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NATIONAL WETLAND INVENTORY

NOTES TO USERS

OKANOGAN HIGHLANDS

CENTRAL WASHINGTON

1:100,000 Scale Map Covered

OKANOGAN NE

MAP PREPARATION

The U. S. Fish and Wildlife Service, Office of Habitat Resources, is conducting an inventory of the wetlands of the United States. The National Wetlands Inventory (NWI) is establishing a wetland data base in both map and computer forms for the entire country. The NWI information will serve to identify the current status of U. S. wetlands and can be used as a reference point from which future changes in wetlands can be evaluated.

The purpose of Notes to Users is to provide general information regarding the production of NWI maps and wetlands found within a relatively similar geographic area. Notes to Users are not intended to include complete descriptions of all wetlands found in the area nor provide complete plant species information.

Specific wetland map delineations and classification are the product of photo-interpretation of high altitude aerial photography, supported by preliminary field reconnaissance and aided by the use of collateral information. The system for wetlands classification is in accordance with "Classification of Wetlands and Deepwater Habitats of the United States", Cowardin, et. al., 1979.

All photography used for interpretation was National High Altitude Color infrared at a scale of 1:58,000. The photography was taken on four days in August 1983 and on August 20th, 1984. Photo-interpretation was done on the color infrared, but collateral black and white photography at a scale of 1:80,000 was used as reference. This was necessary due to the discovery of abnormally high water conditions during and preceding the dates of the color infrared photography.

Geography

The mapping area is located in the northeastern quarter of Washington State. (See attached maps.) Falling within this area are portions of the Okanogan and Colville National Forests. The Cascade and Rocky Mountain Ranges meet in this area which is composed of high steep mountains and high glacial plains.

Bailey's Ecoregion Classification (1978) identifies two major domains within the study area, the Humid Temperate Domain and the Dry Domain. The largest portion of the study area falls within the Humid Temperate Domain, and is further classified as the Warm Continental Division, Columbia Forest Province, Douglas-fir Forest Section. This area consists of high rugged mountains, rising to more than 9,000 feet and flat or nearly flat valleys. Most of the region has been glaciated.

The characteristic vegetation of this area is mixed coniferous-deciduous forest. Douglas-fir forest and cedar-hemlock-Douglas-fir forest predominate with well marked life belts as a striking feature of this province. There are alpine areas with few if any

trees and an Engelmann spruce-subalpine fir belt below this. There is a western redcedar and western hemlock Montane belt. Associated trees include Douglas-fir, western larch, grand fir and western ponderosa pine. At the lower edge of the Montane belt belt in the southern end of the area is a grass-sagebrush belt.

The extreme western edge of the study area falls within the Humid Temperate Domain, Marine Division, Pacific Forest Province, Silver fir-Douglas-fir Forest Section. This area is very similar to the previously described Douglas-fir Forest Section.

The southern portion of the study area falls within the Dry Domain and is further classified as the Steppe Division, Palouse Grassland. This area occupies a series of loess-covered basalt tablelands. Elevations range from 1000 feet to as high as 4000 feet. Slopes are mostly hilly and steep. Major streams have cut deep canyons and glaciation is evident.

Many areas of flat or gently rolling relief have been cultivated for wheat production. Natural vegetation consists of prairie grasses and sagebrush. Some of the steep slopes have wooded areas of hawthorns, cottonwood and ponderosa pine.

Climate

In the northern mountainous part of the study area winters are usually severe. The average temperature of the coldest month is below 32°F. and the warmest is lower than 72°F. Summers consist of hot days and cool nights. Precipitation averages 20 to 40 inches per year most of which comes in the fall, winter and spring. Summers are dry and winter snows are heavy. Permanent snow fields and glaciers are small.

In the southern part of the study area the climate is much different. Precipitation averages 18 to 23 inches and comes mostly during the moderately cool, foggy and rainy winters. Summers are hot and nearly rainless. Average annual temperature is 45°F to 55°F.

Soils

Soil is a major factor in any plant community. Its properties become a major determining factor in hydric conditions and soils are therefore one of the criteria used to determine and define wetlands. Wetland hydric soils in the study area are mostly Mollisols or Entisols.

Representative soil associations include the Malo-Ret and Colville-Peone-Narcisse. The Malo-Ret association is nearly level, well drained and somewhat poorly drained soils of flood plains. Located along the San Poil and Kettle Rivers, the Ret soils dominate the low positions and depressions while the Malo soils are on higher areas. Malo soils are well drained while Ret soils are somewhat poorly drained. Ret soils are usually flooded

or saturated in spring when river levels are high. Most of this association is used for hay, pasture or small grain.

