

NATIONAL WETLAND INVENTORY

NOTES TO USERS

OKANOGAN HIGHLANDS

CENTRAL WASHINGTON

1:100,000 Scale Maps Covered

OKANOGAN NE, SE, SW, NW

DRAFT

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. Many wetland areas during 1983 and 1984 showed open water conditions when on the black and white photography taken during the summer of 1980 these were emergent wetlands with no visible standing water. There were also areas which appeared to be wet on the color photography, but which were actually upland or ephemeral wetlands as determined from the collateral black and white photography. Use of the collateral photography also led to the reduction in size of some wetlands which shown larger on the color photography due to high water conditions.

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 (M2111). 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 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 (M2415). This area is very similar to the previously described Douglas-fir Forest Section and is discussed in "Notes to Users, North Cascades, Central Washington."

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.

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 engage 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 interpreter was completed by Martel Laboratories, Inc., St. Petersburg, Florida. Maps were prepared by NWI National Team in St. Petersburg, Florida.

Wetland Communities

Rivers and streams with their associated vegetated wetlands are the most frequently encountered wetlands. Virtually all rivers were of the upper perennial subsystem (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 unvegetated bars are generally sand or cobble-gravel and occur within the channel or along the edges of the river or stream. These are classified as R3USA (temporarily flooded) or R3USC (seasonally flooded).

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 floodplain 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 floodplains were associated with beaver influence and will be discussed later.

The forested component of floodplain 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 and quaking aspen (Populus tremula). Various grasses, sedges, rushes and ferns occur scattered on the forest floor. As the forested floodplain 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.

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

When riverine systems and their adjacent vegetated wetlands were too narrow to be mapped separately at this scale, the vegetation took precedence. Communities will be the same as those already described but the water regime was determined based on the class of stream on the U.S.G.S. topographic maps. Vegetated linears occurring along perennial streams were given the seasonally flooded water regime (C) while those along intermittent streams were given the temporarily flooded water regime (A). This was done because it was thought that perennial streams would carry enough water to overflow their banks during spring run off for longer periods than intermittent streams.

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

U.S.G.S. quadrangle information was used in virtually all cases to make subsystem determination in the Riverine system. Perennials were labeled as either Riverine upper perennial or lower perennial (R3 and R2 respectively) and intermittents as such (R4). An exception to this was in the case of man-made irrigation canals and flumes. These were placed in the intermittent subsystem whether mapped as perennial or intermittent by U.S.G.S. If perennial by U.S.G.S., then they were labeled R4SBKfx when excavated and R4SBKfr when obviously concrete lined or elevated as a flume. If they were identified as intermittent by U.S.G.S., then they were classified as R4SBKCx or R4SBKCr respectively. These canals are closed off at various times in the growing season depending upon water needs and therefore do not contain water all year.

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 L10WH. Examples of impounded reservoirs are Franklin Roosevelt Lake (Columbia River), Conconully Reservoir and Salmon Lake. These were classified as L10WHh. Substrates will undoubtedly 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 L2USC and along dammed rivers or reservoirs the impounded modifier is added (L2USCh).

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 varying lengths of time during the growing season. Very few semipermanent (PEMF) areas were encountered. When they do occur they contain cattail (Typha latifolia) and hardstem bulrush (Scirpus acutus) 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 unidentified grasses.

Shrub swamps or 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 semi-permanent shrub wetlands herbaceous vegetation is sparse and is comprised of mainly cattail. 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, bulrushes, reed canary grass and unidentified sedges, rushes and forbs.

Forested wetlands around lakes were usually of the temporarily flooded type (PFOA). These wetlands had a well developed over-story of deciduous trees including most often red alder or black cottonwood.

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 various vegetated palustrine wetlands associated with ponds are very similar if not identical to those of lakes as previously described.

Beaver modified wetlands can be discussed as either part of the pond communities or with the riverine associate communities. In most cases these wetlands were the main occurrence of semipermanently flooded wetlands. The impounding of a stream channel by beavers can lead to any combination of wetlands from open water through permanently flooded emergents trees or shrubs. Generally however, the vegetated wetlands within the influence of beaver impoundments are of the semipermanent or seasonally flooded water regimes. The species composition of these wetlands is the same as discussed under the lakes and their associated wetlands and will not be discussed again here. All wetlands which exist because of visible indications of beaver activity are given this special modifier(b), eg. PSSCb.

Other wetlands of the palustrine system were scattered throughout upland areas as pockets or depressional areas. These wetlands included examples of forested, scrub-shrub, emergent, unconsolidated shore and mixed class wetlands.

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 Douglas-fir (Pseudotsuga menziesii). 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 in association with rivers and lakes.

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), unidentified grasses and grass-like plants and sphagnum. 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 canarygrass, phragmites (Phragmites australis), rushes and many species of grasses and grass-like plants. The temporary meadows generally have species of short grasses 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.).

