ESTIMATED LOSS OF SALT MARSH AND FRESHWATER WETLANDS WITHIN THE OREGON COASTAL COHO ESU

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SUMMARY

Acreage of wetland conversions are calculated for 31 population units of the Oregon coastal coho ESU. Table 1 shows acreages for freshwater wetlands, lacustrine wetlands, salt marsh, and subtidal (salt and freshwater) wetlands, stratified by population units. Acreage in 1850 is compared to existing acreage and change is calculated for each type. Change ranges from zero in smaller population units, although up to 2,499 acres in the Tahkenitch unit, to very large conversions in the Coquille (91% total conversion. In other units such as the Coos and Tillamook, changes are very large for certain wetland types but low for others. In general, losses are greatest for freshwater wetlands, less for salt marsh, and negligible for lacustrine and subtidal wetlands.

INTRODUCTION

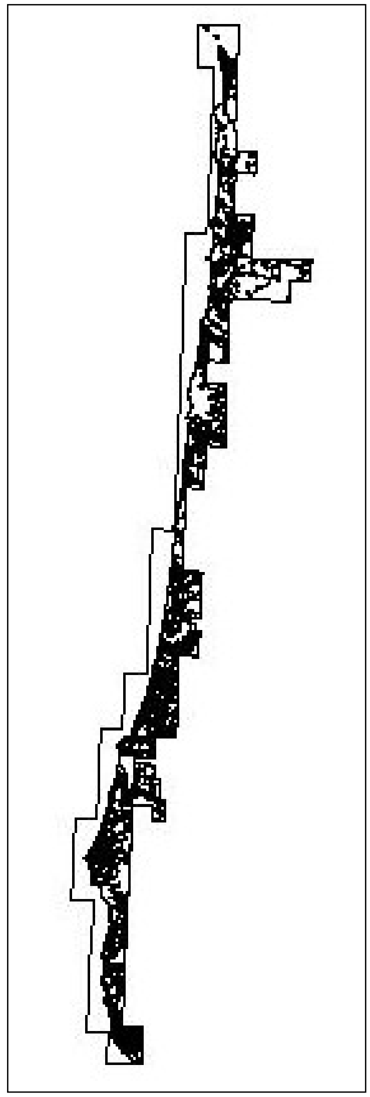
Figures for losses of tidal wetlands in Oregon's estuaries were compiled by Good (2000), but similar figures for freshwater wetlands are not available. Digital mapping by the National Wetlands Inventory (NWI) is useful for calculating total wetland acreage and Cowardin wetland type, but it cannot be used for identifying converted wetlands because many converted wetlands are not classified as such. This report is a first estimation of freshwater losses for the coast, based on analysis of historic vegetation, hydric soils, and 1990's digital orthophotography.

Definitions

It is sometimes difficult to determine the extent of wetland alteration based on remote sensing. "Loss" implies permanent removal of wetlands, but many are in fact restorable and the status of most wetlands can be scored based on the relative amount of conversion to other uses. Obvious conversions include filled and urbanized land, and land currently farmed. Obvious reversions to wetland are visible on abandoned farm or pasture land restocking with native vegetation and some amount of nascent multilayered structural complexity. Land in the early stages of abandonment is the most difficult to assess from remote sensing. For the purposes of this project, a wetland was scored as fully converted if its vegetation appeared to be different from what would be expected in a relatively undisturbed wetland.

Methods

The primary source used for historical wetland data for the Oregon coast was Hawes et al. (2000). This is a GIS dataset developed by the Oregon Natural Heritage Information Center (ORNHIC), based on vegetation data recorded in General Land Office (GLO) survey notes dating from approximately 1855-1880. This cover delineated historical vegetation extending 1 to 15 miles inland from the coast. Coverage up the Coquille River was extended to river mile 47 by crosswalking vegetation attributes, digitizing, and appending a map of the historical vegetation of the Coquille River valley (Benner 1992). Benner's work was also based on GLO survey notes and her mapping methods were nearly identical to those of ORNHIC, so the two products were compatible. The combined covers delineate historical vegetation patterns for the entire coast at a scale of 1:24,000 (Figure 1).



The second step was to extract a wetland polygon cover from the combined GLO covers. Because certain riparian and prairie polygons in the historical cover contained undifferentiated upland and wetland components, hydric soil polygons from NRCS digital soil data were used to clip wetland portions of these vegetation types, and the clipped portions were added to the historical wetland cover. Digital soil data were not available for Tillamook County, so paper maps were used to manually edit the historical cover as needed to reflect hydric soils.

The ODFW coastal coho population unit cover was then used to clip the historical wetland polygon cover to conform with the coho study area. The population unit polygons were then used to stratify the wetland data by population unit (Table 1).

