue to accrue for every fourteen (14) day-period that passes in which the person fails to timely receive the applicable training;

b. for failure to meet SWPPP requirements in accordance with Paragraph 6(a) - $750.00 per omission;

c. for failure to either (i) reference a BMP manual or publication, or (ii) state that no BMP manual or publication was used, in accordance with Paragraph 6(b) - $250.00 per omission;

d. for failure to stabilize a Project prior to Seasonal Thaw in accordance with Paragraph 6(c) - $5,000.00 per Project per year;

e. for a failure to conduct pre-construction inspections in accordance with Paragraph 7(a) - $2,000.00 per Project;

f. for failure to conduct and record CGP Inspections in accordance with Paragraph 7(b) & (c) - $750.00 per inspection;

g. for failure to timely accomplish BMP maintenance and/or repairs in accordance with Paragraph 8 - $500.00 per Project per day until the BMP maintenance and/or repair is completed, not to exceed a total stipulated penalty for all Projects of $250,000.00 per year under this subpart;

h. for failure to provide a timely oral endangerment report of violations or for a deficient oral endangerment report in accordance with Paragraph 9(a) - $750.00 for the first day the report is late or deficient, and then an additional $750.00 for every fourteen (14) day period that passes without the required information being provided, but no stipulated penalty under this subpart shall continue to accrue once a written endangerment report has been submitted to EPA;

i. for failure to provide a timely written endangerment report of violations or for a deficient written endangerment report in accordance with Paragraph 9(a) - $750.00 for the first day the report is late or deficient, and then an additional $750.00 for every fourteen (14) day period that passes without the required information being provided;

j. for failure to timely submit copies of NOIs in accordance with Paragraph 9(b) - $250.00 per NOI;

k. for a failure to submit an Annual Report or, except as provided in Paragraph 54 (Accrual of Stipulated Penalties), a failure to timely cure a deficient Annual Report per Paragraph 9(c) - $750.00 per day the report is late or not timely cured, with the total stipulated penalty under this subpart not to exceed $75,000.00 per year;

l. for reports required under Section IV.G of Appendix G, Revegetation Plan, either a failure to submit such a report or, as provided in Paragraph 54 (Accrual of Stipulated Penalties), a failure to timely cure a deficient report per Paragraph IV.G.3 of Appendix G, Revegetation Plan - $375.00 per day the report is late or deficient;

m. for failure to perform monitoring in accordance with Section IV.D of Appendix G, Revegetation Plan - $7,500.00 per monitoring period each year; and

n. for failure to meet any of the Success Criteria set forth in Sections I.C, II.C or III.C of Appendix G, Revegetation Plan - $7,500.00 per site listed in Appendix G, Revegetation Plan per year.

52. Payment of Stipulated Penalties: Upon DOT&PF's receipt from the United States of a written demand for payment of the penalties, and subject to Section VII (Obligation Subject to Appropriation) of this Consent Decree, all penalties owed to the United States under this Section shall be due and payable within thirty (30) days of the appropriation addressed in Section VII, unless DOT&PF invokes the procedures under Section XI (Dispute Resolution). DOT&PF shall forward the amount due by Electronic Funds Transfer ("EFT") to the United States Department of Justice lockbox bank referencing DOJ case number 90-5-1-1-08977 and the CDCS file number_____ in accordance with instructions provided by the United States upon entry of this Decree. Any EFTs received at the United States Department of Justice lockbox bank after 11:00 a.m. (Eastern Time) will be credited on the next Business Day. After payment, DOT&PF shall mail a cover letter specifying the amount and date of payment, civil docket number and reason for payment, to the United States in accordance with Paragraph 35 (Notification).

53. Waiver of Stipulated Penalties: DOT&PF may request, in writing, that the United States waive stipulated penalties which have been assessed pursuant to Paragraph 51 (Stipulated Penalty Amounts). The United States may, in its sole discretion, waive such claims.

54. Accrual of Stipulated Penalties: Except as otherwise provided in this paragraph, stipulated penalties shall begin to accrue on the day after performance is due or the day a violation occurs and shall continue to accrue through the final day of the correction of the

noncompliance or completion of the activity. Except as provided in the third sentence of this paragraph, stipulated penalties for filing a deficient report shall begin to accrue on the day when EPA notifies DOT&PF of the deficiency. Stipulated penalties for filing a deficient Annual Report or a report required under Section IV.G of Appendix G, Revegetation Plan, shall begin to accrue thirty (30) days after EPA notifies DOT&PF of the deficiency, unless DOT&PF has cured the deficiencies within thirty (30) days in accordance with Paragraph 9.c. or Paragraph IV.G.3. of Appendix G, Revegetation Plan, in which case no stipulated penalties shall accrue. Nothing herein shall prevent the simultaneous accrual of separate penalties for separate violations of this Decree. Except as specifically provided herein, stipulated penalties shall accrue regardless of whether the United States has notified DOT&PF of a violation.

55. No Effect on Obligation to Comply: The payment of penalties shall not alter in any way DOT&PF's obligation to comply with the requirements of this Decree.

56. Effect of Dispute Resolution: Penalties shall continue to accrue during any dispute resolution period, but need not be paid until the following:

a. If the dispute is resolved by agreement or by a decision of the United States that is not appealed to this Court, DOT&PF shall pay accrued penalties determined to be owing to the United States within thirty (30) days of the agreement or the receipt of the United States' decision or order, subject to Section VII (Obligation Subject to Appropriation) of this Consent Decree;

b. If the dispute is appealed to the Court and the United States prevails in whole or in part, DOT&PF shall pay all accrued penalties determined by the Court to be owed within thirty (30) days of receipt of the Court's decision or order, except as provided in

subparagraph c. of this paragraph, and subject to Section VII (Obligation Subject to Appropriation) of this Consent Decree;

c. If the Court's decision is appealed by any party, DOT&PF shall pay all accrued penalties determined by the District Court to be owing into an interest-bearing escrow account within thirty (30) days of receipt of the Court's decision or order. Penalties shall be paid into this account as they continue to accrue, at least every thirty (30) days. Within fifteen (15) days of receipt of the final appellate court decision, the escrow agent shall pay the balance of the account to the United States or to DOT&PF to the extent that they prevail.

57. Interest on Late Payment: If DOT&PF fails to pay stipulated penalties when due, DOT&PF shall pay interest accrued at the rate established by the Secretary of the Treasury under 28 U.S.C. § 1961 beginning upon the day the stipulated penalties were due.

58. Non-Exclusivity of Remedy: Stipulated penalties are not the United States' exclusive remedy for violations of this Decree. The United States expressly reserves the right to seek any other relief it deems appropriate, including but not limited to, action for statutory penalties, contempt, or injunctive relief against DOT&PF. However, the amount of any statutory penalty assessed for a violation of this Decree shall be reduced by an amount equal to the amount of any stipulated penalty assessed and paid pursuant to this Decree for the same violation.

XI. DISPUTE RESOLUTION

59. Exclusive Remedy: Unless otherwise expressly provided for in this Decree, the Dispute Resolution procedures of this Section shall be the exclusive mechanism to resolve disputes arising under this Decree; provided, however, Dispute Resolution under this Section shall not apply to KHLT. However, the procedures set forth in this Section shall not apply to

actions by the United States to enforce obligations of DOT&PF that have not been disputed in accordance with this Section.

60. Informal Dispute Resolution: Any dispute subject to dispute resolution under this Decree shall first be the subject of informal negotiations. The dispute shall be considered to have arisen on the day one party delivers to the other party a written Notice of Dispute, or on the day following delivery by overnight courier or three (3) days following delivery by U.S. Mail. Such Notice of Dispute shall state clearly the matter in dispute. The period of informal negotiations shall not exceed sixty (60) days from the date the dispute arises, unless that period is modified by written agreement. If the parties cannot resolve a dispute by informal negotiations, then the position advanced by the United States shall be considered binding unless, within forty-five (45) days after the conclusion of the sixty (60) day informal negotiation period, DOT&PF seeks to petition the Court as set forth in Paragraph 61 (Petitions to the Court).

61. Petitions to the Court: In the event that the parties cannot resolve a dispute by informal negotiations as set forth above, the following procedures shall control:

a. DOT&PF may seek judicial review of the dispute by filing with the Court and serving on the United States a motion requesting judicial resolution of the dispute. The motion shall contain a written statement of DOT&PF's position on the matter in dispute, including any supporting factual data, analysis, opinion, or documentation, and shall set forth the relief requested and any schedule within which the dispute must be resolved for orderly implementation of this Decree.

b. The United States shall respond to DOT&PF's motion within forty-five (45) days of receipt of the motion, unless the parties stipulate otherwise.

c. DOT&PF may file a reply memorandum within thirty (30) days of receipt of the United States' response.

d. In any dispute under this paragraph, DOT&PF shall bear the burden of demonstrating that its position complies with this Decree and the Clean Water Act and that DOT&PF is entitled to relief under applicable law. The United States reserves the right to argue that its position (a) is reviewable only on the administrative record and (b) shall be upheld unless arbitrary and capricious or otherwise not in accordance with law. For purposes of this Decree, the administrative record shall comprise the Statements of Position exchanged by the parties pursuant to Paragraph 60 (Informal Dispute Resolution), including any documents attached to or incorporated by reference in those Statements. DOT&PF reserves the right to argue that (i) its position is based on a reasonable interpretation of facts, a statute, regulation, or permit, or a reasonable interpretation of this Decree and (ii) the matter is not reviewable only on the administrative record or under an arbitrary and capricious standard of review and that the United States' litigation position is not entitled to any deference.

62. Expedited Review: If the United States believes that a delay would pose or increase a threat of harm to the public or the environment, it may move the Court for a resolution of the dispute prior to the expiration of the sixty (60) day period for informal negotiations. In any dispute under this paragraph, DOT&PF shall bear the burden of demonstrating that its position complies with this Decree and the Clean Water Act, and that DOT&PF is entitled to relief under applicable law.

63. Effect on DOT&PF's Other Obligations: The invocation of dispute resolution procedures under this Section shall not extend, postpone, or affect in any way any obligation of

DOT&PF under this Decree unless the United States agrees in writing or the Court orders otherwise.

64. Computation of Time: The computation of any period of time set forth in this Section XI (Dispute Resolution) shall be governed by Rule 6 of the Federal Rules of Civil Procedure.

XII. FORCE MAJEURE

65. Definition of Force Majeure: DOT&PF shall perform the actions required under this Decree within the time limits set forth or approved herein, unless the performance is prevented or delayed solely by a Force Majeure Event. A "Force Majeure Event" is any event beyond the control of DOT&PF, its contractors, or any entity controlled by DOT&PF that delays the performance of any obligation under this Decree despite DOT&PF's best efforts to fulfill the obligation. For the purposes of fulfilling the requirements of Appendix G, Revegetation Plan, "Force Majeure Event" includes, but is not limited to: failure to obtain required permits despite the timely submission of applications for those permits; acts of vandalism; and flood events exceeding the 25-year recurrence interval. "Best efforts" includes anticipating any potential Force Majeure Event and addressing the effects of any such event (a) as it is occurring and (b) after it has occurred, to prevent or minimize any resulting delay to the greatest extent possible. "Force Majeure Event" does not include DOT&PF's financial inability to perform any obligation under this Decree. Failure to apply for a required CGP or 404 Permit or approval or to provide in a timely manner all information required to obtain a CGP or 404 Permit or approval that is necessary to meet the requirements of this Decree, or failure of DOT&PF to approve contracts shall not, in any event, be considered Force Majeure Events.

66. Required Notification for Force Majeure:

a. DOT&PF shall, as required below in this subparagraph, notify the United States orally and by electronic or facsimile transmission as soon as possible, but not later than five (5) days after the time DOT&PF first knew of, or in the exercise of reasonable diligence under the circumstances should have known of, any event which might constitute a Force Majeure Event. The United States may designate an alternative representative to receive oral and email notification at its discretion by sending DOT&PF a written designation in accordance with Paragraph 35 (Notification).

(1) For obligations related to the Section 404 sites, DOT&PF shall make the notification required by this paragraph to the Wetlands Compliance Officer in Paragraph 35 (Notification); if the Wetlands Compliance Officer is unavailable by telephone, DOT&PF may satisfy the telephone notice requirement by leaving a voice message or sending an email to the person stating that DOT&PF had called to notify EPA pursuant to this paragraph.

(2) For all other obligations under this Consent Decree, DOT&PF shall make the notification required by this paragraph to the NPDES Compliance Officer in Paragraph 35 (Notification); if the NDPES Compliance Officer is unavailable by telephone, DOT&PF may satisfy the telephone notice requirement by leaving a voice message or sending an email to the person stating that DOT&PF had called to notify EPA pursuant to this paragraph.

b. The written notice DOT&PF submits pursuant to this paragraph shall indicate whether DOT&PF claims that the delay should be excused due to a Force Majeure Event. The notice shall describe in detail the basis for DOT&PF's contention that it experienced a delay due to a Force Majeure Event, the anticipated length of the delay, the precise cause or

causes of the delay, the measures taken or to be taken to prevent or minimize the delay, and the timetable by which those measures will be implemented. DOT&PF shall adopt all reasonable measures to avoid or minimize such delay. Failure to so notify the United States shall render this Section XII (Force Majeure) void and of no effect as to the event in question, and shall waive DOT&PF's right to obtain an extension of time for its obligations based on such event.

67. Procedures for Extension: If the United States finds that a delay in performance is, or was, caused by a Force Majeure Event, the United States shall extend the time for performance, in writing, for a period to compensate for the delay resulting from such event, and stipulated penalties shall not be due for such a period. In proceedings on any dispute regarding a delay in performance, the dispute resolution provisions of Section XI (Dispute Resolution) shall apply, and DOT&PF shall have the burden of proving: (a) that the noncompliance at issue was caused by circumstances entirely beyond the control of DOT&PF and any entity controlled by DOT&PF, including its contractors and consultants; (2) that DOT&PF or any entity controlled by DOT&PF could not have foreseen and prevented such noncompliance; and (3) the number of days of noncompliance that were caused by such circumstances.

68. Operations After Force Majeure Event: DOT&PF shall consult with EPA to determine when to begin or resume the operations that had been affected by any Force Majeure Event.

69. Effect on Other Obligations: Compliance with a requirement of this Decree shall not by itself constitute compliance with any other requirement. An extension of one compliance date based on a particular event shall not automatically extend any other compliance date.

DOT&PF shall make an individual showing of proof regarding the cause of each delayed incremental step or other requirement for which an extension is sought.

SO ORDERED this 21st day of November 2010.

/s/ JOHN W. SEDWICK
UNITED STATES DISTRICT JUDGE

EXHIBIT CX 11
2017 Issuance of NWP 3

2017 Nationwide Permits, General Conditions, District Engineer's Decision, Further Information, and Definitions[1]

A. Index of Nationwide Permits, General Conditions, District Engineer's Decision, Further Information, and Definitions

Nationwide Permits

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3. Maintenance
4. Fish and Wildlife Harvesting, Enhancement, and Attraction Devices and Activities
5. Scientific Measurement Devices
6. Survey Activities
7. Outfall Structures and Associated Intake Structures
8. Oil and Gas Structures on the Outer Continental Shelf
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34. Cranberry Production Activities

[1] The 2017 Nationwide Permits, General Conditions, District Engineer's Decision, Further Information, and Definitions were published in the *Federal Register* on January 6, 2017 (82 FR 1860).

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B. Nationwide Permits

1. Aids to Navigation. The placement of aids to navigation and regulatory markers that are approved by and installed in accordance with the requirements of the U.S. Coast Guard (see 33 CFR, chapter I, subchapter C, part 66). (Authority: Section 10 of the Rivers and Harbors Act of 1899 (Section 10))

2. Structures in Artificial Canals. Structures constructed in artificial canals within principally residential developments where the connection of the canal to a navigable water of the United States has been previously authorized (see 33 CFR 322.5(g)). (Authority: Section 10)

3. Maintenance. (a) The repair, rehabilitation, or replacement of any previously authorized, currently serviceable structure or fill, or of any currently serviceable structure or fill authorized by 33 CFR 330.3, provided that the structure or fill is not to be put to uses differing from those uses specified or contemplated for it in the original permit or the most recently authorized modification. Minor deviations in the structure's configuration or filled area, including those due to changes in materials, construction techniques, requirements of other regulatory agencies, or current construction codes or safety standards that are necessary to make the repair, rehabilitation, or replacement are authorized. This NWP also authorizes the removal of previously authorized structures or fills. Any stream channel modification is limited to the minimum necessary for the repair, rehabilitation, or replacement of the structure or fill; such modifications, including the removal of material from the stream channel, must be immediately adjacent to the project. This NWP also authorizes the removal of accumulated sediment and debris within, and in the immediate vicinity of, the structure or fill. This NWP also authorizes the repair, rehabilitation, or replacement of those structures or fills destroyed or damaged by storms, floods, fire or other discrete events, provided the repair, rehabilitation, or replacement is commenced, or is under contract to commence, within two years of the date of their destruction or damage. In cases of catastrophic events, such as hurricanes or tornadoes, this two-year limit may be waived by the district engineer, provided the permittee can demonstrate funding, contract, or other similar delays.

(b) This NWP also authorizes the removal of accumulated sediments and debris outside the immediate vicinity of existing structures (e.g., bridges, culverted road crossings, water intake structures, etc.). The removal of sediment is limited to the minimum necessary to restore the waterway in the vicinity of the structure to the approximate dimensions that existed when the structure was built, but cannot extend farther than 200 feet in any direction from the structure. This 200 foot limit does not apply to maintenance dredging to remove accumulated sediments blocking or restricting outfall and intake structures or to maintenance dredging to remove accumulated sediments from canals associated with outfall and intake structures. All dredged or excavated materials must be deposited and retained in an area that has no waters of the United States unless otherwise specifically approved by the district engineer under separate authorization.

(c) This NWP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to conduct the maintenance activity. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. After conducting the maintenance activity, temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate.

(d) This NWP does not authorize maintenance dredging for the primary purpose of navigation. This NWP does not authorize beach restoration. This NWP does not authorize new stream channelization or stream relocation projects.

Notification: For activities authorized by paragraph (b) of this NWP, the permittee must submit a pre-construction notification to the district engineer prior to commencing the activity (see general condition 32). The pre-construction notification must include information regarding the original design capacities and configurations of the outfalls, intakes, small impoundments, and canals. (Authorities: Section 10 of the Rivers and Harbors Act of 1899 and section 404 of the Clean Water Act (Sections 10 and 404))

Note: This NWP authorizes the repair, rehabilitation, or replacement of any previously authorized structure or fill that does not qualify for the Clean Water Act section 404(f) exemption for maintenance.