In summary the most common vegetated wetlands were of a seasonally flooded type. These occurred as isolated pockets, adjacent to open water areas, in agricultural areas and along river floodplains. Temporarily flooded wetlands were next in frequency occurring in the same kinds of areas as the seasonally flooded. The semipermanently flooded wetlands occurred with the least frequency and were most often tied to lakes, ponds, or beaver influenced stream channels.

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, floodplain forests, river bars	Red alder (<u>Alnus rubra</u>) Black cottonwood (<u>Populus trichocarpa</u>) Quaking aspen (<u>Populus tremula</u>) Western redcedar (<u>Thuja plicata</u>) Fir (<u>Abies</u> spp.) Engelmann spruce (<u>Picea engelmannii</u>) Ponderose pine (<u>Pinus ponderosa</u>) Douglas-fir (<u>Pseudotsuga menziesii</u>)

Table 1: Wetlands Communities

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

CENTRAL WASHINGTON

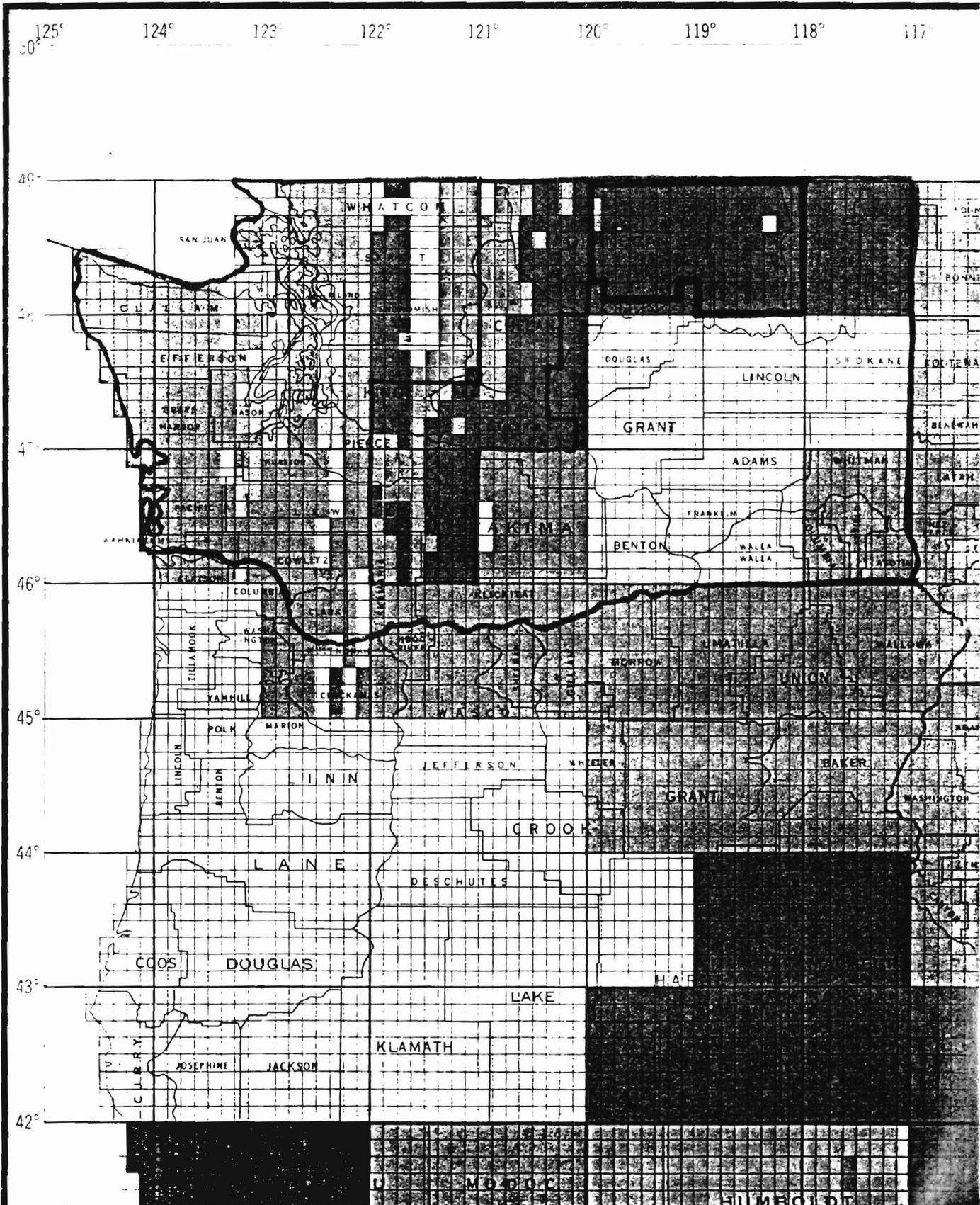
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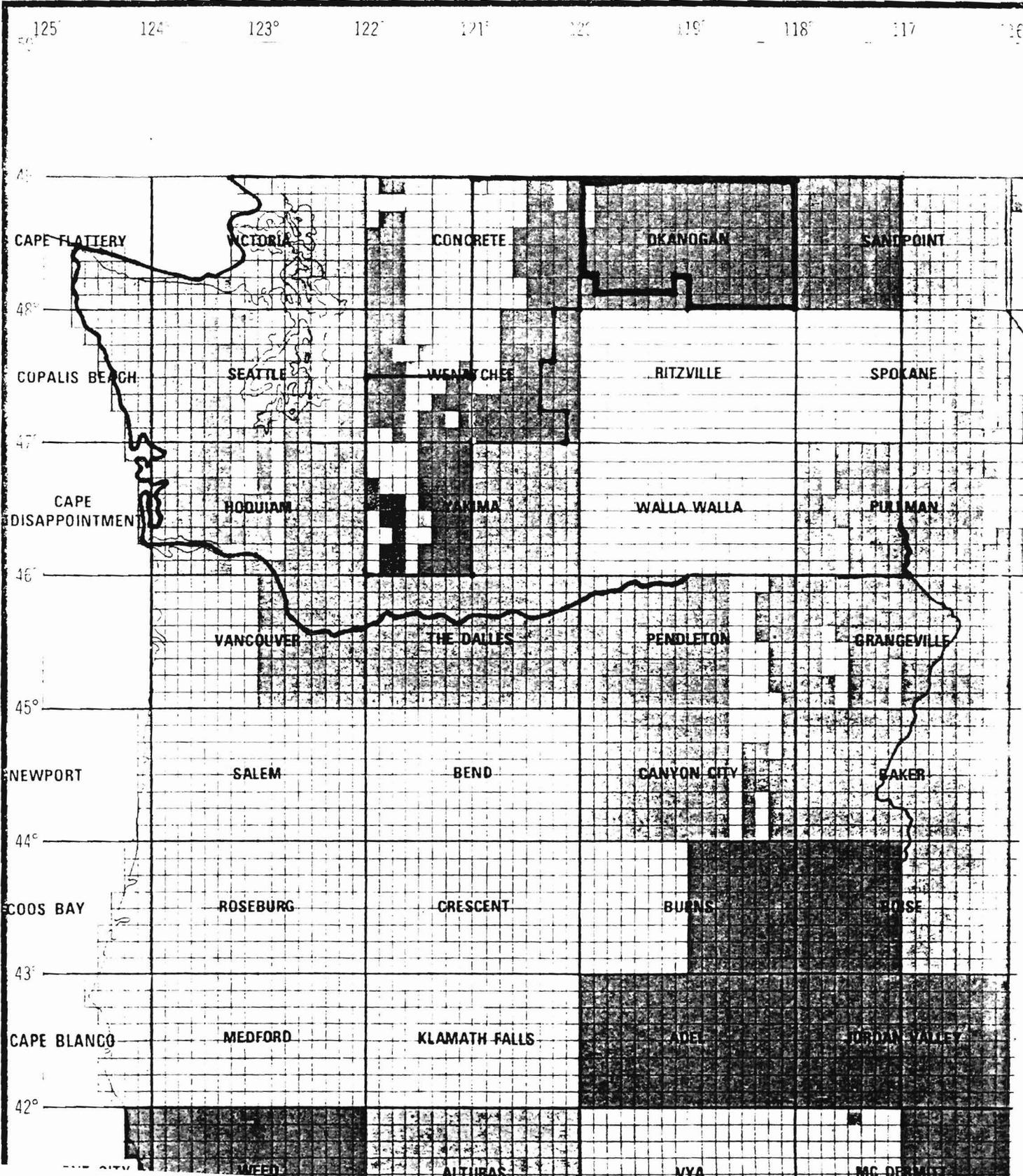
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Bibliography