The wetland cover was then overlaid on digital orthophotoquads and the two layers compared visually to identify losses. Each polygon was scored as being either completely converted, partially converted, or unconverted. Unconverted polygons included not only obviously undisturbed sites, but also those visibly or known to have had restoration activity (e.g., dikes breached, ditches filled, etc.), and abandoned agricultural sites that were evidently reverting to structurally complex native vegetation. A visible shrub layer is evidence of recovering structural complexity.

Currently, few resources are available to demarcate salt marsh from freshwater wetlands in Oregon's estuaries. The breakpoint between salt marsh and fresh marsh is a moving target regulated by seasonal river flows, tides, channel depths, degree of mixing, and salinity tolerances of marsh vegetation. No one has mapped the breakpoint based on vegetation, and it has also probably moved upstream over time because of flood control, channel dredging, and diversion of freshwater for agricultural, industrial, and urban uses. Digital estuarine habitat maps from the Oregon Estuary Plan Book (Cortright et al. 1987) distinguish between salt marsh, fresh marsh, and shrub (freshwater), but coverage extends upstream to fresh marsh in only 3 of the 17

Fig. 1. Extent of historical vegetation cover for Oregon

estuaries included in the book. Digital maps depicting average annual salinity zones for 12 of Oregon's estuaries (NOAA 1999) distinguish fresh from salt water (0-0.5 psu) in 7 of the 12 estuaries included in the coverage. Upstream limits of salt intrusion in 17 Oregon estuaries, obtained from a variety of LCDC and ODFW documents published in the 1970's, fell within 2-8 miles of the salt water-freshwater breakpoint depicted on the NOAA cover, and were usually farther upstream. Personal knowledge of the breakpoint in some estuaries was closer to the NOAA data than the data on upstream salt intrusion, so I used the NOAA data as the best available approximation for the salt marsh-fresh marsh break. This was supplemented by fresh marsh and shrub polygons when available from the Oregon Estuary Plan Book, and shrub and Sitka spruce swamp polygons from the historic vegetation cover, all of which were interpreted as freshwater wetlands.

Limitations

The figures in Table 1 are not congruent with those of Good (2000) because of differences in mapping tidal wetlands and boundaries of the two study areas. GLO surveyors extended their surveys only to the edge of high tide, effectively delineating the boundaries of high salt marsh and excluding most areas of low salt marsh and subtidal lands. GLO surveyors also did not describe or delineate deflation plain wetlands, in most cases because they did not exist in the days before dune stabilization programs. Figures used in this report therefore underestimate the total extent of intertidal emergent marsh and deflation plain wetlands, and total acreages are somewhat lower than what are available from NWI maps. The actual amount of low salt marsh lost to development may be relatively small, and may have been offset to some extent by accretion of mud flats and low salt marsh in some estuaries since 1900 (Johannessen 1964). The areas delineated by the GLO surveyors probably best represent most lands deemed usable for agriculture and urban development, and hence would give a good approximation of areas impacted. Secondly, this report includes all wetlands identified by the GLO record, regardless of estuarine or tidal affinity, and extends as far as 47 miles up some river valleys.

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Table 1. Extent of historical wetlands in Oregon estuaries, based on General Land Office survey notes, and estimated losses to other uses, by coho population unit.

Coastal coho population unit	Freshwater wetland or salt marsh	Wetlands, 1850		Change since 1850		Existing wetlands	
		Acres	% of historical acres	Acres changed	% change by type	Acres	% of existing acres
Alsea	freshwater	41	1	-41	-100	0	0
	salt marsh	617	21	-232	-38	385	15
	subtidal	2,218	77	0	0	2,218	85
	total	2,876	100	-273	-10	2,603	100
Beaver	freshwater	232	44	-232	-100	0	
	salt marsh	269	51	0	0	269	
	subtidal	31	6	0	0	31	
	total	532	100	-232	-44	300	
Cape Arago	freshwater	26	100	-21	-81	5	
	salt marsh	0	0	0	0	0	
	total	26	100	-21	-81	5	
Carter Lake	lacustrine	38	100	0	0	38	
	salt marsh	0	0	0	0	0	
	total	38	100	0	0	38	
China Creek	freshwater	358	100	0	0	358	
	lacustrine	1	0	0	0	1	
	salt marsh	0	0	0	0	0	
	total	359	100	0	0	359	
Coos	freshwater	4,565	22	-2,359	-52	2,206	
	lacustrine	109	1	0	0	109	
	salt marsh	2,560	12	-2,363	-92	197	

