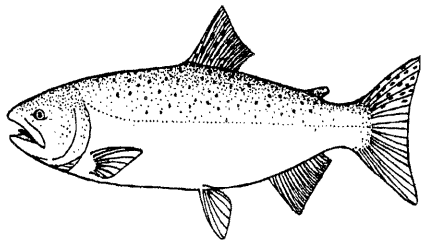

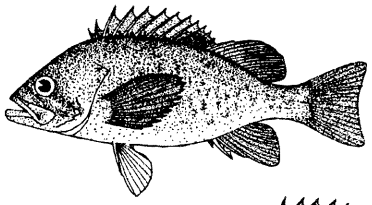

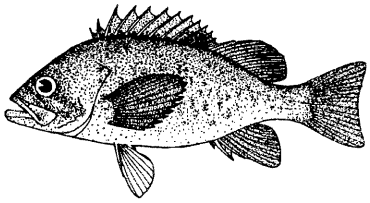

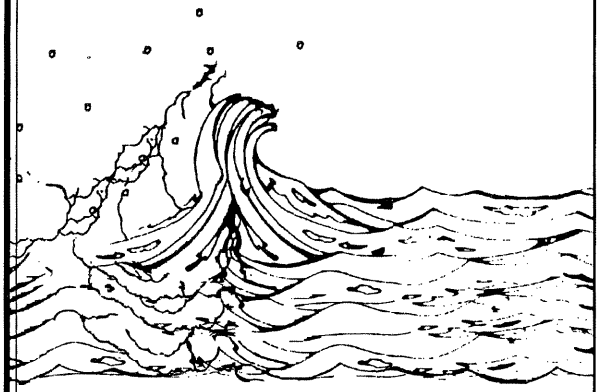

VITAL HABITAT CONCERNS

Pacific Fishery Management Council
Habitat Committee

April 1994

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ACRONYMS LIST

BOR	Bureau of Reclamation
CBFWA	Columbia Basin Fish and Wildlife Authority
Council	Pacific Fishery Management Council
CVPIA	Central Valley Project Improvement Act
DFOP	Detailed Fishery Operating Plan
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FEIS	Final Environmental Impact Statement
FERC	Federal Energy Regulatory Commission
NEPA	National Environmental Policy Analysis
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
USFWS	U.S. Fish and Wildlife Service

PREFACE

The "Vital Habitat Concerns List" is a watershed-based assessment of the most critical habitat issues affecting West Coast marine fish resources. This document emphasizes anadromous salmonid habitat because numerous stocks of salmon and steelhead are at record low levels. Loss of habitat has been identified as one of the main reasons for the decline of anadromous salmonids.

The list's information is organized by "**Upland,**" "**Nearshore,**" and "**Offshore**" zones. Within each zone, problems that have chronically affected or could affect fish habitat are addressed. Separate sections are included on California's Central Valley and the Columbia-Snake River System.

Each issue has an "**Actions Needed**" section that is intended to give state, federal and tribal land use agency regulators and elected officials the Pacific Fishery Management Council's (Council) views on the corrective measures needed for each fish habitat issue.

This document is also intended for the edification of men and women in the fishing industry as well as the conservation community and general public. An informed and educated fishing community must be an active voice in the arena of fish habitat protection, whether it be national issues, such as the Clean Water Act, or the relicensing of a local hydroelectric project.

I. UPLAND ENVIRONMENT

A. CALIFORNIA'S CENTRAL VALLEY AND SAN FRANCISCO BAY-DELTA

Synopsis: *California's Central Valley once supported significant runs of steelhead, chinook and coho salmon. However, as competing water interests removed substantial quantities of water from the Trinity, Sacramento and San Joaquin rivers, fish populations suffered drastic declines resulting in severely restricted fishing seasons. The estuarine ecology of the San Francisco Bay and Delta has also been drastically altered because of insufficient inflows.*

1. California's Central Valley Water Project

California's Central Valley water project has drained hundreds of millions of acres of wetlands and lowered flows throughout the Trinity, Sacramento and San Joaquin river basins. Significant quantities of water (upwards of two-thirds) from these rivers have been diverted to agriculture. This has led to decimation of the once large runs of salmon, as evidenced by the "endangered" status of the Sacramento River winter chinook, and severely restricted 1992 and 1993 ocean salmon seasons at a cost of millions of dollars in lost revenue to coastal, Bay Area, and Central Valley communities.

However, changes to the water allocation system through the 1992 Central Valley Project Improvement Act (CVPIA) have given reason for limited optimism. The CVPIA made fish and wildlife preservation an authorized purpose of the project, including the dedication of an additional 800,000 acre-feet of water for fish and wildlife recovery purposes. The implementation of the CVPIA is now the focus for salmonid restoration. In August 1993, the U.S. Fish and Wildlife Service (USFWS) released, as mandated by Section 3404 (b), the CVPIA "Plan of Action for the Central Valley Anadromous Fish Restoration Program" (Program). Section 3404 includes provisions to:

> Develop within three years of enactment and implement a program which makes all reasonable efforts to ensure that, by the year 2002, natural production of anadromous fish in Central Valley rivers and streams will be sustainable, on a long-term basis, at levels not less than twice the average levels attained during the period of 1968-1991;...

