LOWER COLUMBIA RIVER NATURAL AREA INVENTORY

1992

John A. Christy and Judy A. Putera
Oregon Natural Heritage Program

Report to The Nature Conservancy,
Washington Filed Office, Seattle

3 February 1993

INTRODUCTION

The purpose of this study was to identify remnant habitat approximating conditions prior to Euroamerican settlement, along the floodplain of the lower Columbia River. About 143 river miles were examined in both Oregon and Washington, between Bonneville Dam and the mouth of the river, as well as lower portions of Chinook River, Elochoman River, Grays River, Lewis River, Youngs River and the Willamette River. Our objective was to produce a list of sites, ranked by the relative importance of their elements, for use in setting priorities for protection. We also wanted to examine the historical record, to document the composition of natural communities at the time of settlement, and their subsequent disturbance.

Previous work

Reports of presettlement vegetation along the lower Columbia River are few and fragmentary. Most mention of plants or plant communities are made in conjunction with human activities such as exploration or commerce, and are exceedingly vague. Much of our knowledge had to be inferred from what little there is in the historical record, and from what remains along the river today.

The journals of early botanists such as Douglas (1914) and Scouler (1905) are not particularly helpful in

Cathlamet (Glad and Halse 1993). This species may eventually dominate better-drained sites above the intertidal zone.

All of these taxa should be listed as noxious weeds by both Oregon and Washington. It is unfortunate that all are readily available from the grass seed trade and nurseries.

Plant Communities

Cover data were recorded in 105 vegetation plots, and were used to identify 43 plant communities, which we consider to be elements, along the lower Columbia River (Table 5). Many of these communities are restricted to specific segments along the river. Global and state ranks are given in Appendix 2 for all communities occurring in Oregon, and a few are recommended for those in Washington. Ranking and size of plant community element occurrences are also given in Appendix 2.

We considered seven plant communities to be rare regionally or globally.

1. Artemisia lindleyana-Deschampsia cespitosa (Columbia River mugwort-tufted hairgrass cobble community). Should be ranked G1S1. This community is limited to river miles 140 to 145, just below Bonneville Dam, where the substrate is occasionally-flooded cobbles and gravels mixed with silts. The only known occurrences are both on the Washington side of the river, and are probably relicts of a once more widespread Columbia River Gorge community, now inundated by the water behind Bonneville Dam (Cornelius 1985).

2. Carex aperta (Columbia sedge community). Should be ranked G1S1. This species once formed "extensive meadows on overflow bottomlands in the valley of the Columbia and its tributaries...largely cut for hay and regarded by farmers as the best forage sedge" and was "common about Columbia Slough etc." (Gorman 1926). Piper and Beattie (1915) said it was "the common hay sedge of the Columbia

River bottoms." It probably extended from Longview to Skamania. The only known remaining example covers about two acres near Vancouver Lake. Elsewhere, it has been completely displaced by reed canary grass. The sedge itself is not rare, and can be found mixed with canary grass in many areas, but it is never plentiful.

3. Elymus mollis (American dunegrass community). Ranked G1S1 in Oregon. This species was once the dominant native grass on coastal foredunes. Although it was planted sparingly in dune stabilization programs beginning in 1916, it has been largely displaced throughout its range by the more aggressive European beachgrass (Ammophila arenaria), the species most commonly used for stabilization (Arnst 1942; McLaughlin and Brown 1942). The single population that we saw on East Sand Island may have been planted, and was not a high-quality occurrence. The island has been augmented by accretion and dredge spoil deposition since engineering began at the mouth of the river in 1885.

4. Festuca rubra (Red fescue dune community). Ranked G1S1 in Oregon. Red fescue was a common sod-forming grass of open, stabilized sand dunes on the outer coast. It was the dominant grass on the Clatsop Plains at the time of settlement, but overgrazing and trailing by livestock destroyed the sod and caused new dunes to form. Like American dunegrass, it was planted occasionally for dune stabilization, but has been displaced largely by the more aggressive European beachgrass (Arnst 1942; McLaughlin and Brown 1942). Its occurrence on West Sand Island is the primary reason for proposed designation of a Research Natural Area by the Army Corps of Engineers. Presence of active blowouts, and a relatively early stage of succession within the proposed RNA were probably caused by overgrazing when the island was used as a base for horse seining in Baker Bay.

