



A Summary of Environmental Factors Affecting Oregon Estuaries

OSU MARINE ADVISORY PROGRAM

Edited by William Q. Wick, head of the OSU Marine Advisory Program. This is the first of several reports on Oregon estuaries to be published by the OSU Sea Grant Extension Marine Advisory Program. Subsequent publications will deal with commercial uses and overall use plans.

CRISIS

IN OREGON ESTUARIES

Estuary: n. (L. *aestuarium*, fr. *aestus* swell of the sea, tide) Where the tide ebbs and flows and fresh waters of the land meet the salt waters of the sea. A tidal embayment.

This report, *Crisis in Oregon Estuaries*, is published by the Oregon State University Extension Marine Advisory program in connection with the National Science Foundation's Sea Grant program. Information in the report was provided by the Estuary Conservation and Development Committee of the Oregon chapter of the American Fisheries Society, an organization that has expressed growing concern over the use of the nation's estuarine resources.

Estuaries are extremely valuable as natural resources and for commercial and industrial uses. The conclusions in this report are obviously constructed from a biological point of view. This does not mean that there is no appreciation of the need for industrial development. However, some industries will not mix with natural values and a choice of preferred use must be made.

If you are concerned about this heritage—and the destructive threats that may annihilate its natural resource values—the time to act is **NOW!**

The crisis is now.

WHAT YOU CAN DO ABOUT THE CRISIS IN OREGON ESTUARIES

First, one must recognize that solutions lie largely in *local* hands—your port commission, your county court, your neighbors, and you. Get to know your port commissioners and attend their meetings. They have a difficult job and you can help them by providing information about the value of our estuaries.

Participate with your local county planning commission in developing an integrated land and water use plan preliminary to zoning. Then take an active part in the estuary zoning process, keeping in mind that this includes the entire watershed.

Arrange for educational forums on estuarine values at service clubs, sportsmen's groups and other community organizations. Local fish and game representatives are best and knowledgeable outsiders are often useful.

Action on the *state* level is vital. Tell your state representatives and senators of the need to provide protection of estuarine natural resources to guide compatible commercial/industrial development.

State agencies in Oregon that manage such resources as fish, game and environmental quality have a statutory obligation to protect the natural resources. Call on them for help.

And finally, *federal* cooperation is necessary if the job is to be done. Contact your representatives and senators to indicate your concern and support for coastal zone and estuarine research and management legislation. Many federal agencies have estuarine responsibilities. Make sure that they do their job. After all, they work for you.

Remember, as a *citizen* (whether you live on the coast or inland), the estuaries belong to you. Be

constantly alert to estuarine changes whether they take the form of pollution, land fills, incompatible industry, or any other change for the worse—if a change is not in the public interest, **DO SOMETHING** about it!

RECOMMENDATIONS

Editor's note: *When a committee of the Oregon chapter of the American Fisheries Society observed the crisis in Oregon's estuaries, it made certain recommendations for action. Recognizing their importance, we have listed these recommendations first. The full report, on which the recommendations are based, follows.*

On the basis of data presented in this report and study of the management policies and physical, social, and political problems associated with Oregon estuaries we recommend:

1. Scrutinizing alterations which are occurring and those which are proposed with possible suspension of these alterations until an overall use plan is adopted for each estuary. An overall use plan will prevent sacrificing one resource to develop another.
2. Identifying and agreeing on the objectives of estuarine management in Oregon from the completed land use plans.
3. Clarifying jurisdiction for management of Oregon's estuaries. Each concerned agency's legal involvement should be defined. Areas of overlapping should be identified and legislation recommended to strengthen some areas of responsibility.
4. Establishing an estuary research council to provide data for rational policy decisions. This council, for example, should conduct a detailed hydrographic study of each estuary to serve as a base for evalu-

ating the effect of proposed developments on fish and wildlife.

5. Reviewing state water quality standards, which currently blanket all estuaries, to determine whether separate standards are required for each estuary.
6. Changing outdated Corps of Engineers and port authority "pier lines" to become more compatible with biological and recreational uses of estuaries.
7. Establishing—by the State of Oregon—"state estuarine areas" similar to the program of national areas suggested in the Wild Rivers Act.

WHY THE CONCERN?

Estuaries—call them bays, if you like—are where the fresh waters of the land meet the salt waters of the sea and the tide ebbs and flows in a dynamic and always changing environment.

Estuaries are where you go clam digging or launch a boat for fishing the saltchuck. Where you can watch the lumber freighters load for trips to the far away or hunt black brant in the wind and rain of late fall and winter. Where domestic and industrial wastes are dumped and where little girls find sea-shells.

