APPENDIX E

WETLAND AND STREAM SURVEY

Mt. Ashland Ski Area
Wetland and Stream Survey

March 19, 2003

SE GROUP

Mt. Ashland Ski Area
Wetland and Stream Survey

Prepared for:

Mt. Ashland Association
Jeff Hanson
PO Box 2220
1745 Highway 66
Ashland, OR 97520

Prepared by:

SE GROUP
3245 146th Place SE, Suite 360
Bellevue, WA 98007

February 3, 2003

(Revised April 2004)

1.0 INTRODUCTION

This report presents the results of SE GROUP's reconnaissance level delineation of the wetlands and other waters of the U.S. (hereafter referred to as "wetlands and streams") subject to the jurisdiction of the U.S. Army Corps of Engineers (ACOE) under Section 404 of the Clean Water Act of 1975 as amended in 1977, within the Special Use Permit (SUP) area at the Mt. Ashland Ski Area (MASA). MASA is situated in the Siskiyou Mountain Range of southwestern Oregon, approximately eight miles south of Ashland, Oregon. Specifically, MASA is located at Township 40 South, Range 1 East, Sections 15, 16, 17, 20, and 21, Willamette Meridian (see Figure 1). Mt. Ashland Association is the operator of MASA and is the holder of a Special Use Permit on the Rogue River National Forest and the Klamath National Forest. It is important to note that the Rogue River National Forest administers the SUP for MASA.

The portions of the SUP area that were surveyed by SE GROUP at MASA are depicted in Sheet 1 in Appendix C and hereafter will be referred to as the Study Area. The Study Area encompasses the MASA SUP area and was expanded in some cases to include areas adjacent to proposed project areas (see Sheet 1, Appendix C). The wetlands and streams were delineated consistently with protocols identified in the *1987 Manual* (Environmental Laboratory, 1987).

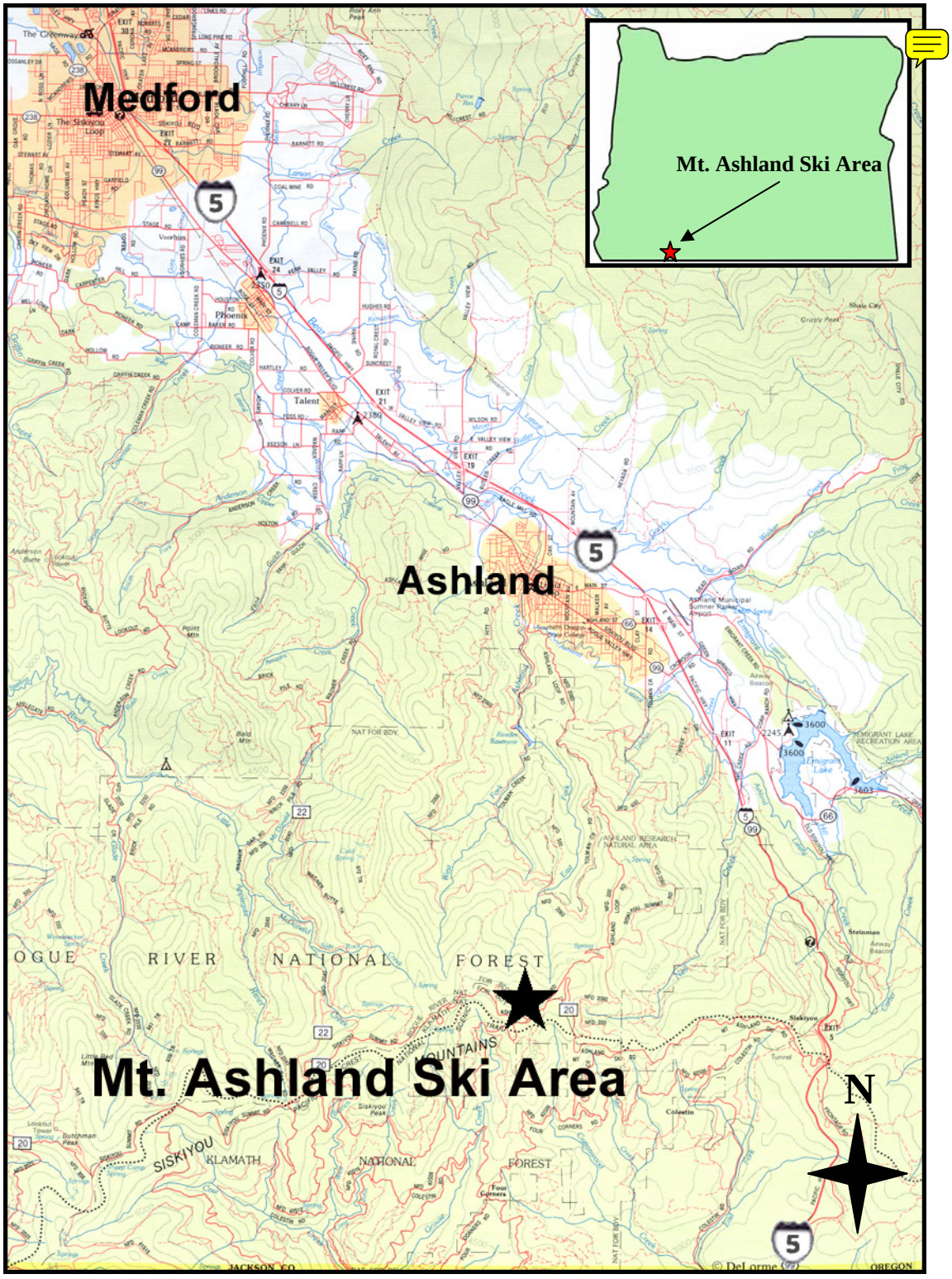
1.1 Delineation Objectives

The primary objectives of the reconnaissance level wetland and stream delineation performed by SE GROUP at the Mt. Ashland Ski Area include the following:

- Determine the geographic extent of jurisdictional wetlands and streams within the Study Area depicted in Sheet 1 in Appendix C consistently with protocols identified in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory, 1987) and pertinent regional guidance letters and public notices.

- Produce an accurate map and associated Geographic Information System (GIS) files that depict the location of the wetlands and streams within the Study Area in relation to the proposed project activities, existing roads, existing lifts and facilities, and other map elements.

Figure 1. Vicinity Map of the Mt. Ashland Ski Area.



Source: De Lorme. 1996. *Oregon Atlas & Gazetteer*. Not to Scale

2.0 METHODS

2.1 Wetland Delineation Protocol

To ensure consistency with U.S. Federal, Oregon State, and Jackson County regulations, SE GROUP performed a reconnaissance level delineation of the wetlands (as defined in 33 CFR 328.3 (a)(1-8) and 328.3 (b-c)) in the Study Area consistently with the methodology outlined in the *1987 Manual*. The methodology found in the *1987 Manual* was implemented with the benefit of current regulations and Regulatory Guidance Letters (RGL) and memoranda (ACOE, RGL 82-2 and 86-9) (USACE, Memorandum 3-92). According to the *1987 Manual*, a three parameter approach is used when making wetland determinations, wherein positive indicators of wetland hydrology, hydric soils, and hydrophytic vegetation all must be present in order to determine that an area is a jurisdictional wetland (Environmental Laboratory, 1987).

2.1.1 *Wetland Hydrology Parameter*

The presence of wetland hydrology can be determined using a variety of direct and indirect indicators, consistent with the *1987 Manual*. Direct hydrology indicators, such as stream gauging station data or historical records, pertaining to the study area can be used to satisfy the wetland hydrology parameter. The wetland hydrology parameter can also be determined using indirect field indicators, which include, but are not limited to: visual observation of inundation or soil saturation, sediment deposition, drainage patterns in wetlands, water stained leaves, watermarks, oxidized root channels (*i.e.* rhizospheres), and drift lines (ACOE, 1991 and Environmental Laboratory, 1987).