4. Fish and Wildlife Harvesting, Enhancement, and Attraction Devices and Activities. Fish and wildlife harvesting devices and activities such as pound nets, crab traps, crab dredging, eel pots, lobster traps, duck blinds, and clam and oyster digging, fish aggregating devices, and small fish attraction devices such as open water fish concentrators (sea kites, etc.). This NWP does not authorize artificial reefs or impoundments and semi-impoundments of waters of the United States for the culture or

holding of motile species such as lobster, or the use of covered oyster trays or clam racks. (Authorities: Sections 10 and 404)

5. Scientific Measurement Devices. Devices, whose purpose is to measure and record scientific data, such as staff gages, tide and current gages, meteorological stations, water recording and biological observation devices, water quality testing and improvement devices, and similar structures. Small weirs and flumes constructed primarily to record water quantity and velocity are also authorized provided the discharge is limited to 25 cubic yards. Upon completion of the use of the device to measure and record scientific data, the measuring device and any other structures or fills associated with that device (e.g., foundations, anchors, buoys, lines, etc.) must be removed to the maximum extent practicable and the site restored to pre-construction elevations. (Authorities: Sections 10 and 404)

6. Survey Activities. Survey activities, such as core sampling, seismic exploratory operations, plugging of seismic shot holes and other exploratory-type bore holes, exploratory trenching, soil surveys, sampling, sample plots or transects for wetland delineations, and historic resources surveys. For the purposes of this NWP, the term "exploratory trenching" means mechanical land clearing of the upper soil profile to expose bedrock or substrate, for the purpose of mapping or sampling the exposed material. The area in which the exploratory trench is dug must be restored to its pre-construction elevation upon completion of the work and must not drain a water of the United States. In wetlands, the top 6 to 12 inches of the trench should normally be backfilled with topsoil from the trench. This NWP authorizes the construction of temporary pads, provided the discharge does not exceed 1/10-acre in waters of the U.S. Discharges and structures associated with the recovery of historic resources are not authorized by this NWP. Drilling and the discharge of excavated material from test wells for oil and gas exploration are not authorized by this NWP; the plugging of such wells is authorized. Fill placed for roads and other similar activities is not authorized by this NWP. The NWP does not authorize any permanent structures. The discharge of drilling mud and cuttings may require a permit under section 402 of the Clean Water Act. (Authorities: Sections 10 and 404)

7. Outfall Structures and Associated Intake Structures. Activities related to the construction or modification of outfall structures and associated intake structures, where the effluent from the outfall is authorized, conditionally authorized, or specifically exempted by, or otherwise in compliance with regulations issued under the National Pollutant Discharge Elimination System Program (section 402 of the Clean Water Act). The construction of intake structures is not authorized by this NWP, unless they are directly associated with an authorized outfall structure.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity. (See general condition 32.) (Authorities: Sections 10 and 404)

8. Oil and Gas Structures on the Outer Continental Shelf. Structures for the exploration, production, and transportation of oil, gas, and minerals on the outer continental shelf within areas leased for such purposes by the Department of the Interior, Bureau of Ocean Energy Management. Such structures shall not be placed within the limits of any designated shipping safety fairway or traffic separation scheme, except temporary anchors that comply with the fairway regulations in 33 CFR 322.5(l). The district engineer will review such proposals to ensure compliance with the provisions of the fairway regulations in 33 CFR 322.5(l). Any Corps review under this NWP will be limited to the effects on navigation and national security in accordance with 33 CFR 322.5(f), as well as 33 CFR 322.5(l) and 33 CFR part 334. Such structures will not be placed in established danger zones or restricted areas as designated in 33 CFR part 334, nor will such structures be permitted in EPA or Corps-designated dredged material disposal areas.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity. (See general condition 32.) (Authority: Section 10)

9. Structures in Fleeting and Anchorage Areas. Structures, buoys, floats, and other devices placed within anchorage or fleeting areas to facilitate moorage of vessels where such areas have been established for that purpose. (Authority: Section 10)

10. Mooring Buoys. Non-commercial, single-boat, mooring buoys. (Authority: Section 10)

11. Temporary Recreational Structures. Temporary buoys, markers, small floating docks, and similar structures placed for recreational use during specific events such as water skiing competitions and boat races or seasonal use, provided that such structures are removed within 30 days after use has been discontinued. At Corps of Engineers reservoirs, the reservoir managers must approve each buoy or marker individually. (Authority: Section 10)

12. Utility Line Activities. Activities required for the construction, maintenance, repair, and removal of utility lines and associated facilities in waters of the United States, provided the activity does not result in the loss of greater than 1/2-acre of waters of the United States for each single and complete project.

Utility lines: This NWP authorizes discharges of dredged or fill material into waters of the United States and structures or work in navigable waters for crossings of those waters associated with the construction, maintenance, or repair of utility lines, including outfall and intake structures. There must be no change in pre-construction contours of waters of the United States. A "utility line" is defined as any pipe or pipeline for the transportation of any gaseous, liquid, liquescent, or slurry substance, for any purpose, and any cable, line, or wire for the transmission for any purpose of electrical energy, telephone, and telegraph messages, and internet, radio, and television communication. The term "utility line" does not include activities that drain a water of

the United States, such as drainage tile or french drains, but it does apply to pipes conveying drainage from another area.

Material resulting from trench excavation may be temporarily sidecast into waters of the United States for no more than three months, provided the material is not placed in such a manner that it is dispersed by currents or other forces. The district engineer may extend the period of temporary side casting for no more than a total of 180 days, where appropriate. In wetlands, the top 6 to 12 inches of the trench should normally be backfilled with topsoil from the trench. The trench cannot be constructed or backfilled in such a manner as to drain waters of the United States (e.g., backfilling with extensive gravel layers, creating a french drain effect). Any exposed slopes and stream banks must be stabilized immediately upon completion of the utility line crossing of each waterbody.

Utility line substations: This NWP authorizes the construction, maintenance, or expansion of substation facilities associated with a power line or utility line in non-tidal waters of the United States, provided the activity, in combination with all other activities included in one single and complete project, does not result in the loss of greater than 1/2-acre of waters of the United States. This NWP does not authorize discharges into non-tidal wetlands adjacent to tidal waters of the United States to construct, maintain, or expand substation facilities.

Foundations for overhead utility line towers, poles, and anchors: This NWP authorizes the construction or maintenance of foundations for overhead utility line towers, poles, and anchors in all waters of the United States, provided the foundations are the minimum size necessary and separate footings for each tower leg (rather than a larger single pad) are used where feasible.

Access roads: This NWP authorizes the construction of access roads for the construction and maintenance of utility lines, including overhead power lines and utility line substations, in non-tidal waters of the United States, provided the activity, in combination with all other activities included in one single and complete project, does not cause the loss of greater than 1/2-acre of non-tidal waters of the United States. This NWP does not authorize discharges into non-tidal wetlands adjacent to tidal waters for access roads. Access roads must be the minimum width necessary (see Note 2, below). Access roads must be constructed so that the length of the road minimizes any adverse effects on waters of the United States and must be as near as possible to pre-construction contours and elevations (e.g., at grade corduroy roads or geotextile/gravel roads). Access roads constructed above pre-construction contours and elevations in waters of the United States must be properly bridged or culverted to maintain surface flows.

This NWP may authorize utility lines in or affecting navigable waters of the United States even if there is no associated discharge of dredged or fill material (See 33 CFR part 322). Overhead utility lines constructed over section 10 waters and utility lines that are routed in or under section 10 waters without a discharge of dredged or fill material require a section 10 permit.

This NWP authorizes, to the extent that Department of the Army authorization is required, temporary structures, fills, and work necessary for the remediation of inadvertent returns of drilling fluids to waters of the United States through sub-soil fissures or fractures that might occur during horizontal directional drilling activities conducted for the purpose of installing or replacing utility lines. These remediation activities must be done as soon as practicable, to restore the affected waterbody. District engineers may add special conditions to this NWP to require a remediation plan for addressing inadvertent returns of drilling fluids to waters of the United States during horizontal directional drilling activities conducted for the purpose of installing or replacing utility lines.

This NWP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to conduct the utility line activity. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. After construction, temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity if any of the following criteria are met: (1) the activity involves mechanized land clearing in a forested wetland for the utility line right-of-way; (2) a section 10 permit is required; (3) the utility line in waters of the United States, excluding overhead lines, exceeds 500 feet; (4) the utility line is placed within a jurisdictional area (i.e., water of the United States), and it runs parallel to or along a stream bed that is within that jurisdictional area; (5) discharges that result in the loss of greater than 1/10-acre of waters of the United States; (6) permanent access roads are constructed above grade in waters of the United States for a distance of more than 500 feet; or (7) permanent access roads are constructed in waters of the United States with impervious materials. (See general condition 32.) (Authorities: Sections 10 and 404)

Note 1: Where the utility line is constructed or installed in navigable waters of the United States (i.e., section 10 waters) within the coastal United States, the Great Lakes, and United States territories, a copy of the NWP verification will be sent by the Corps to the National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), for charting the utility line to protect navigation.

Note 2: For utility line activities crossing a single waterbody more than one time at separate and distant locations, or multiple waterbodies at separate and distant locations, each crossing is considered a single and complete project for purposes of NWP authorization. Utility line activities must comply with 33 CFR 330.6(d).

Note 3: Utility lines consisting of aerial electric power transmission lines crossing navigable waters of the United States (which are defined at 33 CFR part 329) must comply with the applicable minimum clearances specified in 33 CFR 322.5(i).

Note 4: Access roads used for both construction and maintenance may be authorized, provided they meet the terms and conditions of this NWP. Access roads used solely for construction of the utility line must be removed upon completion of the work, in accordance with the requirements for temporary fills.

Note 5: Pipes or pipelines used to transport gaseous, liquid, liquescent, or slurry substances over navigable waters of the United States are considered to be bridges, not utility lines, and may require a permit from the U.S. Coast Guard pursuant to section 9 of the Rivers and Harbors Act of 1899. However, any discharges of dredged or fill material into waters of the United States associated with such pipelines will require a section 404 permit (see NWP 15).

Note 6: This NWP authorizes utility line maintenance and repair activities that do not qualify for the Clean Water Act section 404(f) exemption for maintenance of currently serviceable fills or fill structures.

Note 7: For overhead utility lines authorized by this NWP, a copy of the PCN and NWP verification will be provided to the Department of Defense Siting Clearinghouse, which will evaluate potential effects on military activities.

Note 8: For NWP 12 activities that require pre-construction notification, the PCN must include any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity, including other separate and distant crossings that require Department of the Army authorization but do not require pre-construction notification (see paragraph (b) of general condition 32). The district engineer will evaluate the PCN in accordance with Section D, "District Engineer's Decision." The district engineer may require mitigation to ensure that the authorized activity results in no more than minimal individual and cumulative adverse environmental effects (see general condition 23).

13. Bank Stabilization. Bank stabilization activities necessary for erosion control or prevention, such as vegetative stabilization, bioengineering, sills, rip rap, revetment, gabion baskets, stream barbs, and bulkheads, or combinations of bank stabilization techniques, provided the activity meets all of the following criteria:

(a) No material is placed in excess of the minimum needed for erosion protection;

(b) The activity is no more than 500 feet in length along the bank, unless the district engineer waives this criterion by making a written determination concluding that the discharge will result in no more than minimal adverse environmental effects (an exception is for bulkheads – the district engineer cannot issue a waiver for a bulkhead that is greater than 1,000 feet in length along the bank);

(c) The activity will not exceed an average of one cubic yard per running foot, as measured along the length of the treated bank, below the plane of the ordinary high water mark or the high tide line, unless the district engineer waives this criterion by making a written determination concluding that the discharge will result in no more than minimal adverse environmental effects;

(d) The activity does not involve discharges of dredged or fill material into special aquatic sites, unless the district engineer waives this criterion by making a written determination concluding that the discharge will result in no more than minimal adverse environmental effects;

(e) No material is of a type, or is placed in any location, or in any manner, that will impair surface water flow into or out of any waters of the United States;

(f) No material is placed in a manner that will be eroded by normal or expected high flows (properly anchored native trees and treetops may be used in low energy areas);

(g) Native plants appropriate for current site conditions, including salinity, must be used for bioengineering or vegetative bank stabilization;

(h) The activity is not a stream channelization activity; and

(i) The activity must be properly maintained, which may require repairing it after severe storms or erosion events. This NWP authorizes those maintenance and repair activities if they require authorization.

This NWP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to construct the bank stabilization activity. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. After construction, temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity if the bank stabilization activity: (1) involves discharges into special aquatic sites; or (2) is in excess of 500 feet in length; or (3) will involve the discharge of greater than an average of one cubic yard per running foot as measured along the length of the treated bank, below the plane of the ordinary high water mark or the high tide line. (See general condition 32.) (Authorities: Sections 10 and 404)

14. Linear Transportation Projects. Activities required for crossings of waters of the United States associated with the construction, expansion, modification, or improvement of linear transportation projects (e.g., roads, highways, railways, trails, airport runways, and taxiways) in waters of the United States. For linear transportation projects in non-tidal waters, the discharge cannot cause the loss of greater than 1/2-acre of waters of the United States. For linear transportation projects in tidal waters, the discharge cannot cause the loss of greater than 1/3-acre of waters of the United States. Any stream channel modification, including bank stabilization, is limited to the minimum necessary to construct or protect the linear transportation project; such modifications must be in the immediate vicinity of the project.

This NWP also authorizes temporary structures, fills, and work, including the use of temporary mats, necessary to construct the linear transportation project. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate.

This NWP cannot be used to authorize non-linear features commonly associated with transportation projects, such as vehicle maintenance or storage buildings, parking lots, train stations, or aircraft hangars.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity if: (1) the loss of waters of the United States exceeds 1/10-acre; or (2) there is a discharge in a special aquatic site, including wetlands. (See general condition 32.) (Authorities: Sections 10 and 404)

Note 1: For linear transportation projects crossing a single waterbody more than one time at separate and distant locations, or multiple waterbodies at separate and distant locations, each crossing is considered a single and complete project for purposes of NWP authorization. Linear transportation projects must comply with 33 CFR 330.6(d).

Note 2: Some discharges for the construction of farm roads or forest roads, or temporary roads for moving mining equipment, may qualify for an exemption under section 404(f) of the Clean Water Act (see 33 CFR 323.4).

Note 3: For NWP 14 activities that require pre-construction notification, the PCN must include any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity, including other separate and distant crossings that require Department of the Army authorization but do not require pre-construction notification (see paragraph (b) of general condition 32). The district engineer will evaluate the PCN in accordance with Section D, "District Engineer's Decision." The district engineer may require mitigation to

ensure that the authorized activity results in no more than minimal individual and cumulative adverse environmental effects (see general condition 23).

15. U.S. Coast Guard Approved Bridges. Discharges of dredged or fill material incidental to the construction of a bridge across navigable waters of the United States, including cofferdams, abutments, foundation seals, piers, and temporary construction and access fills, provided the construction of the bridge structure has been authorized by the U.S. Coast Guard under section 9 of the Rivers and Harbors Act of 1899 or other applicable laws. Causeways and approach fills are not included in this NWP and will require a separate section 404 permit. (Authority: Section 404 of the Clean Water Act (Section 404))

16. Return Water From Upland Contained Disposal Areas. Return water from an upland contained dredged material disposal area. The return water from a contained disposal area is administratively defined as a discharge of dredged material by 33 CFR 323.2(d), even though the disposal itself occurs in an area that has no waters of the United States and does not require a section 404 permit. This NWP satisfies the technical requirement for a section 404 permit for the return water where the quality of the return water is controlled by the state through the section 401 certification procedures. The dredging activity may require a section 404 permit (33 CFR 323.2(d)), and will require a section 10 permit if located in navigable waters of the United States. (Authority: Section 404)

17. Hydropower Projects. Discharges of dredged or fill material associated with hydropower projects having: (a) Less than 5000 kW of total generating capacity at existing reservoirs, where the project, including the fill, is licensed by the Federal Energy Regulatory Commission (FERC) under the Federal Power Act of 1920, as amended; or (b) a licensing exemption granted by the FERC pursuant to section 408 of the Energy Security Act of 1980 (16 U.S.C. 2705 and 2708) and section 30 of the Federal Power Act, as amended.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity. (See general condition 32.) (Authority: Section 404)

18. Minor Discharges. Minor discharges of dredged or fill material into all waters of the United States, provided the activity meets all of the following criteria:

(a) The quantity of discharged material and the volume of area excavated do not exceed 25 cubic yards below the plane of the ordinary high water mark or the high tide line;

(b) The discharge will not cause the loss of more than 1/10-acre of waters of the United States; and

(c) The discharge is not placed for the purpose of a stream diversion.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity if: (1) the discharge or the volume of area excavated exceeds 10 cubic yards below the plane of the ordinary high water mark or the high tide line, or (2) the discharge is in a special aquatic site, including wetlands. (See general condition 32.) (Authorities: Sections 10 and 404)

19. Minor Dredging. Dredging of no more than 25 cubic yards below the plane of the ordinary high water mark or the mean high water mark from navigable waters of the United States (i.e., section 10 waters). This NWP does not authorize the dredging or degradation through siltation of coral reefs, sites that support submerged aquatic vegetation (including sites where submerged aquatic vegetation is documented to exist but may not be present in a given year), anadromous fish spawning areas, or wetlands, or the connection of canals or other artificial waterways to navigable waters of the United States (see 33 CFR 322.5(g)). All dredged material must be deposited and retained in an area that has no waters of the United States unless otherwise specifically approved by the district engineer under separate authorization. (Authorities: Sections 10 and 404)

20. Response Operations for Oil or Hazardous Substances. Activities conducted in response to a discharge or release of oil or hazardous substances that are subject to the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR part 300) including containment, cleanup, and mitigation efforts, provided that the activities are done under either: (1) the Spill Control and Countermeasure Plan required by 40 CFR 112.3; (2) the direction or oversight of the federal on-scene coordinator designated by 40 CFR part 300; or (3) any approved existing state, regional or local contingency plan provided that the Regional Response Team (if one exists in the area) concurs with the proposed response efforts. This NWP also authorizes activities required for the cleanup of oil releases in waters of the United States from electrical equipment that are governed by EPA's polychlorinated biphenyl spill response regulations at 40 CFR part 761. This NWP also authorizes the use of temporary structures and fills in waters of the U.S. for spill response training exercises. (Authorities: Sections 10 and 404)

21. Surface Coal Mining Activities. Discharges of dredged or fill material into waters of the United States associated with surface coal mining and reclamation operations, provided the following criteria are met:

(a) The activities are already authorized, or are currently being processed by states with approved programs under Title V of the Surface Mining Control and Reclamation Act of 1977 or as part of an integrated permit processing procedure by the Department of the Interior, Office of Surface Mining Reclamation and Enforcement;

(b) The discharge must not cause the loss of greater than 1/2-acre of non-tidal waters of the United States. The discharge must not cause the loss of more than 300 linear feet of stream bed, unless for intermittent and ephemeral stream beds the district engineer waives the 300 linear foot limit by making a written determination concluding that the discharge will result in no more than minimal individual and cumulative adverse environmental effects. The loss of stream bed plus any other losses of jurisdictional

wetlands and waters caused by the NWP activity cannot exceed 1/2-acre. This NWP does not authorize discharges into tidal waters or non-tidal wetlands adjacent to tidal waters; and

(c) The discharge is not associated with the construction of valley fills. A "valley fill" is a fill structure that is typically constructed within valleys associated with steep, mountainous terrain, associated with surface coal mining activities.

Notification: The permittee must submit a pre-construction notification to the district engineer and receive written authorization prior to commencing the activity. (See general condition 32.) (Authorities: Sections 10 and 404)

22. Removal of Vessels. Temporary structures or minor discharges of dredged or fill material required for the removal of wrecked, abandoned, or disabled vessels, or the removal of man-made obstructions to navigation. This NWP does not authorize maintenance dredging, shoal removal, or riverbank snagging.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity if: (1) the vessel is listed or eligible for listing in the National Register of Historic Places; or (2) the activity is conducted in a special aquatic site, including coral reefs and wetlands. (See general condition 32.) If condition 1 above is triggered, the permittee cannot commence the activity until informed by the district engineer that compliance with the "Historic Properties" general condition is completed. (Authorities: Sections 10 and 404)

Note 1: If a removed vessel is disposed of in waters of the United States, a permit from the U.S. EPA may be required (see 40 CFR 229.3). If a Department of the Army permit is required for vessel disposal in waters of the United States, separate authorization will be required.

Note 2: Compliance with general condition 18, Endangered Species, and general condition 20, Historic Properties, is required for all NWPs. The concern with historic properties is emphasized in the notification requirements for this NWP because of the possibility that shipwrecks may be historic properties.

23. Approved Categorical Exclusions. Activities undertaken, assisted, authorized, regulated, funded, or financed, in whole or in part, by another Federal agency or department where:

(a) That agency or department has determined, pursuant to the Council on Environmental Quality's implementing regulations for the National Environmental Policy Act (40 CFR part 1500 et seq.), that the activity is categorically excluded from the requirement to prepare an environmental impact statement or environmental assessment analysis, because it is included within a category of actions which neither individually nor cumulatively have a significant effect on the human environment; and

(b) The Office of the Chief of Engineers (Attn: CECW-CO) has concurred with that agency's or department's determination that the activity is categorically excluded and approved the activity for authorization under NWP 23.