Estuaries are outdoor laboratories where professors teach their students about worms and where young fish and shellfish get a start in life—or pass through on their way to salt water pastures.

Estuaries are all this and much more.

Oregon's bays are valuable but vulnerable rare jewels. All 14 or so of them could be placed comfortably within Willapa Bay, Washington. They total slightly more than 56,000 acres—less than one-tenth of one percent of the area of Oregon. Of all the sea-board states, only three contain less estuarial area than Oregon. Because estuaries are so scarce, each acre is more valuable than a similar acre in a state with a million acres of estuaries. Many states have lost their estuarial legacy and Oregon is on its way to a similar fate.

The increased use of Oregon estuaries and overlapping jurisdiction of estuary management in Oregon has created a crisis.

The loss of an acre at a time—here and there, now and then—is the estuarial death knell. But proper planning now can safeguard the natural resource values and provide for many types of industrial and commercial development.

A publication of the American Littoral Society recently asserted:

Critical decisions continually must be made whenever progress conflicts with conservation of natural resources. The answer must be clearly in favor of resources when personal greed is the motive for a disruptive project. The solution is more difficult when public benefit is the purpose.

Let's take a look at some of the resources and problems in the estuaries of Oregon:

SPORT AND COMMERCIAL FISHING

A variety of angling opportunities exist in estuaries and offshore. The value of estuaries to fish life requirements cannot be overemphasized. Continuation of sport and commercial angling opportunities offshore and in the bays will depend on estuary management. Experiments conducted by the Oregon Game Commission at Lint Slough give clues to the future values of fish farming of salmon in estuaries. The annual release of millions of coho salmon and steelhead fingerlings in tributaries of the estuaries has increased the economic base of Oregon by productive returns to the commercial and sport fishery.

Licensed sport anglers in Oregon are expected to approach 1,200,000 by 1980 when angler trips may exceed 11,000,000 annually.

The success of Oregon's salmon industry—sport and commercial—is largely dependent on water quality and food production in estuaries. Critical phases of salmon and steelhead life histories occur within these bays. Similarly, other important fish require estuarine nurture for survival to maturity. Shad and striped bass, for example, spawn and feed in estuaries. Herring, which are the major feed for salmon, need the estuaries for successful spawning. Other fishes, such as perch, flounder, and ling cod provide high angling values in our bays.

SPORT AND COMMERCIAL CLAMMING AND CRABBING



A prime value of Oregon estuaries is the production of clams, oysters, and crabs for recreational and commercial uses. Of the 14 estuaries, seven can be called excellent; five, good; and two, marginal as producers of shellfish. Nearly a thousand acres of tidelands have been lost to industrial filling and dredging since 1960. Much of this fill remains unused. Only at unrealistic cost could this tideland be reclaimed and put back into shellfish production. It may, however, be possible to utilize dredge spoil materials to "construct" clam and oyster flats by spreading waste in predetermined areas.

More than 120,000 people dig clams in Oregon yearly. Studies in Yaquina and Tillamook bays have shown the value of estuaries as sources of clams. Diggers in Yaquina bay increased from 10,000 in

750 wds

1960 to 20,000 in 1966. In Tillamook bay 9,000 clam diggers in 1963 harvested at least 171,000 clams from a 16-acre bed. That is a ton of clams per acre.

Dungeness crabs from Oregon estuaries are an important crop to both recreational and commercial harvesters. Commercial and sports crabbers take approximately 300,000 pounds annually from Oregon bays.

Oysters produced in Oregon estuaries are valued at more than \$500,000 per year to Oregon growers. New legislation could allow full use of the estimated 5,000 acres of oyster ground in Oregon estuaries. It has been shown that oyster crops valued to \$5,000 an acre per year can be produced under optimum conditions.

Several intertidal species of shellfish and other invertebrates, such as the thin-shelled little-neck, geoduck and *Lucina* clams in Netarts Bay are rare or endangered species. In other bays jackknife clams, boring clams, native oysters, jingle shells, moon snails, and white anemones may be endangered. Studies are needed to determine status and, if necessary, methods of protection for these forms.

WATERFOWL AND FUR BEARERS

Estuarine mud flats, waters, and marsh vegetation in Oregon bays provide food and resting grounds for thousands of migrating and wintering ducks and geese. Limited numbers of whistling swans winter in bays like Nehalem, Nestucca, and Siletz. Pintail, widgeon, scaup, canvasback, scoters, redhead, ruddy, goldeneyes, bufflehead, mergansers and other species of ducks are common. The black brant is the most important goose and is common in winter and during migration wherever industrial developments have not ruined the eel grass beds.

