COLUMBIA RIVER SALMON UPDATE

This publication was prepared for the University Task Force on Salmon and the Columbia River System by James Cornelius, Extension economist, Oregon State University. The Task Force is a group of faculty from Oregon State University, the University of Idaho, Washington State University, and the University of Washington with interest and expertise relating to the Columbia River system.

The status and viability of salmon in the Columbia River system have become prominent policy issues in the Pacific Northwest. There has been a series of public and private actions affecting salmon in recent years combined with a proliferation of studies. The result is a complex assortment of policy directions and management alternatives that affect the Columbia River system and those who rely on it. The purpose of this update is to briefly review the basic concerns and recent developments affecting Columbia River salmon.

Concern over the size and health of salmon populations is long standing. Columbia River salmon numbers have dropped during the past century from peak populations of perhaps 10 or 15 million fish to only about 2.5 million. Whereas the original salmon population consisted of naturally spawning or wild stocks, only about 20 percent of the remaining salmon spawn naturally in the rivers.

The crystallizing issue in the current controversy has been the designation of certain salmon stocks in the Columbia River system as threatened or endangered under the federal Endangered Species Act (ESA). Species listed as "endangered" are in danger of extinction. The ESA also recognizes "threatened" species; those determined likely to become endangered in the foreseeable future. The ESA requires conservation actions for all threatened and endangered species, restoring populations so they no longer face extinction.

A specific Columbia River stock of sockeye salmon was listed as "endangered" under the ESA in 1991. The term "stock" refers to a subdivision of a given species; for example, the Redfish Lake sockeye is a particular stock of the sockeye salmon, *Onchorhyncus nerka.* These particular salmon migrate 900 miles up the Columbia and Snake River system to spawn in Redfish Lake in central Idaho. Only four adult sockeye returned to Redfish Lake in 1991, and one in 1992, compared to about 1,000 annually in the 1960s.

As a related example, the combined annual returns of Snake River spring, summer, and fall chinook salmon have declined in recent years from roughly 80,000 fish in 1968 to only about 10,000 in the early 1990s, and the runs continue to dwindle. In 1992, these stocks of Snake River chinook were listed as "threatened" under the ESA.

Not all salmon stocks in the Columbia River system are threatened or endangered. Use of the term "salmon" is a general reference to the salmonid family grouping that includes five species of Pacific salmon, and trout, char, and whitefish. As applied to the Columbia River system, "salmon" commonly applies to the anadromous (ocean migrating) *Onchorhyncus* species, including chinook (king), coho (silver), and sockeye (red) salmon, along with steelhead trout.

There apparently are healthy populations of sockeye and chinook salmon in the Columbia and in other United States and Canadian river systems. Regardless, the distinct stocks of Snake River sockeye and chinook have been designated as endangered or threatened species under the ESA. The ESA listing triggers a process designed to prevent extinction of what scientists have determined to be unique salmon stocks. The listing and ensuing "recovery plan" mandated by the ESA may have a significant effect on those who directly or indirectly use the Columbia River system.

Status of the ESA Recovery Plan

The National Marine Fishery Service (NMFS), a branch of the U.S. Department of Commerce, is the federal agency responsible for developing the recovery plan for the Snake River sockeye and chinook salmon. NMFS

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appointed a scientific panel to devise and recommend a recovery plan.

As of August 1993, the recovery plan was reported nearing completion, but had not been made public. Once released, NMFS will consider the recommended plan and associated public comment, complete an environmental impact statement, and ultimately set the recovery plan into action through the authority of the Secretary of Commerce. Upon request, the Secretary may convene a committee (dubbed the "God Squad") to evaluate social and economic effects, and possibly exempt projects from compliance with ESA protection.

Experience with the ESA listing process suggests that submission and implementation of a recovery plan can become a lengthy process, often measured in years. The interval between the initial listing and implementing the recovery plan may create a lag time when intermediate actions provide temporary protection for the listed species.

The recovery plan is a key component of the ESA that will address the specific ecological problems of the listed Snake River salmon. The plan is not necessarily a universal prescription for resolving the broader issues associated with Columbia River salmon in general. However, much of the scientific work underway is cast in broader terms than a specific Snake River sockeye or chinook recovery plan. This recognizes the plight of the Snake River stocks is symptomatic of a broad range of environmental issues confronting Columbia River and other West Coast salmon.