2.1.2 *Hydric Soils Parameter*

As indicated above, hydric soils must be present, in addition to wetland hydrology and hydrophytic vegetation, when making wetland determinations. Hydric soils are defined as, "soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, July 13, 1994). The USDA National Technical Committee on Hydric Soils (NTCHS) developed a set of four technical criteria commonly used by USDA soil scientists for identifying hydric soils (see Table 1). Field indicators can also be used for determining whether a soil meets the hydric soils parameter, which are listed in the document, *Field Indicators of Hydric Soils in the United States, Version 4.0* (USDA, NRCS,1998). Field indicators include, but are not limited to the presence of: a histosol or histic epipedon, hydrogen sulfide odor, organic bodies, stratified layers, muck, gleyed matrix colors, and redox dark surface. Field indicators contained in the above-referenced document are intended to supersede guidance provided in the *1987 Manual* (USDA, NRCS, 1996 and USDA, NRCS, 1998). Soil colors were determined in the field using standard NRCS sampling techniques and Munsell Soil Color Charts (Munsell, 1990).

Table 1. Technical Criteria for Identification of Hydric Soils in the United States.

1	All Histosols except Folists, or
2	Soils in Aquic suborders, great groups, or subgroups, Abolls suborder, Aquisalids, Pachic subgroup, or Cumulic subgroups that are: a. somewhat poorly drained with a water table equal to 0.0 feet from the surface during the growing season, or b. poorly drained or very poorly drained and have either: (1) a water table at 0.0 feet during the growing season if textures are coarse sand, sand, or fine sand in all layers within 20 inches, or for other soils (2) a water table at less than or equal 0.5 feet from the surface during the growing season if permeability is equal to or greater than 6.0 inches/hour in all layers within 20 inches, or (3) a water table at less than or equal to 1.0 feet from the surface during the growing season if permeability is less than 6.0 inches/hour in any layer within 20 inches, or
3	Soils that are frequently ponded for long duration or very long duration during the growing season, or
4	Soils that are frequently flooded for long duration or very long duration during the growing season.

Source: USDA, NTCHS, 1994

2.1.3 *Hydrophytic Vegetation Parameter*

According to the *1987 Manual*, an area meets the hydrophytic vegetation parameter when more than 50% of the dominant species from each stratum have an assigned indicator status of obligate wetland (OBL), facultative wetland (FACW), and/or facultative (FAC). The indicator status of each species was assigned using regionally specific plant taxonomy texts and the *National List of Plant Species that Occur in Wetlands: Northwest (Region 9)* (Reed, 1988). An indicator status refers to the relative frequency with which a particular species occurs in jurisdictional wetlands (see Table 2). Dominant species in each of four strata (*i.e.*, tree, sapling/shrub, herb, and woody vine) were identified as the most abundant species that immediately exceed 50% of the total aerial cover for that stratum, plus any additional species that comprise 20% or more of the total aerial cover for that stratum.

Table 2. Plant Indicator Status Categories.

Indicator Status[a]	**Definition**
Obligate Wetland (OBL)	Occur almost always in wetlands under natural conditions (probability >99%).
Facultative Wetland (FACW)	Usually occur in wetlands (probability >67% to 99%), but occasionally found in non-wetlands.
Facultative (FAC)	Equally likely to occur in wetlands or non-wetlands (probability 33% to 67%).
Facultative Upland (FACU)	Usually occur in non-wetlands, but occasionally found in wetlands (probability 1% to <33%).
Obligate Upland (UPL)	Occur rarely in wetlands under natural conditions (probability <1%).
No Indicator Status (NI)	Insufficient information exists to assign an indicator status.

Source: United States Fish and Wildlife Service, 1988

[a]The three facultative categories are sometimes modified by plus (+) and minus (-) signs for the purpose of designating a higher or lower level of the indicator status. A FAC- indicator status is not considered to be an indicator of hydrophytic vegetation.

2.2 Stream Delineation Protocol

SE GROUP performed a reconnaissance level delineation of the jurisdictional streams within the Study Area consistently with the definitions provided in 33 CFR 328.3 (a)(1-5). The applicable portions of the definition of jurisdictional streams are as follows, "all other waters such as intrastate lakes, rivers, streams (including intermittent streams).....the use, degradation, or destruction of which could affect interstate or foreign commerce..." and "tributaries of waters identified in paragraphs (a)(1)-(4) of this section" (33 CFR 328.3 (a)(3 and 5). In applying this definition to conditions encountered in the Study Area at MASA, SE GROUP used the following criteria for identifying streams: (1) continuous and distinct bed and bank features must be present, (2) evidence of annual scour must be present, and (3) the landforms near the stream must exhibit morphology that is indicative of stream processes (i.e., an identifiable concave swale or gully, not a planer or convex surface). In the Study Area, SE GROUP observed diversion ditches created in uplands, swales (concave landforms), small rivulets, and other erosional features that were not identified as streams because these features did not meet the criteria introduced above or they were exempt from ACOE jurisdiction. The swales and erosional features were generally located on high gradient, convex, and/or sparsely vegetated surfaces, where spring snowmelt was the dominant hydrology source.

2.3 Field Methodology

The fieldwork necessary for the delineation of the wetlands and streams within the Study Area was performed in September, 2001 and June, 2002 by qualified wetland biologists from SE GROUP and with oversight from the U.S. Forest Service. As stated above, the Study Area included the MASA SUP area, and was enlarged in some areas to provide more complete wetland and stream mapping in areas where projects are proposed near the SUP boundary. Another purpose for the Study Area expansion was to provide more complete Riparian Reserve mapping in situations where wetlands and streams where located outside of the SUP area, but their associated Riparian Reserves extended into the SUP Area. The Study Area was also expanded in some cases to provide the basis for analysis of potential effects to adjacent streams and wetlands as a result of the proposed expansion activities. The wetlands and streams that were identified in the Study Area were recorded using standard field mapping techniques that utilized aerial photo interpretation, physical measurements (with compass, clinometer, and field tape), and interpretation of topographic maps. Wetland and stream information that was recorded by SE GROUP on field maps was digitized and converted into GIS shape files and database files. The wetland and stream data was then corrected as necessary, which involved correcting locational features from non-orthographically correct aerial photos, and applying them to consistent topographic base mapping.

3.0 RESULTS

3.1 Wetland Delineation Findings

In the course of the field investigation, SE GROUP identified and delineated 37 wetlands within the Study Area of MASA (see Sheet 2 in Appendix C). SE GROUP has determined that the total area of wetlands within the Study Area is 42.5 acres. Table 3 summarizes the area and hydrogeomorphic type of the wetlands delineated by SE Group in the MASA Study Area by watershed location (Brinson, 1993). For the purposes of future Section 404 permitting needs, this stream delineation is conditional upon field review and final jurisdictional determination by the ACOE. Upon preparation for implementation of an action, authorized by a Forest Service decision, the ACOE will be consulted for review of the action to determine if Section 404 permits are required.

Table 3. Summary of the Wetlands Delineated in the Mt. Ashland Study Area.

Watershed	Area of Slope Wetlands (acres)	Area of Riverine Wetlands (acres)	Total Area (acres)	Area of Watersheds within Study Area (acres)
Ashland	23.13	5.36	28.49	1,065
Neil	0.00	0.00	0.00	154
Cottonwood	9.20	0.00	9.20	156
Grouse	4.83	0.00	4.83	94
Total	**37.16**	**5.36**	**42.52**	**1,469**

3.1.1 Slope Wetlands

SE GROUP delineated a total of 37.2 acres of slope wetlands, which are generally located in the middle to lower elevation portions of the Study Area (see Sheet 2 in Appendix C). As indicated in Table 3, the Ashland watershed contains the largest area of wetlands out of the four watersheds due to the fact that the Ashland Watershed also encompasses the most land area out of the four watersheds in the MASA Study Area. Conversely, no wetlands were encountered in the Neil watershed since the area surveyed only included a very small portion of the upper elevations of the watershed (see Sheet 2 in Appendix C). Slope wetlands are characterized by a groundwater hydrology source, unidirectional flow of water through the wetland and usually occur on sloping land. The primary hydrologic input to the slope wetlands in the Study Area is shallow sub-surface groundwater flow that discharges at or near the surface in response to breaks in slope, slope failures, and/or soil texture changes. The following indirect field indicators were used to determine the presence of wetland hydrology for the slope wetlands in the MASA Study Area; visual observation of soil inundation, visual observation of soil saturation in the upper 12 inches, sediment deposition, drainage patterns in wetlands, and water stained leaves.