The Colville-Peone-Narcisse association is very deep, moderately well drained and poorly drained nearly level soils; on bottom lands, floodplains, alluvial fans, perimeters of lakes and in depressional areas. Colville soils are nearly level, poorly drained and formed in mixed alluvium on bottom lands. Narcisse soils are nearly level, moderately well drained and formed in mixed alluvium on bottom lands and in depressions. The Peone soils are nearly level, poorly drained and formed in mixed alluvium including volcanic ash and diatomite. These soils are found on floodplains, in depressional areas and on alluvial fans.

Wetlands can and do occur on other soil associations within the study area, as these are broad associations and not a list of all hydric soils of the area. Other associations not listed here have hydric soils as small inclusions within otherwise well drained groups of soils.

User Caution

The map document was prepared primarily by stereoscopic analysis of high altitude aerial photographs. Wetlands were identified on the photographs based on vegetation, visible hydrology, and geography in accordance with "Classification of Wetlands and Deep Water Habitats of the United States" Cowardin, et al, 1977. The aerial photographs typically reflected conditions during the specific year and season when they were taken. In addition, there is a margin of error inherent in the use of aerial photographs. Thus a detailed on-the-ground and historical analysis of a single site may result in revision of the wetland boundaries established through photographic interpretation. In addition, some small wetlands and those obscured by dense forest cover may not be included on the map document.

Federal, State, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either design or products of this inventory, to define limits of proprietary jurisdiction of any Federal, State, or local government or to establish the geographical scope of regulatory programs of government agencies. Persons intending to enage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, State, or local agencies concerning specific agency regulatory programs and proprietary jurisdictions that may affect such activities.

Additional information regarding this map or other National Wetland Inventory activities may be obtained by contacting:

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Aerial photo interpretation was completed by Martel Laboratories, Inc., St. Petersburg, Florida. Maps were prepared by NWI National Team in St. Petersburg, Florida.

Wetland Communities and Deepwater Habitats

Of the five wetland systems, only three, the Riverine, Palustrine and Lacustrine were found in the study area. Rivers and streams with their associated vegetated wetlands are the most frequently encountered wetlands. Virtually all rivers were classified as Riverine upper perennial (R30WH). Examples of the medium to large named rivers include the Kettle, Teanaway, Similkameen, Okanogan, Sandpoil and Nespelem Rivers. These rivers are fast flowing with a dissolved oxygen content which is very high and for the most part have a steep gradient (with minor areas of lower gradient). The substrate is generally rubble, cobble-gravel, sand or in some places bedrock. The bars in these upper perennial rivers vary greatly from vegetated to unvegetated.

The portions of river substrate exposed during low flows are generally sand or cobble-gravel and occur within the channel or along the edges of the river or stream. These are classified as Riverine, upper perennial, unconsolidated shore, temporarily flooded (R3USA) or Riverine, upper perennial, unconsolidated shore, seasonnaly flooded (R3USC).

When riverine systems and their adjacent vegetated wetlands were two narrow to be mapped separately at this scale, the vegetation took precedence. Water regimes were determined for these communities based on the class of stream on the U.S.G.S. topographic maps. Wetland vegetation occurring along perennial streams was given the seasonally flooded water regime (C) while wetland vegetation along intermittent streams was given the temporarily flooded water regime (A).

Intermittent riverine subsystems were mainly based on the U.S.G.S. quadrangle information. Seasonally flooded intermittents were well defined channels or streambeds (R4SBC) usually bright white and easily followed on the photography or else in well vegetated valleys. Temporarily flooded streambeds (R4SBA) were more a gray color and less distinct.

Lacustrine communities occurred as both natural and impounded water bodies. These ranged in size from very large to those which were only just large enough to meet the 20 acre size criteria. Some examples of the larger named natural lakes include Omak, Osoyoos, Palmer, Wannacut and Spectacle Lake. These were classified as L1OWH. Examples of impounded reservoirs are Franklin Roosevelt Lake (Columbia River), Conconully Reservoir and Salmon Lake. These were classified as L1OWHh. Substrates will undoubtedley range from silts and muds through bedrock.

Both the natural and impounded lakes had unconsolidated shore (beach bars or draw down) areas. These consisted of sands, muds, silts and cobble-gravel areas which are exposed at sometime during low water periods annually. On natural lakes these areas are classified as; Lacustrine, unconsolidated shore, seasonally flooded (L2USC) and along dammed rivers or reservoirs the impounded modifier is added (L2USCh).

In the Palustrine system ponds, palustrine open water areas, were very similar to lakes with the exception of size. Ponds, both permanent and semipermanent in nature (POWH and POWF respectively) range in size from very small (less than one acre) to just smaller than a lake (just less than 20 acres). Substrate is probably limited to sand, silt or mud with some undoubtedly existing on bedrock. In lava bed areas, many such small ponds occur with great density.