The final product for the Program is scheduled to be completed in late 1995.

ACTIONS NEEDED: Implementation of the contract reform provisions in the San Joaquin Valley, where CVPIA does not provide actual acre-feet targets, has been slowed as subsidized water users attempt to delay the law which is scheduled for implementation in March of 1994. On March 9, 1994, the Westlands Water District and other San Joaquin Valley irrigation districts asked a federal court in Fresno to block mandated fish and wildlife water supplies. Continuous monitoring of the CVPIA is needed to assure that:

- the 800,000 acre-feet is used for fish and wildlife from the headwaters to the ocean,
- there is no backing out of the goal of doubling anadromous fish populations (this goal should be seen as a minimum), and
- funds and water provided for fish and wildlife are expended in actual habitat projects.

2. San Francisco Bay/Sacramento-San Joaquin Water Quality Standards

The Sacramento-San Joaquin estuary is an ecologically important habitat for a vast array of aquatic resources including chinook salmon. The decline of Central Valley salmon stocks is closely linked to water project development, particularly since the 1960s. Decreases in freshwater outflow to San Francisco Bay caused by increased export have resulted in losses of juvenile chinook salmon due to reverse flows and entrainment of fish at the state and federal pumping plants.

On September 3, 1991, the U.S. Environmental Protection Agency (EPA) disapproved certain water quality criteria contained in the Water Quality Control Plan for Salinity for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary that was adopted by the California State Water Resources Control Board on May 1, 1991. These criteria were disapproved because they failed to provide the proper:

- estuarine habitat and other designated fish and wildlife uses,
- salinity criteria to protect the fish spawning (striped bass) designated uses in the lower San Joaquin River and
- salmon smolt survival index criteria to protect fish migration and cold freshwater habitat designated uses in the estuary.

Unfortunately, the EPA has proposed alternative criteria instead of scientifically supportable standards for temperature. These criteria are neither numerical nor qualitative water quality criteria as required by section 303 (c) of the Clean Water Act. The proposed criteria target a limited number of species within the estuary (i.e., fall chinook salmon, striped bass, and splittail) and fail to consider the state and federally listed "endangered" Sacramento winter chinook, spring chinook and late-fall chinook smolts.

ACTIONS NEEDED: The San Francisco Bay-Delta water quality standards are going through the public review process. Implementation of these rules is not likely until December and may be further delayed through actions by the state of California. The Council should recommend to the EPA that scientifically supportable standards for temperature be developed for <u>all</u> races of Central Valley chinook salmon rather than "target index values" for only fall chinook. These standards are a critical part of the overall actions necessary to meet the EPA's stated goal of restoring habitat conditions to those existing in the late 1960s and early 1970s as recommended in the Interagency (EPA, USFWS and the National Marine Fisheries Service [NMFS]) Statement of Principles of 1993.

B. COLUMBIA-SNAKE RIVER HYDROPOWER, IRRIGATION, NAVIGATION AND FLOOD CONTROL OPERATION

Synopsis: *Operations of 8 Columbia-Snake river system hydropower dams have been largely blamed for the system's declining salmon runs. Fisheries in Idaho, Alaska, Washington and Oregon have all been restricted because of threatened Idaho chinook salmon. The majority of scientists feel that if recovery is to be realized, a significant increase in the rate of flow is needed during critical smolt migration periods.*

Historically, 10 to 16 million salmon and steelhead ascended the Columbia River and its tributaries. These runs have dwindled substantially, with numerous wild stocks being listed as either "threatened," "endangered," or at a "high risk" of extinction (American Fisheries Society, 1992). While many factors including overharvest and poor hatchery practices are to blame for this population crash, habitat degradation has played a key role. In the Columbia River Basin, the hydroelectric system operation has been implicated in killing upwards of 95 percent of downstream migrating Snake River chinook smolts as well as more than doubling the time it takes for them to travel from the Salmon River to the lower Columbia River.

Following the listing of Snake River sockeye salmon as an "endangered" species (and later spring/summer and fall chinook salmon as "threatened") under the Endangered Species Act (ESA), NMFS appointed the Snake River Salmon Recovery Team to develop recovery plan recommendations. Their final draft plan will be released in the spring of 1994.

Currently, the Idaho salmon recovery debate is focused on the timing, amount, rate and velocity of flow the Corps of Engineers and Bureau of Reclamation allow through the system and whether barging and trucking of salmon should be continued. On March 16, 1994, NMFS issued its biological opinion on the hydropower operation for 1994 through 1998. (The NMFS decision on whether to issue a Section 10 ESA permit for continued barging of juvenile salmon is in the final stages.) The biological opinion relies on continued barging of juvenile salmon versus increased flow and spill. However, many fish advocates and biologists feel that unless there is an increase in water rates for fish passage needs (and concomitant structural changes in lower Snake and John Day river dams) recovery of upstream Columbia Basin salmon stocks will be in doubt. In the latest development, on March 29, Judge Malcolm Marsh ruled in favor of Idaho and Oregon in their suit against the federal government's 1993 Federal Columbia River Power System biological opinion. In his opinion, Judge Marsh said that federal agencies "have narrowly focused their attention on what the establishment is capable of handling with minimal disruption." The government now has until late May to come up with a new plan for operating the dams.