The composition of the soils observed in the slope wetlands ranged from mucky organic soils (i.e., histic epipedons) to mineral soils with sandy loam texture classes. Most of the mineral soils observed in the Study Area contained very coarse sand which developed from decomposed fragments of the granitic parent material in this region. The hydric soil field indicators that were

observed in the slope wetlands and used to meet the hydric soil parameter include; A2-histic epipedon, F1-loamy mucky minerals, F6-redox dark surface, reducing conditions, and gleyed or low-chroma colors. A detailed description of the hydric soil field indicators observed in the wetland delineation of the MASA Study Area is contained in table 1 in Appendix B.

Vegetation in the slope wetlands is dominated by Engelmann Spruce (*Picea engelmannii*), Shasta fir (*Abies magnifica shatensis*), and Mountain hemlock (*Tsuga mertensiana*) in the tree layer around the perimeter of the wetlands; Sitka alder (*Alnus sinuate*), Black huckleberry (*Vaccinium membranaceum*), and Sitka willow (*Salix sitchensis*) in the shrub layer; and Small-flowered bulrush (*Scirpus microcarpus*), Arrow-leaved groundsel (*Senecio triangularis*), California false hellebore (*Veratrum californicum*), Common marsh marigold (*Caltha palustris*), Bluejoint grass (*Calamagrostis Canadensis*), and Mountain arnica (*Arnica latifolia*) in the herb layer. The plant communities in all of the slope wetlands met the hydrophytic vegetation parameter, where more than 50 % of the dominant plant species within each stratum are Obligate (OBL), Facultative Wetland (FACW), or Facultative (FAC).

3.1.2 Riverine Wetlands

The 5.4 acres of riverine wetlands that were delineated by SE GROUP are generally located on the floodplains adjacent to the Middle Fork of the East Fork of Ashland Creek in the lower elevation portions of the Study Area (see Sheet 2 in Appendix C). The primary hydrologic input to the riverine wetlands is surface water that flows from streams onto adjacent floodplains during high flow events (e.g., spring melt). Secondary hydrologic inputs include shallow sub-surface flow from up-gradient source areas (e.g., valley walls), and from direct precipitation. Riverine wetlands are generally found on active floodplains adjacent to perennial streams with moderate to low entrenchment (Rosgen Type A, B, C, and E streams). The indirect field indicators that were used to determine the presence of wetland hydrology for the riverine wetlands delineated in the MASA Study Area included; visual observation of soil saturation in the upper 12 inches, sediment deposition, and drainage patterns in wetlands.

The soils observed in the riverine wetlands were generally mineral soils with loamy sand textures and occasionally a mucky mineral layer in the surface horizon. A typical profile of the soils observed in the riverine wetlands is summarized below. Soil stratification was commonly observed in the upper parts of the soil profile of riverine wetlands located in active floodplains due to the overbank flow from adjacent streams during seasonal peak flow events. The hydric soil field indicators that were observed in the riverine wetlands and used to meet the hydric soil parameter include; S1-sandy mucky mineral, F6-redox dark surface, and A5-stratified layers. The hydric soil field indicators observed in the wetland delineation of the MASA Study Area is contained in table 1 in Appendix B.

Vegetation in the riverine wetlands is dominated by infrequent patches of Engelmann Spruce (*Picea engelmannii*), Shasta fir (*Abies magnifica shatensis*), and Mountain hemlock (*Tsuga mertensiana*) in the tree layer; Black gooseberry (*Ribes lacustre*), Sitka alder (*Alnus sinuate*), and Sitka willow (*Salix sitchensis*) in the shrub layer; and Arrow-leaved groundsel (*Senecio triangularis*), California false hellebore (*Veratrum californicum*), Common marsh marigold (*Caltha palustris*), Bluejoint grass (*Calamagrostis Canadensis*), and Mountain arnica (*Arnica latifolia*) in the herb layer.

The plant communities in all of the riverine wetlands met the hydrophytic vegetation parameter, where more than 50 % of the dominant plant species within each stratum are Obligate (OBL), Facultative Wetland (FACW), or Facultative (FAC).

3.1.3 Isolated Wetlands

On January 9, 2001, the U.S. Supreme Court ruled that the ACOE could no longer use the "Migratory Bird Rule" to extend its regulation over "waters of the U. S." to include isolated, non-navigable, intrastate waters (Solid Waste Agency of Northern Cook County (SWANCC) v. U.S. Army Corps of Engineers, No. 99-1178 [January 9, 2001]). This recent court decision, referred to as the SWANCC decision, clarified the definition of "isolated waters" by stating that they are waters that lack a hydrologic connection to other waters that are part of or adjacent to interstate waters, a tributary system, or traditionally navigable waters. The SWANCC decision affects any federal, state, or tribe implementing provisions of the Clean Water Act that apply the definition of "waters of the U. S.". The following types of "waters of the U. S." may no longer be under the jurisdiction of the ACOE if they are "isolated waters": intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds. In light of SWANCC, ACOE field staff has been advised to perform formal project-specific headquarters approval prior to asserting jurisdiction over isolated non-navigable intrastate waters based on other types of interstate commerce links listed in current regulatory definitions of "waters of the U. S".

SE GROUP identified seven wetlands in the MASA Study Area that met the definition of "isolated waters", which comprise a total of 1.5 acres of land (see Table 1 in Appendix A). The seven isolated wetlands are located in the middle to lower elevation portions of the Ashland Watershed in association with groundwater discharge at breaks in slope or localized slope failures (see Sheet 2 in Appendix C). Even though these wetlands may not be subject to jurisdiction by the ACOE, state and county agencies may administer laws and ordinances that protect these systems.

3.2 Stream Delineation Findings

SE GROUP determined that the total length of streams within the MASA Study Area is 7.47 miles (39,503 linear feet). Table 4 contains a summary of the stream types and characteristics within each watershed that were delineated by SE GROUP in the MASA Study Area (Rosgen, 1996). The stream length calculation is based on field observations, aerial-photograph interpretation, and analysis performed with GIS software. Areas such as upland swales and rivulets were not included in the delineation because they did not meet the criteria that SE Group used for identifying streams (see Section 2.2). For the purposes of future Section 404 permitting needs, this stream delineation is conditional upon field review and final jurisdictional determination by the ACOE.

Table 4. Summary of the Streams Delineated in the Mt. Ashland Study Area.

Watershed	Rosgen Stream Classification	Average Slope (percent)	Total Length (miles)
Ashland	Aa+ Stream Type	35	4.57
	A Stream Type	16	0.84
	E Stream Type	5	0.10
	Subtotal:	**28**	**5.51**
Neil	Aa+ Stream Type	39	0.07
	Subtotal:	**39**	**0.07**
Cottonwood	Aa+ Stream Type	32	1.26
	Subtotal:	**32**	**1.26**
Grouse	Aa+ Stream Type	29	0.63
	Subtotal:	**29**	**0.63**
	Total	**29**	**7.47**

For the purposes of this discussion, streams identified in the MASA Study Area have been classified using the Rosgen Stream Type method, which categorizes stream reaches based on landform morphology, channel patterns geometry, and channel bed materials (Rosgen, 1996). The Rosgen method outlines criteria for nine distinct Stream Types that are assigned to stream reaches as letters of the alphabet. In the course of the field investigation, SE GROUP determined that streams in the Study Area met the criteria for either Stream Types Aa+, A, or E out of the nine Rosgen Stream Types (see Table 4). The streams delineated by SE GROUP are presented in Sheet 2 in Appendix C by Rosgen Stream Type.

Stream Type "Aa+" characterizes debris transport streams that are high gradient, deeply entrenched streams, which usually lack a floodplain. Type "Aa+" streams are typically located in the headwaters of watersheds on steep, high erosion potential slopes. The "Aa+" streams identified in the MASA Study Area met the criteria for jurisdictional streams presented in Section 2.2 by exhibiting distinct bed and bank features, evidence of annual scour, and exhibited stream morphology. The primary hydrology source to most "Aa+" streams in the Study Area is groundwater discharge from slope wetlands, while the secondary source of hydrology to "Aa+" streams is focused overland flow from snowmelt and storm events. Although Type "Aa+" streams are characterized as transporting large amounts of debris, none of the "Aa+" streams in the Study Area have sufficient channel dimensions or discharge rates to transport Large Woody Material (LWM) to downgradient stream reaches. However, the "Aa+" streams may transport soil, cobbles, and Small Woody Material (SWM) downstream during large storm events or rain on snow events that may initiate debris flows. Large Woody Material is defined as individual trees in the stream channel or on the forest floor that are greater than 24 inches in diameter and greater than 50 feet long (Bear Creek Analysis, 1995). For the purposes of this analysis, SWM is defined as individual trees and branches that are less than 24 inches in diameter and less than 50 feet long.