The formal ESA listing and work towards a recovery plan are only part of the concern over salmon in the Columbia River system. There has been a proliferation of studies, hearings, management actions, and suggested policies that address Northwest salmon issues. The Northwest Power Planning Council's 1992 *Strategy for Salmon* recommends a comprehensive plan for rebuilding salmon runs on the Columbia River. This strategy is not, however, a prescribed recovery plan as mandated by the ESA.

While there are common themes that connect these broad efforts, there is little overall coordination of action, many perspectives on the nature of the problems, and often conflicting recommendations. This may create confusion for affected citizens or those seeking simple explanations. Such confusion also provides opportunity for dissenting interests to stall the recovery process. The following sections review the basic problems, actions, and effects associated with salmon in the Columbia River system. These issues extend beyond the problems specific to the ESA listed Snake River salmon stocks.

Problem Issues

The fundamental problem is the real or potential loss of naturally spawning, wild Columbia River salmon stocks, and declining populations of fish in these stocks. The environmental dimensions of this problem include the loss of biological diversity, the health of surviving stocks, and basic well-being of the Columbia River ecosystem. The human or social dimensions range broadly from the economic loss associated with declining commercial salmon harvest to the role of salmon in Native American culture.

While the problem is widely recognized, there is less consensus on the cause. By some estimates, more than $1 billion has been spent to conserve Columbia River salmon in recent years, yet many basic questions remain unanswered. The ongoing inquiry into the cause of declining salmon numbers has focused on four general issues: hatchery propagation; habitat conditions affecting salmon health and reproduction; hydropower and migration of adult and juvenile salmon; and harvest of salmon for commercial, recreational, and cultural purposes.

Restoration Approaches

Potential restoration action are categorized according to the four general problem areas listed above. Studies indicate that declines in Columbia River salmon populations are not solely the result of any single factor. Moreover, the causal elements in the decline of one species may be somewhat different from those affecting others.

While it may be tempting to blame the dams, commercial harvest, logging, or the hatchery system, the problem likely has evolved from the interrelationship among several contributing factors. This includes some that as yet may be unknown or poorly understood. Action that will restore or maintain salmon populations on the Columbia River system must recognize these multiple factors and interrelationships.

Hatcheries and fish propagation. Fish propagation is aimed at increasing the production of wild salmon, particularly those with declining populations. The role of salmon hatcheries is a controversial issue. Since the ESA applies only to wild stocks, hatchery-produced salmon from hybrid or transplanted stock are not considered to be viable substitutes for the naturally occurring wild fish. Hatchery programs designed solely to produce more salmon for recreational or commercial fisheries actually may interfere with the viability of certain wild salmon stocks. Restoration approaches call for careful reexamination of hatchery program objectives and procedures. Wild brood stock hatcheries may be appropriate for conservation of some stocks.

Habitat. Modification of land uses on property adjacent to the river and its tributaries also is viewed as an important restoration action to enhance salmon propagation through better water quality, and improved breeding and rearing habitat. Reduction or elimination of harmful water pollution and loss of stream side vegetation caused by agricultural, grazing, forestry, or mining practices are important actions in this regard.

Hydropower and migration. Salmon migration, particularly down-river passage of smolts (juvenile fish), is likely to be a key component of future Columbia River salmon management. The survival of smolts as they journey downstream to the ocean is hampered by passage through the hydroelectric dams. Smolt survival also is influenced by management of the current, release flow, and pools created by the water behind these dams.

Scientists have identified several aspects of salmon migration that might be better managed to enhance the survival of smolts and adult fish. These alternatives include physical modifications such as the construction of dam by-pass facilities, or increased screening of irrigation diversions and turbine intakes. Control of predators such as squawfish, and increased transportation of smolts around dams (by barge or truck), are being evaluated. Accelerating current flow at critical passage times in order to speed smolt passage downstream may be accomplished by "flushing" greater water volume down the system or by drawing down pools to increase the flow velocity behind dams.