There is no clear-cut scientific evidence that says provide flow "x" at a specific time of year and survival will increase by "y." However, an October 1993 report to the Northwest Power Planning Council did make the following common sense conclusion about the flow/survival relationship (Cada et al., 1993):

The general relationship of increasing survival with increasing flows in the Columbia River Basin still appears to be reasonable.

Additionally, information from the Idaho Department of Fish and Game correlates increased Snake River flows with increased adult wild spring chinook returns to the middle fork of the Salmon River (between the years 1977–1989).

Barging fish through the system, while having a good track record for Idaho steelhead, appears to have possible serious drawbacks for Snake River chinook. A 1993 USFWS report of the Ad Hoc Transportation Review Group found that:

> It is apparent that transportation is not a good substitute of good in–river migration conditions for many of the salmon stocks evaluated in the study. For some stocks it appears that transportation may have been detrimental to fish survival.

In the November 1993, Detailed Fishery Operating Plan (DFOP) With 1994 Operating Criteria, written by the Columbia Basin Indian Tribes and state and federal wildlife agencies, the authors state:

> ... in–river passage for juvenile migrants provides the best opportunity to rebuild basin fish and wildlife. In–river passage should be accommodated by conditions that maximize the survival of juvenile migrants at dams, in reservoirs between the mainstem dams and cumulatively in their entire migration from natal streams and hatcheries to the ocean.

ACTIONS NEEDED: In November 1993, the Council passed a resolution regarding recovery of Snake River salmon listed under the ESA which includes the following actions:

- optimize survival of in–river migrants as opposed to transportation of juvenile migrants,
- recommend that juvenile bypass systems at all mainstem facilities be completed at the earliest possible date,
- endorse the need to provide 80 percent fish passage efficiency at each project by utilizing spill as required to augment bypass system performance,
- augment streamflows and/or use reservoir drawdowns to increase water velocity and reduce juvenile migrant passage time,
- ensure that measures are implemented which will address the needs of both listed and non–listed stocks in the basin and
- adopt a Snake River salmon recovery plan whose recovery measures are (a) proportional to the documented factors in this decline and (b) include significant incremental annual improvements in hydrosystem passage to substantially increase in–river survival of naturally migrating salmon.

C. INSTREAM FLOW AND SCREENING

Synopsis: *Numerous rivers in the western United States are over–appropriated, resulting in insufficient instream flows for anadromous and native salmonids, especially in drought years. Watersheds suffering from insufficient instream flows include the Sacramento, San Joaquin, Trinity, Klamath, Umatilla, Rogue, Illinois and Snake river tributaries. Insufficient*

instream flow also negatively affects estuaries. Changes are needed in water management to assure that fish have sufficient flows for spawning, rearing and migration. The screening of diversions to protect juvenile and adult fish also needs attention.

Salmonids require clean, cool water for spawning and rearing. Sufficient instream flows are also necessary for anadromous salmonids to reach their spawning grounds. Freshwater flows are also important to the function of floodplains and coastal estuaries. Estuaries are among the most productive natural systems and are important to salmon and numerous other commercially important species of fish and shellfish. Inadequate freshwater inflows damage estuarine dependent resources (see **A. CALIFORNIA'S CENTRAL VALLEY AND SAN FRANCISCO BAY-DELTA**). Floodplains interact significantly with fish habitat in many rivers. Without floodplain restoration and maintenance, the quality and amount of fish habitat may decline substantially.

Competing users of water often do not leave enough water in the stream for fish. Insufficient instream flows for fish caused by overallocation and lack of instream flow rights as well as lack of screening of diversions to protect juvenile (and sometimes adult) fish is a significant fish habitat problem.

Many streams and rivers are overallocated. Much of western water law is based on Doctrine of Prior Appropriation, which gives the water priority to the person with the oldest claim. In many instances, states have continued issuing water permits beyond the stream's ability to provide that water. As far back as 1955, the state of Oregon reported that most streams were over appropriated during peak demand. However, since 1955 almost 25,000 additional permits have been issued (WaterWatch, 1993).

The amount of minimum instream flow needed by fish is not documented or enforced. Without instream flow information, water regulators are more likely to keep issuing water rights or refuse fish flow requests. For example, the Klamath Basin Fisheries Task Force Long Term Plan (1991) has called for an instream flow study. The purpose of the study is to scientifically estimate amounts of salmon spawning and rearing habitat expected at different flows. This information could then be used by policy makers and the courts to determine salmon water needs. Unfortunately, this study is currently on hold. The fact is that water rights law (as mandated in the Klamath Compact) dictates that agricultural and hydro-power water rights have priority over salmonid's instream flow needs.