Type “A” streams have similar channel dimensions and patterns to the “Aa+” Stream Type, but Type “A” streams are not as steep and slightly less confined. Type “A” streams are located in the headwaters of watersheds, but are also located on alluvial fans and other steepened areas in the lower portions of watersheds. The primary hydrologic input to Type “A” streams in the Study Area is surface flow from tributary streams. Groundwater discharge from adjacent wetlands and valley walls is the secondary hydrologic input for this stream type. Transport of LWM is also very limited in Type “A” streams in the Study Area even though discharge at bank full stage is much greater for Type “A” streams than Type “Aa+” streams, because the stream power decreases with the decrease in slope and the entrenched channel morphology physically restricts movement. Type “A” streams also have a high sediment transport potential and are also susceptible to debris flows. The “A” streams identified in the MASA Study Area met the criteria for jurisdictional streams presented in Section 2.2 by exhibiting distinct bed and bank features, evidence of annual scour, and stream morphology.

Type “E” streams are low gradient, unconfined channels with high sinuosity and an active floodplain. The Type “E” streams delineated by SE GROUP are localized in a large meadow and wetland complex in the lower elevation portions of the Ashland watershed on the Middle Fork of the East Fork of Ashland Creek. The Type “E” streams are very stable; as such they transport suspended sediment and bedload very efficiently. However, this stream type is very sensitive to disturbance due to the limited sediment storage capacity and reliance on the adjacent floodplain for peak flow attenuation. LWM movement through Type “E” streams is also very limited because the stream power decreases with the decrease in slope and the small channel size physically restricts movement. Due to the low gradient of this stream type large amounts of suspended sediment and debris flow material would likely be deposited in the floodplains of this stream type and would not be appreciably transported downstream. The Type “E” streams identified in the MASA Study Area met the criteria for jurisdictional streams presented in Section 2.2 by exhibiting distinct bed and bank features, evidence of annual scour, and stream morphology.

3.3 Riparian Reserves

Riparian Reserves are land allocations designated by the U.S. Forest Service, and are defined as “lands along wetlands and streams as well as along potentially unstable areas where special standards and guidelines direct land use” (USDA, USFS, 1994). The five categories of Riparian Reserves have been classified as follows:

(1) fish-bearing streams
(2) permanently flowing nonfish-bearing streams
(3) constructed ponds and reservoirs, and wetlands greater than 1 acre
(4) lakes and natural ponds
(5) seasonally flowing or intermittent streams, and wetlands less than 1 acre

Rationale for the width of the Riparian Reserves for wetlands and streams based on the rationale presented in Table 5. The areas of the Riparian Reserves within each watershed of the MASA Study Area are summarized in Table 6. Streams in the MASA Study Area were classified as perennial, intermittent, or ephemeral in order to assign the appropriate riparian reserve width according to the Northwest Forest Plan (USDA, USDI, 1994). The width of Riparian Reserves for each wetland and stream within the Study Area are documented in Table 3 in Appendix A and also displayed graphically in Sheet 3 in Appendix C.

Table 5. Summary of Riparian Reserve Categories, Classification Rationale, and Selected Reserve Widths for Wetland and Streams in the MASA Study Area.

Water Body	Riparian Reserve Category	Rationale	Selected Reserve Width	Rationale
Streams	2	Permanently flowing nonfish-bearing streams	150 feet	150 feet slope distance is greater than the distance equal to the height of one site-potential tree (146 ft.), the outer edges of 100-year floodplain, the top of the inner gorge, and the outer edges of riparian vegetation.
Ponds & wetlands	3	wetlands >1 acre	150 feet	150 feet slope distance is greater than one site potential tree height (146 ft.), the extent of seasonally saturated soil, and the outer edges of riparian vegetation.
Streams	5	Seasonally flowing/ intermittent streams	146 feet	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
Wetlands	5	Wetlands <1 acre	Varies	The wetland boundary is defined, in part, as the outer edge of riparian vegetation (hydrophytic), so the riparian reserve includes the wetland only, so the width of the Riparian Reserve varies with the size of the wetland.
Unstable Areas	5	Unstable & potentially unstable areas	Varies	The Riparian Reserve includes the unstable areas only since a Riparian Reserve buffer is not required outside of the unstable areas, so the width of the Riparian Reserve varies.

Landslide Hazard Zonation (LHZ) is a technique used by Rogue River National Forest Geologists to assess slope stability of the terrain of the MASA Study Area. Landslides were mapped using the process documented in *Landslide Mapping on the Rogue River National Forest*, which appeared in the journal *Environmental, Groundwater and Engineering Geology: Applications from Oregon* (Hicks and Sitton 1998). This paper includes descriptions and definitions of activity levels, landslide hazard levels and risks evaluation discussed herein.

Landslide Hazard Zone 1 is the highest risk terrain for landslides, and included steep slopes (70% and higher), active landslides, and over-steepened creek banks. This zone is classified as unstable and potentially unstable terrain and is designated as Riparian Reserve category 5 (see Table 5). The Riparian Reserve only includes the extent of the unstable terrain. The width of Riparian Reserves for unstable areas within the Study Area are summarized in Table 5 and the areas of Riparian Reserves within each watershed in the Study Area are outlined in Table 6.

Table 6. Acreage of Riparian Reserves in Each Watershed in the MASA Study Area.

Watershed	Area of Riparian Reserves (acres)	Area of Watersheds within Study Area (acres)
Ashland	249	1,065
Neil	4	154
Cottonwood	51	156
Grouse	29	94
Total:	**333**	**1,469**

4.0 CONCLUSION

SE GROUP determined that the MASA Study Area contains 7.47 miles of streams, and 37 wetlands comprising a total area of approximately 42.5 acres. The actual area of wetlands and streams under the jurisdiction of the ACOE may be less than the results stated above due to recent changes in the scope and interpretation of the definition of "waters of the U.S." contained in the Clean Water Act (SWANCC vs. ACOE, January 9, 2001). Therefore, it is SE GROUP's recommendation that a field verification be scheduled with the ACOE to determine the extent of jurisdictional wetlands and streams within the MASA Study Area and permitting requirements prior to implementation of the alternative selected by the USFS. In addition, all of the pertinent permits and approvals must be acquired from the appropriate federal, state, and local agencies prior to implementation of selected alternative from the Final EIS.

5.0 REFERENCES

Brinson, M. M. 1993. *A Hydrogeomorphic Classification for Wetlands*. United States Army Corps of Engineers Waterways Experiment Station. Vicksburg, MS.

Environmental Laboratory. 1987. *Technical Report Y-87-1 – Corps of Engineers Wetland Delineation Manual*. United States Army Corps of Engineers Waterways Experiment Station. Vicksburg, MS.

Federal Register. 1986. *33 CFR Parts 320 through 330 – Regulatory Programs of the Corps of Engineers; Final Rule*. U. S. Government Printing Office.

Munsell Color. 1990. *Munsell Soil Color Charts*. Macbeth Division of Kollmorgen Instruments Corporation. New Widsor, NY.

National Resource Conservation Service, U. S. Department of Agriculture, & Wetland Science Institute. 1998. *Field Indicators of Hydric Soils in the United States, Version 4.0*. NRCS Wetland Science Institute. Baton Rouge, LA.

Reed, P. B. 1988. *National List of Plant Species that Occur in Wetlands: Northwest (Region 9).* U. S. Government Printing Office.

Rosgen, D. L. 1996. *Applied River Morphology*. Wildland Hydrology. Pagosa Springs, CO.

U. S. Army Corps of Engineers. 1982. *Clarification of "Normal Circumstances" in the Wetland Definition*. Regulatory Guidance Letter No. 82-2.

