
Hill 560 - Wetland Delineation and Functional Analysis

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Bosworth Botanical
Consulting and DOWL
HKM

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INTRODUCTION

This report is in support of the City and Borough of Juneau's (CBJ) development plan for Hill 560. The study area is a collection of four areas on CBJ and University of Alaska SE (UAS) land and associated road access routes located around the base of Hill 560 between Auke Lake and the Mendenhall Valley in Juneau, Alaska (Figure 1). Areas A, B, C, the triangular addition south of C, and access corridors 2 and 3B, are located along the southwest and southern flanks of Hill 560. Area H wraps around the northern point of the hill. Area A is approximately 20 acres and was accessed by the delineator from the Auke Lake trailhead and the end of Hamilton Street. Area B is 18 acres and was accessed from the end of Hamilton St. and from the end of Wildmeadow Lane. Area C, which includes the access road and a wedge of CBJ property in the Brotherhood meadow just south of the area, is approximately 23 acres and was accessed from the end of Wildmeadow Lane. Area H is 26 acres and was accessed from the Auke Lake trail off the Back Loop Road at Goat Hill.

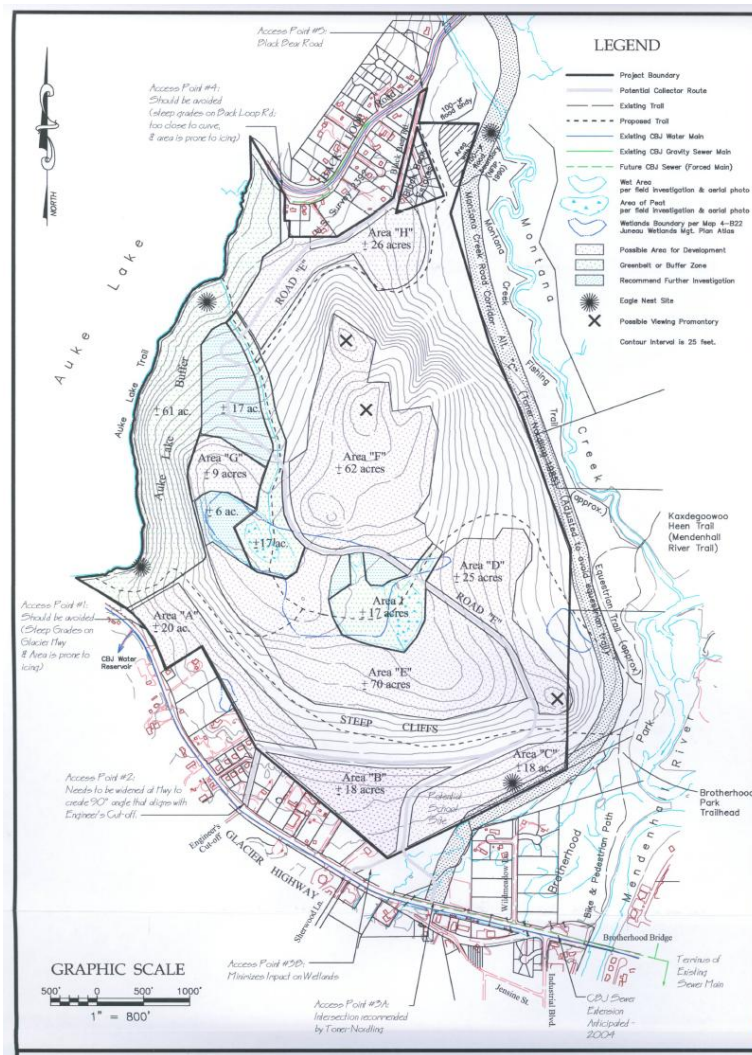


Figure 1 - Hill 560 CBJ Plan Map

METHODS

The US Army COE methodology was used, as outlined in the 1987 Corps of Engineers Wetland Delineation Manual, for Routine Level 3, and amended by the, Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Alaska Region – Oct. 2007. Additional data was collected for the functional analysis part of the report.

Aerial photography, lidar-generated topography, and traditional topography maps were provided by CBJ. These were used to locate the study areas in the field to, locate streams both perennial and seasonal, distance from Auke Lake, determine floodplain location, slope position, and general slope. Mapping was done by BBC and Dowl HKM with GIS and GPS support by Richard Carstensen.

Vegetation was determined using the prevalence index and the dominance method. Plant species are classified by the US Fish and Wildlife Service, and available on the 1988 National List of Plant Species that Occur in Wetlands⁷. Presence or absence and location of alder shrubs and trees and all deciduous trees and shrubs was noted.

Hydrology was determined using two methods: visually, if the water table was at or above the surface or with a soil pit. Soil pits were dug where possible to determine if indicators of hydric soils were present. It was recorded whether the site was near a stream or within a larger floodplain and what its slope position was.

For each sample site the information for an Alaska Region COE Routine Wetland Determination Data Form was collected.

The area had higher than average snowfall during the 2008-09 winter and a dry spring and summer. The weeks before data was collected there had been several storms and normal fall rainy conditions had resumed.

Data was collected in the field on September 1, 2, 3,4, 21 and 28, and October 1, 9, 12, 2009.

STUDY AREA DESCRIPTION

GEOMORPHOLOGY, HYDROLOGY AND SOILS

Hill 560 is a 560 foot high bedrock knob with a relatively flat top and steep to very steep slopes on the north, east and south slopes and cliffs on the west side. The base of the hill is draped with 4-12 feet of dense, relatively impermeable, glacio-marine sediment, overlain on the southwest flank with 4-5 feet of beach deposits. At the base of the steep slopes there are shallow deposits of coarse colluvial material, eroded from the slopes above, covering the glacio-marine sediments. Area H is also at the base of a steep slope but it is also cut in half by a less steep ridge that comes down through the area. The Brotherhood Meadow area is Holocene, uplifted, tidal sediment.

The top of Hill 560 is covered by approximately 60 acres of relatively flat, *Sphagnum*-based bog and forested wetland. These wetland peats collect, hold and control the flow of the rain that falls on the hill. Much of the flow that comes off the hill is subsurface until it is forced to the surface when it reaches the relatively impermeable glacio-marine sediments that surround the base of the hill. Ten small (12-15 inches

wide and 2-5 inches deep) seasonal drainages and 4 larger, perennial streams come down through areas A, B and C. The two streams in the western half of area A flow into Auke Lake and via Auke Creek into the ocean at Auke Bay. The streams from the eastern half of area A and all of areas B and C, coalesce somewhere below the study area, cross under Glacier Highway and flow into the lower Mendenhall River and into the ocean at Gastineau Channel. The larger perennial streams are listed as anadromous in their lower reaches for coho salmon and dolly varden char rearing, by Alaska Department of Fish and Game (ADF&G).