The Office of the Chief of Engineers may require additional conditions, including pre-construction notification, for authorization of an agency's categorical exclusions under this NWP.

Notification: Certain categorical exclusions approved for authorization under this NWP require the permittee to submit a pre-construction notification to the district engineer prior to commencing the activity (see general condition 32). The activities that require pre-construction notification are listed in the appropriate Regulatory Guidance Letters. (Authorities: Sections 10 and 404)

Note: The agency or department may submit an application for an activity believed to be categorically excluded to the Office of the Chief of Engineers (Attn: CECW-CO). Prior to approval for authorization under this NWP of any agency's activity, the Office of the Chief of Engineers will solicit public comment. As of the date of issuance of this NWP, agencies with approved categorical exclusions are: the Bureau of Reclamation, Federal Highway Administration, and U.S. Coast Guard. Activities approved for authorization under this NWP as of the date of this notice are found in Corps Regulatory Guidance Letter 05-07, which is available at: https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll9/id/1272 Any future approved categorical exclusions will be announced in Regulatory Guidance Letters and posted on this same web site.

24. Indian Tribe or State Administered Section 404 Programs. Any activity permitted by a state or Indian Tribe administering its own section 404 permit program pursuant to 33 U.S.C. 1344(g)-(l) is permitted pursuant to section 10 of the Rivers and Harbors Act of 1899. (Authority: Section 10)

Note 1: As of the date of the promulgation of this NWP, only New Jersey and Michigan administer their own section 404 permit programs.

Note 2: Those activities that do not involve an Indian Tribe or State section 404 permit are not included in this NWP, but certain structures will be exempted by Section 154 of Pub. L. 94-587, 90 Stat. 2917 (33 U.S.C. 591) (see 33 CFR 322.4(b)).

25. Structural Discharges. Discharges of material such as concrete, sand, rock, etc., into tightly sealed forms or cells where the material will be used as a structural member for standard pile supported structures, such as bridges, transmission line footings, and walkways, or for general navigation, such as mooring cells, including the excavation of bottom material from within the form prior to the discharge of concrete, sand, rock, etc. This NWP does not authorize filled structural members that would support buildings, building pads, homes, house pads, parking areas, storage areas and

other such structures. The structure itself may require a separate section 10 permit if located in navigable waters of the United States. (Authority: Section 404)

26. [Reserved]

27. Aquatic Habitat Restoration, Enhancement, and Establishment Activities. Activities in waters of the United States associated with the restoration, enhancement, and establishment of tidal and non-tidal wetlands and riparian areas, the restoration and enhancement of non-tidal streams and other non-tidal open waters, and the rehabilitation or enhancement of tidal streams, tidal wetlands, and tidal open waters, provided those activities result in net increases in aquatic resource functions and services.

To be authorized by this NWP, the aquatic habitat restoration, enhancement, or establishment activity must be planned, designed, and implemented so that it results in aquatic habitat that resembles an ecological reference. An ecological reference may be based on the characteristics of an intact aquatic habitat or riparian area of the same type that exists in the region. An ecological reference may be based on a conceptual model developed from regional ecological knowledge of the target aquatic habitat type or riparian area.

To the extent that a Corps permit is required, activities authorized by this NWP include, but are not limited to: the removal of accumulated sediments; the installation, removal, and maintenance of small water control structures, dikes, and berms, as well as discharges of dredged or fill material to restore appropriate stream channel configurations after small water control structures, dikes, and berms, are removed; the installation of current deflectors; the enhancement, rehabilitation, or re-establishment of riffle and pool stream structure; the placement of in-stream habitat structures; modifications of the stream bed and/or banks to enhance, rehabilitate, or re-establish stream meanders; the removal of stream barriers, such as undersized culverts, fords, and grade control structures; the backfilling of artificial channels; the removal of existing drainage structures, such as drain tiles, and the filling, blocking, or reshaping of drainage ditches to restore wetland hydrology; the installation of structures or fills necessary to restore or enhance wetland or stream hydrology; the construction of small nesting islands; the construction of open water areas; the construction of oyster habitat over unvegetated bottom in tidal waters; shellfish seeding; activities needed to reestablish vegetation, including plowing or discing for seed bed preparation and the planting of appropriate wetland species; re-establishment of submerged aquatic vegetation in areas where those plant communities previously existed; re-establishment of tidal wetlands in tidal waters where those wetlands previously existed; mechanized land clearing to remove non-native invasive, exotic, or nuisance vegetation; and other related activities. Only native plant species should be planted at the site.

This NWP authorizes the relocation of non-tidal waters, including non-tidal wetlands and streams, on the project site provided there are net increases in aquatic resource functions and services.

Except for the relocation of non-tidal waters on the project site, this NWP does not authorize the conversion of a stream or natural wetlands to another aquatic habitat type (e.g., the conversion of a stream to wetland or vice versa) or uplands. Changes in wetland plant communities that occur when wetland hydrology is more fully restored during wetland rehabilitation activities are not considered a conversion to another aquatic habitat type. This NWP does not authorize stream channelization. This NWP does not authorize the relocation of tidal waters or the conversion of tidal waters, including tidal wetlands, to other aquatic uses, such as the conversion of tidal wetlands into open water impoundments.

Compensatory mitigation is not required for activities authorized by this NWP since these activities must result in net increases in aquatic resource functions and services.

Reversion. For enhancement, restoration, and establishment activities conducted: (1) In accordance with the terms and conditions of a binding stream or wetland enhancement or restoration agreement, or a wetland establishment agreement, between the landowner and the U.S. Fish and Wildlife Service (FWS), the Natural Resources Conservation Service (NRCS), the Farm Service Agency (FSA), the National Marine Fisheries Service (NMFS), the National Ocean Service (NOS), U.S. Forest Service (USFS), or their designated state cooperating agencies; (2) as voluntary wetland restoration, enhancement, and establishment actions documented by the NRCS or USDA Technical Service Provider pursuant to NRCS Field Office Technical Guide standards; or (3) on reclaimed surface coal mine lands, in accordance with a Surface Mining Control and Reclamation Act permit issued by the Office of Surface Mining Reclamation and Enforcement (OSMRE) or the applicable state agency, this NWP also authorizes any future discharge of dredged or fill material associated with the reversion of the area to its documented prior condition and use (i.e., prior to the restoration, enhancement, or establishment activities). The reversion must occur within five years after expiration of a limited term wetland restoration or establishment agreement or permit, and is authorized in these circumstances even if the discharge occurs after this NWP expires. The five-year reversion limit does not apply to agreements without time limits reached between the landowner and the FWS, NRCS, FSA, NMFS, NOS, USFS, or an appropriate state cooperating agency. This NWP also authorizes discharges of dredged or fill material in waters of the United States for the reversion of wetlands that were restored, enhanced, or established on prior-converted cropland or on uplands, in accordance with a binding agreement between the landowner and NRCS, FSA, FWS, or their designated state cooperating agencies (even though the restoration, enhancement, or establishment activity did not require a section 404 permit). The prior condition will be documented in the original agreement or permit, and the determination of return to prior conditions will be made by the Federal agency or appropriate state agency executing the agreement or permit. Before conducting any reversion activity the permittee or the appropriate Federal or state agency must notify the district engineer and include the documentation of the prior condition. Once an area has reverted to its prior physical condition, it will be subject to whatever the Corps Regulatory requirements are applicable to that type of land at the time. The requirement that the activity results in a net increase in aquatic resource

functions and services does not apply to reversion activities meeting the above conditions. Except for the activities described above, this NWP does not authorize any future discharge of dredged or fill material associated with the reversion of the area to its prior condition. In such cases a separate permit would be required for any reversion.

Reporting. For those activities that do not require pre-construction notification, the permittee must submit to the district engineer a copy of: (1) The binding stream enhancement or restoration agreement or wetland enhancement, restoration, or establishment agreement, or a project description, including project plans and location map; (2) the NRCS or USDA Technical Service Provider documentation for the voluntary stream enhancement or restoration action or wetland restoration, enhancement, or establishment action; or (3) the SMCRA permit issued by OSMRE or the applicable state agency. The report must also include information on baseline ecological conditions on the project site, such as a delineation of wetlands, streams, and/or other aquatic habitats. These documents must be submitted to the district engineer at least 30 days prior to commencing activities in waters of the United States authorized by this NWP.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing any activity (see general condition 32), except for the following activities:

(1) Activities conducted on non-Federal public lands and private lands, in accordance with the terms and conditions of a binding stream enhancement or restoration agreement or wetland enhancement, restoration, or establishment agreement between the landowner and the FWS, NRCS, FSA, NMFS, NOS, USFS or their designated state cooperating agencies;

(2) Voluntary stream or wetland restoration or enhancement action, or wetland establishment action, documented by the NRCS or USDA Technical Service Provider pursuant to NRCS Field Office Technical Guide standards; or

(3) The reclamation of surface coal mine lands, in accordance with an SMCRA permit issued by the OSMRE or the applicable state agency.

However, the permittee must submit a copy of the appropriate documentation to the district engineer to fulfill the reporting requirement. (Authorities: Sections 10 and 404)

Note: This NWP can be used to authorize compensatory mitigation projects, including mitigation banks and in-lieu fee projects. However, this NWP does not authorize the reversion of an area used for a compensatory mitigation project to its prior condition, since compensatory mitigation is generally intended to be permanent.

28. Modifications of Existing Marinas. Reconfiguration of existing docking facilities within an authorized marina area. No dredging, additional slips, dock spaces, or

expansion of any kind within waters of the United States is authorized by this NWP. (Authority: Section 10)

29. Residential Developments. Discharges of dredged or fill material into non-tidal waters of the United States for the construction or expansion of a single residence, a multiple unit residential development, or a residential subdivision. This NWP authorizes the construction of building foundations and building pads and attendant features that are necessary for the use of the residence or residential development. Attendant features may include but are not limited to roads, parking lots, garages, yards, utility lines, storm water management facilities, septic fields, and recreation facilities such as playgrounds, playing fields, and golf courses (provided the golf course is an integral part of the residential development).

The discharge must not cause the loss of greater than 1/2-acre of non-tidal waters of the United States. The discharge must not cause the loss of more than 300 linear feet of stream bed, unless for intermittent and ephemeral stream beds the district engineer waives the 300 linear foot limit by making a written determination concluding that the discharge will result in no more than minimal adverse environmental effects. This NWP does not authorize discharges into non-tidal wetlands adjacent to tidal waters. The loss of stream bed plus any other losses of jurisdictional wetlands and waters caused by the NWP activity cannot exceed 1/2-acre.

Subdivisions: For residential subdivisions, the aggregate total loss of waters of United States authorized by this NWP cannot exceed 1/2-acre. This includes any loss of waters of the United States associated with development of individual subdivision lots.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity. (See general condition 32.) (Authorities: Sections 10 and 404)

30. Moist Soil Management for Wildlife. Discharges of dredged or fill material into non-tidal waters of the United States and maintenance activities that are associated with moist soil management for wildlife for the purpose of continuing ongoing, site-specific, wildlife management activities where soil manipulation is used to manage habitat and feeding areas for wildlife. Such activities include, but are not limited to, plowing or discing to impede succession, preparing seed beds, or establishing fire breaks. Sufficient riparian areas must be maintained adjacent to all open water bodies, including streams, to preclude water quality degradation due to erosion and sedimentation. This NWP does not authorize the construction of new dikes, roads, water control structures, or similar features associated with the management areas. The activity must not result in a net loss of aquatic resource functions and services. This NWP does not authorize the conversion of wetlands to uplands, impoundments, or other open water bodies. (Authority: Section 404)

Note: The repair, maintenance, or replacement of existing water control structures or the repair or maintenance of dikes may be authorized by NWP 3. Some such activities

may qualify for an exemption under section 404(f) of the Clean Water Act (see 33 CFR 323.4).

31. Maintenance of Existing Flood Control Facilities. Discharges of dredged or fill material resulting from activities associated with the maintenance of existing flood control facilities, including debris basins, retention/detention basins, levees, and channels that: (i) were previously authorized by the Corps by individual permit, general permit, or 33 CFR 330.3, or did not require a permit at the time they were constructed, or (ii) were constructed by the Corps and transferred to a non-Federal sponsor for operation and maintenance. Activities authorized by this NWP are limited to those resulting from maintenance activities that are conducted within the "maintenance baseline," as described in the definition below. Discharges of dredged or fill materials associated with maintenance activities in flood control facilities in any watercourse that have previously been determined to be within the maintenance baseline are authorized under this NWP. To the extent that a Corps permit is required, this NWP authorizes the removal of vegetation from levees associated with the flood control project. This NWP does not authorize the removal of sediment and associated vegetation from natural water courses except when these activities have been included in the maintenance baseline. All dredged and excavated material must be deposited and retained in an area that has no waters of the United States unless otherwise specifically approved by the district engineer under separate authorization. Proper sediment controls must be used.

Maintenance Baseline: The maintenance baseline is a description of the physical characteristics (e.g., depth, width, length, location, configuration, or design flood capacity, etc.) of a flood control project within which maintenance activities are normally authorized by NWP 31, subject to any case-specific conditions required by the district engineer. The district engineer will approve the maintenance baseline based on the approved or constructed capacity of the flood control facility, whichever is smaller, including any areas where there are no constructed channels but which are part of the facility. The prospective permittee will provide documentation of the physical characteristics of the flood control facility (which will normally consist of as-built or approved drawings) and documentation of the approved and constructed design capacities of the flood control facility. If no evidence of the constructed capacity exists, the approved capacity will be used. The documentation will also include best management practices to ensure that the adverse environmental impacts caused by the maintenance activities are no more than minimal, especially in maintenance areas where there are no constructed channels. (The Corps may request maintenance records in areas where there has not been recent maintenance.) Revocation or modification of the final determination of the maintenance baseline can only be done in accordance with 33 CFR 330.5. Except in emergencies as described below, this NWP cannot be used until the district engineer approves the maintenance baseline and determines the need for mitigation and any regional or activity-specific conditions. Once determined, the maintenance baseline will remain valid for any subsequent reissuance of this NWP. This NWP does not authorize maintenance of a flood control facility that has been abandoned. A flood control facility will be considered abandoned if it has operated at a significantly reduced capacity without needed maintenance being accomplished in a timely manner. A flood control

facility will not be considered abandoned if the prospective permittee is in the process of obtaining other authorizations or approvals required for maintenance activities and is experiencing delays in obtaining those authorizations or approvals.

Mitigation: The district engineer will determine any required mitigation one-time only for impacts associated with maintenance work at the same time that the maintenance baseline is approved. Such one-time mitigation will be required when necessary to ensure that adverse environmental effects are no more than minimal, both individually and cumulatively. Such mitigation will only be required once for any specific reach of a flood control project. However, if one-time mitigation is required for impacts associated with maintenance activities, the district engineer will not delay needed maintenance, provided the district engineer and the permittee establish a schedule for identification, approval, development, construction and completion of any such required mitigation. Once the one-time mitigation described above has been completed, or a determination made that mitigation is not required, no further mitigation will be required for maintenance activities within the maintenance baseline (see Note, below). In determining appropriate mitigation, the district engineer will give special consideration to natural water courses that have been included in the maintenance baseline and require mitigation and/or best management practices as appropriate.

Emergency Situations: In emergency situations, this NWP may be used to authorize maintenance activities in flood control facilities for which no maintenance baseline has been approved. Emergency situations are those which would result in an unacceptable hazard to life, a significant loss of property, or an immediate, unforeseen, and significant economic hardship if action is not taken before a maintenance baseline can be approved. In such situations, the determination of mitigation requirements, if any, may be deferred until the emergency has been resolved. Once the emergency has ended, a maintenance baseline must be established expeditiously, and mitigation, including mitigation for maintenance conducted during the emergency, must be required as appropriate.

Notification: The permittee must submit a pre-construction notification to the district engineer before any maintenance work is conducted (see general condition 32). The pre-construction notification may be for activity-specific maintenance or for maintenance of the entire flood control facility by submitting a five-year (or less) maintenance plan. The pre-construction notification must include a description of the maintenance baseline and the disposal site for dredged or excavated material. (Authorities: Sections 10 and 404)

Note: If the maintenance baseline was approved by the district engineer under a prior version of NWP 31, and the district engineer imposed the one-time compensatory mitigation requirement on maintenance for a specific reach of a flood control project authorized by that prior version of NWP 31, during the period this version of NWP 31 is in effect (March 19, 2017, to March 18, 2022) the district engineer will not require additional compensatory mitigation for maintenance activities authorized by this NWP in that specific reach of the flood control project.

32. Completed Enforcement Actions. Any structure, work, or discharge of dredged or fill material remaining in place or undertaken for mitigation, restoration, or environmental benefit in compliance with either:

(i) The terms of a final written Corps non-judicial settlement agreement resolving a violation of Section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act of 1899; or the terms of an EPA 309(a) order on consent resolving a violation of section 404 of the Clean Water Act, provided that:

(a) The activities authorized by this NWP cannot adversely affect more than 5 acres of non-tidal waters or 1 acre of tidal waters;

(b) The settlement agreement provides for environmental benefits, to an equal or greater degree, than the environmental detriments caused by the unauthorized activity that is authorized by this NWP; and

(c) The district engineer issues a verification letter authorizing the activity subject to the terms and conditions of this NWP and the settlement agreement, including a specified completion date; or

(ii) The terms of a final Federal court decision, consent decree, or settlement agreement resulting from an enforcement action brought by the United States under section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act of 1899; or

(iii) The terms of a final court decision, consent decree, settlement agreement, or non-judicial settlement agreement resulting from a natural resource damage claim brought by a trustee or trustees for natural resources (as defined by the National Contingency Plan at 40 CFR subpart G) under Section 311 of the Clean Water Act, Section 107 of the Comprehensive Environmental Response, Compensation and Liability Act, Section 312 of the National Marine Sanctuaries Act, section 1002 of the Oil Pollution Act of 1990, or the Park System Resource Protection Act at 16 U.S.C. 19jj, to the extent that a Corps permit is required.

Compliance is a condition of the NWP itself; non-compliance of the terms and conditions of an NWP 32 authorization may result in an additional enforcement action (e.g., a Class I civil administrative penalty). Any authorization under this NWP is automatically revoked if the permittee does not comply with the terms of this NWP or the terms of the court decision, consent decree, or judicial/non-judicial settlement agreement. This NWP does not apply to any activities occurring after the date of the decision, decree, or agreement that are not for the purpose of mitigation, restoration, or environmental benefit. Before reaching any settlement agreement, the Corps will ensure compliance with the provisions of 33 CFR part 326 and 33 CFR 330.6(d)(2) and (e). (Authorities: Sections 10 and 404)

33. Temporary Construction, Access, and Dewatering. Temporary structures, work, and discharges, including cofferdams, necessary for construction activities or access fills or dewatering of construction sites, provided that the associated primary activity is authorized by the Corps of Engineers or the U.S. Coast Guard. This NWP also authorizes temporary structures, work, and discharges, including cofferdams, necessary for construction activities not otherwise subject to the Corps or U.S. Coast Guard permit requirements. Appropriate measures must be taken to maintain near normal downstream flows and to minimize flooding. Fill must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. The use of dredged material may be allowed if the district engineer determines that it will not cause more than minimal adverse environmental effects. Following completion of construction, temporary fill must be entirely removed to an area that has no waters of the United States, dredged material must be returned to its original location, and the affected areas must be restored to pre-construction elevations. The affected areas must also be revegetated, as appropriate. This permit does not authorize the use of cofferdams to dewater wetlands or other aquatic areas to change their use. Structures left in place after construction is completed require a separate section 10 permit if located in navigable waters of the United States. (See 33 CFR part 322.)