Bailey, R.G. 1978. "Description of the Ecoregions of the United States." 77pp. U.S. Department of Agriculture. Forest Service.

Cowardin, L.M., et al. 1979. "Classification of Wetlands and Deepwater Habitats of the United States." 103pp. U.S. Dept. of the Interior. Fish and Wildlife Service. FWS/OBS-79/31.

"Hydric Soils of the United States 1985." First edition 1985. U.S. Department of Agriculture. Soil Conservation Service.

* Kozloff, (FI). (MI). (Date). "Plants and Animals of the Pacific Northwest." (Publication data).

Little, Elbert L. 1980. "The Audubon Society Field Guide to North American Trees, Western Region." Alfred A. Knopf, Inc., New York.

Soil Survey of Douglas County, Washington. 1981. U.S. Department of Agriculture. Soil Conservation Service.

Soil Survey of North Ferry Area, Washington. 1979. U.S. Department of Agriculture. Soil Conservation Service.

Soil Survey of Okanogan County Area, Washington. 1980. U.S. Department of Agriculture. Soil Conservation Service.

Soil Survey of Stevens County, Washington. 1982. U.S. Department of Agriculture. Soil Conservation Service.

Weinmann, F., et al. 1984. "Wetland Plants of the Pacific Northwest." 85pp. U.S. Army Corps of Engineers.

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Please supply the missing information needed above.

THANKS.

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