U. S. Army Corps of Engineers. 1986. *Clarification of "Normal Circumstances"*. Regulatory Guidance Letter No. 86-9.

U. S. Army Corps of Engineers. 1992. *Clarification and Interpretation of the 1987 Manual*. Memorandum 3-92.

U. S. Army Corps of Engineers. 1995. *An Approach for Assessing Wetland Functions Using Hydrogeomorphic Classification, Reference Wetlands, and Functional Indices*. Technical Report WRP-DE-9. Vicksburg, MS.

U. S. Department of Agriculture, U. S. Forest Service, and the Bureau of Land Management. 1994. *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl.* U.S. Government Printing Office.

APPENDIX A

Wetland, Stream, and Riparian Reserve Data Tables From the Survey of the Mt. Ashland Study Area

Table 1. Classification and Area Calculation of the Wetlands Located within the MASA Study Area.

Wetland ID	Watershed	HGM Class	Total Area (square feet)	Total Area (acres)
2	Ashland	Riverine	5,761	0.13
3	Ashland	Riverine	52,009	1.19
11	Ashland	Riverine	845	0.02
24	Ashland	Riverine	168,703	3.87
25	Ashland	Riverine	6,308	0.15
1	Ashland	Slope	1,777	0.04
4	Ashland	Slope	3,235	0.07
5	Ashland	Slope	2,998	0.07
6	Ashland	Slope	24,289	0.56
7	Ashland	Slope	10,874	0.25
8	Ashland	Slope	2,657	0.06
9	Ashland	Slope	26,633	0.61
12	Ashland	Slope	126,754	2.91
13	Ashland	Slope	13,717	0.32
14	Ashland	Slope	319,279	7.33
15	Ashland	Slope	1,558	0.04
16	Ashland	Slope	7,507	0.17
17	Ashland	Slope	68,786	1.58
18	Ashland	Slope	44,862	1.03
19	Ashland	Slope	52,776	1.21
20	Ashland	Slope	46,024	1.06
21	Ashland	Slope	26,859	0.62
22	Ashland	Slope	3,270	0.08
23	Ashland	Slope	66,450	1.53
35	Ashland	Slope	46,892	1.08
36	Ashland	Slope	110,260	2.53
10	Cottonwood	Slope	212,141	4.87
26	Cottonwood	Slope	20,155	0.46
29	Cottonwood	Slope	150,527	3.46
37	Cottonwood	Slope	17,673	0.41
27	Grouse	Slope	108,225	2.48
28	Grouse	Slope	58,631	1.35
30	Grouse	Slope	22,605	0.52
31	Grouse	Slope	1,037	0.02
32	Grouse	Slope	959	0.02
33	Grouse	Slope	1,092	0.03
34	Grouse	Slope	17,650	0.41
			1,851,777	**42.52**

Table 2. Classification and Length and Slope Calculation of the Streams Located within the MASA Study Area.

Stream ID	Watershed	Rosgen Type	Stream Type	Length (feet)	Length (miles)	Average Slope (percent)
149	Ashland	A	per	774	0.15	16
156	Ashland	A	per	586	0.11	12
157	Ashland	A	int	561	0.11	16
159	Ashland	A	per	65	0.01	14
165	Ashland	A	per	1,056	0.20	11
168	Ashland	A	per	66	0.01	18
175	Ashland	A	int	620	0.12	20
189	Ashland	A	per	225	0.04	20
190	Ashland	A	int	129	0.02	21
191	Ashland	A	int	215	0.04	11
192	Ashland	A	int	126	0.02	15
87	Ashland	Aa+	int	400	0.08	45
122	Ashland	Aa+	eph	862	0.16	30
126	Ashland	Aa+	int	713	0.13	27
127	Ashland	Aa+	eph	279	0.05	44
128	Ashland	Aa+	eph	158	0.03	40
130	Ashland	Aa+	eph	150	0.03	44
133	Ashland	Aa+	int	520	0.10	40
134	Ashland	Aa+	per	3,228	0.61	27
136	Ashland	Aa+	int	776	0.15	36
139	Ashland	Aa+	per	2,619	0.49	38
141	Ashland	Aa+	int	461	0.09	39
146	Ashland	Aa+	eph	1,156	0.22	45
147	Ashland	Aa+	int	943	0.18	41
148	Ashland	Aa+	eph	509	0.10	45
150	Ashland	Aa+	int	1,310	0.25	22
151	Ashland	Aa+	per	599	0.11	36
152	Ashland	Aa+	int	1,189	0.22	22
154	Ashland	Aa+	int	807	0.15	31
155	Ashland	Aa+	int	875	0.17	27
178	Ashland	Aa+	int	378	0.07	40
179	Ashland	Aa+	per	551	0.10	32
182	Ashland	Aa+	int	186	0.04	37
183	Ashland	Aa+	int	146	0.03	49
184	Ashland	Aa+	int	285	0.05	47
185	Ashland	Aa+	per	2,012	0.38	27
193	Ashland	Aa+	eph	154	0.03	29
194	Ashland	Aa+	culvert	71	0.01	22
195	Ashland	Aa+	int	722	0.14	29
234	Ashland	Aa+	eph	1,728	0.33	29
235	Ashland	Aa+	int	392	0.07	27
163	Ashland	E	int	109	0.02	2
166	Ashland	E	int	129	0.02	8
186	Ashland	E	per	167	0.03	5
187	Ashland	E	per	108	0.02	5
205	Cottonwood	Aa+	int	62	0.01	30
206	Cottonwood	Aa+	int	101	0.02	17

207	Cottonwood	Aa+	eph	610	0.12	35
208	Cottonwood	Aa+	eph	417	0.08	28
209	Cottonwood	Aa+	eph	347	0.07	33
211	Cottonwood	Aa+	eph	459	0.09	33
212	Cottonwood	Aa+	per	535	0.10	29
213	Cottonwood	Aa+	eph	584	0.11	40
214	Cottonwood	Aa+	per	205	0.04	35
215	Cottonwood	Aa+	int	278	0.05	29
216	Cottonwood	Aa+	per	791	0.15	29
217	Cottonwood	Aa+	int	952	0.18	30
218	Cottonwood	Aa+	int	53	0.01	31
230	Cottonwood	Aa+	eph	605	0.11	38
233	Cottonwood	Aa+	eph	443	0.08	35
236	Cottonwood	Aa+	int	140	0.03	38
237	Cottonwood	Aa+	int	102	0.02	32
219	Grouse	Aa+	eph	943	0.18	47
220	Grouse	Aa+	eph	481	0.09	26
221	Grouse	Aa+	eph	483	0.09	36
228	Grouse	Aa+	int	597	0.11	23
229	Grouse	Aa+	int	195	0.04	24
231	Grouse	Aa+	eph	534	0.10	26
232	Grouse	Aa+	int	109	0.02	23
153	Neil	Aa+	eph	361	0.07	39
				39,503	**7.47**	**29**

Table 3. Riparian Reserve Categories, Selected Reserves Widths, and Rationale for Wetland and Stream Classification in the MASA Study Area.