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity if the activity is conducted in navigable waters of the United States (i.e., section 10 waters) (see general condition 32). The pre-construction notification must include a restoration plan showing how all temporary fills and structures will be removed and the area restored to pre-project conditions. (Authorities: Sections 10 and 404)

34. Cranberry Production Activities. Discharges of dredged or fill material for dikes, berms, pumps, water control structures or leveling of cranberry beds associated with expansion, enhancement, or modification activities at existing cranberry production operations. The cumulative total acreage of disturbance per cranberry production operation, including but not limited to, filling, flooding, ditching, or clearing, must not exceed 10 acres of waters of the United States, including wetlands. The activity must not result in a net loss of wetland acreage. This NWP does not authorize any discharge of dredged or fill material related to other cranberry production activities such as warehouses, processing facilities, or parking areas. For the purposes of this NWP, the cumulative total of 10 acres will be measured over the period that this NWP is valid.

Notification: The permittee must submit a pre-construction notification to the district engineer once during the period that this NWP is valid, and the NWP will then authorize discharges of dredge or fill material at an existing operation for the permit term, provided the 10-acre limit is not exceeded. (See general condition 32.) (Authority: Section 404)

35. Maintenance Dredging of Existing Basins. The removal of accumulated sediment for maintenance of existing marina basins, access channels to marinas or boat slips, and boat slips to previously authorized depths or controlling depths for ingress/egress, whichever is less. All dredged material must be deposited and retained in

an area that has no waters of the United States unless otherwise specifically approved by the district engineer under separate authorization. Proper sediment controls must be used for the disposal site. (Authority: Section 10)

36. Boat Ramps. Activities required for the construction of boat ramps, provided the activity meets all of the following criteria:

(a) The discharge into waters of the United States does not exceed 50 cubic yards of concrete, rock, crushed stone or gravel into forms, or in the form of pre-cast concrete planks or slabs, unless the district engineer waives the 50 cubic yard limit by making a written determination concluding that the discharge will result in no more than minimal adverse environmental effects;

(b) The boat ramp does not exceed 20 feet in width, unless the district engineer waives this criterion by making a written determination concluding that the discharge will result in no more than minimal adverse environmental effects;

(c) The base material is crushed stone, gravel or other suitable material;

(d) The excavation is limited to the area necessary for site preparation and all excavated material is removed to an area that has no waters of the United States; and,

(e) No material is placed in special aquatic sites, including wetlands.

The use of unsuitable material that is structurally unstable is not authorized. If dredging in navigable waters of the United States is necessary to provide access to the boat ramp, the dredging must be authorized by another NWP, a regional general permit, or an individual permit.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity if: (1) The discharge into waters of the United States exceeds 50 cubic yards, or (2) the boat ramp exceeds 20 feet in width. (See general condition 32.) (Authorities: Sections 10 and 404)

37. Emergency Watershed Protection and Rehabilitation. Work done by or funded by:

(a) The Natural Resources Conservation Service for a situation requiring immediate action under its emergency Watershed Protection Program (7 CFR part 624);

(b) The U.S. Forest Service under its Burned-Area Emergency Rehabilitation Handbook (FSH 2509.13);

(c) The Department of the Interior for wildland fire management burned area emergency stabilization and rehabilitation (DOI Manual part 620, Ch. 3);

(d) The Office of Surface Mining, or states with approved programs, for abandoned mine land reclamation activities under Title IV of the Surface Mining Control and Reclamation Act (30 CFR subchapter R), where the activity does not involve coal extraction; or

(e) The Farm Service Agency under its Emergency Conservation Program (7 CFR part 701).

In general, the prospective permittee should wait until the district engineer issues an NWP verification or 45 calendar days have passed before proceeding with the watershed protection and rehabilitation activity. However, in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur, the emergency watershed protection and rehabilitation activity may proceed immediately and the district engineer will consider the information in the pre-construction notification and any comments received as a result of agency coordination to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

Notification: Except in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur, the permittee must submit a pre-construction notification to the district engineer prior to commencing the activity (see general condition 32). (Authorities: Sections 10 and 404)

38. Cleanup of Hazardous and Toxic Waste. Specific activities required to effect the containment, stabilization, or removal of hazardous or toxic waste materials that are performed, ordered, or sponsored by a government agency with established legal or regulatory authority. Court ordered remedial action plans or related settlements are also authorized by this NWP. This NWP does not authorize the establishment of new disposal sites or the expansion of existing sites used for the disposal of hazardous or toxic waste.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity. (See general condition 32.) (Authorities: Sections 10 and 404)

Note: Activities undertaken entirely on a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site by authority of CERCLA as approved or required by EPA, are not required to obtain permits under Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act.

39. Commercial and Institutional Developments. Discharges of dredged or fill material into non-tidal waters of the United States for the construction or expansion of commercial and institutional building foundations and building pads and attendant features that are necessary for the use and maintenance of the structures. Attendant features may include, but are not limited to, roads, parking lots, garages, yards, utility lines, storm water management facilities, wastewater treatment facilities, and recreation facilities such as playgrounds and playing fields. Examples of commercial developments

include retail stores, industrial facilities, restaurants, business parks, and shopping centers. Examples of institutional developments include schools, fire stations, government office buildings, judicial buildings, public works buildings, libraries, hospitals, and places of worship. The construction of new golf courses and new ski areas is not authorized by this NWP.

The discharge must not cause the loss of greater than 1/2-acre of non-tidal waters of the United States. The discharge must not cause the loss of more than 300 linear feet of stream bed, unless for intermittent and ephemeral stream beds the district engineer waives the 300 linear foot limit by making a written determination concluding that the discharge will result in no more than minimal adverse environmental effects. The loss of stream bed plus any other losses of jurisdictional wetlands and waters caused by the NWP activity cannot exceed 1/2-acre. This NWP does not authorize discharges into non-tidal wetlands adjacent to tidal waters.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity. (See general condition 32.) (Authorities: Sections 10 and 404)

Note: For any activity that involves the construction of a wind energy generating structure, solar tower, or overhead transmission line, a copy of the PCN and NWP verification will be provided to the Department of Defense Siting Clearinghouse, which will evaluate potential effects on military activities.

40. Agricultural Activities. Discharges of dredged or fill material into non-tidal waters of the United States for agricultural activities, including the construction of building pads for farm buildings. Authorized activities include the installation, placement, or construction of drainage tiles, ditches, or levees; mechanized land clearing; land leveling; the relocation of existing serviceable drainage ditches constructed in waters of the United States; and similar activities.

This NWP also authorizes the construction of farm ponds in non-tidal waters of the United States, excluding perennial streams, provided the farm pond is used solely for agricultural purposes. This NWP does not authorize the construction of aquaculture ponds.

This NWP also authorizes discharges of dredged or fill material into non-tidal waters of the United States to relocate existing serviceable drainage ditches constructed in non-tidal streams.

The discharge must not cause the loss of greater than 1/2-acre of non-tidal waters of the United States. The discharge must not cause the loss of more than 300 linear feet of stream bed, unless for intermittent and ephemeral stream beds the district engineer waives the 300 linear foot limit by making a written determination concluding that the discharge will result in no more than minimal adverse environmental effects. The loss of stream bed plus any other losses of jurisdictional wetlands and waters caused by the

NWP activity cannot exceed 1/2-acre. This NWP does not authorize discharges into non-tidal wetlands adjacent to tidal waters.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity. (See general condition 32.) (Authority: Section 404)

Note: Some discharges for agricultural activities may qualify for an exemption under Section 404(f) of the Clean Water Act (see 33 CFR 323.4). This NWP authorizes the construction of farm ponds that do not qualify for the Clean Water Act section 404(f)(1)(C) exemption because of the recapture provision at section 404(f)(2).

41. Reshaping Existing Drainage Ditches. Discharges of dredged or fill material into non-tidal waters of the United States, excluding non-tidal wetlands adjacent to tidal waters, to modify the cross-sectional configuration of currently serviceable drainage ditches constructed in waters of the United States, for the purpose of improving water quality by regrading the drainage ditch with gentler slopes, which can reduce erosion, increase growth of vegetation, and increase uptake of nutrients and other substances by vegetation. The reshaping of the ditch cannot increase drainage capacity beyond the original as-built capacity nor can it expand the area drained by the ditch as originally constructed (i.e., the capacity of the ditch must be the same as originally constructed and it cannot drain additional wetlands or other waters of the United States). Compensatory mitigation is not required because the work is designed to improve water quality.

This NWP does not authorize the relocation of drainage ditches constructed in waters of the United States; the location of the centerline of the reshaped drainage ditch must be approximately the same as the location of the centerline of the original drainage ditch. This NWP does not authorize stream channelization or stream relocation projects. (Authority: Section 404)

42. Recreational Facilities. Discharges of dredged or fill material into non-tidal waters of the United States for the construction or expansion of recreational facilities. Examples of recreational facilities that may be authorized by this NWP include playing fields (e.g., football fields, baseball fields), basketball courts, tennis courts, hiking trails, bike paths, golf courses, ski areas, horse paths, nature centers, and campgrounds (excluding recreational vehicle parks). This NWP also authorizes the construction or expansion of small support facilities, such as maintenance and storage buildings and stables that are directly related to the recreational activity, but it does not authorize the construction of hotels, restaurants, racetracks, stadiums, arenas, or similar facilities.

The discharge must not cause the loss of greater than 1/2-acre of non-tidal waters of the United States. The discharge must not cause the loss of more than 300 linear feet of stream bed, unless for intermittent and ephemeral stream beds the district engineer waives the 300 linear foot limit by making a written determination concluding that the discharge will result in no more than minimal adverse environmental effects. The loss of stream bed plus any other losses of jurisdictional wetlands and waters caused by the

NWP activity cannot exceed 1/2-acre. This NWP does not authorize discharges into non-tidal wetlands adjacent to tidal waters.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity. (See general condition 32.) (Authority: Section 404)

43. Stormwater Management Facilities. Discharges of dredged or fill material into non-tidal waters of the United States for the construction of stormwater management facilities, including stormwater detention basins and retention basins and other stormwater management facilities; the construction of water control structures, outfall structures and emergency spillways; the construction of low impact development integrated management features such as bioretention facilities (e.g., rain gardens), vegetated filter strips, grassed swales, and infiltration trenches; and the construction of pollutant reduction green infrastructure features designed to reduce inputs of sediments, nutrients, and other pollutants into waters to meet reduction targets established under Total Daily Maximum Loads set under the Clean Water Act.

This NWP authorizes, to the extent that a section 404 permit is required, discharges of dredged or fill material into non-tidal waters of the United States for the maintenance of stormwater management facilities, low impact development integrated management features, and pollutant reduction green infrastructure features. The maintenance of stormwater management facilities, low impact development integrated management features, and pollutant reduction green infrastructure features that are not waters of the United States does not require a section 404 permit.

The discharge must not cause the loss of greater than 1/2-acre of non-tidal waters of the United States. The discharge must not cause the loss of more than 300 linear feet of stream bed, unless for intermittent and ephemeral stream beds the district engineer waives the 300 linear foot limit by making a written determination concluding that the discharge will result in no more than minimal adverse environmental effects. This NWP does not authorize discharges into non-tidal wetlands adjacent to tidal waters. The loss of stream bed plus any other losses of jurisdictional wetlands and waters caused by the NWP activity cannot exceed 1/2-acre. This NWP does not authorize discharges of dredged or fill material for the construction of new stormwater management facilities in perennial streams.

Notification: For discharges into non-tidal waters of the United States for the construction of new stormwater management facilities or pollutant reduction green infrastructure features, or the expansion of existing stormwater management facilities or pollutant reduction green infrastructure features, the permittee must submit a pre-construction notification to the district engineer prior to commencing the activity. (See general condition 32.) Maintenance activities do not require pre-construction notification if they are limited to restoring the original design capacities of the stormwater management facility or pollutant reduction green infrastructure feature. (Authority: Section 404)

44. Mining Activities. Discharges of dredged or fill material into non-tidal waters of the United States for mining activities, except for coal mining activities, provided the activity meets all of the following criteria:

(a) For mining activities involving discharges of dredged or fill material into non-tidal wetlands, the discharge must not cause the loss of greater than 1/2-acre of non-tidal wetlands;

(b) For mining activities involving discharges of dredged or fill material in non-tidal open waters (e.g., rivers, streams, lakes, and ponds) the mined area, including permanent and temporary impacts due to discharges of dredged or fill material into jurisdictional waters, must not exceed 1/2-acre; and

(c) The acreage loss under paragraph (a) plus the acreage impact under paragraph (b) does not exceed 1/2-acre.

The discharge must not cause the loss of more than 300 linear feet of stream bed, unless for intermittent and ephemeral stream beds the district engineer waives the 300 linear foot limit by making a written determination concluding that the discharge will result in no more than minimal adverse environmental effects.

The loss of stream bed plus any other losses of jurisdictional wetlands and waters caused by the NWP activity cannot exceed 1/2-acre.

This NWP does not authorize discharges into non-tidal wetlands adjacent to tidal waters.

Notification: The permittee must submit a pre-construction–notification to the district engineer prior to commencing the activity. (See general condition 32.) If reclamation is required by other statutes, then a copy of the final reclamation plan must be submitted with the pre-construction notification. (Authorities: Sections 10 and 404)

45. Repair of Uplands Damaged by Discrete Events. This NWP authorizes discharges of dredged or fill material, including dredging or excavation, into all waters of the United States for activities associated with the restoration of upland areas damaged by storms, floods, or other discrete events. This NWP authorizes bank stabilization to protect the restored uplands. The restoration of the damaged areas, including any bank stabilization, must not exceed the contours, or ordinary high water mark, that existed before the damage occurred. The district engineer retains the right to determine the extent of the pre-existing conditions and the extent of any restoration work authorized by this NWP. The work must commence, or be under contract to commence, within two years of the date of damage, unless this condition is waived in writing by the district engineer. This NWP cannot be used to reclaim lands lost to normal erosion processes over an extended period.

This NWP does not authorize beach restoration or nourishment.

Minor dredging is limited to the amount necessary to restore the damaged upland area and should not significantly alter the pre-existing bottom contours of the waterbody.

Notification: The permittee must submit a pre-construction notification to the district engineer (see general condition 32) within 12 months of the date of the damage; for major storms, floods, or other discrete events, the district engineer may waive the 12-month limit for submitting a pre-construction notification if the permittee can demonstrate funding, contract, or other similar delays. The pre-construction notification must include documentation, such as a recent topographic survey or photographs, to justify the extent of the proposed restoration. (Authorities: Sections 10 and 404)

Note: The uplands themselves that are lost as a result of a storm, flood, or other discrete event can be replaced without a section 404 permit, if the uplands are restored to the ordinary high water mark (in non-tidal waters) or high tide line (in tidal waters). (See also 33 CFR 328.5.) This NWP authorizes discharges of dredged or fill material into waters of the United States associated with the restoration of uplands.

46. Discharges in Ditches. Discharges of dredged or fill material into non-tidal ditches that are: (1) constructed in uplands, (2) receive water from an area determined to be a water of the United States prior to the construction of the ditch, (3) divert water to an area determined to be a water of the United States prior to the construction of the ditch, and (4) determined to be waters of the United States. The discharge must not cause the loss of greater than one acre of waters of the United States.

This NWP does not authorize discharges of dredged or fill material into ditches constructed in streams or other waters of the United States, or in streams that have been relocated in uplands. This NWP does not authorize discharges of dredged or fill material that increase the capacity of the ditch and drain those areas determined to be waters of the United States prior to construction of the ditch.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity. (See general condition 32.) (Authority: Section 404)

47. [Reserved]

48. Commercial Shellfish Aquaculture Activities. Discharges of dredged or fill material into waters of the United States or structures or work in navigable waters of the United States necessary for new and continuing commercial shellfish aquaculture operations in authorized project areas. For the purposes of this NWP, the project area is the area in which the operator is authorized to conduct commercial shellfish aquaculture activities, as identified through a lease or permit issued by an appropriate state or local government agency, a treaty, or any easement, lease, deed, contract, or other legally binding agreement that establishes an enforceable property interest for the operator. A

"new commercial shellfish aquaculture operation" is an operation in a project area where commercial shellfish aquaculture activities have not been conducted during the past 100 years.

This NWP authorizes the installation of buoys, floats, racks, trays, nets, lines, tubes, containers, and other structures into navigable waters of the United States. This NWP also authorizes discharges of dredged or fill material into waters of the United States necessary for shellfish seeding, rearing, cultivating, transplanting, and harvesting activities. Rafts and other floating structures must be securely anchored and clearly marked.

This NWP does not authorize:

(a) The cultivation of a nonindigenous species unless that species has been previously cultivated in the waterbody;

(b) The cultivation of an aquatic nuisance species as defined in the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990;

(c) Attendant features such as docks, piers, boat ramps, stockpiles, or staging areas, or the deposition of shell material back into waters of the United States as waste; or

(d) Activities that directly affect more than 1/2-acre of submerged aquatic vegetation beds in project areas that have not been used for commercial shellfish aquaculture activities during the past 100 years.

Notification: The permittee must submit a pre-construction notification to the district engineer if: (1) the activity will include a species that has never been cultivated in the waterbody; or (2) the activity occurs in a project area that has not been used for commercial shellfish aquaculture activities during the past 100 years. If the operator will be conducting commercial shellfish aquaculture activities in multiple contiguous project areas, he or she can either submit one PCN for those contiguous project areas or submit a separate PCN for each project area. (See general condition 32.)

In addition to the information required by paragraph (b) of general condition 32, the pre-construction notification must also include the following information: (1) a map showing the boundaries of the project area(s), with latitude and longitude coordinates for each corner of each project area; (2) the name(s) of the species that will be cultivated during the period this NWP is in effect; (3) whether canopy predator nets will be used; (4) whether suspended cultivation techniques will be used; and (5) general water depths in the project area(s) (a detailed survey is not required). No more than one pre-construction notification per project area or group of contiguous project areas should be submitted for the commercial shellfish operation during the effective period of this NWP. The pre-construction notification should describe all species and culture activities the operator expects to undertake in the project area or group of contiguous project areas during the effective period of this NWP. If an operator intends to undertake

unanticipated changes to the commercial shellfish aquaculture operation during the effective period of this NWP, and those changes require Department of the Army authorization, the operator must contact the district engineer to request a modification of the NWP verification; a new pre-construction notification does not need to be submitted. (Authorities: Sections 10 and 404)

Note 1: The permittee should notify the applicable U.S. Coast Guard office regarding the project.

Note 2: To prevent introduction of aquatic nuisance species, no material that has been taken from a different waterbody may be reused in the current project area, unless it has been treated in accordance with the applicable regional aquatic nuisance species management plan.

Note 3: The Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 defines "aquatic nuisance species" as "a nonindigenous species that threatens the diversity or abundance of native species or the ecological stability of infested waters, or commercial, agricultural, aquacultural, or recreational activities dependent on such waters."

49. Coal Remining Activities. Discharges of dredged or fill material into non-tidal waters of the United States associated with the remining and reclamation of lands that were previously mined for coal. The activities must already be authorized, or they must currently be in process as part of an integrated permit processing procedure, by the Department of the Interior Office of Surface Mining Reclamation and Enforcement, or by states with approved programs under Title IV or Title V of the Surface Mining Control and Reclamation Act of 1977 (SMCRA). Areas previously mined include reclaimed mine sites, abandoned mine land areas, or lands under bond forfeiture contracts.

As part of the project, the permittee may conduct new coal mining activities in conjunction with the remining activities when he or she clearly demonstrates to the district engineer that the overall mining plan will result in a net increase in aquatic resource functions. The Corps will consider the SMCRA agency's decision regarding the amount of currently undisturbed adjacent lands needed to facilitate the remining and reclamation of the previously mined area. The total area disturbed by new mining must not exceed 40 percent of the total acreage covered by both the remined area and the additional area necessary to carry out the reclamation of the previously mined area.