Irrigation diversion screening is inadequate. There are thousands of unscreened or inadequately screened irrigation diversions in the west. In California's Central Valley alone, NMFS reports that there are over 2,000 unscreened diversions. In the Columbia River Basin, the Columbia Basin Fish and Wildlife Authority's Fish Screen Oversight Committee believes that the currently-listed ESA habitat areas will be adequately screened by 1996. However, screens in many of the other sub-basins are outdated (CBFWA, 1994). In the John Day River Basin in Oregon, which is managed for wild chinook and steelhead, most fish screens (292) were constructed in the mid 1950s and 1960s and 19 diversions are currently unscreened. Most of the old facilities were poorly designed and do not provide adequate protection for juvenile anadromous fishes (Moulton, 1993).

Rivers with chronic instream flow problems include the following.

Klamath Basin: In 1992, the ocean salmon fishing season in northern California and southern Oregon was curtailed substantially to try to reach the minimum acceptable escapement of 35,000 fall chinook into the Klamath River. Ironically, these returning chinook were subjected to sub-optimal flow conditions which hindered their spawning success. The 1991 in-river year class of fall chinook was also negatively impacted because of insufficient instream flow and resultant high water temperatures. Again in January of 1994, the Bureau of Reclamation (BOR) announced that because of precipitation at only 60 percent of normal, water releases from Klamath Lake would be reduced to below target levels for supporting down-river salmon and steelhead in order to protect "endangered" Lost River and shortnose suckers. These reduced flows resulted in the dewatering of fall chinook redds. However, this measure could benefit irrigators by boosting irrigation reserves. Hopefully, new efforts by BOR and local irrigators at developing an irrigation water "set aside" program for increased instream flow will prove fruitful.

Rogue River, OR: Returning spring chinook adults were killed by the thousands in 1992 because of record low flows and high temperatures on the Rogue River.

Illinois River, OR: A tributary of the Rogue River, Illinois River summer steelhead are in record low numbers. Blamed for the steelhead's demise are poor land use practices including logging, road-building and dewatering for agricultural purposes. The result has been siltation, reduced flows and elevated water temperatures which at times reach more than 80 degrees fahrenheit.

San Joaquin, CA: Irrigation diversions have reduced flows to levels that have driven adult fall chinook salmon to historic lows, from 70,000 in 1985 to less than 1,000 adults in recent years. In March 1994, the Westlands Water District and other San Joaquin Valley irrigation districts asked a federal court in Fresno to block CVPIA mandated water for fish and wildlife in the San Joaquin.

Umatilla, OR: Currently, BOR is conducting a National Environmental Policy Analysis (NEPA) in the Umatilla Basin. Under close scrutiny is illegal water use by irrigators through the practice of water spreading. According to BOR, water spreading is "the unauthorized use of federally developed project water or facilities on lands not previously approved by (BOR) for such use." In the Umatilla Basin, irrigators have been selling water that they receive from BOR to irrigators outside their district boundaries. While BOR has shut off water spreading in the Umatilla Basin, irrigation districts in return have requested legalization of their past activities. BOR has begun a NEPA process to evaluate this request. Water spreading results in less water available for instream flows for anadromous and native salmonids.

Trinity, CA: The Trinity River suffers from insufficient flows to support salmon and steelhead. The diversion of significant quantities of Trinity River Basin water to the Sacramento River along with blockage of access to the upper 100 miles of anadromous fish habitat are the main culprit behind the decline in Trinity River salmon and steelhead. After construction of the Trinity River Dam in the early 1960s, river flows were significantly

reduced. BOR has at times diverted as much as 90 percent of the Trinity River into the Sacramento River (Central Valley). Currently, fishery flow allocations are 340,000 acre-feet annually. It is widely believed that this allocation, which was mandated by a 1991 Secretary of the Interior decision and the CVPIA of 1992, is insufficient, and without sufficient flows salmonid restoration will be unsuccessful.

Yakima, WA: The Yakima's water supplies are severely overtaxed by the competing demands of irrigation and instream flows for fish production, including spring and fall chinook and summer steelhead. With 2 exceptions, there are no binding minimum instream flows for fish. As available water and demand are rather precariously balanced, instream flows are rarely optimal and may be catastrophically low for fish production in drought years. Water quality, including high temperature, sedimentation and chemical contamination from irrigation return flows is exacerbated by low flows.

Snake River Basin Tributaries: Several critical habitat areas for Snake River spring/summer chinook salmon, which are listed as "threatened" under the ESA, are impacted by irrigation diversions. Many upper **Salmon River** tributaries (Idaho) in the Salmon National Forest that historically produced anadromous fish are currently either dewatered, dammed for irrigation, or adult passage is restricted because of low flows (Keifenheim, 1992). In the **Grande Ronde River** Basin (Oregon), low streamflows, exacerbated by irrigation use, severely restrict the area in some mainstem and tributary stream reaches that are suitable for rearing juvenile salmonids. Low streamflows also allow water temperatures to reach stressful or lethal levels (Northwest Power Planning Council, 1990).