Area H has two small seasonal drainages and 2 larger perennial streams - one on each side of the ridge. The northwesterly trending one flows into Auke Lake and via Auke Creek into the ocean at Auke Bay. The easterly trending one flows into Montana Creek and into the ocean at Gastineau Channel via the Mendenhall River. This stream is listed as an anadromous for coho salmon and dolly varden char, in its lower reach.

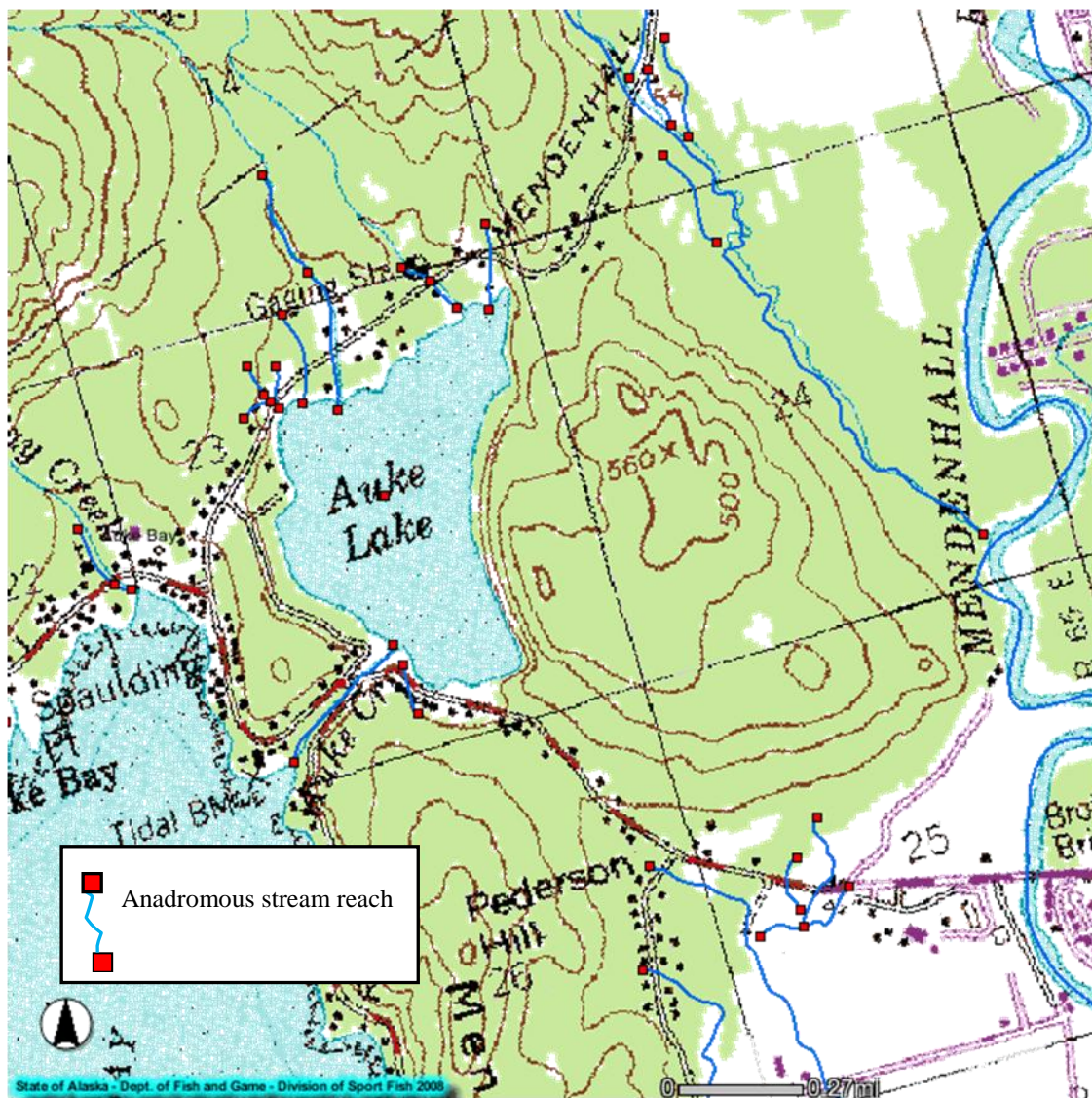


Figure 2 - ADF&G Anadromous Streams Map for the study area connected areas, showing .



Figure 3 - Small seasonal stream in area B.



Figure 4 - Seasonal stream on the bluff in area C.



Figure 5 - Small fen pond in Access Corridor #3B

The forested upland soils in and above the study area transition from:

- the Tolstoi series a shallow, well-drained mineral soil found on the steeper, shallow-to -bedrock slopes above the study area.
- to the Kupreanof Series, a deep, well-drained soil that forms in colluvium. It is found on the colluvium at the base of the steep slopes.
- to the lowest and youngest soils in the non-wetland part of the Brotherhood meadow study area. It is an unnamed, undeveloped young soil of recent floodplain silts over uplifted intertidal silts.

The wetland soils transition from:

- the **Wadleigh Series** consisting of somewhat poorly drained soils that occur on lower slopes of hills. These soils are formed in very gravelly loamy material underlain by firm glacio-marine sediments that impede internal drainage. It supports a forest of western hemlock and skunk cabbage.
- to the **Maybeso Series**, a very poorly drained soil of nearly level to strongly sloping seepage areas, drainageways and benches. This soil is made up of mucky peat 16 to 50 inches over impermeable glacio-marine sediments. It supports a forest of western hemlock and skunk cabbage. Most of the forested wetlands on the shallowly sloping parts of the study area, at the toe of the steeper parts of Hill 560 are of this series.

- to the **Kogish Series** – very poorly drained nearly level to strongly sloping peat soils that occur in flat areas. The peat materials are derived chiefly from sphagnum moss, which is the dominant vegetation. The lower part of Area B has about a five acre patch of fenny bog with this soil type.
- to the **Kina Series** – very poorly drained deep peat soils that occur on footslopes. The peat materials are derived chiefly from sedges. The wedge of CBJ property on the north edge of the Brotherhood meadow is underlain by a young, shallow, version of this type of soil with 14-16 inches of sedge peat over uplifted intertidal sediments.