Notification: The permittee must submit a pre-construction notification and a document describing how the overall mining plan will result in a net increase in aquatic resource functions to the district engineer and receive written authorization prior to commencing the activity. (See general condition 32.) (Authorities: Sections 10 and 404)

50. Underground Coal Mining Activities. Discharges of dredged or fill material into non-tidal waters of the United States associated with underground coal mining and reclamation operations provided the activities are authorized, or are currently being

processed as part of an integrated permit processing procedure, by the Department of the Interior, Office of Surface Mining Reclamation and Enforcement, or by states with approved programs under Title V of the Surface Mining Control and Reclamation Act of 1977.

The discharge must not cause the loss of greater than 1/2-acre of non-tidal waters of the United States. The discharge must not cause the loss of more than 300 linear feet of stream bed, unless for intermittent and ephemeral stream beds the district engineer waives the 300 linear foot limit by making a written determination concluding that the discharge will result in no more than minimal adverse environmental effects. The loss of stream bed plus any other losses of jurisdictional wetlands and waters caused by the NWP activity cannot exceed 1/2-acre. This NWP does not authorize discharges into non-tidal wetlands adjacent to tidal waters. This NWP does not authorize coal preparation and processing activities outside of the mine site.

Notification: The permittee must submit a pre-construction notification to the district engineer and receive written authorization prior to commencing the activity. (See general condition 32.) If reclamation is required by other statutes, then a copy of the reclamation plan must be submitted with the pre-construction notification. (Authorities: Sections 10 and 404)

Note: Coal preparation and processing activities outside of the mine site may be authorized by NWP 21.

51. Land-Based Renewable Energy Generation Facilities. Discharges of dredged or fill material into non-tidal waters of the United States for the construction, expansion, or modification of land-based renewable energy production facilities, including attendant features. Such facilities include infrastructure to collect solar (concentrating solar power and photovoltaic), wind, biomass, or geothermal energy. Attendant features may include, but are not limited to roads, parking lots, and stormwater management facilities within the land-based renewable energy generation facility.

The discharge must not cause the loss of greater than 1/2-acre of non-tidal waters of the United States. The discharge must not cause the loss of more than 300 linear feet of stream bed, unless for intermittent and ephemeral stream beds the district engineer waives the 300 linear foot limit by making a written determination concluding that the discharge will result in no more than minimal adverse environmental effects. The loss of stream bed plus any other losses of jurisdictional wetlands and waters caused by the NWP activity cannot exceed 1/2-acre. This NWP does not authorize discharges into non-tidal wetlands adjacent to tidal waters.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity if the discharge results in the loss of greater than 1/10-acre of waters of the United States. (See general condition 32.) (Authorities: Sections 10 and 404)

Note 1: Utility lines constructed to transfer the energy from the land-based renewable energy generation facility to a distribution system, regional grid, or other facility are generally considered to be linear projects and each separate and distant crossing of a waterbody is eligible for treatment as a separate single and complete linear project. Those utility lines may be authorized by NWP 12 or another Department of the Army authorization.

Note 2: If the only activities associated with the construction, expansion, or modification of a land-based renewable energy generation facility that require Department of the Army authorization are discharges of dredged or fill material into waters of the United States to construct, maintain, repair, and/or remove utility lines and/or road crossings, then NWP 12 and/or NWP 14 shall be used if those activities meet the terms and conditions of NWPs 12 and 14, including any applicable regional conditions and any case-specific conditions imposed by the district engineer.

Note 3: For any activity that involves the construction of a wind energy generating structure, solar tower, or overhead transmission line, a copy of the PCN and NWP verification will be provided to the Department of Defense Siting Clearinghouse, which will evaluate potential effects on military activities.

52. Water-Based Renewable Energy Generation Pilot Projects. Structures and work in navigable waters of the United States and discharges of dredged or fill material into waters of the United States for the construction, expansion, modification, or removal of water-based wind, water-based solar, wave energy, or hydrokinetic renewable energy generation pilot projects and their attendant features. Attendant features may include, but are not limited to, land-based collection and distribution facilities, control facilities, roads, parking lots, and stormwater management facilities.

For the purposes of this NWP, the term "pilot project" means an experimental project where the water-based renewable energy generation units will be monitored to collect information on their performance and environmental effects at the project site.

The discharge must not cause the loss of greater than 1/2-acre of waters of the United States, including the loss of more than 300 linear feet of stream bed, unless for intermittent and ephemeral stream beds the district engineer waives the 300 linear foot limit by making a written determination concluding that the discharge will result in no more than minimal adverse environmental effects. The loss of stream bed plus any other losses of jurisdictional wetlands and waters caused by the NWP activity cannot exceed 1/2-acre.

The placement of a transmission line on the bed of a navigable water of the United States from the renewable energy generation unit(s) to a land-based collection and distribution facility is considered a structure under Section 10 of the Rivers and Harbors Act of 1899 (see 33 CFR 322.2(b)), and the placement of the transmission line on the bed of a navigable water of the United States is not a loss of waters of the United States for the purposes of applying the 1/2-acre or 300 linear foot limits.

For each single and complete project, no more than 10 generation units (e.g., wind turbines, wave energy devices, or hydrokinetic devices) are authorized. For floating solar panels in navigable waters of the United States, each single and complete project cannot exceed 1/2-acre in water surface area covered by the floating solar panels.

This NWP does not authorize activities in coral reefs. Structures in an anchorage area established by the U.S. Coast Guard must comply with the requirements in 33 CFR 322.5(l)(2). Structures may not be placed in established danger zones or restricted areas designated in 33 CFR part 334, Federal navigation channels, shipping safety fairways or traffic separation schemes established by the U.S. Coast Guard (see 33 CFR 322.5(l)(1)), or EPA or Corps designated open water dredged material disposal areas.

Upon completion of the pilot project, the generation units, transmission lines, and other structures or fills associated with the pilot project must be removed to the maximum extent practicable unless they are authorized by a separate Department of the Army authorization, such as another NWP, an individual permit, or a regional general permit. Completion of the pilot project will be identified as the date of expiration of the Federal Energy Regulatory Commission (FERC) license, or the expiration date of the NWP authorization if no FERC license is required.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity. (See general condition 32.) (Authorities: Sections 10 and 404)

Note 1: Utility lines constructed to transfer the energy from the land-based collection facility to a distribution system, regional grid, or other facility are generally considered to be linear projects and each separate and distant crossing of a waterbody is eligible for treatment as a separate single and complete linear project. Those utility lines may be authorized by NWP 12 or another Department of the Army authorization.

Note 2: An activity that is located on an existing locally or federally maintained U.S. Army Corps of Engineers project requires separate approval from the Chief of Engineers or District Engineer under 33 U.S.C. 408.

Note 3: If the pilot project generation units, including any transmission lines, are placed in navigable waters of the United States (i.e., section 10 waters) within the coastal United States, the Great Lakes, and United States territories, copies of the NWP verification will be sent by the Corps to the National Oceanic and Atmospheric Administration, National Ocean Service, for charting the generation units and associated transmission line(s) to protect navigation.

Note 4: Hydrokinetic renewable energy generation projects that require authorization by the Federal Energy Regulatory Commission under the Federal Power Act of 1920 do not require separate authorization from the Corps under section 10 of the Rivers and Harbors Act of 1899.

Note 5: For any activity that involves the construction of a wind energy generating structure, solar tower, or overhead transmission line, a copy of the PCN and NWP verification will be provided to the Department of Defense Siting Clearinghouse, which will evaluate potential effects on military activities.

53. Removal of Low-Head Dams. Structures and work in navigable waters of the United States and discharges of dredged or fill material into waters of the United States associated with the removal of low-head dams.

For the purposes of this NWP, the term "low-head dam" is defined as a dam built across a stream to pass flows from upstream over all, or nearly all, of the width of the dam crest on a continual and uncontrolled basis. (During a drought, there might not be water flowing over the dam crest.) In general, a low-head dam does not have a separate spillway or spillway gates but it may have an uncontrolled spillway. The dam crest is the top of the dam from left abutment to right abutment, and if present, an uncontrolled spillway. A low-head dam provides little storage function.

The removed low-head dam structure must be deposited and retained in an area that has no waters of the United States unless otherwise specifically approved by the district engineer under separate authorization.

Because the removal of the low-head dam will result in a net increase in ecological functions and services provided by the stream, as a general rule compensatory mitigation is not required for activities authorized by this NWP. However, the district engineer may determine for a particular low-head dam removal activity that compensatory mitigation is necessary to ensure the authorized activity results in no more than minimal adverse environmental effects.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity. (See general condition 32.) (Authorities: Sections 10 and 404)

Note: This NWP does not authorize discharges of dredged or fill material into waters of the United States or structures or work in navigable waters to restore the stream in the vicinity of the low-head dam, including the former impoundment area. Nationwide permit 27 or other Department of the Army permits may authorize such activities. This NWP does not authorize discharges of dredged or fill material into waters of the United States or structures or work in navigable waters to stabilize stream banks. Bank stabilization activities may be authorized by NWP 13 or other Department of the Army permits.

54. Living Shorelines. Structures and work in navigable waters of the United States and discharges of dredged or fill material into waters of the United States for the construction and maintenance of living shorelines to stabilize banks and shores in coastal waters, which includes the Great Lakes, along shores with small fetch and gentle slopes that are subject to low- to mid-energy waves. A living shoreline has a footprint that is

made up mostly of native material. It incorporates vegetation or other living, natural "soft" elements alone or in combination with some type of harder shoreline structure (e.g., oyster or mussel reefs or rock sills) for added protection and stability. Living shorelines should maintain the natural continuity of the land-water interface, and retain or enhance shoreline ecological processes. Living shorelines must have a substantial biological component, either tidal or lacustrine fringe wetlands or oyster or mussel reef structures. The following conditions must be met:

(a) The structures and fill area, including sand fills, sills, breakwaters, or reefs, cannot extend into the waterbody more than 30 feet from the mean low water line in tidal waters or the ordinary high water mark in the Great Lakes, unless the district engineer waives this criterion by making a written determination concluding that the activity will result in no more than minimal adverse environmental effects;

(b) The activity is no more than 500 feet in length along the bank, unless the district engineer waives this criterion by making a written determination concluding that the activity will result in no more than minimal adverse environmental effects;

(c) Coir logs, coir mats, stone, native oyster shell, native wood debris, and other structural materials must be adequately anchored, of sufficient weight, or installed in a manner that prevents relocation in most wave action or water flow conditions, except for extremely severe storms;

(d) For living shorelines consisting of tidal or lacustrine fringe wetlands, native plants appropriate for current site conditions, including salinity, must be used if the site is planted by the permittee;

(e) Discharges of dredged or fill material into waters of the United States, and oyster or mussel reef structures in navigable waters, must be the minimum necessary for the establishment and maintenance of the living shoreline;

(f) If sills, breakwaters, or other structures must be constructed to protect fringe wetlands for the living shoreline, those structures must be the minimum size necessary to protect those fringe wetlands;

(g) The activity must be designed, constructed, and maintained so that it has no more than minimal adverse effects on water movement between the waterbody and the shore and the movement of aquatic organisms between the waterbody and the shore; and

(h) The living shoreline must be properly maintained, which may require periodic repair of sills, breakwaters, or reefs, or replacing sand fills after severe storms or erosion events. Vegetation may be replanted to maintain the living shoreline. This NWP authorizes those maintenance and repair activities, including any minor deviations necessary to address changing environmental conditions.

This NWP does not authorize beach nourishment or land reclamation activities.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the construction of the living shoreline. (See general condition 32.) The pre-construction notification must include a delineation of special aquatic sites (see paragraph (b)(4) of general condition 32). Pre-construction notification is not required for maintenance and repair activities for living shorelines unless required by applicable NWP general conditions or regional conditions. (Authorities: Sections 10 and 404)

Note: In waters outside of coastal waters, nature-based bank stabilization techniques, such as bioengineering and vegetative stabilization, may be authorized by NWP 13.

C. Nationwide Permit General Conditions

Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as applicable, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Prospective permittees should contact the appropriate Corps district office to determine if regional conditions have been imposed on an NWP. Prospective permittees should also contact the appropriate Corps district office to determine the status of Clean Water Act Section 401 water quality certification and/or Coastal Zone Management Act consistency for an NWP. Every person who may wish to obtain permit authorization under one or more NWPs, or who is currently relying on an existing or prior permit authorization under one or more NWPs, has been and is on notice that all of the provisions of 33 CFR 330.1 through 330.6 apply to every NWP authorization. Note especially 33 CFR 330.5 relating to the modification, suspension, or revocation of any NWP authorization.

1. Navigation. (a) No activity may cause more than a minimal adverse effect on navigation.

(b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.

(c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. Aquatic Life Movements. No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody,

including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species. If a bottomless culvert cannot be used, then the crossing should be designed and constructed to minimize adverse effects to aquatic life movements.

3. Spawning Areas. Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

4. Migratory Bird Breeding Areas. Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

5. Shellfish Beds. No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48, or is a shellfish seeding or habitat restoration activity authorized by NWP 27.

6. Suitable Material. No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see section 307 of the Clean Water Act).

7. Water Supply Intakes. No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

8. Adverse Effects From Impoundments. If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

9. Management of Water Flows. To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization, storm water management activities, and temporary and permanent road crossings, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

10. Fills Within 100-Year Floodplains. The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

11. Equipment. Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

12. Soil Erosion and Sediment Controls. Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow, or during low tides.

13. Removal of Temporary Fills. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

14. Proper Maintenance. Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable NWP general conditions, as well as any activity-specific conditions added by the district engineer to an NWP authorization.

15. Single and Complete Project. The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

16. Wild and Scenic Rivers. (a) No NWP activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status.

(b) If a proposed NWP activity will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, the permittee must submit a pre-construction notification (see general condition 32). The district engineer will coordinate the PCN with the Federal agency with direct management responsibility for that river. The permittee shall not begin the NWP activity until notified by the district engineer that the Federal agency with direct management responsibility for that river has determined in writing that the proposed NWP activity will not adversely affect the Wild and Scenic River designation or study status.

(c) Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service). Information on these rivers is also available at: http://www.rivers.gov/.

17. Tribal Rights. No NWP activity may cause more than minimal adverse effects on tribal rights (including treaty rights), protected tribal resources, or tribal lands.

18. Endangered Species. (a) No activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify the critical habitat of such species. No activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless ESA section 7 consultation addressing the effects of the proposed activity has been completed. Direct effects are the immediate effects on listed species and critical habitat caused by the NWP activity. Indirect effects are those effects on listed species and critical habitat that are caused by the NWP activity and are later in time, but still are reasonably certain to occur.

(b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. If pre-construction notification is required for the proposed activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation has not been submitted, additional ESA section 7 consultation may be necessary for the activity and the respective federal agency would be responsible for fulfilling its obligation under section 7 of the ESA.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that might be affected by the proposed activity or that utilize the designated critical habitat that might be affected by the proposed activity. The district engineer will determine whether the proposed activity "may affect" or will have "no effect" to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps' determination within 45 days of receipt of a complete pre-construction notification. In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the activity, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification that the proposed activity will have "no effect" on listed species or critical habitat, or until ESA section 7 consultation has been completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(d) As a result of formal or informal consultation with the FWS or NMFS the district engineer may add species-specific permit conditions to the NWPs.

(e) Authorization of an activity by an NWP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the FWS or the NMFS, the Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word "harm" in the definition of "take" means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

(f) If the non-federal permittee has a valid ESA section 10(a)(1)(B) incidental take permit with an approved Habitat Conservation Plan for a project or a group of projects that includes the proposed NWP activity, the non-federal applicant should provide a copy of that ESA section 10(a)(1)(B) permit with the PCN required by paragraph (c) of this general condition. The district engineer will coordinate with the agency that issued the ESA section 10(a)(1)(B) permit to determine whether the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation conducted for the ESA section 10(a)(1)(B) permit. If that coordination results in concurrence from the agency that the proposed NWP activity and the associated incidental take were considered in the internal ESA section 7 consultation for the ESA section 10(a)(1)(B) permit, the district engineer does not need to conduct a separate ESA section 7 consultation for the proposed NWP activity. The district engineer will notify the non-federal applicant within 45 days of receipt of a complete pre-construction notification whether the ESA section 10(a)(1)(B) permit covers the proposed NWP activity or whether additional ESA section 7 consultation is required.

(g) Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the FWS and NMFS or their world wide web pages at http://www.fws.gov/ or http://www.fws.gov/ipac and http://www.nmfs.noaa.gov/pr/species/esa/ respectively.

19. Migratory Birds and Bald and Golden Eagles. The permittee is responsible for ensuring their action complies with the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. The permittee is responsible for contacting appropriate local office of the U.S. Fish and Wildlife Service to determine applicable measures to reduce impacts to migratory birds or eagles, including whether "incidental take" permits are necessary and available under the Migratory Bird Treaty Act or Bald and Golden Eagle Protection Act for a particular activity.

20. Historic Properties. (a) In cases where the district engineer determines that the activity may have the potential to cause effects to properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.

(b) Federal permittees should follow their own procedures for complying with the requirements of section 106 of the National Historic Preservation Act. If pre-construction notification is required for the proposed NWP activity, the Federal permittee must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will verify that the appropriate documentation has been submitted. If the appropriate documentation is not submitted, then additional consultation under section 106 may be necessary. The respective federal agency is responsible for fulfilling its obligation to comply with section 106.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if the NWP activity might have the potential to cause effects to any historic properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties might have the potential to be affected by the proposed NWP activity or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of, or potential for, the presence of historic properties can be sought from the State Historic Preservation Officer, Tribal Historic Preservation Officer, or designated tribal representative, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). When reviewing pre-construction notifications, district engineers will comply with the current procedures for addressing the requirements of section 106 of the National Historic Preservation Act. The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. Based on the information submitted in the PCN and these identification efforts, the district engineer shall determine whether the proposed NWP activity has the potential to cause effects on the historic properties. Section 106 consultation is not required when the district engineer determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR 800.3(a)). Section 106 consultation is required when the district engineer determines that the activity has the potential to cause effects on historic properties. The district engineer will conduct consultation with consulting parties identified under 36 CFR 800.2(c) when he or she makes any of the following effect determinations for the purposes of section 106 of the NHPA: no historic properties affected, no adverse effect, or adverse effect. Where the non-Federal applicant has identified historic properties on which the activity might have the potential to cause effects and so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects to historic properties or that NHPA section 106 consultation has been completed.

(d) For non-federal permittees, the district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA section 106 consultation is required. If NHPA section 106 consultation is required, the district engineer will notify the non-Federal applicant that he or she cannot

begin the activity until section 106 consultation is completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(e) Prospective permittees should be aware that section 110k of the NHPA (54 U.S.C. 306113) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

21. Discovery of Previously Unknown Remains and Artifacts. If you discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by this permit, you must immediately notify the district engineer of what you have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district engineer will initiate the Federal, Tribal, and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

22. Designated Critical Resource Waters. Critical resource waters include, NOAA-managed marine sanctuaries and marine monuments, and National Estuarine Research Reserves. The district engineer may designate, after notice and opportunity for public comment, additional waters officially designated by a state as having particular environmental or ecological significance, such as outstanding national resource waters or state natural heritage sites. The district engineer may also designate additional critical resource waters after notice and opportunity for public comment.

(a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, 50, 51, and 52 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.

(b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, 38, and 54, notification is required in accordance with general condition 32, for any activity proposed in the designated critical resource waters including wetlands adjacent to those

waters. The district engineer may authorize activities under these NWPs only after it is determined that the impacts to the critical resource waters will be no more than minimal.

23. Mitigation. The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal:

(a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).

(b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating for resource losses) will be required to the extent necessary to ensure that the individual and cumulative adverse environmental effects are no more than minimal.

(c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse environmental effects of the proposed activity are no more than minimal, and provides an activity-specific waiver of this requirement. For wetland losses of 1/10-acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in only minimal adverse environmental effects.

