National Marine Pollution Plan Seeks Ocean Dumping Studies

As waste increases and places to put it decrease, research into possible effects of more ocean dumping becomes urgent. So recommends the Commerce Department's National Oceanic and Atmospheric Administration (NOAA) in a National Marine Pollution Program Plan issued this spring.

The 5-year plan, required by the National Ocean Pollution Planning Act of 1978, finds that sewage waste disposal in particular is a growing problem as the population increases. "Pressure is mounting to allow continued and increased disposal of sewage sludge in the oceans," the plan says. It also calls for more study of ocean dumping of dredged material and industrial waste—much of which is toxic—to see how best such activities can be carried out.

To make waste management decisions, the plan says, a conceptual model to assess the risks and impacts of ocean dumping options should be developed, and applied in a specific region to assess its usefulness and the feasibility of a regional approach. The plan was drawn up by the Interagency Committee on Ocean Pollution Research, Development, and Monitoring.

An earlier 5-year plan was issued by the Committee in the fall of 1979. "The emphasis on municipal waste disposal in the new plan represents a substantial change from the first plan," said Anthony Calio, chairman of the committee and deputy administrator of NOAA. "This reflects a change in public attitude — ocean dumping is now considered by many to be preferable to land dumping. We must find ways to use the oceans effectively as a waste repository."

The plan also recommends that some Outer Continental Shelf oil and gas leasing research be diverted from prelease environmental studies to post-lease monitoring, aimed at measuring the subtle effects of oil and gas activities conducted over long periods of time. Federal research on petroleum pollution in the marine environment represents about 25 percent of the total Federal expenditure. An interagency planning group is being formed to coordinate the long-term monitoring program.

Other relatively high priority areas listed by the plan are accidental discharges of oil and hazardous materials, nonpoint source pollution (such as agricultural runoff), and increased coal use as an emerging problem (disposal of fly ash and related activities will cause mounting problems as coal use is increased).

Areas of relatively low priority in the context of national marine pollution problems—either because they do not pose problems or because the problems are being adequately addressed—are brine disposal, sand and gravel mining, deep seabed mining, and ocean-thermal energy conversion.

Magnetite Is Magnetic Material in Tuna Skulls

A University of Hawaii graduate student, Michael Walker, reports that the magnetic material located within the ethmoid bone complex in the skulls of yellowfin tuna has been successfully extracted and analyzed. Walker and graduate student Anjanette Perry, Andrew Dizon of the NMFS La Jolla Laboratory, and J. Kirschvink of Princeton University have been conducting a search for magnetic crystals in migratory Pacific tunas and green turtles.

Magnetically clean dissections of 35 yellowfin tuna skulls were made and the tissue from within the ethmoid bones removed. The collected tissue was ground with a teflon pestle, the fats were extracted with ether, and the remaining tissue digested in 5.25 percent sodium hypochlorite solution (household bleach). After centrifuging and washing, a colorless residue remained. When a strong magnet was brought up to the side of the test tube, small black particles aggregated near the magnet and followed it as it was moved.

An X-ray diffraction pattern obtained from one of these particles showed that it contained magnetite, the material believed to be the likely basis for the magnetic sense in tuna. This mineralogical study of the magnetic material in the heads of tuna confirms previous magnetometry studies which indicated that the material could be magnetite. (Source: *Tuna Newsletter,* 77:2.)

A Computer Assisted Fishery Export Service

Companies wanting to increase export sales may contact the National Marine Fisheries Service (NMFS) regarding a program provided to the U.S. seafood industry to help increase exports of fishery products. By contacting NMFS, a company's name and the products it has to export will be added to a data system entitled "Computer Assisted System for Export of Seafood" (CASES).

When NMFS receives foreign sales inquiries for seafood, these inquiries are matched with the data in the system, and if a firm can supply the needs of the

buyer, the sales opportunity will be sent to it. For more information about this service, please write Kenneth T. Ellington, National Marine Fisheries Service, F/UD1, Washington, DC 20235 or telephone (202) 634-7451.