Figure 6 - Mucky peat soil - 16 + inches deep in area A.



Figure 7 - Sphagnum-based peat in bog in area B.



Figure 8 - Sedge based peat in Tri - addition.



Figure 9 - Young silty well-drained floodplain soil in Tri - addition.(monoculture of invasive reed canary grass)

VEGETATION

Most of the study area is forested. The well-drained bedrock slopes have a Sitka spruce/western hemlock forest with an understory of early blueberry, rusty menziesia, dwarf dogwood and trailing raspberry. The colluvial slopes have a Sitka spruce/western hemlock forest with an understory of devils club and foamflower and enchanters nightshade. Though some of this zone is technically not wetland (the soils are made up of layers of colluvial, mineral material and the water table is sometimes below 12 inches) the presence of large amounts of devils club in this zone indicates that the water table is consistently close to the surface and any disturbance of this area would result in surface water. The lower, toe-of-slope zones have a forested wetland of a low volume western hemlock overstory with an understory of skunk cabbage. There is a zone of transition in parts of the study area between the colluvial area at the base of the steep slope and the lower part of the toe of the slope. In this zone there often are parallel stringers of upland, tree bole hummocks and wetland skunk cabbage swales. Where the wetland swales are more than 40% of the total area the total has been classified as wetland.

In a flat area at the base of the slope a small sub-shrub bog with fenny edges has developed. The bog is dominated by stunted shore pine and sub-shrubs such as Labrador tea and crowberry and wetland sedges. The fen edges of the bog are dominated by Sitka alder, crabapple, skunk cabbage and buckbean. A similar

vegetative community (without the buckbean) is found at the edge of the Brotherhood meadow, where the slope intersects with the uplifted intertidal meadow and the Mendenhall River floodplain.

The Brotherhood meadow section of the study area has a red alder and Sitka sedge community in the west and a reed canary grass community in the western part.



Figure 10 - W. hemlock/blueberry forest on well-drained ridge in area H.



Figure 11 - Toe of slope W. hemlock/Sitka spruce/devils club forest in area A.



Figure 12 - Stilt-rooted w. hemlock in forested wetland in area C.



Figure 13 - W. hemlock/devils club/skunk cabbage forest in area H.



Figure 14 - Skunk cabbage swale between tree bole hummocks in area B.



Figure 15 - Edge fen with Sitka alder/crabapple and skunk cabbage in area B.



Figure 16 - Subshrub bog in area B.



Figure 17 - Brotherhood meadow edge fen with Sitka spruce/red alder/skunk cabbage along border between area C and the Tri - addition.



Figure 18 - Another version of the Brotherhood meadow edge fen with red alder/skunk cabbage/crabapple/Sitka sedge - along border between area C and the Tri - addition.



Figure 19 - Brotherhood meadow - Sitka sedge/Sitka alder marsh in Tri - addition.



Figure 20 - Invasive reed canary grass in east end of Brotherhood meadow in Tri - addition.

PLANT SPECIES LIST

Scientific name/ common name/ indicator status

Picea sitchensis/Sitka spruce/FACU
Tsuga heterophylla /Western hemlock/FAC
Tsuga mertensiana/ mountain hemlock/ FAC
Alnus rubra/Red alder/FAC
Pinus contorta/shore pine/FAC
Vaccinium ovalifolium/ early blueberry/FAC
Vaccinium parvifolium/red huckleberry/FAC
Menzisia ferruginea/false azalea/NI
Alnus sinuata/Sitka alder/FAC
Salix sitchensis/ Sitka willow/FAC
Rubus spectabilis/ salmonberry/FACU
Oplopanax horridum / devils club/FACU
Sambucus racemosa/elderberry/FACU
Malus fusca/crabapple/FACU
Gymnocarpium dryopteris/ oak fern/ FACU
Dryopteris dilatata/spiny wood fern/FACU
Lysichiton americanum/ skunk cabbage/OBL
Coptis asplenifolius/ goldthread/FAC
Cornus canadensis/ dwarf dogwood/FACU
Rubus pedatus/ trailing raspberry/FAC
Athyrium felix-femina/lady fern/FAC
Streptopus streptopoides/ twisted stalk/FAC
Ranunculus repens/creeping buttercup/ FAC
Equisetum arvense/ horsetail/ FACU
Trifolium repens/white clover/FAC
Vaccinium caespitosum/ dwarf blueberry/FACW
Vaccinium vitis idea/cranberry/FAC
Ledum groenlandicum/Laborador tea/FACW
Carex kelloggii/Kellogg's sedge/OBL
Carex sitchensis/Sitka sedge/OBL
Calamagrostis canadensis/bluejoint/FAC
Equisetum fluviatile/water horsetail/OBL
Maianthemum dilatatum/deer berry/NI
Tiarella trifoliata/foamflower/FAC
Angelica genuflexa/kneeling angelica/FACW
Heracleum lanatum/cow parsnip/FACU
Circae alpina/enchanters nightshade/FACW
Carex pauciflora/small-flowered sedge/OBL
Deschampsia beringensis/beach hairgrass/FAC
Rubus arcticus/nagoonberry/FAC
Gentiana douglasiana/Douglas gentian/FACW
Menyanthes trifoliata/buckbean/OBL
Empetrum nigrum/crowberry/FAC
Cicuta douglasii/water hemlock/FACW
Phalaris arundineacea/reed canary grass/OBL
Geum macrophyllum/big-leaved avens/FACW