(d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation to ensure that the activity results in no more than minimal adverse environmental effects. Compensatory mitigation for losses of streams should be provided, if practicable, through stream rehabilitation, enhancement, or preservation, since streams are difficult-to-replace resources (see 33 CFR 332.3(e)(3)).

(e) Compensatory mitigation plans for NWP activities in or near streams or other open waters will normally include a requirement for the restoration or enhancement, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, the restoration or maintenance/protection of riparian areas may be the only compensatory mitigation required. Restored riparian areas should consist of native species. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. If it is not possible to restore or maintain/protect a riparian area on both sides of a stream, or if the waterbody is a lake or coastal waters, then restoring or maintaining/protecting a riparian area along a single bank or shoreline may be sufficient. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on

what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of minimization or compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

(f) Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332.

(1) The prospective permittee is responsible for proposing an appropriate compensatory mitigation option if compensatory mitigation is necessary to ensure that the activity results in no more than minimal adverse environmental effects. For the NWPs, the preferred mechanism for providing compensatory mitigation is mitigation bank credits or in-lieu fee program credits (see 33 CFR 332.3(b)(2) and (3)). However, if an appropriate number and type of mitigation bank or in-lieu credits are not available at the time the PCN is submitted to the district engineer, the district engineer may approve the use of permittee-responsible mitigation.

(2) The amount of compensatory mitigation required by the district engineer must be sufficient to ensure that the authorized activity results in no more than minimal individual and cumulative adverse environmental effects (see 33 CFR 330.1(e)(3)). (See also 33 CFR 332.3(f)).

(3) Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, aquatic resource restoration should be the first compensatory mitigation option considered for permittee-responsible mitigation.

(4) If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the district engineer to make the decision on the NWP verification request, but a final mitigation plan that addresses the applicable requirements of 33 CFR 332.4(c)(2) through (14) must be approved by the district engineer before the permittee begins work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)).

(5) If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan only needs to address the baseline conditions at the impact site and the number of credits to be provided.

(6) Compensatory mitigation requirements (e.g., resource type and amount to be provided as compensatory mitigation, site protection, ecological performance standards, monitoring requirements) may be addressed through conditions added to the NWP authorization, instead of components of a compensatory mitigation plan (see 33 CFR 332.4(c)(1)(ii)).

(g) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2-acre, it cannot be used to authorize any NWP activity resulting in the loss of greater than 1/2-acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that an NWP activity already meeting the established acreage limits also satisfies the no more than minimal impact requirement for the NWPs.

(h) Permittees may propose the use of mitigation banks, in-lieu fee programs, or permittee-responsible mitigation. When developing a compensatory mitigation proposal, the permittee must consider appropriate and practicable options consistent with the framework at 33 CFR 332.3(b). For activities resulting in the loss of marine or estuarine resources, permittee-responsible mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee. For permittee-responsible mitigation, the special conditions of the NWP verification must clearly indicate the party or parties responsible for the implementation and performance of the compensatory mitigation project, and, if required, its long-term management.

(i) Where certain functions and services of waters of the United States are permanently adversely affected by a regulated activity, such as discharges of dredged or fill material into waters of the United States that will convert a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse environmental effects of the activity to the no more than minimal level.

24. Safety of Impoundment Structures. To ensure that all impoundment structures are safely designed, the district engineer may require non-Federal applicants to demonstrate that the structures comply with established state dam safety criteria or have been designed by qualified persons. The district engineer may also require documentation that the design has been independently reviewed by similarly qualified persons, and appropriate modifications made to ensure safety.

25. Water Quality. Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of an NWP with CWA section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR 330.4(c)). The district engineer or State or Tribe may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

26. Coastal Zone Management. In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). The district engineer or a

State may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

27. Regional and Case-By-Case Conditions. The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

28. Use of Multiple Nationwide Permits. The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

29. Transfer of Nationwide Permit Verifications. If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature:

"When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below."

_____
(Transferee)

_____
(Date)

30. Compliance Certification. Each permittee who receives an NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and implementation of any required compensatory mitigation. The success of any required permittee-responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the district engineer.

The Corps will provide the permittee the certification document with the NWP verification letter. The certification document will include:

(a) A statement that the authorized activity was done in accordance with the NWP authorization, including any general, regional, or activity-specific conditions;

(b) A statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(l)(3) to confirm that the permittee secured the appropriate number and resource type of credits; and

(c) The signature of the permittee certifying the completion of the activity and mitigation.

The completed certification document must be submitted to the district engineer within 30 days of completion of the authorized activity or the implementation of any required compensatory mitigation, whichever occurs later.

31. Activities Affecting Structures or Works Built by the United States. If an NWP activity also requires permission from the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers (USACE) federally authorized Civil Works project (a "USACE project"), the prospective permittee must submit a pre-construction notification. See paragraph (b)(10) of general condition 32. An activity that requires section 408 permission is not authorized by NWP until the appropriate Corps office issues the section 408 permission to alter, occupy, or use the USACE project, and the district engineer issues a written NWP verification.

32. Pre-Construction Notification. (a) Timing. Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, if the PCN is determined to be incomplete, notify the prospective permittee within that 30 day period to request the additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, district engineers will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either:

(1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

(2) 45 calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 18 that listed species or critical habitat might be affected or are in the vicinity of the activity, or to notify the Corps pursuant to general condition 20 that the activity might have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there is "no effect" on listed species or "no potential to cause effects" on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or section 106 of the National Historic Preservation Act (see 33 CFR 330.4(g)) has been completed. Also, work cannot begin under NWPs 21, 49, or 50 until the permittee has received written approval from the Corps. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee may not begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

(b) Contents of Pre-Construction Notification: The PCN must be in writing and include the following information:

(1) Name, address and telephone numbers of the prospective permittee;

(2) Location of the proposed activity;

(3) Identify the specific NWP or NWP(s) the prospective permittee wants to use to authorize the proposed activity;

(4) A description of the proposed activity; the activity's purpose; direct and indirect adverse environmental effects the activity would cause, including the anticipated amount of loss of wetlands, other special aquatic sites, and other waters expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; a description of any proposed mitigation measures intended to reduce the adverse environmental effects caused by the proposed activity; and any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity, including other separate and distant crossings for linear projects that require Department of the Army authorization but do not require pre-construction notification. The description of the proposed activity and any proposed mitigation measures should be sufficiently detailed to allow the district engineer to determine that the adverse environmental effects of the activity will be no more than minimal and to determine the need for compensatory mitigation or other mitigation measures. For single and complete linear projects, the PCN must include the quantity of anticipated losses of wetlands, other special aquatic sites, and other waters for each single and complete crossing of those wetlands, other special aquatic sites, and other

waters. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the activity and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans);

(5) The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many wetlands, other special aquatic sites, and other waters. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate;

(6) If the proposed activity will result in the loss of greater than 1/10-acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse environmental effects are no more than minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

(7) For non-Federal permittees, if any listed species or designated critical habitat might be affected or is in the vicinity of the activity, or if the activity is located in designated critical habitat, the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed activity or utilize the designated critical habitat that might be affected by the proposed activity. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with the Endangered Species Act;

(8) For non-Federal permittees, if the NWP activity might have the potential to cause effects to a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, the PCN must state which historic property might have the potential to be affected by the proposed activity or include a vicinity map indicating the location of the historic property. For NWP activities that require pre-construction notification, Federal permittees must provide documentation demonstrating compliance with section 106 of the National Historic Preservation Act;

(9) For an activity that will occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a “study river” for possible inclusion in the system while the river is in an official study status, the PCN must identify the Wild and Scenic River or the “study river” (see general condition 16); and

(10) For an activity that requires permission from the Corps pursuant to 33 U.S.C. 408 because it will alter or temporarily or permanently occupy or use a U.S. Army Corps of Engineers federally authorized civil works project, the pre-construction notification must include a statement confirming that the project proponent has submitted a written request for section 408 permission from the Corps office having jurisdiction over that USACE project.

(c) Form of Pre-Construction Notification: The standard individual permit application form (Form ENG 4345) may be used, but the completed application form must clearly indicate that it is an NWP PCN and must include all of the applicable information required in paragraphs (b)(1) through (10) of this general condition. A letter containing the required information may also be used. Applicants may provide electronic files of PCNs and supporting materials if the district engineer has established tools and procedures for electronic submittals.

(d) Agency Coordination: (1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the activity's adverse environmental effects so that they are no more than minimal.

(2) Agency coordination is required for: (i) all NWP activities that require pre-construction notification and result in the loss of greater than 1/2-acre of waters of the United States; (ii) NWP 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52 activities that require pre-construction notification and will result in the loss of greater than 300 linear feet of stream bed; (iii) NWP 13 activities in excess of 500 linear feet, fills greater than one cubic yard per running foot, or involve discharges of dredged or fill material into special aquatic sites; and (iv) NWP 54 activities in excess of 500 linear feet, or that extend into the waterbody more than 30 feet from the mean low water line in tidal waters or the ordinary high water mark in the Great Lakes.

(3) When agency coordination is required, the district engineer will immediately provide (e.g., via e-mail, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete PCN to the appropriate Federal or state offices (FWS, state natural resource or water quality agency, EPA, and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will have 10 calendar days from the date the material is transmitted to notify the district engineer via telephone, facsimile transmission, or e-mail that they intend to provide substantive, site-specific comments. The comments must explain why the agency believes the adverse environmental effects will be more than minimal. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district engineer will fully consider agency comments received within the specified time frame concerning the proposed activity's compliance with the terms and conditions of the NWPs, including the need for mitigation to ensure the net adverse environmental effects of the proposed activity are no more than minimal. The district engineer will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction

notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

(4) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

(5) Applicants are encouraged to provide the Corps with either electronic files or multiple copies of pre-construction notifications to expedite agency coordination.

D. District Engineer's Decision

1. In reviewing the PCN for the proposed activity, the district engineer will determine whether the activity authorized by the NWP will result in more than minimal individual or cumulative adverse environmental effects or may be contrary to the public interest. If a project proponent requests authorization by a specific NWP, the district engineer should issue the NWP verification for that activity if it meets the terms and conditions of that NWP, unless he or she determines, after considering mitigation, that the proposed activity will result in more than minimal individual and cumulative adverse effects on the aquatic environment and other aspects of the public interest and exercises discretionary authority to require an individual permit for the proposed activity. For a linear project, this determination will include an evaluation of the individual crossings of waters of the United States to determine whether they individually satisfy the terms and conditions of the NWP(s), as well as the cumulative effects caused by all of the crossings authorized by NWP. If an applicant requests a waiver of the 300 linear foot limit on impacts to streams or of an otherwise applicable limit, as provided for in NWPs 13, 21, 29, 36, 39, 40, 42, 43, 44, 50, 51, 52, or 54, the district engineer will only grant the waiver upon a written determination that the NWP activity will result in only minimal individual and cumulative adverse environmental effects. For those NWPs that have a waivable 300 linear foot limit for losses of intermittent and ephemeral stream bed and a 1/2-acre limit (i.e., NWPs 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52), the loss of intermittent and ephemeral stream bed, plus any other losses of jurisdictional waters and wetlands, cannot exceed 1/2-acre.

2. When making minimal adverse environmental effects determinations the district engineer will consider the direct and indirect effects caused by the NWP activity. He or she will also consider the cumulative adverse environmental effects caused by activities authorized by NWP and whether those cumulative adverse environmental effects are no more than minimal. The district engineer will also consider site specific factors, such as the environmental setting in the vicinity of the NWP activity, the type of resource that will be affected by the NWP activity, the functions provided by the aquatic resources that will be affected by the NWP activity, the degree or magnitude to which the

aquatic resources perform those functions, the extent that aquatic resource functions will be lost as a result of the NWP activity (e.g., partial or complete loss), the duration of the adverse effects (temporary or permanent), the importance of the aquatic resource functions to the region (e.g., watershed or ecoregion), and mitigation required by the district engineer. If an appropriate functional or condition assessment method is available and practicable to use, that assessment method may be used by the district engineer to assist in the minimal adverse environmental effects determination. The district engineer may add case-specific special conditions to the NWP authorization to address site-specific environmental concerns.

3. If the proposed activity requires a PCN and will result in a loss of greater than 1/10-acre of wetlands, the prospective permittee should submit a mitigation proposal with the PCN. Applicants may also propose compensatory mitigation for NWP activities with smaller impacts, or for impacts to other types of waters (e.g., streams). The district engineer will consider any proposed compensatory mitigation or other mitigation measures the applicant has included in the proposal in determining whether the net adverse environmental effects of the proposed activity are no more than minimal. The compensatory mitigation proposal may be either conceptual or detailed. If the district engineer determines that the activity complies with the terms and conditions of the NWP and that the adverse environmental effects are no more than minimal, after considering mitigation, the district engineer will notify the permittee and include any activity-specific conditions in the NWP verification the district engineer deems necessary. Conditions for compensatory mitigation requirements must comply with the appropriate provisions at 33 CFR 332.3(k). The district engineer must approve the final mitigation plan before the permittee commences work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation. If the prospective permittee elects to submit a compensatory mitigation plan with the PCN, the district engineer will expeditiously review the proposed compensatory mitigation plan. The district engineer must review the proposed compensatory mitigation plan within 45 calendar days of receiving a complete PCN and determine whether the proposed mitigation would ensure the NWP activity results in no more than minimal adverse environmental effects. If the net adverse environmental effects of the NWP activity (after consideration of the mitigation proposal) are determined by the district engineer to be no more than minimal, the district engineer will provide a timely written response to the applicant. The response will state that the NWP activity can proceed under the terms and conditions of the NWP, including any activity-specific conditions added to the NWP authorization by the district engineer.

4. If the district engineer determines that the adverse environmental effects of the proposed activity are more than minimal, then the district engineer will notify the applicant either: (a) that the activity does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit; (b) that the activity is authorized under the NWP subject to the applicant's submission of a mitigation plan that would reduce the adverse environmental effects so that they are no more than minimal; or (c) that the activity is authorized under the NWP

with specific modifications or conditions. Where the district engineer determines that mitigation is required to ensure no more than minimal adverse environmental effects, the activity will be authorized within the 45-day PCN period (unless additional time is required to comply with general conditions 18, 20, and/or 31, or to evaluate PCNs for activities authorized by NWPs 21, 49, and 50), with activity-specific conditions that state the mitigation requirements. The authorization will include the necessary conceptual or detailed mitigation plan or a requirement that the applicant submit a mitigation plan that would reduce the adverse environmental effects so that they are no more than minimal. When compensatory mitigation is required, no work in waters of the United States may occur until the district engineer has approved a specific mitigation plan or has determined that prior approval of a final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation.

E. Further Information

1. District Engineers have authority to determine if an activity complies with the terms and conditions of an NWP.

2. NWPs do not obviate the need to obtain other federal, state, or local permits, approvals, or authorizations required by law.

3. NWPs do not grant any property rights or exclusive privileges.

4. NWPs do not authorize any injury to the property or rights of others.

5. NWPs do not authorize interference with any existing or proposed Federal project (see general condition 31).

F. Definitions

Best management practices (BMPs): Policies, practices, procedures, or structures implemented to mitigate the adverse environmental effects on surface water quality resulting from development. BMPs are categorized as structural or non-structural.

Compensatory mitigation: The restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.

Currently serviceable: Useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.

Direct effects: Effects that are caused by the activity and occur at the same time and place.

Discharge: The term "discharge" means any discharge of dredged or fill material into waters of the United States.

Ecological reference: A model used to plan and design an aquatic habitat and riparian area restoration, enhancement, or establishment activity under NWP 27. An ecological reference may be based on the structure, functions, and dynamics of an aquatic habitat type or a riparian area type that currently exists in the region where the proposed NWP 27 activity is located. Alternatively, an ecological reference may be based on a conceptual model for the aquatic habitat type or riparian area type to be restored, enhanced, or established as a result of the proposed NWP 27 activity. An ecological reference takes into account the range of variation of the aquatic habitat type or riparian area type in the region.

Enhancement: The manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s), but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area.

Ephemeral stream: An ephemeral stream has flowing water only during, and for a short duration after, precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for stream flow.

Establishment (creation): The manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area.

High Tide Line: The line of intersection of the land with the water's surface at the maximum height reached by a rising tide. The high tide line may be determined, in the absence of actual data, by a line of oil or scum along shore objects, a more or less continuous deposit of fine shell or debris on the foreshore or berm, other physical markings or characteristics, vegetation lines, tidal gages, or other suitable means that delineate the general height reached by a rising tide. The line encompasses spring high tides and other high tides that occur with periodic frequency but does not include storm surges in which there is a departure from the normal or predicted reach of the tide due to the piling up of water against a coast by strong winds such as those accompanying a hurricane or other intense storm.

Historic Property: Any prehistoric or historic district, site (including archaeological site), building, structure, or other object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria (36 CFR part 60).

Independent utility: A test to determine what constitutes a single and complete non-linear project in the Corps Regulatory Program. A project is considered to have independent utility if it would be constructed absent the construction of other projects in the project area. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility.

Indirect effects: Effects that are caused by the activity and are later in time or farther removed in distance, but are still reasonably foreseeable.

Intermittent stream: An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow.

Loss of waters of the United States: Waters of the United States that are permanently adversely affected by filling, flooding, excavation, or drainage because of the regulated activity. Permanent adverse effects include permanent discharges of dredged or fill material that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody. The acreage of loss of waters of the United States is a threshold measurement of the impact to jurisdictional waters for determining whether a project may qualify for an NWP; it is not a net threshold that is calculated after considering compensatory mitigation that may be used to offset losses of aquatic functions and services. The loss of stream bed includes the acres or linear feet of stream bed that are filled or excavated as a result of the regulated activity. Waters of the United States temporarily filled, flooded, excavated, or drained, but restored to pre-construction contours and elevations after construction, are not included in the measurement of loss of waters of the United States. Impacts resulting from activities that do not require Department of the Army authorization, such as activities eligible for exemptions under section 404(f) of the Clean Water Act, are not considered when calculating the loss of waters of the United States.

Navigable waters: Waters subject to section 10 of the Rivers and Harbors Act of 1899. These waters are defined at 33 CFR part 329.

Non-tidal wetland: A non-tidal wetland is a wetland that is not subject to the ebb and flow of tidal waters. Non-tidal wetlands contiguous to tidal waters are located landward of the high tide line (i.e., spring high tide line).

Open water: For purposes of the NWPs, an open water is any area that in a year with normal patterns of precipitation has water flowing or standing above ground to the extent that an ordinary high water mark can be determined. Aquatic vegetation within the area of flowing or standing water is either non-emergent, sparse, or absent. Vegetated

shallows are considered to be open waters. Examples of "open waters" include rivers, streams, lakes, and ponds.

Ordinary High Water Mark: An ordinary high water mark is a line on the shore established by the fluctuations of water and indicated by physical characteristics, or by other appropriate means that consider the characteristics of the surrounding areas.

Perennial stream: A perennial stream has flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from rainfall is a supplemental source of water for stream flow.

Practicable: Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

Pre-construction notification: A request submitted by the project proponent to the Corps for confirmation that a particular activity is authorized by nationwide permit. The request may be a permit application, letter, or similar document that includes information about the proposed work and its anticipated environmental effects. Pre-construction notification may be required by the terms and conditions of a nationwide permit, or by regional conditions. A pre-construction notification may be voluntarily submitted in cases where pre-construction notification is not required and the project proponent wants confirmation that the activity is authorized by nationwide permit.

Preservation: The removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions.

Protected tribal resources: Those natural resources and properties of traditional or customary religious or cultural importance, either on or off Indian lands, retained by, or reserved by or for, Indian tribes through treaties, statutes, judicial decisions, or executive orders, including tribal trust resources.

Re-establishment: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area and functions.

Rehabilitation: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area.

Restoration: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: re-establishment and rehabilitation.