The most common Palustrine vegetated wetlands were of a seasonally flooded type. These were found adjacent to open water areas, as isolated depressions, in agricultural areas and along river flood plains or in lowland areas. Temporarily flooded wetlands were next in frequency occurring in the same kinds of areas as the seasonally flooded. The semipermantly flooded wetlands occurred with the least frequency and were most often tied to lakes, ponds, or impounded stream channels.

The vegetated river bars range from scrub-shrub to forested and occur either within the river channel or along the banks. Seasonally flooded scrub-shrub bars were comprised of sparse to dense willow (Salix spp.) and were on sand to various mixtures of cobble-gravel and sand. Some bars had varying amounts of red alder (Alnus rubra) also. These wetlands were classified as PSSC. The temporarily flooded bars are more built up places in the channel or areas leading up the banks of the channel. These temporarily flooded scrub-shrub wetlands had very dense cover of willow, alder or a mixture and are classified as PSSA. In general the more vegetation on the bar the less often and the shorter the duration of the flooding.

Forested river bars were not encountered frequently. When they were, they were vegetated with red alder or black cottonwood (Populus trichocarpa) and were generally temporarily flooded (PFOA). The seasonally flooded examples were mainly forested with red alder and classified as PFOC.

River flood plain scrub-shrub wetland communities had varying densities of shrubs. The seasonally flooded of these wetlands (PSSC) were comprised of various mixtures of willow and red alder. The temporarily flooded shrub communities (PSSA) were mainly vegetated by red alder. Semipermanent scrub-shrub wetlands (PSSF) within river flood plains were associated with beaver dams.

Scrub-shrub wetlands also occur along and around lakes. These communities range from very dense growth of shrubs to more open areas of shrubs with a groundcover of herbaceous growth. The wettest of these areas are the semipermanently flooded communities (PSSF). They are usually monotypic willow or dominated by willow with red alder in mixture. In these semipermanent shrub wetlands herbaceous vegetation is sparse and is comprised of mainly cattail (Typha latifolia). Seasonally flooded scrub-shrub wetlands (PSSC) which are encountered most frequently of shrub wetlands have more of a mixture of species. Included here are codominant willows and red alder. Herbaceous species of this community are more prevalent than in the semipermanent areas and include sphagnum moss (Sphagnum sp.), hardstem bulrushes (Scirpus acutus), reed canary grass (Phalaris arundinacea) and unidentified sedges (Carex spp.), rushes (Juncus spp.) and forbs.

The forested component of flood plain wetland communities was mainly temporarily flooded (PFOA). These areas were on small benches or terraces slightly raised above the channel but before the banks rose to upland (non-wetlands). Species present here include red alder (both tree and shrub size), black cottonwood, lodgepole pine (Pinus contorta) and quaking aspen (Populus tremula subsp. tremuloides). Various grasses, sedges, rushes and ferns occur scattered on the forest floor. As the forested flood plain gets wetter (PFOC) the herbaceous layer changes to a more sedge/rush composition and becomes more scattered and red alder and willow increase in frequency of occurrence. The tree composition also changes to less of a mixture and more toward monotypic stands of red alder or black cottonwood. Monotypic stands of red alder or black cottonwood may also be temporarily flooded or upland however, so location in respect to the river channel, slope, or elevation must be considered for these communities.

Forested depressions were mostly seasonally flooded. When dominated by evergreen species these areas had a more open understory. The species here were Western redcedar (Thuja plicata) or Engelmann spruce (Picea engelmannii). Under a forest cover of this type there was a more lush growth of ferns and mosses together with sedges.

Deciduous forested wetlands were communities of variation. Temporarily flooded stands of quaking aspen were found, but aspen could also be found on upland. Red Alder stands could be seasonally flooded, temporarily flooded or upland communities. The forested wetlands occurring in depressions throughout the study area resembled those already discussed.

Emergent wetlands within floodplains were seasonally flooded to temporarily flooded (PEMC, PEMA). Seasonally flooded emergent communities were composed of soft rush (Juncus effusus), spike-rushes (Eleocharis sp.), Nebraska sedge (Carex nebraskensis), slough sedge (Carex obnupta), horse-tails or scouring rushes (Equisetum spp.), and reed canary grass.

These areas are generally within broad valleys and are often used as pasture or if dry enough at the end of the season they are mowed for hay. Temporarily flooded areas are composed of more grasses such as hairgrass (Deschampsia sp.) Many of these areas are also grazed or mowed if accessible.