Carex pluriflora/many-flowered sedge/OBL

Hippuris vulgaris/maretail/OBL

Eriophorum russeolum/rusty cottengrass/FACW

RESULTS TABLE			
Sample pt.	Area	Vegetation dom./hydro/geomorph	Wetland status/NWI class
1	A	Skunk cabbage wetland/stream	Wetland – PSS3/4/PEM1 - Waters of the US
2	A	Forested wetland – W. Hemlock/blueberry-slope	Wetland – PFO4
3	A	Forested wetland – W. Hemlock/blueberry-slope	Wetland – PFO4
4	A	Sitka spruce/w. hemlock forest - slope	Upland
5	A	Sitka spruce/w. hemlock forest /devils club - toe of slope	Upland
6	A	Skunk cabbage /stream	Wetland –PEM1- Waters of the US
7	A	Devils club thicket - toe of slope	Upland
8	A	Sitka spruce/w. hemlock forest -knob	Upland
9	A	Stream	Waters of the US
10	A	Sphagnum bog/Forested wetland edge	Wetland – PEM1
11	A	Skunk cabbage - toe of slope alcove	Wetland – PEM1
12	A	Sitka spruce/w. hemlock forest - slope	Upland
13	A	W. Hemlock/ skunk cabbage -slope	Wetland – PFO4
14	A	Stream	Waters of the US
15	A	W. Hemlock/ skunk cabbage -slope	Wetland – PFO4
16	A/#2	W. Hemlock/ skunk cabbage -slope	Wetland – PFO4
17	A	W. Hemlock/ skunk cabbage -slope - stream	Wetland – PFO4/ Waters of the US
18	A	W. Hemlock/ skunk cabbage -slope	Wetland – PFO4
19	A	Sitka spruce/w. hemlock forest - slope	Upland
20	A	Stream	Waters of the US
21	B	Sitka spruce/w. hemlock forest - slope	Upland
22	B	W. Hemlock/ skunk cabbage -toe of slope	Wetland – PFO4
23	B	W. Hemlock/blueberry/skunk cabbage - slope	Wetland – PFO4
24	B	W. Hemlock/blueberry forest - slope	Upland
25	B	Sitka alder/crabapple/skunk cabbage fen edge - flat	Wetland – PSS1/PEM1
26	B	Stunted pine/Labrador tea/sedge bog/fen edge - flat	Wetland - PEM1/PSS3/4
27	B	Stunted pine/Labrador tea/sedge bog flat	Wetland – PEM1/PSS3/4
28	B	W. Hemlock/ skunk cabbage flat	Wetland – PFO4
29	B	W. Hemlock/ skunk cabbage slight slope	Wetland – PFO4
30	B	W. hemlock/rusty menziesia - bluff edge	Upland
31	B	W. hemlock/blueberry/blueberry/skunk cabbage - flat	Wetland – PFO4
32	B	Sitka alder/crabapple/skunk cabbage fen edge - flat	Wetland – PSS1/PEM1
33	B	Sitka alder/crabapple/skunk cabbage fen edge - flat	Wetland – PSS1/PEM1
34	B	W. hemlock/blueberry/devils club- slope	Upland
35	Tri	Red alder/Sitka sedge/skunk cabbage fen edge - flat	Wetland PFO1/PEM1
36	Tri	Sitka alder/skunk cabbage fen edge - flat	Wetland PFO1/4/PEM1
37	Tri	Red alder/Sitka willow/creeping buttercup - flat - trail fill	Upland
38	Tri	Horsetail/angelica/skunk cabbage - flat - fen edge	Wetland PEM1
39	#3B	Sitka sedge/skunk cabbage - sedge bog	Wetland PEM1
40	#3B	Marsh potentilla/marestail - floating mat - flat	Wetland PEM1
41	C	Bluff edge stream crossing	Waters of the US
42	C	Bluff edge stream crossing	Waters of the US
43	C	Bluff edge W. hemlock	Upland
44	C	Bluff edge stream crossing	Waters of the US
45	C	Bluff edge W. hemlock/skunk cabbage	Wetland PFO1
46	C	Bluff edge stream crossing	Waters of the US

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47	C	W. hemlock/skunk cabbage - swale - old cistern	Wetland - PFO4
48	Tri	Red alder/Sitka sedge marsh - flat	Wetland PFO4/PEM1
49	Tri	Sitka sedge/bluejoint marsh - flat	Wetland PEM1
50	Tri	Sitka sedge/bluejoint marsh - flat	Wetland PEM1
51	Tri	Reed canary grass - flat	Upland
52	Tri	Skunk cabbage - stream channel	Wetland PEM1-Waters of US
53	Tri	Reed canary grass - flat	Upland
54	C	Bluff edge stream crossing	Waters of the US
55	C	Hemlock/spruce	Wetland PFO4
56	C	W. hemlock/blueberry/dogwood	Upland
57	C	stream crossing	Waters of the US
58	C	stream crossing	Waters of the US
59	C	W. hemlock/blueberry/skunk cabbage - flat	Wetland PFO4
60	C	W. hemlock/blueberry/skunk cabbage - flat	Wetland PFO4
63(1)	H	Stream/Trail intersection	Waters of US
64(2)	H	W. hemlock/blueberry/skunk cabbage - flat - stream	Wetland PFO4-Waters of US
65(3)	H	W. hemlock /skunk cabbage - flat - stream	Wetland PFO4-Waters of US
66(4)	H	W. hemlock/devils club - flat - stream	Wetland PFO4-Waters of US
67(5)	H	Property boundary	Upland
68(6)	H	W. hemlock/Sitka spruce/blueberry - ridge top	Upland
69(7)	H	W. hemlock/blueberry/skunk cabbage - toe of slope	Wetland PFO4
70(8)	H	Stream	Waters of US
71(9)	H	Stream	Waters of US
72(10)	H	W. hemlock/blueberry/skunk cabbage - toe of slope	Wetland PFO4
73(11)	H	Wetland - Upland Edge - W. hemlock/blueberry	Wetland/Upland
74(19)	H	W. hemlock/blueberry/skunk cabbage - flat - stream	Wetland PFO4-Waters of US
75(20)	H	W. hemlock/devils club/skunk cabbage - flat - stream	Wetland PFO4-Waters of US
76(21)	H	W. hemlock/Sitka spruce/blueberry - ridge top	Upland
77(22)	H	W. hemlock/devils club/skunk cabbage - Hummock & swale	Wetland PFO4
78(23)	H	Stream	Waters of US
79(24)	H	W. hemlock/Sitka spruce/blueberry - small ridge top	Upland
80(25)	H	W. hemlock/Sitka spruce/blueberry - small ridge top	Upland
81(26)	H	W. hemlock/Sitka spruce/blueberry - small ridge top	Upland
82(72)	H	W. hemlock/blueberry/skunk cabbage - hillside	Wetland PFO4
83(73)	H	W. hemlock/blueberry/skunk cabbage - hillside	Wetland PFO4
84(74)	H	W. hemlock/devils club/skunk cabbage - toe of slope	Wetland PFO4
85(76)	H	W. hemlock/blueberry/skunk cabbage - hillside	Wetland PFO4
86(77)	H	W. hemlock/blueberry/skunk cabbage - hillside	Wetland PFO4
87(78)	H	W. hemlock/blueberry/skunk cabbage - toe of slope	Wetland PFO4
88(79)	H	W. hemlock/blueberry/skunk cabbage - toe of slope	Wetland PFO4
89(80)	H	W. hemlock/blueberry/skunk cabbage - stream	Wetland PFO4
90(81)	H	W. hemlock/blueberry/skunk cabbage - hillside	Wetland PFO4
91(82)	H	W. hemlock/devils club/skunk cabbage	Upland
92(83)	H	Stream	Wetland PFO4-Waters of US
93(84)	H	W. hemlock/blueberry/skunk cabbage - hillside	Wetland PFO4
94(85)	H	Stream	Wetland PFO4-Waters of US
95(86)	H	W. hemlock/blueberry/skunk cabbage - toe of slope	Wetland PFO4