Riffle and pool complex: Riffle and pool complexes are special aquatic sites under the 404(b)(1) Guidelines. Riffle and pool complexes sometimes characterize steep gradient sections of streams. Such stream sections are recognizable by their hydraulic characteristics. The rapid movement of water over a course substrate in riffles results in a rough flow, a turbulent surface, and high dissolved oxygen levels in the water. Pools are deeper areas associated with riffles. A slower stream velocity, a streaming flow, a smooth surface, and a finer substrate characterize pools.

Riparian areas: Riparian areas are lands next to streams, lakes, and estuarine-marine shorelines. Riparian areas are transitional between terrestrial and aquatic ecosystems, through which surface and subsurface hydrology connects riverine, lacustrine, estuarine, and marine waters with their adjacent wetlands, non-wetland waters, or uplands. Riparian areas provide a variety of ecological functions and services and help improve or maintain local water quality. (See general condition 23.)

Shellfish seeding: The placement of shellfish seed and/or suitable substrate to increase shellfish production. Shellfish seed consists of immature individual shellfish or individual shellfish attached to shells or shell fragments (i.e., spat on shell). Suitable substrate may consist of shellfish shells, shell fragments, or other appropriate materials placed into waters for shellfish habitat.

Single and complete linear project: A linear project is a project constructed for the purpose of getting people, goods, or services from a point of origin to a terminal point, which often involves multiple crossings of one or more waterbodies at separate and distant locations. The term "single and complete project" is defined as that portion of the total linear project proposed or accomplished by one owner/developer or partnership or other association of owners/developers that includes all crossings of a single water of the United States (i.e., a single waterbody) at a specific location. For linear projects crossing a single or multiple waterbodies several times at separate and distant locations, each crossing is considered a single and complete project for purposes of NWP authorization. However, individual channels in a braided stream or river, or individual arms of a large, irregularly shaped wetland or lake, etc., are not separate waterbodies, and crossings of such features cannot be considered separately.

Single and complete non-linear project: For non-linear projects, the term "single and complete project" is defined at 33 CFR 330.2(i) as the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers. A single and complete non-linear project must have independent utility (see definition of "independent utility"). Single and complete non-linear projects may not be "piecemealed" to avoid the limits in an NWP authorization.

Stormwater management: Stormwater management is the mechanism for controlling stormwater runoff for the purposes of reducing downstream erosion, water quality degradation, and flooding and mitigating the adverse effects of changes in land use on the aquatic environment.

Stormwater management facilities: Stormwater management facilities are those facilities, including but not limited to, stormwater retention and detention ponds and best management practices, which retain water for a period of time to control runoff and/or improve the quality (i.e., by reducing the concentration of nutrients, sediments, hazardous substances and other pollutants) of stormwater runoff.

Stream bed: The substrate of the stream channel between the ordinary high water marks. The substrate may be bedrock or inorganic particles that range in size from clay to boulders. Wetlands contiguous to the stream bed, but outside of the ordinary high water marks, are not considered part of the stream bed.

Stream channelization: The manipulation of a stream's course, condition, capacity, or location that causes more than minimal interruption of normal stream processes. A channelized stream remains a water of the United States.

Structure: An object that is arranged in a definite pattern of organization. Examples of structures include, without limitation, any pier, boat dock, boat ramp, wharf, dolphin, weir, boom, breakwater, bulkhead, revetment, riprap, jetty, artificial island, artificial reef, permanent mooring structure, power transmission line, permanently moored floating vessel, piling, aid to navigation, or any other manmade obstacle or obstruction.

Tidal wetland: A tidal wetland is a jurisdictional wetland that is inundated by tidal waters. Tidal waters rise and fall in a predictable and measurable rhythm or cycle due to the gravitational pulls of the moon and sun. Tidal waters end where the rise and fall of the water surface can no longer be practically measured in a predictable rhythm due to masking by other waters, wind, or other effects. Tidal wetlands are located channelward of the high tide line.

Tribal lands: Any lands title to which is either: 1) held in trust by the United States for the benefit of any Indian tribe or individual; or 2) held by any Indian tribe or individual subject to restrictions by the United States against alienation.

Tribal rights: Those rights legally accruing to a tribe or tribes by virtue of inherent sovereign authority, unextinguished aboriginal title, treaty, statute, judicial decisions, executive order or agreement, and that give rise to legally enforceable remedies.

Vegetated shallows: Vegetated shallows are special aquatic sites under the 404(b)(1) Guidelines. They are areas that are permanently inundated and under normal

circumstances have rooted aquatic vegetation, such as seagrasses in marine and estuarine systems and a variety of vascular rooted plants in freshwater systems.

Waterbody: For purposes of the NWPs, a waterbody is a jurisdictional water of the United States. If a wetland is adjacent to a waterbody determined to be a water of the United States, that waterbody and any adjacent wetlands are considered together as a single aquatic unit (see 33 CFR 328.4(c)(2)). Examples of "waterbodies" include streams, rivers, lakes, ponds, and wetlands.

EXHIBIT CX 12
Jen Resume

Mark S. Jen
U.S. Environmental Protection Agency, Region 10
222 West Seventh Avenue, #19; Anchorage, AK 99513

EDUCATION

Yale University - School of Forestry and Environmental Studies (1992) — New Haven, CT
Master of Environmental Studies

California State University (1990) — Los Angeles, CA
Bachelor of Science in Biology

PROFESSIONAL EXPERIENCE

U.S. Environmental Protection Agency, Region 10 (1993 to Present) — Anchorage, AK
Environmental Scientist (GS-1301)

Enforcement and Compliance Assurance Division - Surface Water Enforcement Section
Clean Water Act § 404 - Enforcement Program

Inspector – Conduct inspections and investigations for compliance with applicable regulations, guidances, and permits pursuant to the Clean Water Act § 404.

- Collect field data and photographic evidence and conduct interviews to support development of administrative and/or judicial enforcement cases.
- Provide technical field assistance and interpret aerial imagery and other web-based sources to support the Regional Jurisdiction Lead in evaluating CWA jurisdiction.
- Provide program compliance assistance on the preparation of Restoration Plans, Completion and Annual Monitoring Reports.
- Prepare written inspection reports within agency timeframes.

Case Officer – Serve as technical expert in the development, negotiation, and litigation of civil and judicial enforcement matters.

- Prepare formal information requests pursuant to CWA § 308.
- Conduct research and investigations to support preparation of the Case Development Reports to address the elements of the CWA violation.
- Evaluate options for injunctive relief, including restoration, preservation, and mitigation based on EPA's CWA § 404 Injunctive Relief Policy.
- Calculate civil administrative penalties based on EPA's CWA § 404 Penalty Policy.
- Provide technical support to attorneys in the development of Administrative Orders and Complaints, Consent Agreements/Final Orders, Judicial Referrals, etc.
- Review and approve Fill Removal and Restoration Plans and monitor deadlines for submittal of compliance deliverables and other actions required under Administrative Orders and/or Judicial Consent Decrees.
- Provide briefings and recommendations to EPA management on enforcement matters.

Office of Ecosystem, Tribal, and Public Affairs – Aquatic Resources Unit
Clean Water Act § 404 - Regulatory Program

Project Reviewer – Responsible for developing technical review comments on U.S. Army Corps of Engineers (USACE) Public Notices of Application for Permit associated with projects resulting in the discharge of dredged and/or fill material in Waters of the United States, including wetlands.

- Consistent with EPA's CWA § 404(b)(1) Guidelines, recommended measures to avoid, minimize, and compensate for unavoidable impacts.
- Pursuant to CWA § 404(q), elevated EPA concerns regarding projects resulting in unacceptable adverse impacts to aquatic resources of national importance.
- Coordinated EPA's technical review and comments on the Corps' Proposal to Reissue the Nationwide Permits (NWPs).
- Participated in pre-application meetings and interagency site visits with the Corps.

CWA Section 404(f) Exemptions – In coordination with USACE, provided clarification to the USDA, Forest Service, and project proponents regarding the applicability of CWA § 404(f) exemptions for normal ongoing silvicultural activities in the Chugach and Tongass National Forests.

- The construction of forest roads to access timber harvest areas would be exempt if the silvicultural activities were part of an ongoing timber harvest with an established Forest Plan. Implementation of forestry BMPs and erosion/sediment control measures are required, including installation of culverts for adequate fish passage.

Nationwide Permit Coordinator – Responsible for team coordination to develop regional comments to EPA HQ regarding the USACE NWPs Program, which are reauthorized every five years.

Transportation Coordinator – Represented EPA on the interagency workgroup to integrate CWA § 404 and related permit requirements in NEPA for transportation projects and to facilitate early and effective interagency consultation and coordination. This work resulted in the EPA becoming a signatory to Alaska's NEPA/404 Merger Agreement (1997).

CWA § 401 Certifications – Responsible for preparing CWA § 401 water quality certifications for USACE issued CWA permits on the Annette Islands Indian Reservation, Metlakatla Indian Community.

- Coordinated directly with the Tribe regarding specific conditions for the 401 certifications.

Alaska Wetland Grants Coordinator – Responsible for coordinating, reviewing, and awarding of wetland grants to State, Local, or Tribal applicants with a team of internal and external agencies.

- Developed selection criteria for awarding of grant applications.
- Coordinated with the Grants Administration Unit to develop a formal process for grant applications, which improved working relationships.

Project Officer – Responsible for the awarding, administration, and monitoring of wetland grants awarded to State, Local, and Tribal governments.

- Negotiated work plans and budgets, monitored progress with award conditions and deliverables.
- Conducted Post-Award Monitoring to evaluate program outcomes and compliance with their Financial Assistance Agreements.

Contracting Officer Representative – Responsible for developing the scope of work, schedule, budget, and task orders/work assignments for EPA awarded contracts.

- Coordinated with the Contracting Officer and Contractor to finalize the contract.
- Conducted monitoring of the Contractor's progress with the task order/work assignment by reviewing deliverables, invoices, progress reports, and tracking the budget/expenditures.

Program/Technical Support to Superfund (CERCLA) - Prepared a CWA § 404(b)(1) Guidelines evaluation and CWA § 401 Water Quality Certification as required Applicable or Relevant and Appropriate Requirements (ARARs) for planned remedial activities at the Ketchikan Pulp Mill Marine Operable Unit.

Watershed Coordinator – Coordinated a multi-agency Kenai River Watershed Group resulting in improved coordination and communication between federal, state, and local agencies and the establishment of an advisory group for the Alaska Department of Natural Resources.

Alaska Wetlands Initiative – Coordinated with EPA HQ, state, federal, local agencies, and other Stakeholders regarding a process to improve the implementation of the CWA Section 404 regulatory program in Alaska.

Office of Ecosystem, Tribal, and Public Affairs – NEPA Review Unit
National Environmental Policy Act (NEPA) Review Program

NEPA Lead Reviewer – Responsible for the coordination of an interdisciplinary team of Associate Reviewers with program and technical expertise and the development of EPA NEPA review comments pursuant to Section 309 of the Clean Air Act to support lead federal agencies' Environmental Impact Statements for major federal actions, which included projects where EPA served as a Cooperating Agency, as well as NEPA review for projects related to natural gas pipelines; oil, gas, and energy; hard rock mining development, operation, and reclamation; land use planning, military facilities and operations; and transportation infrastructure.

NEPA Compliance Coordinator – Responsible for providing program guidance to local governments on the preparation of Environmental Assessments and Categorical Exclusions, including additional requirements under NEPA.

- Reviewed and approved NEPA documents to ensure compliance with EPA's NEPA implementing regulations for Special Appropriations Act Grants (40 CFR Part 6).

Office of Ecosystem, Tribal, and Public Affairs - Tribal Trust and Assistance Unit (1-year detail)
Tribal Program

Tribal Coordinator – Responsible for building capacity of Alaska Tribes, primarily in Cook Inlet, Prince William Sound, Kachemak Bay, and the Kenai Peninsula

- Coordinated and facilitated meetings with Tribes regarding EPA programs, trainings, and projects.
- Negotiate work plans and budgets regarding Indian General Assistance Program (IGAP) Grants.
- Monitored Tribal grantees performance with the award terms and conditions.

Tribal Liaison – Provided support to the Native Village of Tyonek regarding the Chuitna Coal Project EIS and coordinated the development of a Tribal Consultation and Coordination Plan with EPA.

Superfund and Emergency Management Division (Volunteer)
Emergency Response Program

HQ National Incident Management Assistance Team (N-IMAT) – Responsible for providing support as the Resources Unit Leader to Regions during large scale or long duration responses, as well as training and coaching, if requested.

Response Support Corps – Deployed to national and regional responses, including the Oregon Wildfires, Portland Warehouse Fire, Hurricane Irma, Fukushima Nuclear, Deepwater Horizon, etc.

Resources Unit Leader – Served in a Key Leadership Position within the Incident Command System. Responsible for developing the Incident Action Plan, tracking tactical response personnel and resources, managing and ordering tactical resources.

U.S. Environmental Protection Agency, Headquarters (1992 to 1993) Washington, DC
Environmental Protection Specialist (GS-0028)

Office of Water, Office of Wetlands, Oceans, and Watersheds, Wetlands Division
Wetlands and Aquatic Resources Regulatory Branch

Legislative Quality Action Team – Assisted in the preparation of the proposed rule – *Exception from Wetlands Mitigation Sequence for Alaska.*

- Reviewed public comments and worked with a contractor to develop an electronic docket system.
- Developed the Wetland Fact Sheets for public outreach and education.

National Performance Review (Permit Reform Taskforce) – Selected to participate in an inter-program taskforce to develop recommendations for improving the efficiency of EPA's permitting programs.

Yale University, School of Forestry and Environmental Studies (1990 to 1992) New Haven, CT

Research Assistant – Responsible for collecting water, soil, and vegetation samples from wetland study sites and analyzing their nutrient contents using wet digestion and a spectrophotometer.

- Analyzed annual tree ring growth of Atlantic White Cedar and developed correlations between tree ring growth and nutrient dynamics of the study site.

Teaching Assistant – Responsible for assisting to the professor by grading homework and exams, and to students enrolled in the graduate course on water chemistry and quality.

Student Editor – Responsible for the review, editing, and layout production of the quarterly Yale Alumni Newsletter – *Yale Forest School News*, and the biannual - *Yale Tropical Resources Institute (TRI) News*.

Wildlife International Ltd (Summer 1990) Lafayette, LA

Summer Field Technician – Participated in a long-term study to evaluate the fate, persistence, and environmental effects of a new fungicide, which was proposed for federal registration under FIFRA.

- Collected water and soil samples from multiple study sites and prepared them for laboratory analysis.
- Engaged local rice farmers and collect meteorological data during field treatments.

California State University (1989 TO 1990) Los Angeles, CA

Field and Laboratory Assistant – Participated in a long-term ecological study to evaluate the effects of predator/prey relationships between spiny lobster and mussel populations on Santa Catalina Island.

- Collected, sorted, and identified intertidal/subtidal marine invertebrate species within substrate sample plots.

U.S. Department of Energy - Engineering and Science Research Fellowship Oak Ridge, TN
Oak Ridge National Laboratory (Jan - Aug 1988 and Summer 1989)

Research Fellow – Collaborated with scientists to develop a study to evaluate the potential risk for food chain bioaccumulation and transfer of volatile organic chemicals to humans and animals by ingestion of contaminated vegetation, and the significance of foliar uptake as a pathway for contamination.

- Designed, developed, and tested double glass closed system chambers in a controlled environment to expose, measure, and monitor gaseous uptake of ^{14}C-Toluene to soybean foliage during consecutive light and dark phases.

PUBLICATIONS

Jen, M.S. (1996). Wood Residues in Alaska – Exploring Alternative Uses. *Pacific Northwest International Section of the Air and Waste Management Association Newsletter. June 1996*.

Jen, M.S., Hoylman. A.M, Edwards, N.T. and Walton, B.T. (1995). Experimental Method to Measure Gaseous Uptake of ^{14}C-Toluene by Foliage. *Environmental and Experimental Botany. Vol. 35. Pp. 389-398*. Pergamon Press

Walton, B.T., and Anderson, T.A., Deckert, D.J. and Jen, M.S. (1992). Trichlorethylene in Soil: Plant Uptake, Toxicity, and Biodegradation in the Rhizosphere. *The Toxicologist 12: 336* (abstract).

Jen, M.S. and Siccama, T. (1991). Peat, Water, and Tree Ring Chemistry in Relation to the Cyclical Growth Patterns in Atlantic White Cedar (*Chamaecyparis thyoides*). *In the Proceedings of Coastally Restricted Forests and Forested Freshwater Wetlands: Structure and Function, Restoration, and Management Conference*. Yale University, New Haven, CT (abstract).

Jen. M.S. (1989). Deposition of ^{14}C-Toluene and Its Uptake by Soybean (*Glycine max* [L] cv.) Foliage. *In Proceedings of the Southern California Academy of Sciences' Annual Meeting*. California Lutheran University, Thousand Oaks, CA (abstract).

AWARDS AND RECOGNITION

EPA Federal Service Award (2022)
EPA R10 Emergency Response - Challenge Coin (2020) – Oregon Wildfire Response
EPA R10 Emergency Response - Challenge Coin (2018) – Portland Warehouse Fire Response
EPA R2 Emergency Response - Challenge Coin (2017) – Hurricanes Harvey, Irma, and Maria Response
EPA Federal Service Award (2012)
EPA R10 - Bronze Medal for Commendable Service (2006) – SE Alaska Transportation Projects Team
EPA R10 - Bronze Medal for Commendable Service (2004) – Region 10 NEPA Review Team
EPA Federal Service Award (2002)
EPA HQ - Bronze Medal for Commendable Service (1994) – Alaska Wetlands Initiative Team
Alumni Award of Honor in Biology (1990) – California State University, Los Angeles
Technical Communications Award (1990) - Tennessee Chapter Society for Tech Communications
Best Student Paper Award in Botany (1989) – Southern California Academy of Sciences

HONOR SOCIETIES

Phi Kappa Phi Honor Society
Golden Key National Honor Society
Dean's List

PROFESSIONAL DEVELOPMENT AND TRAINING

<u>EPA National Enforcement Training Institute – Inspector/Enforcement Training</u>
Direct Examination and Witness Preparation (2024)
SPCC/FRP Inspector Training Course; Portland, OR (2024)
After the Inspection - Inspector Skills Refresher (2021)

CWA - Waters of the United States (WOTUS) Training for Inspectors; Seattle, WA (2019)
CWA § 402 NPDES National Technical Inspector Workshop; Boston, MA (2019)
Inspection Interviews (2019)
Being a Witness (2019)
Denial of Access (2018)
Field Note Taking for Compliance Inspectors (2018)
Opening Conference (2017)
Digital Camera Policy Overview (2015)
CWA § 404 Enforcement Training; Seattle, WA (2012)
Writing for Inspectors; Seattle, WA (2009)
Advanced Inspector Training; San Francisco, CA (2002)
CWA § 404 Training; Anchorage, AK (2002)
CWA § 402 Storm Water Inspection Training; Seattle, WA (2001)
CWA § 404 Enforcement Workshop; Anchorage, AK (1997)
Basic Inspector Training; Anchorage, AK (1997)

Technical/Program Development Training

Alaska Department of Fish and Game - Streambank Rehabilitation Workshop; Big Lake, AK (2022)
NEPA/CAA Section 309 Review; Denver, CO (2007)
Alaska Department of Transportation & Public Facilities – Cumulative Effects Assessment for Transportation Projects; Anchorage, AK (2006)
EPA HQ NEPA/CAA § 309 Review Training; Washington, DC (2004)
Wetland Training Institute, Inc. – Applied Hydric Soils; San Diego, CA (2002)
USACE – Dredged Material Assessment and Management Seminar; Anchorage, AK (2001)
Wildland Hydrology, Inc. – Applied Fluvial Geomorphology; Pagosa Springs, CO (1997)
EPA Hazardous Waste Operations and Emergency Response Refresher (HAZWOPER) – 8 hours
EPA Emergency Response to Hazardous Material Incidents – 40 hours; Anchorage, AK (1996)
Wetlands Biological Assessment Methods and Criteria Development Workshop; Boulder, CO (1996)
EPA R10 – Application of Bioassessment; Anchorage, AK (1996)
Wetland Science Training Cooperative – Hydrogeomorphic (HGM) Approach to Assessment of Wetland Functions Training; Fairbanks, AK (1996)
Interagency Wetland Delineation Training; Anchorage, AK (1995)
USACE - Dredged Material Testing and Evaluation Seminar; Anchorage, AK (1995)
Applying the NEPA Process; Portland, OR (1994)
Aquatic Habitat Restoration in Northern Ecosystems; Girdwood, AK (1994)
CWA § 404 Regulatory Issues Training; Atlanta, GA (1993)

EXHIBIT CX 13
Jensen Resume

Amy Jensen, MPA

(Formerly Amy Lieb)

Education

Master of Public Administration (MPA) 2006
University of Colorado, Denver, CO

Bachelor of Science in Hydrology 1999
University of New Hampshire, Durham, NH

Professional Experience

U.S. Environmental Protection Agency, Region 10, Seattle, WA (02/2019 – present)
Physical Scientist, Regional Wetland Coordinator

- Serves as a national and regional expert on wetlands and other aquatic resources. Responsible for scientific aspects of regional efforts to maintain and restore the overall quality and quantity of aquatic resources. Serves as the senior point of contact with external stakeholders (state and tribal governments, federal partners, etc) on behalf of the regional program and representing the Agency at external events.
- Provides technical analysis and advice based on current scientific information on a wide range of issues, including enforcement cases, proposed regulations and policies, and pollution events. Serves as the regional subject matter expert on enforcement matters, including determining the extent of Clean Water Act (CWA) jurisdiction.
- Supports senior EPA management as a senior scientific adviser by providing independent, scientifically-based recommendations on controversial matters. This includes providing technical advice on resource regulation and ecological function to EPA management across the Region. Additionally, leads effort of ensuring consistency and scientific integrity of the unit's technical work.
- Provides technical assistance and direction to EPA staff on: CWA Jurisdiction Determinations; wetlands determination and delineation; identifying activities that are exempt from Section 404 regulations; reviewing permit applications for Section 404 activities and ensuring adherence to the 404(b)(1) Guidelines; restoration of aquatic ecosystems; reviewing and commenting on National Environmental Policy Act (NEPA) actions involving impacts to aquatic resources; interpretation of new laws, regulations, program and policies.