New Policy Addresses Seizure of Illegal Fish

NOAA has revised its policy of seizing and seeking forfeiture of fish it believes were taken or retained in violation of the Magnuson Fishery Conservation and Management Act (MFCMA). The revised policy allows National Marine Fisheries Service special agents to seize a vessel's entire catch if the vessel has committed previous violations of the MFCMA, or if the violation in question is especially serious (regardless of previous violation history), or if the violation in question involves multiple counts.

Effective enforcement of the MFCMA, and protection of fishery resources, requires this more severe response to flagrant and repeated violations. Therefore, this new policy makes clear that in cases involving serious violations of federal regulations, NOAA will seize and seek forfeiture of a vessel's entire catch.

NOAA will consider seizure and forfeiture of the vessel in addition to its catch in serious cases where lesser penalties have not been, or would not be successful deterrents. For additional information, contact Marguerite Matera, Staff Attorney, Office of General Counsel, NOAA (617) 281-3600.

Transport Program Reduces Salmonid Smolt Losses at Hydroelectric Dams

Transportation of steelhead trout, *Salmo gairdneri*, and chinook salmon, *Oncorhynchus tshawytscha*, smolts to bypass eight hydroelectric dams on the Columbia and Snake Rivers in the Pacific Northwest (Fig. 1) has increased the number of juvenile fish that survive the downstream run. The number of adults that return to spawn may increase to predam levels for some species, reports Donn Park of the Coastal Zone and Estuarine Studies Division of the NMFS Northwest and Alaska Fisheries Center (NWAFC), Seattle, Wash.

Smolts transported around the dams are spared the perils that have been raising their mortality rates steadily since the dams were built. Mortalities rose dangerously after the last four dams were completed: John Day Dam in 1968, Lower Monumental Dam in 1969, Little Goose Dam in 1970, and Lower Granite Dam in 1975 (Fig. 1).

Downstream migrant salmonids passing a dam ordinarily follow one of two paths. If river flow is low and no water spills over the dam, the fish are forced to pass through the turbines. If they aren't killed directly in the turbine, those emerging face a concentrated predator fish population waiting to attack stunned and injured smolts.

The smolts may follow a second path when the river flow is high. If water is spilling over the dam, fish that don't go through turbines can pass in the spilling water. Although passage over the spill is a safer route than passage through turbines, even this route can be dangerous. During high spill, the water picks up air as it falls and, at some dams, higher levels of dissolved gases than fish can tolerate may result. Smolts can die from gas-bubble disease, a condition caused by excessive absorption of gases (primarily nitrogen) through the gills. As more turbines are added to existing dams, fewer fish pass over the dams with spilling water: Most pass through the turbines.

The smolt transportation program reroutes the smolts that would normally go through the turbines. The system can be divided into two parts.

First, fingerling bypasses can be built into each dam. As seaward-bound smolts enter the turbine intake, the majority are intercepted by a screen that directs them into a protected area called the turbine gatewell. An opening in the gatewell leads to a bypass channel through which the smolts pass to the tailrace on the other side of the dam. This bypass system passes 50-70 percent of the smolts, sparing them from the dangers at that particular dam.

If they faced only one dam, the bypass

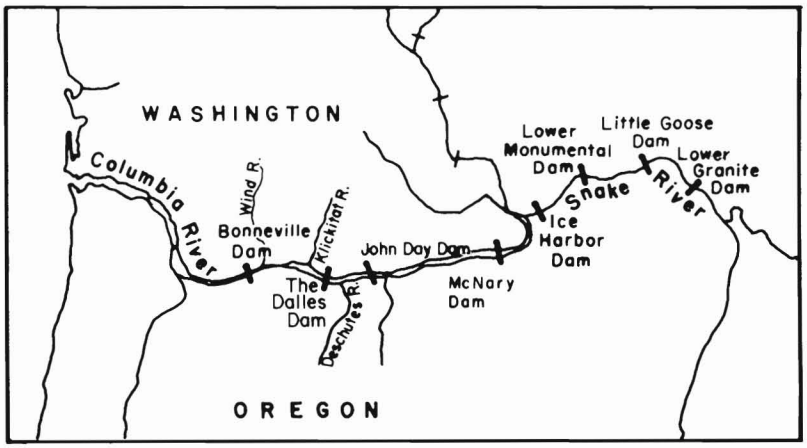

Figure 1.—Dams on Snake and Columbia Rivers involved in the fish transportation program.