CONCLUSIONS

AREA A

The western third of area A is steeper than the rest of the study area and has some Holocene beach deposits over the glaciomarine deposits. Because of this, most of the area is better drained than the other toe of slope sites and there is less of the forested wetland community and colluvial devils club community typical for the rest of the study area. Within this area, one perennial and one seasonal stream flow down the slope and then along the base of Glacier Hwy and into Auke Lake. The center section of area A is very narrow, squeezed in between the very steep slopes on the north and the private property on the south. Once the property lines were surveyed and the exact location of the slope break was mapped it left a very narrow corridor in the center section. In this area there is an indistinct boundary between the "upland" colluvial devils club community and the lower wetland w. hemlock/skunk cabbage community.

ACCESS ROAD #2

This access corridor, which is located between the Hamilton Street subdivision on the west and a church on the right, has a perennial stream flowing down the middle of it that is anadromous for coho salmon and dolly varden char just below this reach, on the south side of Glacier Highway. The corridor has had most of its trees cut at some point and been filled in some parts but there is still wetland along the stream and across the upper part of the corridor.

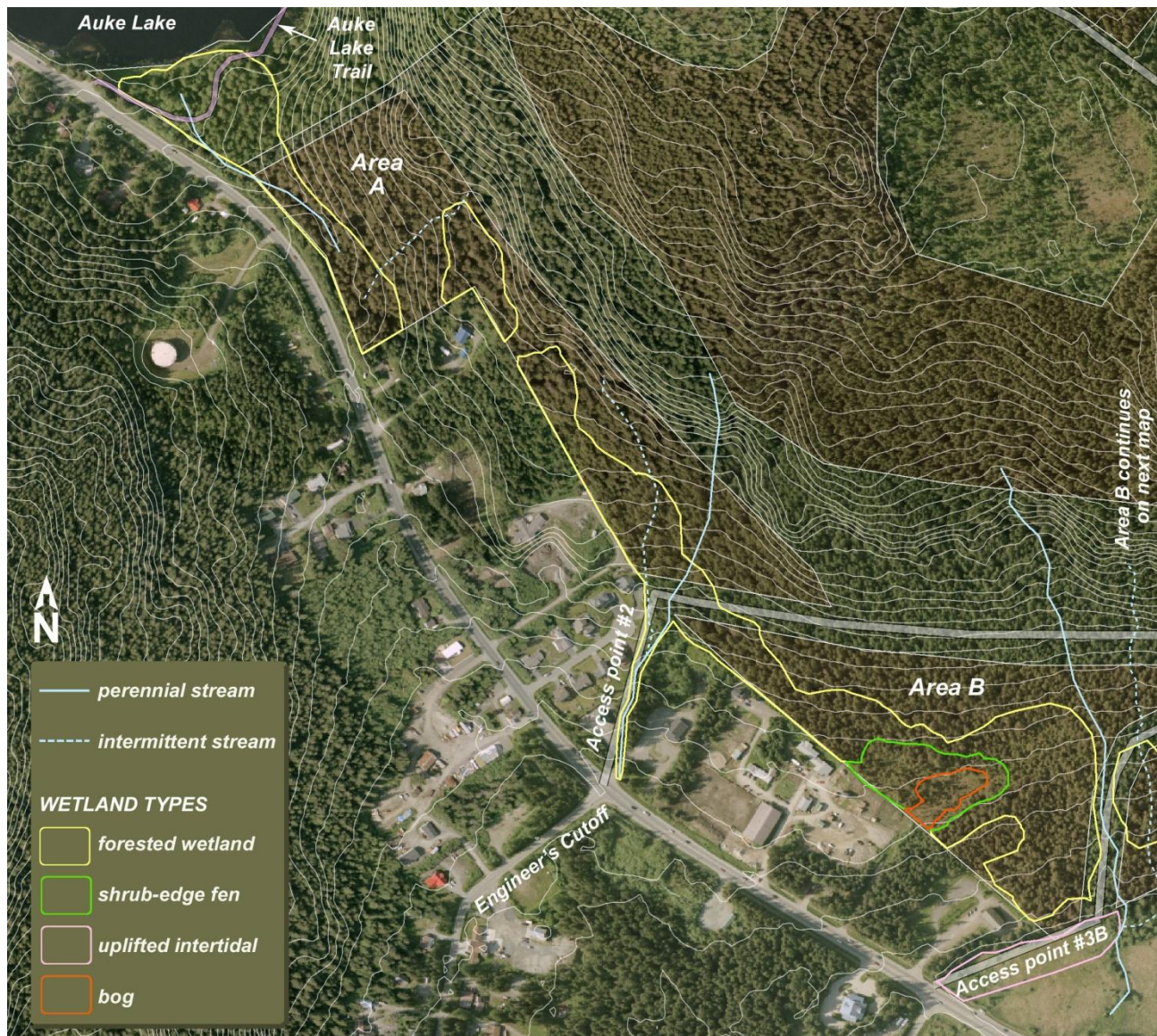


Figure 21 - Wetland Map for Area A and part of B

AREA B

A transect downslope from north to south through area B would show:

- Sitka spruce/western hemlock/devils club forest - upland
- to western hemlock/skunk cabbage - wetland
- to Sitka alder/crabapple fen - wetland
- to shore pine/sub-shrub bog - wetland
- to western hemlock/skunk cabbage - wetland
- to narrow upland bluff above Brotherhood meadow
- to Sitka sedge/skunk cabbage meadow edge
- to marsh potentilla/cottongrass bog

The perennial stream that flows through area B is anadromous when it reaches the Brotherhood meadow flats.