5. Picea sitchensis/Cornus stolonifera (Sitka spruce swamp). Ranked G3S2 in Oregon. These stands typically have Cornus stolonifera-Salix sitchensis shrub swamp in their interior, with spruce trees

3. **Overflow plains.** Longview to Skamania, river miles 65 to 140. Elevations in this segment of the floodplain are generally higher, and shorelines upriver from Portland typically have sandy cutbanks. Although hydric soils are common, the moisture regime is seasonal rather than perennial, and soils are better drained. The dendritic, meandering tidal streams of the previous segment are replaced by linear, shallow troughs and low ridges that are parallel to the river. These are relics of the extensive reworking of sediments by high-energy floods that occurred prior to flood control. Broad, shallow overflow lakes and ponds are common. These originally were recharged annually by the June flood, and many dried up by late summer. Recharge of most of these is now limited to precipitation. As in the previous segment, thousands of acres of bottomland have been diked and the sloughs gated. Weirs were installed on many of the overflow lakes to retain water for livestock and duck hunting. The wettest sites currently are dominated by extensive stands of Eleocharis palustris in shallows along the river, Salix fluviatilis on sandy banks and bars, and Salix lasiandra on wet flats along channels and around overflow lakes. The Fraxinus latifolia/Urtica dioica association occurs on slightly higher sites protected by natural levees. The understory has been degraded extensively by grazing and invasion of reed canary grass. Higher banks and the tops of natural levees are dominated by associations of Fraxinus latifolia and Populus trichocarpa, with Cornus stolonifera, Symphoricarpos albus and Urtica dioica. Historically, several plant communities occurred in this segment that are now extremely rare or extirpated, including Carex aperta marsh, Deschampsia cespitosa prairie, and oak savanna with an understory probably dominated by Festuca rubra and Danthonia californica. Sand deposition between Government Island and Skamania Island formed extensive tidal flats, and east winds from the Columbia River Gorge blew sand into towering dunes on the Oregon shore in the vicinity of Rooster Rock State Park. Although the dunes on the mainland have been stabilized by vegetation, those on Sand Island are still active, and are the last such features on the lower Columbia River.

4. **Columbia River Gorge.** Skamania to Bonneville Dam, river miles 140 to 145. This short stretch of

river is characterized by a coarse substrate of cobble and gravels, presumably derived from the Table Mountain landslide that formed the former falls and rapids known as The Cascades. There are few wetlands on the floodplain, and the rocky shores have a sparse flora. Tidal influence reaches zero at Warrendale, just below Beacon Rock. The rare Artemisia lindleyana-Deschampsia cespitosa plant community is restricted to this segment. These five miles are all that remain of what was a much more extensive reach of river, now inundated by the waters behind Bonneville Dam.

IMPACTS OF EUROAMERICAN SETTLEMENT

Alteration of flood regimes

The Columbia River drains an area of 259,000 square miles. Prior to the construction of dams on the Columbia and its tributaries, the lower river flooded under two distinct seasonal regimes, one initiated by winter rain west of the Cascades, the other by spring snowmelt east of the Cascades.

While winter floods were usually more local in distribution, spring floods affected the entire reach of river below what is now Bonneville Dam. Flood heights gradually diminished downstream, and below river mile 40 the broad estuary and strong tidal influence dissipated its effects. Floodwaters of 20 to 30 feet at Vancouver would rise to only two to five feet in the estuary (U.S. Army Corps of Engineers 1948, 1988).