ACTIONS NEEDED: Streamflows need to be protected for fish resources. The following steps could assist in providing more flows for fish (adapted, in part, from WaterWatch, 1993):

- require all users to eliminate waste
- define waste as the amount of water diverted in excess of the amount required to meet beneficial uses specified in the users permit
- protect and quantify instream flows for fish resources
- facilitate transfers of existing water rights to instream flows utilizing trust water rights or other mechanisms which result in increased streamflows
- require all water rights holders to install and maintain fish screening and bypass devices
- take all necessary actions to eliminate fish entrainment and mortality in surface water diversions
- explore the feasibility of exchanging surface water rights for ground water rights where such exchanges result in increased streamflow
- require accurate, timely metering of surface water diversions

D. UPLAND LAND USE PRACTICES AND POLLUTED RUN-OFF

Synopsis: *In the freshwater portion of their life history, anadromous salmonids require healthy riparian zones which provide shade and cover. Protection of the entire watershed, especially riparian areas and wetlands, from mining, logging, grazing and development is vital for healthy fish stocks.*

Salmon evolved in watersheds typified by cool uncontaminated waters and large downed instream conifers (large woody debris). Wetlands, including the riparian areas of watersheds, are a vital watershed habitat. The sponge-like nature of wetlands assists in their capacity to continually recharge streams and rivers in the low water periods of summer and protect watersheds from catastrophic flood events by slowly releasing water. Wetlands provide the vegetative regulatory mechanism for the exchange of nutrients and materials, including food supplies, from upland forests to streams. They also facilitate thermal regulation for adequate supplies of cold water.

Over the past 150 years, land use activities such as grazing of sheep and cattle, clear-cut timber harvesting, mineral mining and construction of homes and businesses (urban growth and land conversion) have changed the form and function of the watershed's riparian and wetland areas. These practices, often undertaken without fish habitat in mind, have significantly altered the quantity and quality of water that is delivered to the stream and the amount of cover that is available for fish and other stream-associated wildlife. While much has been written about watershed and ecosystem management, state and federal laws including the Clean Water Act, state forest practice acts, grazing regulations on state and federal lands, and local land use planning decisions will continue to be the nuts and bolts of fish habitat protection.

1. Timber Harvest and Road Building

Past timber harvest practices such as splash dams severely damaged fish habitat. More recently, attention has been placed on 2 areas: riparian zone management and road building. Numerous scientific studies have closely linked the importance of large woody debris and streamside vegetation to salmonid survival. Streamside trees and vegetation provide shade to keep stream temperatures cool. Large woody debris provides nutrients, shade and habitat complexity. Once these areas are disturbed (i.e., removal of large streamside trees), more solar energy reaches the stream causing elevated stream temperatures which is deleterious for salmonid survival. Side channels and stream-associated wetlands provide calm water refuges for coho salmon during high winter flows. Research indicates that most of the sediment that enters the stream from silvicultural practices can be traced to erosion from poorly designed roads and culvert failures (Yee and Reolofs, 1980).

ACTIONS NEEDED: Protection of the riparian area and the floodplain for water recharge, temperature control and physical structure for fish habitat is vital. Timber harvest management practices must include leaving sufficient streamside buffers to provide shade and future large woody debris on private and public lands. Current federal standards that

are to be implemented as a part of the Bureau of Land Management/U.S. Forest Service "PACFISH" strategy include buffers as follows (the Clinton Forest Plan also embraces a similar set of riparian buffer strips):

- Fish bearing streams and lakes = **300 ft**
- Permanently flowing non-fish bearing streams = **150 ft**
- Ponds, reservoirs, and wetlands > 1 acre = **150 ft**
- Seasonally flowing or intermittent streams, wetlands < 1 acre, landslides and landslide-prone areas = **100 ft**

2. Mining

Watersheds in the west are still being impacted by past and present mining practices. Research in California's Salmon River (Klamath National Forest) found that hydraulic mining of the main river valleys that took place from about 1870 to 1950 produced an estimated 15.8 million cubic yards of sediment, the effects of which are still being felt today.

Cyanide heap-leach gold mining has the potential to adversely impact anadromous fish habitat. Mine exploration and development, along with associated wetland fills and road construction, may increase downstream sedimentation. Impacts to aquatic life may also result from chemical contamination by accidental spills and leaks from heap-leach pads, leachate from acid-forming tailings and catastrophic failure of waste material storage areas. Hydraulic suction gold dredging may cause sedimentation, disturbance of adult salmon and steelhead, and entrainment of eggs and sac fry.

ACTIONS NEEDED: Currently, 2 bills are in Congress that would overhaul the more than century-old mining law which regulates private access to unreserved federal lands, mostly in the west, to prospect for and produce gold, silver, copper, zinc and other "hard-rock" minerals. Conservation interests have been arguing for years that the current law does not explicitly require mining lands to be restored after production is finished. Measures must be taken to protect anadromous resting, spawning and rearing habitat.