ACCESS CORRIDOR #3B

This corridor follows the ecotone between the hill slope and the Brotherhood meadow. It is all wetland, some of it marsh with 5-10 inches of standing water. The small drainages in this part of the meadow are rearing habitat for coho and dolly varden.



Figure 22 - Wetland Map for Area C and Wildmeadow Triangular Addition

AREA C

Area C is mostly forested wetland with a strip of upland forest along the upper edge where the slope is steeper and the lower edge where there is a well-drained bluff down to the Brotherhood meadow. One perennial stream comes off of area C. It is part of the headwaters for a coho and dolly varden rearing stream.

WILD MEADOW LANE TRIANGLE ADDITION (TRI-ADDITION)

The upper edge of this area is an ecotone between the hill slope and the Brotherhood meadow. This is a wetland community of red alder, skunk cabbage and Sitka sedge. There is a filled road/trail bed along the southern edge of the ecotone from the west point to the east edge where the trail joins the Mendenhall River trail. Along the western, untraveled part of the trail weedy, early successional species, such as Sitka alder and willow and creeping buttercup, have invaded. Two perennial streams from off the hill slope, meander through the meadow, coalescing with the anadromous stream that flows down the valley to Gastineau channel. The meadow dries as you go south and east towards the Mendenhall River. The eastern third of the meadow was once an uplifted beach meadow community of native grasses and cow parsnip. It has been invaded and taken over by the aggressive, invasive species, reed canary grass. Reed canary grass is very adaptable and is able to grow in wetlands. It is spreading in the meadow into the wetlands in the western part of the study area.

AREA H

As in the areas at the southern end of Hill 560, area H, which is wrapped around the northern point of Hill 560, is located at the base of steep slopes and transitions from colluvial areas directly adjacent to the steep slope, to forested wetlands over water-perching glacio-marine sediments. A north-trending upland ridge divides area H in half, with one perennial stream on each side. The west side stream flows into Auke Lake and the east side stream flows into Montana Creek.

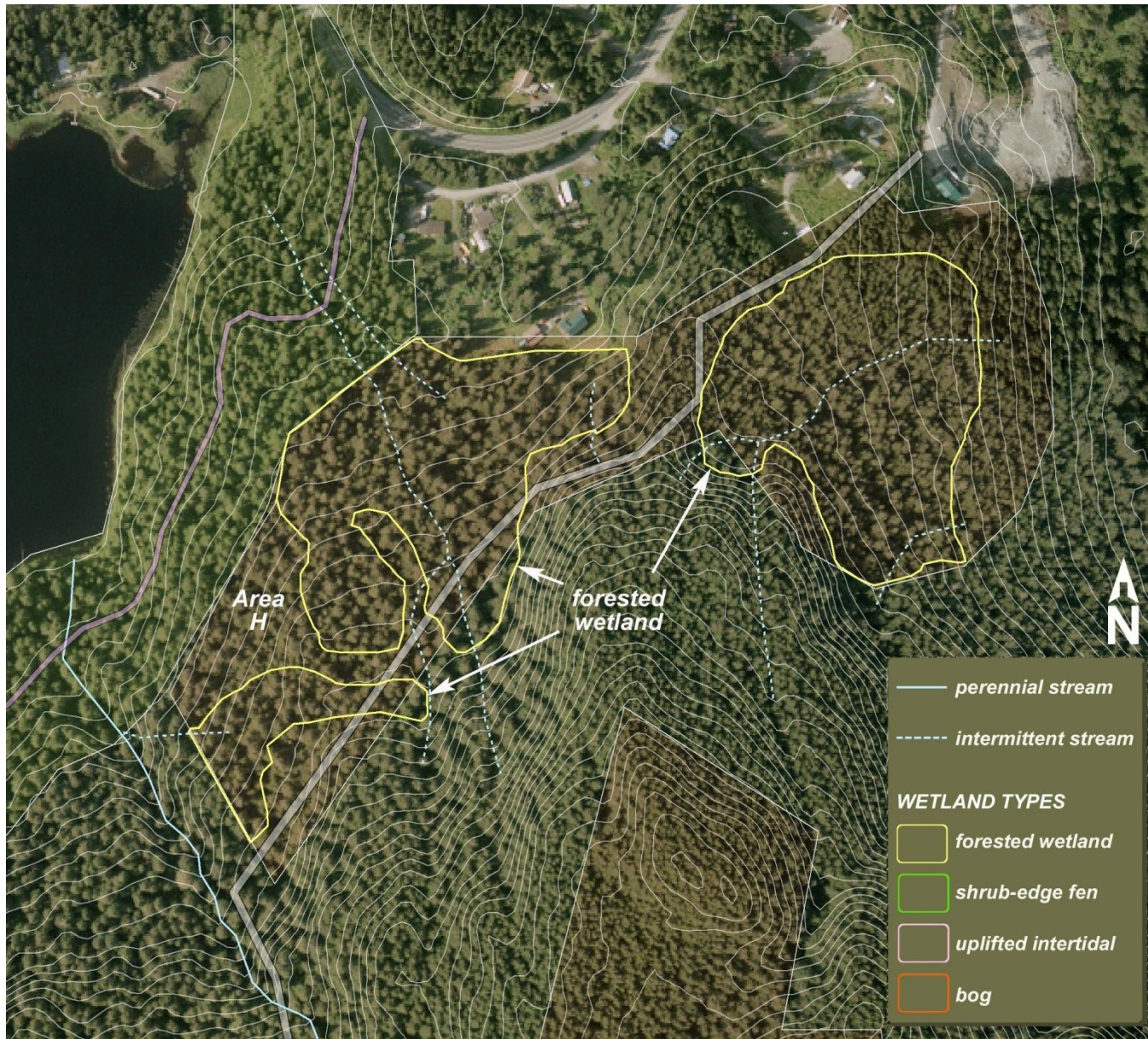


Figure 23 - Wetland Map for Area H

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ENVIRONMENTAL FUNCTIONS ASSESSMENT (BASED ON THE ADAMUS METHODOLOGY)