	subtidal	13,810	66	0	0	13,810	
	total	21,044	100	-4,722	-22	16,322	
Coquille	freshwater	13,785	82	-13,784	-100	1	
	lacustrine	12	0	0	0	12	
	salt marsh	1,571	9	-1,554	-99	17	
	subtidal	1,419	8	0	0	1,419	
	total	16,787	100	-15,338	-91	1,449	
Depoe Bay	freshwater	88	100	-69	-78	19	
	salt marsh	0	0	0	0	0	
	total	88	100	-69	-78	19	
Devils Lake	freshwater	391	38	-192	-49	199	
	lacustrine	645	62	0	0	645	
	salt marsh	0	0	0	0	0	
	total	1,036	100	-192	-19	844	
Ecola	freshwater	304	92	-70	-23	234	
	salt marsh	15	5	-8	-53	7	
	subtidal	11	3	0	0	11	
	total	330	100	-78	-24	252	
Floras	freshwater	3,867	77	-3,296	-85	571	
	lacustrine	1,176	23	0	0	1,176	
	salt marsh	0	0	0	0	0	
	total	5,043	100	-3,296	-65	1,747	
Lower Umpqua	freshwater	2,515	22	-2,162	-86	353	
	salt marsh	1,252	11	-658	-53	594	
	subtidal	7,571	67	0	0	7,571	
	total	11,338	100	-2,820	-25	8,518	
Necanicum	freshwater	1,944	83	-850	-45	1,094	
	lacustrine	233	10	0	0	233	
	salt marsh	0	0	0	0	0	
	subtidal	153	7	0	0	153	
	total	2,330	100	-850	-37	1,480	
Nehalem	freshwater	2,260	39	-1,774	-79	486	
	lacustrine	52	1	-13	-25	39	
	salt marsh	853	15	-694	-81	159	
	subtidal	2,681	46	0	0	2,681	
	total	5,846	100	-2,481	-42	3,365	
Neskowin	freshwater	259	92	-130	-50	129	
	lacustrine	24	8	0	0	24	
	salt marsh	0	0	0	0	0	
	total	283	100	-130	-46	153	
Nestucca	freshwater	1,459	44	-1,062	-73	397	
	salt marsh	584	18	-549	-94	35	
	subtidal	1,287	39	0	0	1,287	
	total	3,330	100	-1,611	-48	1,719	
Netarts	freshwater	748	16	-748	-100	0	
	lacustrine	20	0	0	0	20	

	salt marsh	781	17	0	0	781	
	subtidal	3,155	67	0	0	3,155	
	total	4,704	100	-748	-16	3,956	
Rockaway	freshwater	37	13	-22	-60	15	
	lacustrine	240	87	0	0	240	
	salt marsh	0	0	0	0	0	
	total	277	100	-22	-8	255	
Salmon	freshwater	436	29	-217	-50	219	
	salt marsh	889	58	-232	-26	657	
	subtidal	197	13	0	0	197	
	total	1,522	100	-449	-30	1,073	
Seal Rock	freshwater	33	70	0	0	33	
	lacustrine	14	30	0	0	14	
	salt marsh	0	0	0	0	0	
	total	47	100	0	0	47	
Siletz	freshwater	1,389	39	-254	-18	1,135	
	salt marsh	874	25	-664	-76	210	
	subtidal	1,269	36	0	0	1,269	
	total	3,532	100	-918	-30	2,614	
Siltcoos	freshwater	1,150	20	-630	-55	520	
	lacustrine	4,460	80	0	0	4,460	
	salt marsh	0	0	0	0	0	
	total	5,610	100	-630	-11	4,980	
Siuslaw	freshwater	1,534	30	-1,012	-66	522	
	lacustrine	341	7	0	0	341	
	salt marsh	385	7	-51	-13	334	
	subtidal	2,924	56	0	0	2,924	
	total	5,184	100	-1,063	-21	4,121	
Sixes	freshwater	406	66	-212	-52	194	
	salt marsh	0	0	0	0	0	
	subtidal	209	34	0	0	209	
	total	615	100	-212	-35	403	
Tahkenitch	freshwater	223	9	0	0	223	
	lacustrine	2,276	91	0	0	2,276	
	salt marsh	0	0	0	0	0	
	total	2,499	100	0	0	2,499	
Tenmile	freshwater	3,037	51	-2,072	-68	965	
	lacustrine	2,941	49	0	0	2,941	
	salt marsh	0	0	0	0	0	
	total	5,978	100	-2,072	-35	3,906	
Thiel Creek	freshwater	23	100	-12	-52	11	
	salt marsh	0	0	0	0	0	
	total	23	100	-12	-52	11	
Threemile Creek	freshwater	53	36	0	0	53	
	lacustrine	96	64	0	0	96	
	salt marsh	0	0	0	0	0	

	total	149	100	0	0	149	
Tillamook	freshwater	3,064	21	-2,820	-92	244	
	salt marsh	1,239	9	-1,065	-86	174	
	subtidal	10,035	70	0	0	10,035	
	total	14,338	100	-3,885	-27	10,453	
Yachats	freshwater	353	51	0	0	353	
	lacustrine	338	49	0	0	338	
	salt marsh	0	0	0	0	0	
	total	691	100	0	0	691	
Yaquina	freshwater	357	6	-235	-66	122	
	salt marsh	1,800	28	-1,313	-73	487	
	subtidal	4,254	66	0	0	4,254	
	total	6,411	100	-1,548	-24	4,863	