3. Grazing

Poor grazing practices have substantially degraded many streams, rivers and wetlands in the western United States. When livestock are allowed to enter stream riparian areas for extended periods, overhanging vegetation is grazed down and trampled causing increased sedimentation and elevated stream temperatures. As the stream widens and shallows, the water table drops away from the surface. When this occurs, riparian zone vegetation (which require their roots to be in water) is replaced by plants more accustomed to dry climates, resulting in a loss of diversity.

ACTIONS NEEDED: Proper watershed management must include provisions for protection of the riparian and floodplain zones from overgrazing. On March 17, the Clinton Administration unveiled its third attempt at grazing reform. Included in the reforms are grazing Citizen Advisory Councils and the setting of broad environmental standards that include some improvements in stream protection.

4. Hydroelectric Development

Numerous dams, including the Grand Coulee–Chief Joseph (Columbia River), Hells Canyon (Snake River), Keswick (Sacramento River), Pelton–Round Butte (Deschutes River), and Trinity and Lewiston Dams (Trinity River), have blocked or impeded access to thousands of miles of spawning and rearing grounds to anadromous salmonids. The Federal Energy Regulatory Commission (FERC) will consider relicensing Hells Canyon and Pelton projects in the coming years, for which preconsultation discussions have already begun. Restoration of historical production areas must be considered. Many other projects are up for FERC relicensing including all the Snake River–Idaho Power projects. Relicensing of several hydroelectric projects by FERC is currently underway. Environmental Impact Statements for the Condit Dam (White Salmon River, WA) and the Leaburg–Waterville Project (McKenzie River, OR) are being prepared.

ACTION NEEDED: Where suitable, hydroelectric projects should provide safe upstream and downstream passage for anadromous fish resources.

5. Agriculture

Besides impacting fish habitat through excessive water withdrawals, poor agricultural practices have altered riparian areas and instream habitat through removal of riparian vegetation, stream channelization and bank hardening, drainage of wetlands, and chemical or organic contamination. These activities have lead to increased stream sedimentation, increased water temperature, loss of stream length and pool volume, and loss of large woody debris as habitat and for channel stabilization.

ACTION NEEDED: Agricultural water withdrawals must leave enough water for instream flow needs (see **C. INSTREAM FLOW AND SCREENING**). Stream corridors should be protected or restored to provide functional riparian areas and instream habitat.

6. Urban Growth and Land Conversion

Population growth and the subsequent conversion of forest and agricultural lands to urban, suburban and rural residential uses have a variety of negative effects on fish resources.

For salmonids in freshwater these effects include:

- direct loss of stream and riparian habitat to road and building site construction and maintenance,

- loss or partial obstruction of upstream and/or downstream migration due to culverts and bridges,
- increased winter streamflows and reduced summer streamflows due to increased impervious surfaces and stormwater run-off,
- reduced streamflows due to water diversion,
- elevated stream temperatures and chemical contamination, stream and streambed sedimentation,
- increased disturbance/harassment/poaching of spawning adults by humans,
- increased disturbance and/or mortalities of adults by pets and livestock and
- increased risk of catastrophic fish kills as a result of intentional or accidental spills of toxic substances.

For salmonids in marine water and for marine fish, particularly within urban areas, shoreline vegetation clearance, bulkheading, filling and dredging, and point and non-point pollution have resulted in the loss of:

- shallow water migration routes and spawning areas,
- marine and shoreline vegetation and intertidal wetlands, and
- water quality.

ACTION NEEDED: Urban growth and land conversion is primarily a local land use issue, and secondarily a state and federal regulatory issue. It is up to local government (cities and counties) to consider and provide for the needs of salmon and marine fish in land use planning and implementation. State and federal regulatory agencies need to protect habitat to the full extent of their authority. State and federal agencies should provide support and cooperation to local governments responsible for land use decisions.

II. NEARSHORE ENVIRONMENT

Synopsis: The nearshore marine environment, including bays, estuaries and nearshore coastal waters, are the ocean's most productive areas. Over 50 percent of the northwest's commercially important fish and shellfish are wetland-dependent. Declines in fish stocks are directly attributable to wetlands loss. Contaminants from point sources and polluted run-off eventually find their way downstream threatening nearshore waters.

A. COASTAL WETLANDS

For many marine fish and shellfish, coastal wetlands (non-freshwater) are absolutely essential. Salt marshes, mangrove swamps, tidal flats and associated fresh water wetlands provide critical habitats for spawning, feeding and migration. As a nationwide average, about 75 percent of commercially caught fish and shellfish are composed of estuarine-dependent species, 52 percent in the northwest (Chambers, 1992). The commercial catches of these wetland-dependent fish and shellfish contribute about $5.5 billion to the national economy annually. Recreational landings of estuarine-dependent fish are estimated to have a total economic impact of $8.2 billion annually. Research indicates that the destruction of estuarine wetlands have direct, negative impacts on fisheries resources and subsequently the industries they support. According to the National Oceanic and Atmospheric Administration (NOAA) and USFWS, there are over 27 million acres of coastal wetlands in the lower 48 states. Estimates are that we have lost about half of our historic coastal wetlands (Johnston et al., 1992).