Lake marshes consisted of emergent species of grasses, sedges, rushes, grass-like plants and forbs. They occurred around the edges of lakes in the shallow areas which are flooded for varing lengths of time during the growing season. Very few semipermanent (PEMF) areas were encountered. When they do occur they contain cattail and hardstem bulrush or are almost a monotypic stand of cattail. The next drier zone is the seasonally flooded (PEMC) shallow marsh. The species here include cattails, bulrushes, rushes, sedges and reed canary grass. The temporarily flooded zone (PEMA) between the shallow marsh and the upland is comprised of rushes, sedges, and water tolerant grasses.

Wet meadow emergent communities occurred as high mountain meadows, pasture or grazed areas and mowed meadows. The high mountain meadows had a rather distinct edge where shrubs or trees started the transition to drier conditions and uplands. The water table fluctuates from above the soil surface to usually just below it. Species here include slough sedge, water sedge (Carex aquatilis), Nebraska sedge, ladies tresses (Spiranthes romanzoffiana), water tolerant grasses and grass-like plants and sphagnum moss. These communities were classified as PEMC.

Emergent wetlands which are grazed or mowed occur in the valley areas. These wetlands are quite often influenced by irrigation of surrounding cropland. These meadows are generally seasonally to temporarily flooded depending on size, soils and man's influence. Seasonally flooded examples contain reed canary grass, phragmites (Phragmites australis),rushes and many species of grasses and grass-like plants. The temporary meadows generally have species of short grasses, spike-rushes and sedges.

Springs occur throughout the study area. They take the form of seepy slopes, "headwaters" of and along rivers and within meadow areas. The seepy slope type is vegetated by many species of sedges and some wetland grasses. The "headwaters" type are generally within scrub-shrub communities. Species here include willow and alder, and along the drainages, hawthorn (Crataegus sp.). The meadow type is vegetated by grasses, sedges and rushes.

Community descriptions and species listed here are representative of the more commonly occurring conditions within the study area and are not intended to be all inclusive. Wetlands may be encountered which are different, to one degree or another, from those discussed here.

Table 1: Wetlands Communities

NWI CODE	NWI DESCRIPTION	COMMON DESCRIPTION	VEGETATION/SUBSTRATE
R3OW	Riverine, upper perennial, open water	River, stream or creek	Unvegetated; sand, cobble-gravel or rubble
R2OW	Riverine, lower perennial, open water	River, stream or creek	Unvegetated sand, cobble-gravel or rubble
R4SB	Riverine, intermittent, stream bed	Stream or creek	Unvegetated; sand, cobble-gravel or rubble
R3US	Riverine, upper perennial, unconsolidated shore	River bars, gravel bars	Unvegetated; sand, cobble-gravel or rubble
L1OW	Lacustrine, limnetic, open water	Lakes (can be dammed river channels)	Unvegetated, sand, mud or cobble-gravel
L2US	Lacustrine, littoral, unconsolidated shore	Lake shores, impoundment draw down zones	Unvegetated; sand, mud, or cobble-gravel
PFO	Palustrine, forested	Wet forest, depressional forest, flood plain forests, river bars	Red alder (*Alnus rubra*) Black cottonwood (*Populus trichocarpa*) Quaking aspen (*Populus tremula* subsp. *tremuloides*) Western redcedar (*Thuja plicata*) Englemann spruce (*Picea engelmannii*) Lodgepole pine (*Pinus contorta*)

Table 1: Wetlands Communities

NWI CODE	NWI DESCRIPTION	COMMON DESCRIPTION	VEGETATION/SUBSTRATE
PSS	Palustrine, scrub-shrub	Shrub swamp, shrub thicket, flood plain thickets, river bars.	Red alder (*Alnus rubra*) Willow (*Salix* spp.) Hawthorn (*Crataegus* sp.)
PEM	Palustrine, emergent	Alpine meadows, wet meadows, wet pasture, depressions, lake edges, pond edges, river banks, marsh, shallow marsh, deep marsh	Sphagnum (*Sphagnum* sp.) Soft rush (*Juncus effusus*) Nebraska sedge (*Carex nebraskensis*) Slough sedge (*Carex obnupta*) Reed canary grass (*Phalaris arundinacea*) Horse-tail (*Equisetum* spp.) Cattails (*Typa latifolia*) Hairgrass (*Deschampsia* sp.) Water sedge (*Carex aquatilis*) Ladies tresses (*Spiranthes romanzoffiana*) Hardstem bulrush (*Scirpus acutus*) Phragmites (*Phragmites australis*) Spike-rushes (*Eleocharis* spp.) Water tolerant forbs Water tolerant grasses
POW	Palustrine, open water	Pond	Unvegetated, sand, mud, cobble-gravel

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