system would be enough to maintain satisfactory runs. At each successive dam, however, the smolts that aren't rerouted through the bypass system suffer a mortality of 15-20 percent. Smolt mortalities from repeated passages through the turbines add up and the surviving population is significantly reduced.

The second part of the transportation program prevents repeated run reductions at each dam. Instead of releasing smolts from the tailrace directly into the river, researchers truck (Fig. 2) or barge (Fig. 3) them from upriver dams to a release site below the nearest dam to the estuary, Bonneville Dam. Although some smolt mortality is associated with trucking and barging, the number lost in a single transporting is far less than the number that would be lost if the smolts had to pass through each dam's danger areas.

Steelhead trout have shown the best adult return figures of the transported species. During years when the river flow is low, the returns from transported smolts far outnumber those from nontransported smolts. For example, in a 1980 NOAA Technical Memorandum, Donn park wrote than in 1973, only 3.5 percent of the seaward migrants were transported, but they provided 40 percent of the adult returns from that year. During years when the river level allows some water to spill over the dams, the increased adult returns from transported steelhead trout aren't as spectacular, but they still outnumber returns from those not transported.

Chinook salmon returns increased appreciably during the early years of transporting but the return levels diminished during later years. While total numbers of returns to the river have been lower than expected, the returns of adults from previously barged and trucked smolts have been consistently higher than returns from nontransported smolts. For example, during 1978, approximately six chinook salmon adults trucked or barged as smolts returned for every return from nontransported controls. Researchers suspect that early-ocean mortality may be decreasing the total adult returns—without transportation, total adult returns could be even lower.

Transportation successes from Ice Harbor, McNary, Lower Granite, and Little Goose Dams have encouraged researchers to expand the program. Each year equipment is upgraded and added so that more smolts are transported with the least possible stress. Transport programs have been expanded to include coho, *O. kisutch;* sockeye, *O. nerka;* and summer and fall chinook salmon as well as the steelhead trout and spring chinook salmon. The trucking and barging of smolts around dangerous dams is now joining such programs as hatchery and fingerling bypass systems. They are all essential for preserving the Pacific Northwest's salmonid resources.
Mary Lee Sibley-Armour, NWAFC

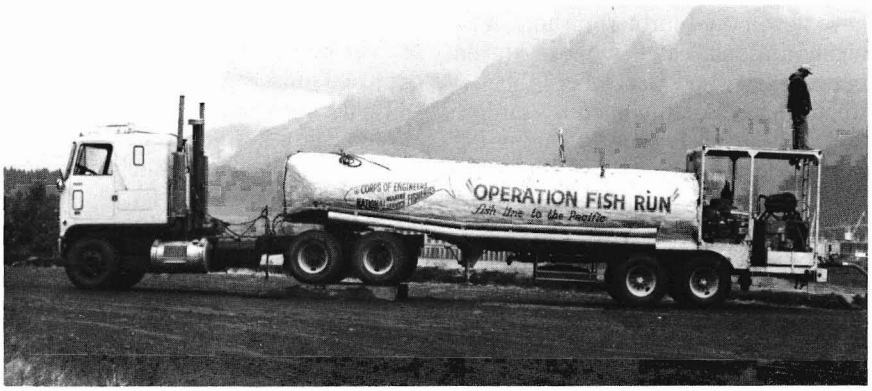

Figure 2.—Truck used to transport Pacific salmon smolts from upriver dams to a safe release site below Bonneville Dam.

Figure 3.—Barging salmonid smolts on the Columbia River.