Aquatic Support Category

WETLAND FUNCTION	Forested Wetland	Uplifted Intertidal Flats	Shrub/skunk cabbage fen edge	Sub-shrub Bogs
Groundwater Discharge	High (6)	High(6)	High (6)	High (6)
Sediment/toxicant retention(6)	High(6)	High(6)	High(6)	High(6)
Nutrient export(7)	High(6)	MHigh(5)	Med(4)	Low(2)
Riparian support (10)	MLow(3)	High(6)	High(6)	Low(2)
Salmonid habitat (10)	Low(2)	High(6)	MLow(3)	VLow(1)
Erosion sensitivity (7)	Low(2)	Low(2)	Low(2)	Low(2)

Human Use Category

WETLAND FUNCTION	Forested Wetland	Uplifted Intertidal Flats	Shrub/skunk cabbage fen edge	Sub-shrub Bogs
Recharge (7)	MLow(3)	Low(2)	Low(2)	MHigh (5)
Recreation potential (5)	Med(4)	MHigh(5)	High(6)	MLow(3)
Recreation actual (6)	?	?	?	?
Surface hydrologic control (9)	Med(4)	High(6)	MHigh(5)	Med(4)
Detention Value (9)	Med(4)	Med(4)	Med(4)	Med(4)

Terrestrial Support Category

WETLAND FUNCTION	Forested Wetland	Uplifted Intertidal Flats	Shrub/skunk cabbage fen edge	Sub-shrub Bogs
Wildlife Support (11.5)	Med(4)	High(6)	High(6)	Med(4)

Wetland Assessment Category

	Forested Wetland	Uplifted Intertidal Flats	Shrub/skunk cabbage fen edge	Sub-shrub Bogs
Wetland Assessment Category	B(44)	A(54)	A(50)	C(39)

“ADAMUS METHODOLOGY” CRITERIA USED FOR ASSESSING RELATIVE LEVEL OF EACH FUNCTION

Ratings in column 2 are VH (very high, 7), H (high, 6), MH (moderately high, 5), M (moderate, 4), ML (moderately low, 3), L (low, 2), or VL (very low). C1, C5, etc. refer to cell addresses in the accompanying spreadsheet where the data can be found (see Appendix A for data categories). The weight shown for each function is the one recommended by the CDD (1997) report.

Important Note: When scoring each function, begin with its top row and then proceed downward row by row only if the criteria in the row being examined are not met. Only one rating (the highest applicable one) should be assigned per function per wetland.

Function	Rating	Criteria
Groundwater Discharge	H (6) if	1) Wetland is non-tidal (C9=0) AND 2) either is at the toe of a steep slope (C5= TS) or is on a slope of greater than 15% (C6= H) or in an alluvial fan or avalanche chute (C4= AC) or is intersected by a perennial stream or is within 50 ft of one (C11= PI).
	L if	Wetland is tidal (C9= Y) and is not intersected by a perennial stream or within 50 ft of one (C11= not PI & not P50) and is not at toe of a steep slope (C5= not TS) and not in alluvial fan (C4= not AF) and is on a slope of less than 7% (C6= L)
	M if	not H and not L
Sediment/ Toxicant Retention (weight= 6)	H (6) if	1) Wetland is at toe of a steep slope or on a flat (C5= TS or F) and has a slope of less than 15% (C6= M or L) and its soil is predominantly peat (C7= Y), OR 2) Wetland is not intersected by a perennial or ephemeral stream (C11= not PI & not Ei) and is on a slope of less than 7% (C6= L)
	MH (5) if	Wetland is not intersected by a perennial or ephemeral stream (C11= not PI & not Ei) and its gradient is less than 15% (C6= not H) and its soil is predominantly peat (C7=Y)
	L (2) if	Wetland gradient is greater than 15% (C6= H) and pit-mound topographic variation is not extensive or great (C17= 0 or T1L)
	ML (3) if	not H and not MH and not L

Function	Rating	Criteria			
Nutrient Export (weight= 7)	H (6) if	1) Wetland is tidal (C9= Y) OR			
		2) Wetland is intersected by a perennial stream (C11= PI) AND ANY of 2a, 2b, or 2c 2a) its surface water levels experience large fluctuation (C13= H) or 2b) its area covered only seasonally by surface water is extensive (C15= H) 2c) it is dominated by trees (C18= T50) or deciduous shrubs (C19= D50)			
		L (2) if	1) There is no perennial stream within 200 ft of the wetland and not intersected by ephemeral stream (C11= not PI & not P50 & not P200 & not Ei), and any of the following: 2a) is mostly covered by wetland moss (C21= M50) or 2b) the wetland's surface water levels experience little or no fluctuation (C13= L) or 2c) the area covered only seasonally by surface water is very limited (C15= S)		
			M (4) if	not H and not L	
	Riparian Support (weight= 10)		H (6) if	1) Wetland is intersected by a perennial stream (C11= PI) or is within an annual floodplain (C12= FP) AND EITHER 1a) alder shrub covers at least half of the wetland's vegetated area or stream bank (C19= A50 or A90), or 1b) deciduous shrubs/trees cover more than 90% of the wetland's vegetated area or stream bank (C20= D90). OR 2) Wetland is intersected by an ephemeral stream (C11= Ei) and 2a) alder shrub covers more than 90% of the wetland's vegetated area or stream bank (C19= A90) or 2b) deciduous shrubs/trees cover more than 50% of the wetland's vegetated area or stream bank (C20= D50).	
		MH (5) if		1) Wetland is intersected by a perennial stream (C11= PI) or is within its annual floodplain (C12= FP) AND EITHER 1a) alder shrub covers at least 1% of the wetland's vegetated area or stream bank (C19= A1), or 1b) deciduous shrubs/trees cover more than 50% of the wetland's vegetated area or stream bank (C20= D50). OR 2) Wetland is intersected by an ephemeral stream (C11= Ei) or is within 50 ft of a perennial stream (C11= PI) AND 2a) alder shrub covers more than 50% of the wetland's vegetated area or stream bank (C19= A50) or 2b) deciduous shrubs/trees cover more than 1% of the wetland's vegetated area or stream bank (C20= D1).	
				L (2) if	There is no perennial or ephemeral stream within 50 ft of the wetland (C11= not PI & not Ei & not P50 & not Ei), and the wetland contains less than 1% deciduous shrubs/trees (C20= 0)
					ML (3) if