ID Number	RR Category	RR Category Rationale	Selected RR Width (feet)	Reserve Width Rationale
WETLANDS				
2	5	< 1 acre	0	The wetland boundary is defined, in part, as the outer edge of riparian vegetation (hydrophytic), so the riparian reserve includes the wetland only.
3	3	> 1 acre	150	150 feet slope distance is greater than one site potential tree height (146 ft.), the extent of seasonally saturated soil, and the outer edges of riparian vegetation
11	5	< 1 acre	0	The wetland boundary is defined, in part, as the outer edge of riparian vegetation (hydrophytic), so the riparian reserve includes the wetland only.
24	3	> 1 acre	150	150 feet slope distance is greater than one site potential tree height (146 ft.), the extent of seasonally saturated soil, and the outer edges of riparian vegetation
25	5	< 1 acre	0	The wetland boundary is defined, in part, as the outer edge of riparian vegetation (hydrophytic), so the riparian reserve includes the wetland only
1	5	< 1 acre	0	The wetland boundary is defined, in part, as the outer edge of riparian vegetation (hydrophytic), so the riparian reserve includes the wetland only
4	5	< 1 acre	0	The wetland boundary is defined, in part, as the outer edge of riparian vegetation (hydrophytic), so the riparian reserve includes the wetland only
5	5	< 1 acre	0	The wetland boundary is defined, in part, as the outer edge of riparian vegetation (hydrophytic), so the riparian reserve includes the wetland only
6	5	< 1 acre	0	The wetland boundary is defined, in part, as the outer edge of riparian vegetation (hydrophytic), so the riparian reserve includes the wetland only
7	5	< 1 acre	0	The wetland boundary is defined, in part, as the outer edge of riparian vegetation (hydrophytic), so the riparian reserve includes the wetland only
8	5	< 1 acre	0	The wetland boundary is defined, in part, as the outer edge of riparian vegetation (hydrophytic), so the riparian reserve includes the wetland only
9	5	< 1 acre	0	The wetland boundary is defined, in part, as the outer edge of riparian vegetation (hydrophytic), so the riparian reserve includes the wetland only
12	3	> 1 acre	150	150 feet slope distance is greater than one site potential tree height (146 ft.), the extent of seasonally saturated soil, and the outer edges of riparian vegetation
13	5	< 1 acre	0	The wetland boundary is defined, in part, as the outer edge of riparian vegetation (hydrophytic), so the riparian reserve includes the wetland only.
14	3	> 1 acre	150	150 feet slope distance is greater than one site potential tree height (146 ft.), the extent of seasonally saturated soil, and the outer edges of riparian vegetation
15	5	< 1 acre	0	The wetland boundary is defined, in part, as the outer edge of riparian vegetation (hydrophytic), so the riparian reserve includes the wetland only
16	5	< 1 acre	0	The wetland boundary is defined, in part, as the outer edge of riparian vegetation (hydrophytic), so the riparian reserve includes the wetland only
17	3	> 1 acre	150	150 feet slope distance is greater than one site potential tree height (146 ft.), the extent of seasonally saturated soil, and the outer edges of riparian vegetation
18	3	> 1 acre	150	150 feet slope distance is greater than one site potential tree height (146 ft.), the extent of seasonally saturated soil, and the outer edges of riparian vegetation
19	3	> 1 acre	150	150 feet slope distance is greater than one site potential tree height (146 ft.), the extent of seasonally saturated soil, and the outer edges of riparian vegetation

20	3	> 1 acre	150	150 feet slope distance is greater than one site potential tree height (146 ft.), the extent of seasonally saturated soil, and the outer edges of riparian vegetation
21	5	< 1 acre	0	The wetland boundary is defined, in part, as the outer edge of riparian vegetation (hydrophytic), so the riparian reserve includes the wetland only
22	5	< 1 acre	0	The wetland boundary is defined, in part, as the outer edge of riparian vegetation (hydrophytic), so the riparian reserve includes the wetland only
23	3	> 1 acre	150	150 feet slope distance is greater than one site potential tree height (146 ft.), the extent of seasonally saturated soil, and the outer edges of riparian vegetation
35	3	> 1 acre	150	150 feet slope distance is greater than one site potential tree height (146 ft.), the extent of seasonally saturated soil, and the outer edges of riparian vegetation
36	3	> 1 acre	150	150 feet slope distance is greater than one site potential tree height (146 ft.), the extent of seasonally saturated soil, and the outer edges of riparian vegetation
10	3	> 1 acre	150	150 feet slope distance is greater than one site potential tree height (146 ft.), the extent of seasonally saturated soil, and the outer edges of riparian vegetation
26	5	< 1 acre	0	The wetland boundary is defined, in part, as the outer edge of riparian vegetation (hydrophytic), so the riparian reserve includes the wetland only.
29	3	> 1 acre	150	150 feet slope distance is greater than one site potential tree height (146 ft.), the extent of seasonally saturated soil, and the outer edges of riparian vegetation
37	5	< 1 acre	0	The wetland boundary is defined, in part, as the outer edge of riparian vegetation (hydrophytic), so the riparian reserve includes the wetland only.
27	3	> 1 acre	150	150 feet slope distance is greater than one site potential tree height (146 ft.), the extent of seasonally saturated soil, and the outer edges of riparian vegetation
28	3	> 1 acre	150	150 feet slope distance is greater than one site potential tree height (146 ft.), the extent of seasonally saturated soil, and the outer edges of riparian vegetation
30	5	< 1 acre	0	The wetland boundary is defined, in part, as the outer edge of riparian vegetation (hydrophytic), so the riparian reserve includes the wetland only
31	5	< 1 acre	0	The wetland boundary is defined, in part, as the outer edge of riparian vegetation (hydrophytic), so the riparian reserve includes the wetland only
32	5	< 1 acre	0	The wetland boundary is defined, in part, as the outer edge of riparian vegetation (hydrophytic), so the riparian reserve includes the wetland only
33	5	< 1 acre	0	The wetland boundary is defined, in part, as the outer edge of riparian vegetation (hydrophytic), so the riparian reserve includes the wetland only
34	5	< 1 acre	0	The wetland boundary is defined, in part, as the outer edge of riparian vegetation (hydrophytic), so the riparian reserve includes the wetland only
STREAMS				
157	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
175	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
190	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.

191	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
192	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
149	2	Perennial, no fish	150	150 feet slope distance is greater than the distance equal to the height of one site-potential tree (146 ft.), the outer edges of 100-year floodplain, the top of the inner gorge, and the outer edges of riparian vegetation.
156	2	Perennial, no fish	150	150 feet slope distance is greater than the distance equal to the height of one site-potential tree (146 ft.), the outer edges of 100-year floodplain, the top of the inner gorge, and the outer edges of riparian vegetation.
159	2	Perennial, no fish	150	150 feet slope distance is greater than the distance equal to the height of one site-potential tree (146 ft.), the outer edges of 100-year floodplain, the top of the inner gorge, and the outer edges of riparian vegetation.
165	2	Perennial, no fish	150	150 feet slope distance is greater than the distance equal to the height of one site-potential tree (146 ft.), the outer edges of 100-year floodplain, the top of the inner gorge, and the outer edges of riparian vegetation.
168	2	Perennial, no fish	150	150 feet slope distance is greater than the distance equal to the height of one site-potential tree (146 ft.), the outer edges of 100-year floodplain, the top of the inner gorge, and the outer edges of riparian vegetation.
189	2	Perennial, no fish	150	150 feet slope distance is greater than the distance equal to the height of one site-potential tree (146 ft.), the outer edges of 100-year floodplain, the top of the inner gorge, and the outer edges of riparian vegetation.
194	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
122	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
127	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
128	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
130	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
146	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
148	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
193	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
234	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
87	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.

126	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
133	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
136	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
141	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
147	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
150	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
152	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
154	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
155	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
178	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
182	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
183	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
184	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
195	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
235	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
134	2	Perennial, no fish	150	150 feet slope distance is greater than the distance equal to the height of one site-potential tree (146 ft.), the outer edges of 100-year floodplain, the top of the inner gorge, and the outer edges of riparian vegetation.
139	2	Perennial, no fish	150	150 feet slope distance is greater than the distance equal to the height of one site-potential tree (146 ft.), the outer edges of 100-year floodplain, the top of the inner gorge, and the outer edges of riparian vegetation.
151	2	Perennial, no fish	150	150 feet slope distance is greater than the distance equal to the height of one site-potential tree (146 ft.), the outer edges of 100-year floodplain, the top of the inner gorge, and the outer edges of riparian vegetation.

179	2	Perennial, no fish	150	150 feet slope distance is greater than the distance equal to the height of one site-potential tree (146 ft.), the outer edges of 100-year floodplain, the top of the inner gorge, and the outer edges of riparian vegetation.
185	2	Perennial, no fish	150	150 feet slope distance is greater than the distance equal to the height of one site-potential tree (146 ft.), the outer edges of 100-year floodplain, the top of the inner gorge, and the outer edges of riparian vegetation.
163	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
166	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
186	2	Perennial, no fish	150	150 feet slope distance is greater than the distance equal to the height of one site-potential tree (146 ft.), the outer edges of 100-year floodplain, the top of the inner gorge, and the outer edges of riparian vegetation.
187	2	Perennial, no fish	150	150 feet slope distance is greater than the distance equal to the height of one site-potential tree (146 ft.), the outer edges of 100-year floodplain, the top of the inner gorge, and the outer edges of riparian vegetation.
207	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
208	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
209	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
211	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
213	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
230	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
233	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
205	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
206	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
215	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
217	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
218	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.