B. CONTAMINANTS

1. Point Source Pollution

The nation's estuaries and coastal waters are the ultimate repository for pollutants from urban and agricultural areas. The Office of Technology Assessment's 1987 Wastes in the Marine Environment study notes that the nation's estuaries are still the dumping grounds for wastewater discharged from 1,300 major industrial and 500 municipal facilities. Industrial discharges account for 90 percent of the inputs of cadmium, mercury and chlorinated hydrocarbons into marine waters, while municipal sewage treatment facilities contribute half the biological oxygen demand, total nitrogen, oil and grease. Studies by NOAA (1988) indicate that on the West Coast, very high contaminant levels are found in San Francisco Bay, Santa Monica Bay, Long Beach Harbor, San Diego Bay, and in the Eagle and Duwamish Harbors of Puget Sound.

2. Polluted Run-off

According to the EPA, the harm from polluted run-off (non-point source pollutants) may even exceed that from point source discharges. Polluted run-off includes chemicals and/or sediments from agricultural, grazing, mining, and timber harvesting activities, as well as the lead, chromium, zinc, copper and oil from our urban streets.

3. Combined Sewer Overflows and Stormwater Run-off

Combined sewers are pipes that carry sanitary wastes along with storm water run-off. During storm events the sewer becomes filled to capacity. The untreated excess wastewater, including raw sewage, enters the aquatic environment. For example, Oregon's Willamette River receives 6 billion gallons of waste overflows annually (80 percent of it is stormwater run-off).

Stormwater run-off in itself can also be a source of toxic pollutants. Rainfall on streets can carry heavy metals (cadmium, lead), petroleum products and trash into storm drains and then into river and estuaries.

ACTIONS NEEDED:

- Watershed planning to reduce polluted run-off is vital for all landowners in a watershed.
- Inputs of sewage, heavy metals and petroleum products from combined sewer overflows and storm drains must be reduced through proper treatment.
- Remaining coastal wetlands must be protected.
- Wetlands must be restored where possible.
- Toxic discharges from point sources must be reduced by reducing and/or phasing out the use of toxins.
- **A strong Clean Water Act, up for reauthorization in 1994, will be the key to protection of coastal wetlands and coastal water quality.**

III. OFFSHORE ENVIRONMENT

Synopsis: Offshore marine habitat issues do not get the attention of nearshore and upland habitat issues. The offshore area's shelves, rocky pinnacles and sea mounts provide habitat for economically important species such as rockfish and lingcod. While offshore habitats have not been significantly threatened by man's activities to date, 3 issues have raised interest: ocean mining, off-shore oil drilling and dredge spoil disposal.

A. OIL AND GAS EXPLORATION

While offshore oil exploration and drilling receives considerable attention, only 2 percent of the input of petroleum into the world's oceans comes from offshore production activities (**45** percent comes from tanker operations, spills at terminals, bilge and fuel oil flushing, and ship accidents; **36.5** percent comes from municipal and industrial wastes and run-off; **7.7** percent comes from natural seeps; and **9.2** percent comes from atmospheric deposition [NRC, 1985, Boesch and Rabelais, 1987]).

According to NOAA, (Olympic Coast National Marine Sanctuary Final Environmental Impact Statement [FEIS], 1993), sensitive marine resources may be threatened from offshore petroleum activities by (1) well blowouts caused by equipment or failure, (2) oil spills and pipeline leaks, (3) noise and visual disturbances caused by drilling, (4) pollution associated with aquatic discharges and (5) short term pipeline construction upheaval. Washington, Oregon and California are not scheduled for any oil/gas lease sales until the year 2000. Even then, a series of environmental studies must be performed to determine if oil and gas development can take place in an environmentally sound manner.

Action Needed: The Olympic Coast National Marine Sanctuary released its FEIS late in 1993. It is important that this 2,500 square mile area be designated in a timely fashion. (**Note:** The National Marine Sanctuary Program, administered by NOAA, identifies unique marine environments which possess conservation, recreational, ecological, historical, research, educational or aesthetic qualities of special national significance. National Marine Sanctuaries prohibit oil, gas and mineral leasing and pre-leasing activities. Thirteen sites have been designated by Congress since 1972. The 4 designated West Coast sites are Cordell Bank, Gulf of the Farallones, Monterey Bay, and the Channel Islands).

B. DREDGE SPOIL DISPOSAL

Dredged muds are the last materials legally disposed of in U.S. waters. All other substances were banned in 1988. Concerns are raised in the fishing community when ocean disposal of contaminated sediments threatens fish spawning, nursery and feeding areas. Currently, an interagency review (by the EPA and the Departments of Commerce, Army, Transportation and Interior) of dredging issues is being conducted by the Maritime

Administration. This process has arisen from complaints by shipping interests and the ports that the permitting process is a bureaucratic nightmare fraught with costly delays. The environmental and fishing communities blame contaminated sediments and their disposal as the problem threatening fish and shellfish resources.