Waterfowl hunting is an important recreational pursuit on nearly all bays. And let's not forget the myriad flocks of shorebirds—the plovers, sandpipers, and their allies that depend on man to keep the estuarine mudflat in useable condition as a habitat, furnishing recreation for thousands of birdwatchers.



Mammals that use Oregon estuaries include fur-bearers such as beaver, mink, muskrat, otter, and nutria—and marine animals, most commonly the harbor seal and occasionally porpoises.

WATER QUALITY

Recently adopted water standards in Oregon's estuaries applied a broad brush because of the

shortness of time to meet the deadline set by Congress and the scarcity of uniform water quality data from each estuary. The new Environmental Quality Commission had no choice but to blanket all estuaries with a single set of standards. The present standards are adequate only for interim use and should be expanded to enhance the protection of each individual estuary.

Log storage in estuaries causes one of the most critical water quality problems. Water purity over public shellfish grounds is a common problem. Other needs include an orderly procedure for industrial and domestic developments in and around estuaries. An assured summer discharge of fresh water into estuaries is necessary to maintain proper salinity levels. Channel improvement can be very destructive to shellfish production, waterfowl usage, and fish production unless timing of dredging and disposal of spoils is planned with these living resources in mind. The road builder, landowner and farmer must be cautious in their harvest so as to reduce the amount of sediment entering the estuaries.

MANAGEMENT

Data from the Oregon Division of State Lands indicate that approximately 40 local, district, county, state, and federal agencies exert some form of management over Oregon estuaries. Overlapping jurisdiction is obviously followed by indiscriminate and unilateral planning, or worse—a *lack of planning because of unclear jurisdiction*.

A sampling of authorities and jurisdiction includes:

Local and county:

- 14 port commissions
- 7 county courts
- county and district planning groups

State:

- Board of Health
- Committee on Natural Resources
- Department of Agriculture
- Division of State Lands
- Environmental Quality Commission
- Fish Commission
- Game Commission
- Highway Commission
- Marine Board
- Pacific Marine Fisheries Commission
- Parks and Recreation Advisory Committee
- Planning and Development Division
- Port Authorities Commission
- State Engineer
- State Police
- Water Resources Board

Federal:

Bureau of Commercial Fisheries
Bureau of Land Management
Bureau of Sport Fisheries and Wildlife
Coast and Geodetic Survey
Coast Guard
Corps of Engineers
Federal Water Quality Administration
Food and Drug Administration
Forest Service
Geological Survey
Public Health Service
Soil Conservation Service

CAPSULE VIEW OF THE CRISIS IN MAJOR OREGON ESTUARIES

Editor's note: Acreage of estuaries listed is the total area. "Tideland acres" is that portion of the estuary with 6 feet or less of tidewater.

Columbia River Estuary and Young's Bay, approximately 15,000 acres

The Columbia River estuary has salt water intrusion for about 18 miles from the mouth. This estuary is an important ocean shipping and industrial area in addition to its importance as a commercial and sport salmon fishing and processing center. Commercial fishermen take salmon by gillnet on the main river and in Young's Bay and by trolling in the ocean. Groundfish, crabs, and shrimp are captured offshore. Sturgeon are taken by both commercial and sport fishermen in the river. Waterfowl use the marshes and open waters during fall and winter.

Crisis: Industrial, thermal, and domestic pollution threatens salmon fisheries.

Nehalem Bay, 3,766 acres—1,180 tideland acres

Nehalem Bay supports an excellent population of softshell clams in the upper reaches and quantities of crabs for sport fishing near the mouth. Excessive fresh water now limits clam species to the softshell varieties. Sportfishing for salmon, flounder, perch, and other fishes is important in the bay and across the bar. Waterfowl, including Canada geese and whistling swans, and shorebirds use the bay in fall and winter.

Crisis: An imminent threat of filling that would reduce the volume of rich, brackish water and change the flow patterns necessary for clams, crabs, and larval fish.

Tillamook Bay, 8,839 acres—5,147 tideland acres

Tillamook Bay—Oregon's second largest estuary—has the largest tideland acreage. More than 90 percent of Oregon-produced oysters come from Tillamook Bay. Sport and commercial clam digging and crabbing is important. Excellent gaper and cockle clam populations are present with smaller quantities of softshell, butter, and littleneck clams. Salmon and perch sport fishing is excellent within the bay. Sport

boats fish for salmon offshore and commercial crab, salmon, shrimp, and groundfish boats operate offshore. Pollution is a seasonal problem and efforts are being made to reduce this. Log storage and fish processing are major industrial uses of this bay. Large populations of widgeon, pintail, canvasback, scaup, and other ducks use the area in fall and winter. Tillamook Bay is the major wintering area for black brant in Oregon and waterfowl hunting is popular.