1. **Winter floods.** The winter "rain floods" result from runoff generated by seasonal rain storms in and west of the Cascade Range, an area comprising only about 3% of the Columbia River watershed. Some 25 dams in the Cowlitz, Lewis and Willamette River basins have diminished major winter flooding on these streams. Rain floods generally crest and abate within one or two days, and originally occurred primarily on the tributaries or at their confluences with the Columbia River. Such storms caused the Columbia to flood an average of once every five years. Notable winter floods on the

Columbia occurred in 1881, 1909, 1917, 1933, 1941, 1946, 1964 and 1974. The largest of these, in 1964, was 29.5 feet above mean low water at Vancouver (U.S. Army Corps of Engineers 1948, 1988).

Winter flooding also occurs between the mouth of the river and Puget Island, when high winter tides coincide with high winds and runoff from major storms, to raise water levels four to five feet above predicted high winter tides of nine or 10 feet. Some of these events can drive floating debris far into the interior of stands of riparian vegetation. The 1933 rain flood combined with winter high tides to reach a stage in the estuary equaling that of the 1894 flood.

2. **Spring floods**. About 93% of the Columbia River watershed is east of the Cascade Range, extending all the way to the Rocky Mountains. This region has a cold continental climate, and the primary source of high water is from snowmelt, occurring between April and August. Before the dams were built, spring floods were often higher and lasted much longer than winter floods. Most occurred each year in May or June. The average "June flood" regularly inundated 170,000 acres of bottomland along the lower Columbia River for periods up to 60 days. Major floods inundated 250,000 to 300,000 acres.

The spring floods were the primary force influencing landforms and vegetation on the river bottoms. The average annual flood reached a stage of 21.5 ft. above mean low water at Vancouver, a had a flow of about 600,000 cfs. These average flows were punctuated periodically by huge flows that had tremendous impact on riparian habitats. Spring floods greater than 600,000 cfs occurred 46 times between 1858 and 1956. Floods between 800,000 and 900,000 cfs occurred in 1859, 1866, 1871, 1882, 1887 and 1956. Floods exceeded 900,000 cfs in 1862, 1876, 1880, 1894 and 1948. The largest of these, in 1894, reached 1,254,000 cfs, twice as large as the average spring flood. Floodwaters reached 43 feet above mean low water at Beacon Rock and 36.2 feet at Vancouver, diminishing to about 12 feet at the mouth of the river. A spring flood in 1849 was probably of the same magnitude (U.S. Army Corps of Engineers 1948, 1988).

Aerial photographs showing flooded bottomland are housed at the Oregon Historical Society, and most depict areas between Longview and Crown Point. Over enormous areas of bottomland, only the tops of ash, Pacific willow and cottonwood trees were visible at highest flood stages, the lakes and sloughs all being inundated.

Historical accounts of floods in rural areas along the lower Columbia River are hard to find. Surveyors for the General Land Office noted in the 1850's that "the Columbia bottoms...are all overflowed by the river in high water", "subject to annual inundation varying from one to fifteen feet deep" and "subject to overflow from the high waters of the Columbia River which occurs annually...in the first of May and continuing until the middle of July, during which time the farmers may sail over their farms in boats." Bottomlands at Rooster Rock State Park flooded from four to 20 feet. On Puget Island, "water stood on practically all the land for several months each year" (Butler 1953). Sauvie Island "was inundated almost every year by the floods and back waters of the two rivers" (Cleaver 1989).

Diking, more than 200 hydroelectric and storage dams, irrigation diversions and a long-term decline in precipitation have diminished the occurrence of floods along the lower Columbia River. Comparison of early and contemporary photographs shows some striking changes along the river, due primarily to flood control, and to a lesser extent, channel controls such as pile dikes. Most obvious is a change in shorelines on both islands and the mainland, caused by accretion of sediment. Many islands between Portland and Bonneville Dam had wide aprons of sand and gravel flats around their upstream ends, and cutbanks where flood waters scoured away sediments and vegetation. Undermined vegetation dumped into the river and piled up at the upper ends of islands downstream. Some of these features are still active at Reed, Sand and Skamania Islands. Most islands between Puget Island and Bonneville Dam have increased in size, and many interior sloughs have silted in. The *Salix fluviatilis*-*Salix lasiandra* community has populated former sand and gravel flats, expanding the size of islands and shorelines, to the detriment of *Rorippa columbiae* and the *Artemisia lindleyana*-*Deschampsia cespitosa* community at the upper end of the study area (Cornelius 1985; Scherer 1991). Shallow overflow lakes and ponds have diminished in size because of similar siltation and