*Specific Accomplishment*s: Leader of Technical Team that wrote the Pebble Deposit Area Final Determination under Clean Water Act Section 404(c) authority to limit the use of certain waters in the Bristol Bay watershed as disposal sites for certain discharges of dredged or fill material associated with development of a mine at the Pebble deposit, a large ore body in southwest Alaska.

U.S.D.A Forest Service, Northern Region, Missoula, MT (02/2015 – 02/2019)
Hydrologist, Regional Hydrologist

- Develop, direct, evaluate, and adapt the hydrology, wetland, and watershed management/restoration program for the 10 National Forest System units in the Northern Region (Region 1). Ensure these 25-million acres of forests and grasslands yield sustained flows of high-quality water and support diverse aquatic habitats while providing a range of other goods and services.
- Serve as senior Regional expert for technical wetland and aquatic resource questions and legal requirements pertaining to CWA, National Environmental Policy Act (NEPA), federal and state water quality laws, federal regulations, and agency policy. Provide guidance on requirements needed for sufficient NEPA analyses.
- Liaison with stakeholder entities and represent the agency in complex, high-profile meetings, conferences, and negotiations on significant water/aquatic resource issues (i.e. CWA Section 404 jurisdiction determinations and coordination with the U.S. Army Corps of Engineers, CWA agreements with states, tribal and ESA consultation on Forest Plans; GAO and USDA-OIG audits).
- Develop and maintain effective integration of the program with other key programs, including fisheries, engineering, timber and range management, as well as other Regions. Seeks opportunities to optimize collaboration between programs and regions to respond to adjustments in forest needs and agency direction.
- Lead development and execution of strategic regional water and watershed initiatives, policies, and programs, such as the Aquatic and Riparian Conservation Strategy for Forest Plan revisions. Assist with national program strategies, including Watershed Condition Framework for watershed restoration.
- Lead the development, organization, administration and implementation of the regulatory components of the Region's water quality management program and Best Management Practices Monitoring Program to address CWA Sections 402 & 319.

U.S.D.A. Forest Service, Mt. Baker-Snoqualmie National Forest, Everett, WA (01/2009 – 02/2015)
Hydrologist, Soil & Water Program Manager

- Develop and manage a comprehensive forest watershed restoration program that succeeded through extensive partnerships with tribes and stewardship groups.
- Lead NEPA analyses for potential effects to surface water, ground water, and wetlands.
- Represent the Forest Service on the Puget Sound Federal Caucus (PSFC) Steering Committee, responding to Tribal Treaty Rights at Risk issues, communicating with local, Regional, and Washington Offices of federal agencies. Regularly brief USDA Executives.
- Leader of PSFC strategy on "Stewardship of Federal Lands and Assets" where federal agencies are collaborating to address declining salmon populations in the Puget Sound, initially focused on inventory and prioritization of aquatic organism passage barriers.
- Provide management direction to specialists and technicians on all aquatic projects.
- Co-Team Leader for Forest-wide Sustainable Roads System (SRS) effort, responsible for leading Interdisciplinary Team, public engagement, and GIS and database management.

- Collaboratively implement a forest-wide Legacy Road and Trail program with Engineering Program that successfully completed 5 large-scale environmental assessments to decommission 92 miles and store 36 miles of National Forest System road.
- Lead the development of a field inventory of aquatic risks on 586 miles of road using a combination of contracts, field crews, and tribal partners.

Specific Accomplishments: Achieved 100% of Soil & Water restoration targets every year.

U.S.D.A. Forest Service, Pacific Northwest Region, Portland, OR (01/2014 – 06/2014)
Hydrologist, Acting Regional Water Quality Program Manager

- Serve as the primary Regional contact for legal requirements pertaining to management of water quality on National Forest System lands in Oregon and Washington in regard to all aspects of the CWA and other water quality laws and regulations.
- Lead the development, organization, administration and implementation of the regulatory components of the Region's water quality management program.
- Lead Regional Best Management Practices Monitoring Program.
- Coordinate rollout of draft directives on Groundwater and Best Management Practices.
- Develop the Regional response to proposed 303(d) listed streams by the Oregon Department of Environmental Quality, including all forest comments.
- Direct and guide the use of NetMap within the Region.

U.S.D.A. Forest Service, Washington, DC (12/2010 – 03/2011)
Hydrologist, Acting National Surface Water Program Manager

- Organize the job responsibilities of a position that was abruptly vacated to accelerate the transition with the newly hired National Program Manager.
- Provide expert technical advice and counsel to agency staff on policies and program direction effecting management of the National Forest System Lands.
- Respond to Department, Chief, and external inquiries regarding policies and program direction. Assist with the implementation of FY12 Budget Justification.
- Assist with the rollout of agency Best Management Practices Monitoring Program and Watershed Condition Framework Strategy for watershed restoration.
- Facilitate discussions with EPA and OGC on CWA court rulings regarding NPDES permits and increase awareness of these rulings with agency units and staff.

U.S.D.A. Forest Service, Gifford-Pinchot National Forest, Amboy, WA (10/2006 – 01/2009)
Hydrologist, North Zone Hydrologist

- As Interdisciplinary Team Leader, lead the development of a restoration program through planning, development, and implementation of watershed and river restoration projects in order to pursue Stewardship Contracting.
- As North Zone Hydrologist, analyze and document the hydrologic effects of land management activities, including timber sales, watershed or river restoration, and recreation development throughout the Gifford Pinchot National Forest.
- Ensures projects adequately address CWA, NEPA, President's Northwest Forest Plan, and other State and Federal requirements.

- As the Forest Service Liaison for the Lewis River Collaborative, develop collaborative relationships with external organizations, including Skamania County and Gifford Pinchot Task Force, for Stewardship Contracting. Perform all meeting management.
- Plan, develop, and implement road decommission projects as team leader of two Environmental Assessments.
- Develop and implement contracts for road decommission and restoration projects.
- Coordinate forest-wide water temperature data collection, database management, and submission to WA Department of Ecology's central database.

Specific Accomplishments: Facilitator for the Federal Land Managers in Washington (2008).

US Dept. of Interior, Bureau of Reclamation, Denver, CO (12/2002 – 10/2006)
Hydrologist

- As Interdisciplinary Project Manager, led the planning and development of Appraisal and Reconnaissance level water supply studies to solve water resource management issues.
- As a project hydrologist, assessed viability of current and future water supplies and developed recommendations for water resource management through hydrologic modeling and analytical techniques.
- Served as technical expert where definitions, methods and/or data are highly incomplete, controversial, or uncertain and whose evaluations and recommendations were accepted by others as those of a technical expert in hydrology.
- Team leader of a Feasibility Study to improve water supply systems on the Makah Indian Nation Reservation on the Olympic Peninsula of Washington.
- Forecasted water yield of ungaged sites by gathering hydrologic data, analyzing trends in historical data, and adapting standard methods.
- Published natural flow estimates for the Olympic Peninsula of Washington to determine where streams were potentially over-allocated. (see #2 in Publications)
- Published natural flow estimates for the Upper Klamath River as part of Klamath Basin water rights adjudication process. (see #1 in Publications in right-hand column)
- Analyzed and improved effectiveness of standard methods using geospatial data technology (GIS) and modeling.
- Coordinate work between team members and resolve conflicts to fulfill study objectives.
- Developed and implemented scopes of work, cost estimates, budgets, timelines, and interagency agreements.

Specific Accomplishments: Detail to Reclamation's Office of Policy as co-leader of "Managing for Excellence" leadership team (2006), Steering Committee member of Combined Federal Campaign (2005).

US Dept. of Interior, Bureau of Reclamation, Bismarck, ND (02/2001 – 12/2002)
Hydrologist

- As a project hydrologist, assessed viability of current and future water supplies and developed recommendations for water resource management through hydrologic modeling and analytical techniques.

- Plan, develop, and coordinate hydrology studies in the Red River Valley Water Supply Project in North Dakota as part of an Environmental Impact Statement. (see #3 in Publications)
- Prepare scope of work, budgets, and interagency agreements.
- Determine study approach and evaluate technical adequacy of contractor products.
- Interpret study results in terms of scientific significance.
- Ensure environmental statutes and regulations are addressed.
- Developed RRVWSP map products for illustration of alternatives using GIS.

Specific Accomplishments: International Red River Basin, Hydrology Committee member (2001 - 2002), Interim GIS Coordinator (2001-2002), and Reclamation Employee Association Board member (2002).

U.S.D.A. Forest Service, Shoshone National Forest, Cody, WY (06/1999-02/2001)
Hydrologic Technician

- Classified water resources of the Forest using GIS, aerial photographs, and field review to create a 2.4 million acre forest-wide water resource inventory.
- Provided technical advice and expertise on the Shoshone NF's Integrated Resource Inventory (IRI) team, including the development of geospatial databases, standard procedures, and data dictionaries.
- Coordinated integration of Shoshone National Forest 6th-level watershed boundaries (HUC12) with Wyoming statewide delineation by designing and implementing a procedure to review, correct, and validate existing data.
- Prepare post-burn restoration treatments as a hydrologist on Burned Area Emergency Rehabilitation (BAER) teams.
- Aid with watershed improvement projects by surveying on-going river restorations and by analyzing bedload transport in rivers to determine particle size distributions.
- Analyzed precipitation patterns across Northwest Wyoming using SNOTEL site data. Presented findings to a basic Hydrology course (taught by Greg Bevenger).
- Frequent application Rosgen classification system and Natural Channel Design methods.

Earth Systems Research Center, University of New Hampshire (09/1998-05/1999)
Hydrologic Technician

- Support research scientists in analyzing global water resource issues, particularly climate changes and population growth, using GIS (ArcINFO) and analytical research.

U.S.D.A. Forest Service, Boise National Forest, Emmett, ID (05/1998 – 08/1998)
Hydrologic Technician

- Performed field investigations to survey water resources of a 16,000 acre forest watershed.
- Conduct channel condition assessments for sedimentation, channel stability, erosion, and landslide potential.
- Survey stream channel profiles and perform Wolman Pebble Counts.
- Conduct fish habitat and presence/absence (population) surveys, while snorkeling.
- GPS or digitize all streams and enter stream survey data into GIS.

Teaching Experience

Cadre member for Forest Service National Program Management Training (2017 – 2018).

- Teach Program Management skills and techniques to 15-30 Forest Service staff including developing a program work plan, budgeting, strategies, and accomplishment reporting.

Cadre member for Forest Service Region 6 Level II (NR9) Stream Survey Training (2012-2014).

- Teach all hydrology-related analytical techniques for stream surveying to 20-40 seasonal technicians (per class) in field and classroom settings, including Ordinary High Water Mark, bankfull flow, streamflow measurement, Wolman Pebble counts, etc.

Cadre member for Aquatic Permitting in Washington State Training (2013).

- Teach 65 state and federal staff about permitting requirements of the Clean Water Act (Sections 404 and 402), Washington State Hydraulic Permits, and Endangered Species Act Section 7 Consultation.

Professional Affiliations

Association of State Wetland Managers (ASWM), Member
American Water Resources Association (AWRA), Member

Conference Presentations

Mott Lacroix, K., A. Jensen, M. Eberle, P. Luehring (2017). *Improving Watershed Health Through the Watershed Condition Framework: The Role of National Forest Lands*. American Water Resources Association Annual Conference. Portland, OR.

Jensen, A. (2018). *U.S. Forest Service National Hydrography Database Stewardship Strategy*. Montana AWRA Annual Conference. West Yellowstone, MT.

Publications (excludes NEPA documents)

1. Bureau of Reclamation. (2005). Natural flow of the upper Klamath River—Phase I: Prepared by the Technical Service Center, Denver, Colo., for U.S. Department of the Interior, Bureau of Reclamation, Klamath Basin Area Office, Klamath Falls, Oreg., November. Retrieved from http://www.klamathbasincrisis.org/science/undepleted_klam_fnl_rpt12-05.pdf. Sole author of "Attachment B -Estimation of Natural Inflow to Upper Klamath Lake from Streams" Retrieved from http://www.klamathbasincrisis.org/science/undepleted_klam_fnl_rpt_attach121505.pdf

2. Lieb, A., and T. Perry. (2005). Watershed Conditions and Seasonal Variability for Select Streams within WRIA 20, Olympic Peninsula, Washington. Prepared by U.S. Department of the Interior Bureau of Reclamation Technical Services Center, Denver, Colorado. Retrieved from https://web.archive.org/web/20100615202014/http://www.onrc.washington.edu//Home/DraftWRIA20final4.pdf

3. Macek-Rowland, K.M.; Arntson, A.D.; Ryberg, K.R.; Dahl, A.L.; Lieb, A. (2004). Water-use data for the Red River of the North Basin, North Dakota, Minnesota, and South Dakota, 1979-2001: U.S. Geological Survey Open-File Report 2004-1308, 255 p. Retrieved from http://pubs.usgs.gov/of/2004/1308/

Honor Societies

Pi Alpha Alpha National Honor Society
Mortar Board National Honor Society

Select Professional Development

Regulatory IV: Interagency Wetland Delineation
Stream & Watershed Restoration Design & Implementation
Aquatic Organism Passage
Applied Fluvial Morphology – by Dave Rosgen
River Morphology and Applications – by Dave Rosgen
Collaborative Public Involvement - Cispus Workshop
COR/COTR Certification
Project Management Training
Peer Review Training
StateMOD (Hydrologic model) training
GSTARS Sediment Transport Model –Federal Hydrologic Modeling Conf
ArcHydro – Las Vegas, NV – Federal Interagency Hydrologic Modeling Conference
MODSIM (Hydrologic model) Workshop
Hydrologist for BAER teams

EXHIBIT CX 14
Public Notice Screenshot

Public Notices at U.S. EPA

Types of Public Notices

Public Notice: Administrative Complaint against Alaska Department of Transportation and Public Facilities

Publish Date: September 11, 2024

Summary

EPA is providing notice of filing of an administrative complaint and notice of opportunity for hearing against the State of Alaska Department of Transportation and Public Facilities (respondent) for violations of the Clean Water Act.

EPA alleges that the respondent discharged dredged and/or fill material without Clean Water Act section 404 authorization into wetlands adjacent to tributaries to the Gastineau Channel and wetlands adjacent to the Gastineau Channel at multiple locations in **Juneau, Alaska**.

Respondents

Alaska Department of Transportation and Public Facilities
P.O. Box 112500
3132 Channel Drive
Juneau, Alaska 99811

Legal authority

These are Class II administrative penalty proceedings, governed by Section 309(g) of the Clean Water Act, 33 U.S.C. § 1319(g), and the procedural rules found at 40 CFR Part 22. The requirements that apply to public comment and participation are set forth in Section 309(g)(4) of the Clean Water Act, 33 U.S.C. § 1319(g)(4), and 40 CFR § 22.45.

Related documents

A copy of the complaint and notice of opportunity for hearing is available at EPA Administrative Enforcement Docket CWA-10-2024-0154.

How to Comment

Comments Due: October 10, 2024

All written comments should be sent by email to the Regional Hearing Clerk (R10_RHC@epa.gov), within 30 days of the date of this notice.

Comments should reference docket number **CWA-10-2024-0154**. Be sure to include your name and address if you would like a response.

If you are unable to submit written comments by email, please call Salee Porter, Regional Hearing Clerk, at 206-553-0531.

For technical questions contact the Case Officer, Mark Jen (jen.mark@epa.gov), 907-271-3411.

EXHIBIT CX 15
Documentation of Service

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

STATE OF ALASKA DEPT OF LAW , CIVIL DIV
ASSISTANT ATTORNEY GENERAL
BRIAN GREGG
1031 W. 4TH AVENUE
SUITE # 200
ANCHORAGE , AK 99501

9590 9402 8258 3094 1772 51

9589 0710 5270 0837 9109 51

COMPLETE THIS SECTION ON DELIVERY

A. Signature

X Alex Manning ☐ Agent ☐ Addressee

B. Received by (Printed Name) Alex Manning | C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

RECEIVED
SEP 16 2024
CIVIL - NC

3. Service Type
- ☐ Adult Signature
- ☐ Adult Signature Restricted Delivery
- ☐ Certified Mail®
- ☐ Certified Mail Restricted Delivery
- ☐ Collect on Delivery
- ☐ Collect on Delivery Restricted Delivery
- ☐ Priority Mail Express®
- ☐ Registered Mail™
- ☐ Registered Mail Restricted Delivery
- ☐ Signature Confirmation™
- ☐ Signature Confirmation Restricted Delivery

PS Form 3811, July 2020 PSN 7530-02-000-9053 Domestic Return Receipt

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

STATE OF ALASKA DEPT OF TRANSPORTATION
COMMISSIONER
RYAN ANDERSON
P.O. BOX # 112500
3132 CHANNEL DRIVE
JUNEAU , AK 99811

9590 9402 8258 3094 1772 37

9589 0710 5270 0837 9109 37

COMPLETE THIS SECTION ON DELIVERY

A. Signature

X SEP 06 2024 ☐ Agent ☐ Addressee

B. Received by (Printed Name) State of Alaska | C. Date of Delivery

Department of Administration

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

Risk Services

3. Service Type
- ☐ Adult Signature
- ☐ Adult Signature Restricted Delivery
- ☐ Certified Mail®
- ☐ Certified Mail Restricted Delivery
- ☐ Collect on Delivery
- ☐ Collect on Delivery Restricted Delivery
- ☐ Priority Mail Express®
- ☐ Registered Mail™
- ☐ Registered Mail Restricted Delivery
- ☐ Signature Confirmation™
- ☐ Signature Confirmation Restricted Delivery

PS Form 3811, July 2020 PSN 7530-02-000-9053 Domestic Return Receipt