Crisis: Major fires in the watershed have caused excess sedimentation in this estuary and have reduced the tidal prism (the volume difference between mean high tide and mean low tide) and bay productivity.

Netarts Bay, 2,406 acres (mostly tidelands)



Netarts is a high-salinity, nearly pristine estuary with excellent clam populations and a small oyster industry. Quantities of gaper, cockle, butter, littleneck, and softshell clams support heavy sport digging. Cockle clams are dug commercially. Sport fishing for salmon, perch, flounder,

and crab is popular in the bay. A minor amount of offshore fishing for salmon and ling cod is done. Remnant populations of native oysters, geoducks, and thin-shelled littleneck clams exist. Minor pollution occurs through septic tank seepage near the town of Netarts and plans are underway to correct this. Excellent black brant, waterfowl, and shorebird populations use this bay. The upper bay joins Cape Lookout State Park. The Oregon State University estuary research area (150 acres) is near Whiskey Creek. Netarts Bay should be considered for designation as an estuarine natural area.

Crisis: Productive area of this bay is threatened by filling and road building.

Sand Lake, approximately 700 acres

Sand Lake is a high-salinity, small embayment. As yet, no industrial uses are evident although minor pollution may occur from bayside houses. The most prevalent clam in this estuary is the bent nose which is unimportant for food. Flounder fishing is excellent and there appears to be opportunity for oyster production. Ghost shrimp are abundant and are used as bait. Ducks and geese use the area during migration and wintering. Two public campgrounds receive heavy use during the spring and summer. This delightfully beautiful estuary is in a near-primitive state and should be considered for designation as an estuarine natural area.

Crisis: Sedimentation from logging, road building, and potential filling threatens to make this shallow bay less productive.

Nestucca Bay, 1,149 acres (mostly tidelands)

This small bay is nearly drowning in fresh water. Low salinity restricts clam production to the soft-shell varieties. Salmon and cutthroat trout fishing is excellent and flounder and perch are also taken. Nestucca Bay is a moderately important waterfowl hunting and wintering area.

Crisis: Siltation from logging runoff has seriously reduced the depth and flushing pattern, creating a dangerously low salinity in this estuary. Domestic sewage is becoming a serious problem.

Salmon River, 438 acres

The petite Salmon River estuary contains small quantities of softshell clams and supports a fishery for flounder, perch, salmon, and cutthroat trout. Waterfowl and other birds use the area. A nature conservancy area on the south side of Cascade Head adjoins the estuary. Salmon River is an excellent area for study of intertidal zonation of plants and animals. This estuary should be considered for designation as an estuarine natural area.

Crisis: Developments in the upper reaches of the Salmon foretell domestic pollution in this pristine estuary.

Siletz Bay, 1,203 acres (mostly tidelands)

This small bay supports important sport fisheries for coho and chinook salmon, cutthroat trout, flounder, and perch. Softshell clams are harvested on the flats between Kernville and Cutler City. Large numbers of waterfowl use the bay during migration and wintering. Housing developments encroaching on the estuary threaten the value of the bay by dredging and filling of the valuable shallow marsh. This "key" type of housing development in Florida has demolished several entire bays. Some long-range developments being considered for Siletz Bay point to abolishment of all tidal flats.

Crisis: Abusive land management in the watershed has caused excessive siltation resulting in lowering of salinity. Now, the danger is filling.

Yaquina Bay, 2,853 acres—1,741 tideland acres

This large bay is an important industrial, commercial, and natural resource bay. Cackle, gaper, and softshell clams are important recreational and commercial resources. Crabbing and bay fishing for salmon, flounder, perch, and other species is popular. Large quantities of herring are taken for salmon bait. Sports boats fish offshore for salmon and commercial fishermen take crabs, shrimp, groundfish, and salmon offshore.

Yaquina, like Coos Bay, is a major industrial bay with fish processing, log storage, pulp manufacturing, lumber shipment, and other industrial uses. Recent dredging programs have destroyed valuable

shellfish and waterfowl areas by dredging and filling. Black brant, several species of ducks, and shorebirds depend on use of the bay during migration and wintering. Yaquina is a producer of both native and Pacific oysters. Oregon State University's Marine Science Center and Marine Research Reserve are located on the bay. For further information see the Bureau of Sport Fisheries and Wildlife report, "Fish and Wildlife of Yaquina Bay, Oregon."