On both the Columbia and Willamette rivers, logging for paper pulp reached major proportions by the turn of the century (Sedell and Froggatt 1984). "But a few years ago this timber was called worthless, nowadays the steamboats tow great rafts to the paper mills of Oregon City every year" (Nash 1904).

Wood chips from upland logging gradually replaced native cottonwood as a source of paper pulp between 1900 and 1920, although use of hybrid cottonwoods for this purpose has increased markedly in the last decade.

2. **Oregon ash.** Ash is almost as ubiquitous as cottonwood along the lower Columbia River, and is most common on the overflow plains between Longview and Skamania. Although usually intermixed with cottonwood on terraces and natural levees, pure and often extensive stands are frequent on slightly lower elevations between riverside levees and interior overflow lakes and ponds. As noted previously, all the stands we saw had been degraded by grazing and invasion of reed canary grass.

Most trees we saw on the lower Columbia River, both mixed with cottonwood and in monotypic stands, ranged from 8 to 48 inches in diameter, and most were between 11 and 21 inches. Ash trees with similar diameters in the Willamette Valley ranged from 59 to 72 years old (Frenkel & Heinitz 1987). Many stands therefore appear to have originated between 1910 and 1930, and reproduction continues at the present time. In contrast, a few stands on Sauvie Island, the Ridgefield NWR and at Burlington Bottoms, have old-growth trees with diameters of five to six feet. Many of them occur at the edges of tidal creeks draining interior overflow lakes, and are absent farther back from the streams. They are always hollow, impossible to date with an increment borer, and are surely of presettlement age. Peattie (1953) reported trees over two hundred years old. Trees of this size seem to be most common on the overflow plains topography between Deer Island and Portland. Adjacent monotypic stands of ash were always the younger age class described previously.

Although ash trees were used for wagon and carriage frames, tool handles, oars, barrel staves, furniture and interior finish of houses, its primary use was for firewood (Sargent 1894, Jepson 1910, Peattie 1953). Reynolds (1942) provided statistics on oak and alder, but not for Oregon ash. Presumably it was used primarily for domestic heating and not for commercial steamship contracts.

3. **Pacific willow.** Although all willows were classified as shrubs during this inventory, Pacific willow often attains tree height throughout most of its range. It is ubiquitous between Grays Bay and Bonneville Dam, but reaches its best development as a community in the overflow plains segment between Longview and Skamania. It occupies a topographic position between the Fraxinus latifolia/Urtica dioica or the Fraxinus latifolia-Populus trichocarpa/Cornus stolonifera/Urtica dioica communities and what was probably the Carex aperta community, now completely replaced by reed canary grass. The understory is now dominated by reed canary grass, and we found no stands with an intact understory.

Trees we saw ranged from 8 to 30 inches in diameter, and most were between 13 and 20 inches. Although absolute dates are unknown, photography housed at the Army Corps of Engineers and the Oregon Historical Society indicates that trees with diameters of 24 to 30 inches are 50 to 60 years old. This is about the maximum diameter seen along the river. Pacific willow is a favored food of beaver. The community seems to be maintained by vigorous resprouting following blowdown or heavy cropping by beaver. Although well suited to periodic inundation, prolonged flooding has killed stands at Rooster Rock State Park and at Smith and Bybee Lakes.