Function	Rating	Criteria
Salmonid Habitat (weight= 11)	VH (7) if	1) Wetland is tidal (C9= Y), OR
		2) salmonid fish can access part of the wetland year-round (C10=P) and habitat quality (pools, undercut banks, wood, etc.) is good (C14= H)
	H (6) if	Salmonid fish can access part of the wetland year-round (C10= P) and habitat quality is moderate (C14=H)
	MH(5) if	Salmonid fish can access part of the wetland year-round (C10= P) and habitat quality is low (C14= M or L).
	ML (3) if	Salmonid fish can access part of the wetland seasonally (C10= S) and habitat quality is moderate or high (C14= M or H).
	L (2) if	Salmonid fish can access part of the wetland seasonally (C10= S) and habitat quality is low (C14=L).
	VL (1) if	Salmonid fish cannot access the wetland at any time (C10= 0)
Erosion Sensitivity (weight= 7)	H (6) if	Wetland is on a slope of greater than 15% (C6= H) and its predominant soil is peat (C7= Y)
	MH(5) if	Wetland is on a slope of greater than 15% (C6= H) and its predominant soil is not peat (C7= 0)
	ML (3) if	Wetland is on a slope of greater than 7% (C6= M or H) and its predominant soil is peat (C7= Y)
	L (2) if	Not H and not ML and not MH
Groundwater Recharge (weight= 7)	H (6) if	Wetland is not in an alluvial fan or avalanche chute (C4= not AF & not AC) or tidal area (C9= 0) AND
		Wetland is not intersected by a perennial stream or within 50 ft of one (C11= not PI & not P50) and is either on a plateau (C5= P) or has a slope of mostly less than 7% (C6= L)
	L (2) if	Wetland is tidal (C9= Y) or is intersected by a perennial stream (C11= PI)
	M (4) if	Not H and not L

Hill 560 - Wetland Delineation and Functional Analysis

Function	Rating	Criteria
Hydrologic Control (weight= 9)	H (6) if	1) Wetland non-tidal (C9= 0) and is on a slope of less than 7% (C6= L) and is not intersected by a stream (either perennial or ephemeral) (C11= not PI & not Ei) OR
		2) Wetland is not in a mid-slope or toe-slope position (C5= not TS & not MS) and is in a floodplain (C12= FP) or has extensive seasonal ponding of surface water (C15= H) or has extensive and large pit-mound topography (C17= T25H)
	MH(5) if	Wetland is non-tidal (C9= 0) and has moderate-extensive seasonal ponding of surface water (C15= M) or moderate water level fluctuations (C13= M) or extensive but mild pit-mound topography (C17= T25L)
	L (2) if	Wetland is tidal (C9= Y)
	ML (3) if	Not H and not MH and not L
Detention Value* (weight= 9)	H (6) if L(2) if	Wetland is non-tidal (C9= 0) and uphill areas have peat soils (C8= Y) and relatively extensive development (C26= H)
		Wetland is tidal (C9= Y) and uphill areas have little or no development (C26= L)
	M (4) if	Not H and not L
Recreational Use Potential (weight= 5)	H (6) if	Developed hiking trails go to or near (within 100 ft of) wetland and wetland is within 0.5 mile of trailhead (C30= H) and wetland is on public land (C31= C)
	MH (5) if	Developed hiking trails go to or near the wetland but wetland is farther than 0.5 mile from trailhead (C30= M) and wetland is on public land (C31= C)
	L (2) if	No hiking trails go to or near the wetland and wetland is more than 0.5 mile from road (C30= 0) and wetland is on private land (C31= P)
	ML (3) if	No trails are within 100 ft of wetland but the wetland is within 0.5 mile of a road (C30= L) and wetland is on public land (C31= C)
Recreational Use Actual (weight= 6)	H (6) if	Results of a 1987 recreational survey indicated relatively high use of this wetland or the closest one (C32= H)
	MH (5) if	Results of a 1987 recreational survey indicated moderately high use of this wetland or the closest one (C32= MH)
	L (2) if	Results of a 1987 recreational survey indicated relatively low use of this wetland or the closest one (C32= L)
	ML (3) if	Results of a 1987 recreational survey indicated relatively moderately low use of this wetland or the closest one (C32= ML)

Function	Rating	Criteria
Wildlife Support* (weight= 11.5)	H (6) if	1) Wetland is tidal (C9= Y) or contains or adjoins at least 1 acre of perennially ponded non-tidal water (C16= PW) OR
		2) Wetland is contiguous to a large forested tract and not separated from it by roads (C25= C) and has little or no uphill development (C26= L), and has not been altered by nearby ditches or roads (C28= 0), and has less than 10% cover of non-native plants (C29= 0), and 2a or 2b:
		2a) creates a gap in the canopy of an extensive surrounding forest (C23= CC) and is not primarily wetland moss (C21= 0 or M1) and is (2a1) distant from the nearest residence (C27= F) or (2a2) has many vegetation structural forms (C22= H), OR
		2b) does not create such a gap (C25= 0) and is not within 100 ft of a residence (C27= M or F), and has more than 90% total tree cover (C18=T90) or more than 50% deciduous tree/shrub cover (C20= D50), or has salmonid access (C10= S or P), or at least one large-diameter tree (C24= BT), or extensive pit-mound topography (C17= T25L or T25H), or many vegetation forms (C22= H)
	MH (5) if	Wetland is contiguous to a large forested tract and not separated from it by roads (C25= C) and has less than 10% cover of non-native plants (C29= 0), and EITHER
		a) creates a gap in the canopy of an extensive surrounding forest (C23= CC) and is not within 100 ft of a residence (C27= M or F) and has some diversity of vegetation structural forms (C22= not L) OR b) has more than 50% deciduous tree/shrub cover (C18= T50 or C20= D50) or is intersected by or within 50 ft of a perennial stream (C11= PI or P50) or is more than 0.5 mile from a road and lacks developed trails (C30= 0)
	L (2) if	1) Wetland does not create a gap in the canopy of an extensive surrounding forest (C23= 0), and is not tidal (C9= 0), and is not within 500 ft of perennially ponded non-tidal water (C16= 0), and does not have salmonid access (C10= 0), and has no large-diameter trees (C24= not BT & not MT), and has little or no pit-mound topography (C17= 0 or T1L), and has 1a or 1b:
		1a) >90% moss cover (C21= M90) or more than 10% cover of non-native plants (C29= Y) or only a few vegetation structural forms (C22= L), OR
		1b) is not contiguous to a large forested tract (C25= 0) and has any of the following: extensive development in uphill areas (C26= H) or is close to a residence (C27= N) or has been altered by nearby ditches or roads (C28= Y) or has developed trails and a trailhead nearby (C30= H).
	ML (3) if	Not H and not ML and not L