Crisis: Even with a long range water and land use plan, serious problems could occur in this major bay from industrial waste, oil spills from ships, or other similar accidents. Land filling continues.

Alsea Bay, 2,227 acres

Alsea Bay is an excellent sport fishing bay for salmon and cutthroat trout. Perch, flounder, herring, and crab fishing are fair and some waterfowl are present. The softshell is the most important clam and cockles and gapers are present in small numbers. This bay appears to have some potential for oyster production. Industrial use is limited to log towing. Lint Slough, on Alsea Bay, is an Oregon Game Commission saline salmon rearing experimental station.

Crisis: Watershed logging, polluted streams, domestic wastes, and a lack of an integrated land and water use plan threatens this basically pristine estuary.

Siuslaw Bay, 1,589 acres—597 tideland acres

Like Alsea, Siuslaw Bay provides excellent fishing for salmon, cutthroat trout, flounder, and perch. Softshell and gaper clamming is productive. The estuary itself is narrow and crooked and water quality appears to be good. Some log towing and barging is carried on.

Crisis: Increased industrialization—especially upstream—and the unknowns of possible nuclear plant thermal enrichment pose threats to this estuary.

Umpqua Bay; Winchester Bay, 5,712 acres—1,548 tideland acres



The Umpqua is a sizeable estuary and has good quantities of large softshell clams. Winchester Bay contains a few gaper clams. Exceptional sport salmon fishing in the lower bay and adjacent ocean makes this a truly great sport fishing area. The commercial herring fishery in Winchester Bay provides most of the bait for this fishery.

Commercial salmon trolling, shrimp fishing, crabbing, and ground fishing occur offshore. Striped bass, shad, and green and white sturgeon are taken in the upper bay. Waterfowl, particularly scaup, use the upper bay.

This estuary is an important industrial area with fish processing, pulp manufacturing, lumber shipping, and other uses.

Crisis: Siltation from gravel washing operations and logging pose imminent threats, as does increased industrialization.

Coos Bay, 9,543 acres—4,569 tideland acres

Coos Bay is the largest Oregon estuary in total acreage. It is an important industrial bay with log storage, lumber shipment, pulp manufacturing, fish processing and other commercial uses. The lower bay contains excellent beds of gaper and cockle clams and other species are abundant but small in size. Historically, Coos Bay had tremendous populations of native oysters. None have survived. Probably pollution from fires of two hundred years ago wiped out the population. Pacific oysters are produced in a small area in South Slough. Salmon, striped bass, shad, perch, and other fish are caught by sportsmen in the bay. Commercial boats take quantities of groundfish, shrimp, crabs, and salmon offshore. Ducks, especially canvasbacks and pintails, are abundant migrating and wintering birds. Large numbers of black brant also winter in Coos Bay.

Crisis: Multiple problems exist in this large and important estuary. Industrial pollution in the form of pulp mill effluent, log storage, tideland filling and other incompatible uses threaten this bay. An integrated land and water use plan is badly needed.

Coquille River, 703 acres

This low-salinity bay contains limited beds of softshell clams and a small commercial and recreational crab fishery exists. Striped bass, shad, and salmon are taken in the bay. The bay is a valuable shad- and salmon-rearing area. Coquille valley waterfowl populations, especially pintails and widgeons, use the bay as a migrant and wintering area. Fish processing plants are active.

Crisis: Domestic sewage and reduced salinity from sediment are creating problems for this estuary.

OTHER ESTUARIAL AREAS

Further south, the geology of the coast changes and the estuaries become smaller. However, their significance is not reduced. The estuaries of south coastal streams such as the Rogue, Elk, Sixes, Pistol, Chetco and Winchuck are absolutely necessary for the survival of the chinook salmon which uses the rivers. During the summer, juvenile chinook feed and grow in these protected bodies of water and move seaward with the fall freshets.

Crisis: Tremendous silt loads are occurring, caused by continued extensive logging on unstable soils.



375



Landfills such as this are destroying the ecology of Oregon estuaries. Here trucks dump fill dirt near productive oyster beds.

Oregon Game Commission



Much waste and tideland fill is dumped into Oregon estuaries. Overall land use plans are needed to prevent sacrificing one resource to develop another.

Oregon Game Commission



Oregon's estuaries should be preserved for multiple use. With proper planning and safeguards, Oregon estuaries can be preserved for leisure and commercial purposes.