ACTION NEEDED: Dredge spoils, both uncontaminated and contaminated by toxins, must be disposed of in a manner that does not impact fish resources. This includes: (1) designating deep-water dredge spoil disposal sites off the continental shelf, (2) testing the dredge spoils for their suitability to be dredged and for at-sea disposal, (3) disposing of dredged toxic materials at designated onshore toxic waste disposal sites, (4) monitoring at-sea disposal to assure compliance with dumping regulations within designated sites and that no adverse impacts result to marine life in the area of at-sea disposal sites, and (5) designating and utilizing upland disposal sites for the purposes of reusing dredged materials and reducing at-sea disposal.

C. OCEAN MINING

In addition to offshore oil, gas and sulphur resources, there are approximately 90 different mineral commodities available in the marine environment. There are 4 basic methods of mineral extraction on land or sea: scraping, excavating, tunneling, and fluidizing. The effects of marine mining on the environment may include: removal of mined material; introduction of processing wastes tailings and discharges or energy as heat light, seismic or acoustic waves; perturbation or mixing at the seafloor; and subsequent replacement of mined material as waste, tailings, or discharges (CSA, 1993).

ACTION NEEDED: Monitoring of ocean mining activities is needed for impacts on living marine resources.

REFERENCES

Boesch, D. and N. Rabelais, 1987. Long Term Environmental Effects of Offshore Oil and Gas Development. Elsevier Applied Science, NY.

Cada, G. Deacon, M., Mitz, S., and M. Bevelhimer. 1993. Review Of Information Pertaining To the Effect of Water Velocity On the Survival of Juvenile Salmon and Steelhead in the Columbia River Basin. Report to the Northwest Power Planning Council by the Oak Ridge National Laboratory, Oak Ridge, TN.

Chambers, J. 1992. Coastal Degradation and Fish Population Losses. pp. 45–51, in "Stemming the Tide of Coastal Fish Habitat Loss," R. Stroud, editor. National Coalition for Marine Conservation, Savannah, GA, 258 pp.

Columbia Basin Fish and Wildlife Authority. January 13, 1994, letter to Northwest Power Planning Council.

Confederated Tribes of the Umatilla Indian Reservation. December 17, 1993. Announcement of NEPA Scoping Meeting on Irrigation Districts' Request to Expand Boundaries.

Continental Shelf Associates. 1993. Synthesis and Analysis of Existing Information Regarding Environmental Effects of Marine Mining. OCS Study Mineral Management Service 93–0006. Minerals Management Service, Washington, D.C.

Johnston, J., Field, D. and A. Reyer, 1992. Disappearing Coastal Wetlands pp. 53–58 in "Stemming the Tide of Coastal Fish Habitat Loss," R. Stroud, editor. National Coalition for Marine Conservation, Savannah, GA, 258 pp.

Keifenheim, Marilyn. 1992. U.S. Forest Service – Region 4. Salmon National Forest Level 1 Stream Diversion Inventory (In cooperation with the Idaho Department of Fish and Game and Bureau of Land Management, Salmon District).

Klamath Basin Fisheries Task Force. 1991. Long Term Plan For the Klamath Basin Conservation Area Fishery Restoration Program. U.S. Fish and Wildlife Service, Klamath River Fishery Resource Office, Yreka, CA.

Moulton, C. 1993. A Proposed Long–Range Plan for Fish Screen Replacement in the John Day Basin. ODFW, John Day, OR.

National Oceanic and Atmospheric Administration. 1988. A Summary of Selected Data on Chemical Contaminants in Sediments Collected During 1984, 1985, 1986, 1987. NOAA Technical Memorandum NOS 44, Rockville, MD.

National Research Council, 1985. Oil in the Sea: Inputs, Fates, and Effects. National Academy Press Washington, D.C.

Nehlsen, W., Williams, J. and J. Lichatowich. 1991. Pacific Salmon at the Crossroads: Stocks at Risk from California, Oregon, Idaho, and Washington. Fisheries 16 (20: 4–21).

Northwest Power Planning Council. 1990. Grande Ronde River Subbasin Salmon and Steelhead Plan.

Olympic Coast National Marine Sanctuary Final Environmental Impact Statement, Volume I. 1993. National Oceanic and Atmospheric Administration, Sanctuaries and Reserves Division, Silver Spring, MD.

U.S. Fish and Wildlife Service. August 1993. Draft Plan of Action for the Central Valley Anadromous Fish Restoration Program. U.S. Fish and Wildlife Service, Sacramento, CA.

U.S. Fish and Wildlife Service. 1993. Report of the Ad Hoc Transportation Review Group of December 31, 1994 to John R. Donaldson, CBFWA. U.S. Fish and Wildlife Service, Vancouver, WA.

WaterWatch. 1993. "New Directions For Oregon's Water Policy, Recommendations to the People of Oregon, the Governor, and the Oregon Legislature. Portland, OR, 23 pp.

Yee, S. and T. Roelofs. 1980. Planning Forest Roads To Protect Salmonid Habitat; in "Influence of Forest and Rangeland Management on Anadromous Fish Habitat In Western North America," William R. Meehan, Technical Editor. USDA Pacific Northwest Forest and Range Experiment Station, Portland, OR.