236	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
237	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
212	2	Perennial, no fish	150	150 feet slope distance is greater than the distance equal to the height of one site-potential tree (146 ft.), the outer edges of 100-year floodplain, the top of the inner gorge, and the outer edges of riparian vegetation.
214	2	Perennial, no fish	150	150 feet slope distance is greater than the distance equal to the height of one site-potential tree (146 ft.), the outer edges of 100-year floodplain, the top of the inner gorge, and the outer edges of riparian vegetation.
216	2	Perennial, no fish	150	150 feet slope distance is greater than the distance equal to the height of one site-potential tree (146 ft.), the outer edges of 100-year floodplain, the top of the inner gorge, and the outer edges of riparian vegetation.
219	5	Intermittent /Ephemeral	146	150 feet slope distance is greater than the distance equal to the height of one site-potential tree (146 ft.), the outer edges of 100-year floodplain, the top of the inner gorge, and the outer edges of riparian vegetation.
220	5	Intermittent /Ephemeral	146	150 feet slope distance is greater than the distance equal to the height of one site-potential tree (146 ft.), the outer edges of 100-year floodplain, the top of the inner gorge, and the outer edges of riparian vegetation.
221	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
231	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
228	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
229	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
232	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.
153	5	Intermittent /Ephemeral	146	The distance equal to the height of one site-potential tree (146 ft.) is greater than 100 feet slope distance, the extent of unstable and potentially unstable areas, the outer edge of riparian vegetation, and the top of the inner gorge.

APPENDIX B

Hydric Soil Indicators Observed in the Mt. Ashland Study Area

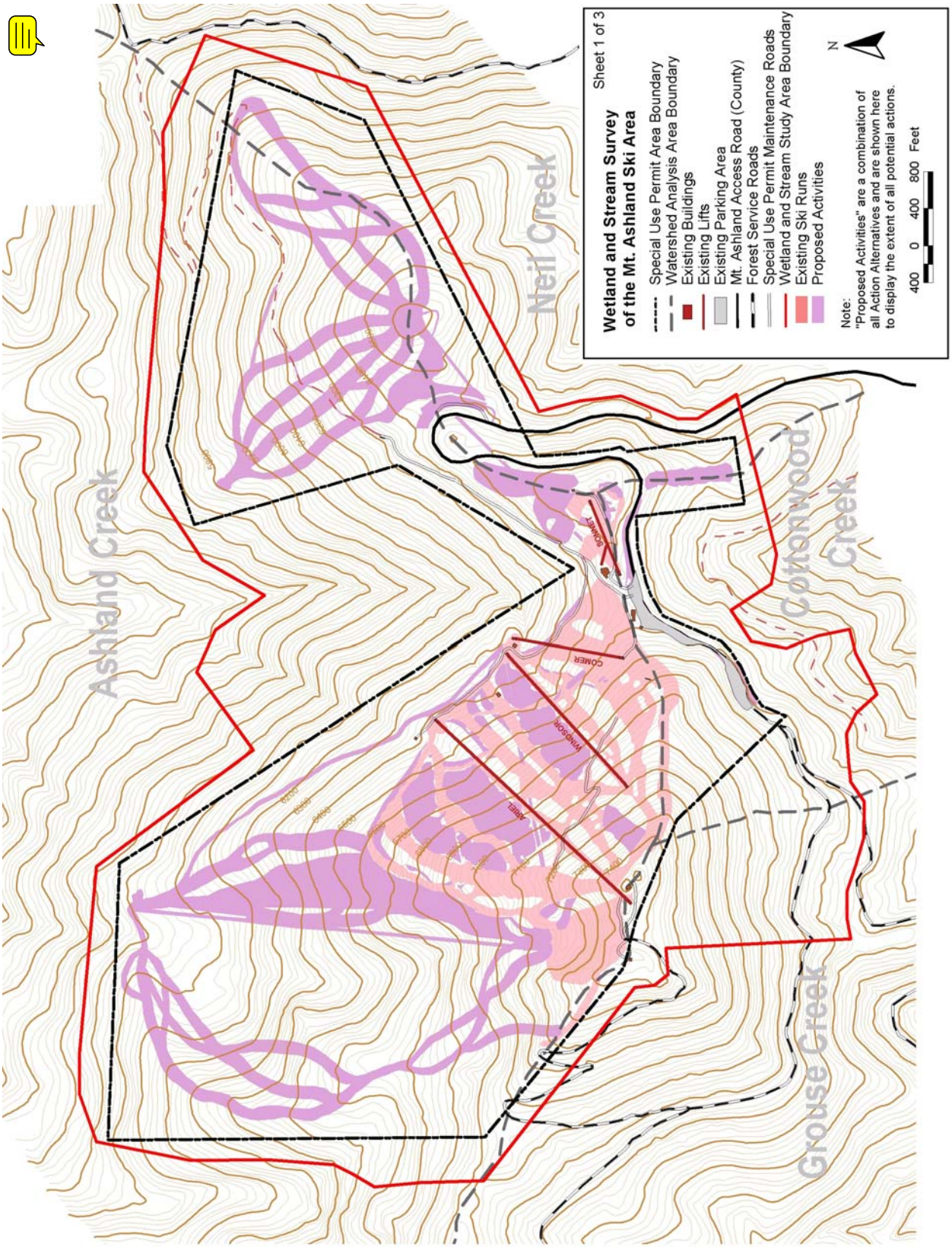
Table 1. List of Hydric Soil Indicators Used in the Delineation of the MASA Study Area

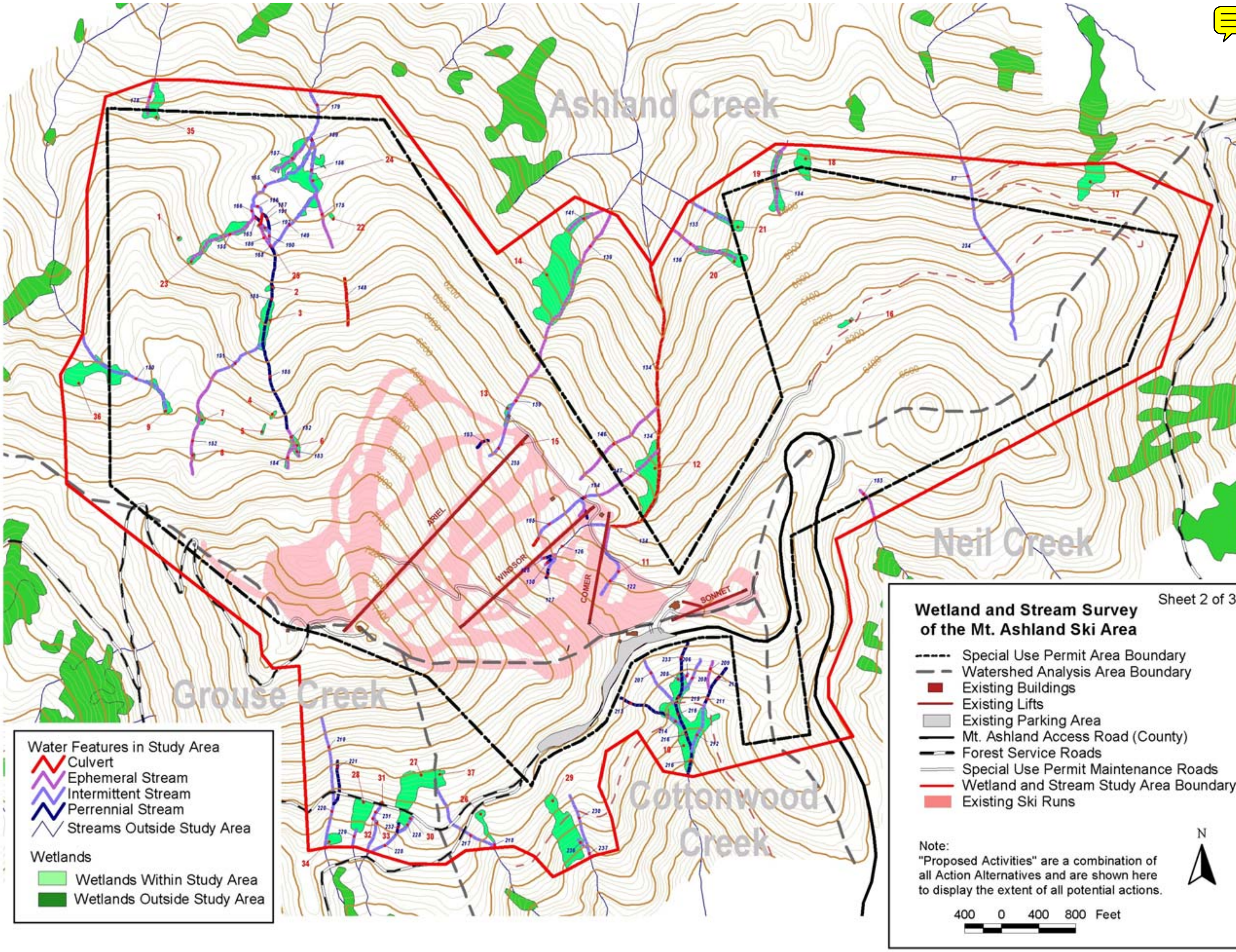
INDICATOR NAME	DESCRIPTION OF CRITERIA
A2 – Histic Epipedon	Surface organic soil material 20 cm (8 in.) or more thick.
F1 – Loamy Mucky Mineral	A mucky modified mineral layer 10 cm (4 in.) or more thick starting within 15 cm (6 in.) of the soil surface.
F6 – Redox Dark Surface	A layer at least 10 cm (4 in.) thick entirely within the upper 30 cm (12 in.) of the mineral soil that has: a. matrix value 3 or less and chroma 1 or less and 2% or more distinct or prominent redox concentrations as soft masses or pore linings, or b. matrix value 3 or less and chroma 2 or less and 5% or more distinct or prominent redox concentrations as soft masses or pore linings.
S1 – Sandy Mucky Mineral	A mucky modified mineral layer 5 cm (2 in,) or more thick starting within 15 cm (6 in.) of the soil surface.
A5 – Stratified Layers	Several stratified layers starting within the upper 15 cm (6 in.) of the soil surface. One or more of the layers has value 3 or less with chroma 1 or less and/or it is muck, mucky peat, peat or mucky modified mineral texture. The remaining layers have value 4 or more and chroma 2 or less.