The Pacific willow community remains widespread around overflow lakes and ponds, where historically it probably reached its greatest development. Apparently there were no commercial uses of the species in our area (Peattie 1953). Clearing of

			Plan.
44	Jackson & Whites Islands, WA	Purchase	Excellent habitat mix on larger undiked islands; adjacent to extensively-diked Dept. of Wildlife.
49	Wallace Island, OR	Purchase	Large undiked island with predominantly habitat.
60	Coal Creek Slough	Purchase	Farthest upriver surviving occurrence of undiked freshwater tideland marsh and willow shrub swamp; adjacent to extensively-diked Willow Grove and Longview bottomland.
101	Vancouver Lake	NAP	Last remaining known example of _Carex aperta_ marsh on lower Columbia River. Globally endangered community.
131	Sand Island, OR	NHCA	Last remaining unstabilized sand dunes on lower Columbia River; active burial of cottonwood forest; regionally significant, many historic losses.
138	Franz Lake, WA	RNA	Largest remaining wapato, spikerush and bulrush marsh on lower Columbia River. All other occurrences are smaller and more impacted by development and adventive species.
141	Beacon Rock	NAP	One of two known surviving occurrences of

Plant communities
Eleocharis palustris
Salix lasiandra/Urtica dioica

100	L	8-21	Sauvie Island, OR: Virginia Lake. T2N, R1W, Secs. 17, 18. Quad: Sauvie Island. Plant communities Fraxinus latifolia-Populus trichocarpa/Symphoricarpos albus/Urtica dioica Ludwigia palustris-Polygonum hydropiperoides
101	M	8-28	Vancouver Lake, WA: S end. T2N, R1E, Secs. 7, 8, 17. Quad: Vancouver. Animals Ardea herodias (Mapped: .267, breeding colony) Casmerodius albus (Mapped: .010) Plants Carex interrupta Lindernia dubia Plant communities Carex aperta Eleocharis palustris Salix fluviatilis-Salix lasiandra Salix lasiandra/Urtica dioica Solidago occidentalis
102	L	9-17	Sauvie Island, OR: Bybee-Howell Marsh. T2N, R1W, Sec. 21. Quad: Sauvie Island. Plants Scirpus cyperinus Plant communities

<u>Bidens cernua</u> - OR: G4S4

A	100	RM 21: OR, Russian Island	
A	5-10	RM 44: WA, Jackson Island	
A	5-10	RM 49: OR, Anunde Island	
B	5-10	RM 63: OR, Lord Island	Recenly grazed, weedy
B	10-20	RM 81: WA, Burke Island	Currently grazed, weedy
B	5-10	RM 88: OR, Scappoose Bay	Industrial waste

<u>Carex aperta</u> - OR: G1S1; WA: should be G1S1

B	2	RM 101: WA, S end Vancouver Lake	Pure stand, diked on one side
D	5-10	RM 102: OR, Burlington Bottoms	Recently grazed, weedy

<u>Carex lyngbyei</u> (freshwater association) - OR: G4S3

C	5	RM 16: OR, Haven Island	
B	10-20	RM 16: OR, Cooperage Slough	
A	400-500	RM 19: OR, Lois Island/Russian Island	
B	500-550	RM 21: OR, Russian Island	
A	600	RM 22: WA, mouth of Grays River	
C	20-50	RM 23: WA, Pigeon Bluff	Weedy
A	100-150	RM 25: OR, Calendar Slough	
A	500-600	RM 25: OR, Minaker Island	
B	200-300	RM 26: OR, Karlson Island	Somewhat weedy
A	30-40	RM 27: OR, Knappa Slough	Small but outstanding
C	20	RM 37: OR, Tenasillahe Island RNA	Weedy
C	50	RM 37: WA, Hunting Islands	Weedy, possible dredge spoils
B	40-60	RM 38: WA, Ryan Island	
C	5-10	RM 40: WA, Little Island	
C	10-20	RM 41: WA, Coffee Pot Island	
B	20-30	RM 44: WA, Jackson Island	
A	75-100	RM 44: WA, Whites Island	