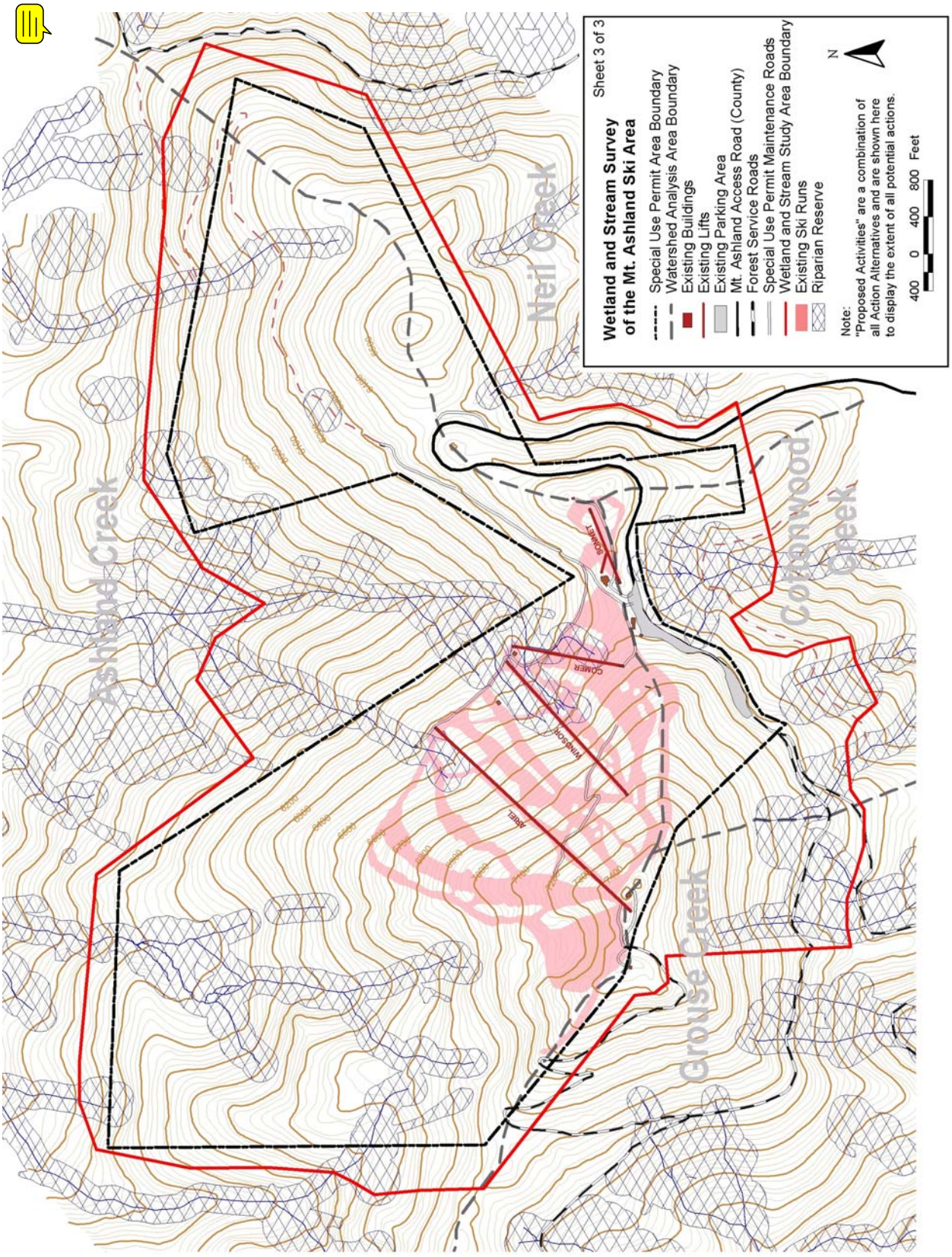
Source: Field Indicators of Hydric Soils in the United States (USDA NRCS, 1998)

APPENDIX C

Maps of the Wetland and Stream Survey of the Mt. Ashland Study Area


Wetland and Stream Survey
of the Mt. Ashland Ski Area
Sheet 1 of 3
Special Use Permit Area Boundary
Watershed Analysis Area Boundary
Existing Buildings
Existing Lifts
Existing Parking Area
Mt. Ashland Access Road (County)
Forest Service Roads
Special Use Permit Maintenance Roads
Wetland and Stream Study Area Boundary
Existing Ski Runs
Proposed Activities
N
Note:
"Proposed Activities" are a combination of all Action Alternatives and are shown here to display the extent of all potential actions.
400 0 400 800 Feet
Ashland Creek
Neil Creek
Cottonwood Creek
Grouse Creek
SUMMIT
COMER
WINDSOR
PIONEER


Ashland Creek
Neil Creek
Grouse Creek
Cottonwood Creek
ARIEL
WINDSOR
COMER
SONNET
Sheet 2 of 3
Wetland and Stream Survey of the Mt. Ashland Ski Area
Special Use Permit Area Boundary
Watershed Analysis Area Boundary
Existing Buildings
Existing Lifts
Existing Parking Area
Mt. Ashland Access Road (County)
Forest Service Roads
Special Use Permit Maintenance Roads
Wetland and Stream Study Area Boundary
Existing Ski Runs
Note:
"Proposed Activities" are a combination of all Action Alternatives and are shown here to display the extent of all potential actions.
N
400 0 400 800 Feet
Water Features in Study Area
Culvert
Ephemeral Stream
Intermittent Stream
Perrennial Stream
Streams Outside Study Area
Wetlands
Wetlands Within Study Area
Wetlands Outside Study Area


Sheet 3 of 3
Wetland and Stream Survey
of the Mt. Ashland Ski Area
Special Use Permit Area Boundary
Watershed Analysis Area Boundary
Existing Buildings
Existing Lifts
Existing Parking Area
Mt. Ashland Access Road (County)
Forest Service Roads
Special Use Permit Maintenance Roads
Wetland and Stream Study Area Boundary
Existing Ski Runs
Riparian Reserve
N
Note:
"Proposed Activities" are a combination of all Action Alternatives and are shown here to display the extent of all potential actions.
400 0 400 800 Feet
Neil Creek
Ashland Creek
Cottonwood Creek
Grouse Creek
SOMER
SOMER
PARK
APRIL