Harvest. Fishery managers have determined there are harvestable surpluses of certain Columbia River salmon stocks. The problem posed by commercial or recreational fishing for these stocks is the incidental or unintentional harvest of endangered or threatened species such as the listed Snake River stocks. This occurs because several salmon stocks are present in the same place at the same time. Harvesters may impose some mortality on protected salmon both at sea and in the river because of an inability to distinguish among stocks, or through the use of non-selective lethal fishing gear such as gill nets.

Restoration alternatives include banning or restricting harvest where mixed stock fisheries include ESA listed Columbia River stocks. Selective harvest regulations under consideration include prescriptions for non-lethal fishing gear, marking all hatchery fish, and a policy to return uninjured to the water all non-marked, wild salmon.

Institutional factors. The restoration actions described above illustrate actions that might be undertaken as a part of a specific ESA recovery plan, or as general prescriptions for comprehensive salmon management. An equally important question is how to accomplish these actions given the complex network of public and private interests involved. The Columbia River is not managed by any single entity. Coordinated, comprehensive salmon management must consider the Columbia River's multiple use objectives. Changes or modifications in institutional parameters such as water allocation or management agency jurisdiction may be necessary to accommodate a comprehensive salmon restoration plan.

Outcomes

Most would agree that restoring or maintaining healthy salmon populations is desirable. The controversial questions are how much recovery is appropriate, how the recovery should be accomplished, and who should bear the costs or consequences. The restoration approaches currently under consideration could impose significant restrictions on the future use of the Columbia River system, its salmon, water resources, and land uses adjacent to the river and its tributaries. Policies that modify the use or flow of the Columbia River to accommodate salmon likely will disrupt the network of use forged by other sectors, especially power generation. Directly and indirectly, the Columbia River system affects important sectors such as commercial and recreational fisheries, hydroelectric power, agriculture, forestry, mining, industrial manufacturing, and barge transportation.

Economic studies of selected recovery actions conclude there are substantial costs associated with some alternatives. Preliminary estimates of selected flow regimes indicate that the potential economic value of hydropower losses could range as high as $1 billion annually for major alterations in spring and summer river flows on the Columbia and Snake River system. A four-dam spillway drawdown on the Snake River is projected to cost roughly $75 million annually in lost hydropower. These costs are exclusive of any other restoration actions, or the impacts on other industries, such as agriculture.

In some cases, the long term effects of these restoration possibilities on salmon populations are uncertain. The magnitude of costs and uncertainty of outcomes associated with restoration draw attention to the relative cost effectiveness of management alternatives under consideration.

Because adverse economic impacts on the hydropower and other sectors may be significant, with little or no direct economic benefit to them, industry reaction to many of the restoration alternatives is guarded. This caution springs from as yet unresolved questions over what or who specifically is contributing to declines in Columbia River salmon stocks, as well as concern

over the ultimate effectiveness of the proposed restoration alternatives. Given the uncertainty, the road to salmon recovery may involve "adaptive management" of the Columbia River system, whereby managers undertake a salmon restoration strategy, and then evaluate its effectiveness in application. Subsequent modifications in the management plan would be made based on lessons learned from the initial design.

While the primary objective of the Snake River salmon recovery plan is focused closely on continued survival of ESA listed sockeye and chinook stocks, many will judge the overall restoration strategy in terms of its social and economic effects. The plan will be scrutinized in terms of its probability of success, cost effectiveness, and the distribution of benefits and costs among affected groups. In the public policy arena, concerns over the environment are interrelated with effects on human behavior.

The Columbia River system salmon issue is symptomatic of conflicts that arise from multiple uses of publicly owned natural resources, and dramatized by threats to the continued survival of these resources. The salmon issue is a crucial test of the public's ability to manage natural resources in the Columbia River system in a responsible, sustainable manner.

For More Information

Alternative Actions for Restoring and Maintaining Salmonid Populations on the Columbia River System, L. Eisgruber, et al. Pacific Northwest Extension publication PNW 407, Oregon State University, Corvallis, March 1992. Single copy $2.00.

Salmon and the Columbia River System, J.C. Barron and G. Thorgaard. Pacific Northwest Extension publication PNW 362, Oregon State University, Corvallis, April 1991. Single copy 75¢

The Effect of Lower Snake River Reservoir Drawdown on Barge Transportation: Some Observations, J.R. Hamilton, M. Martin, and K.C. Casavant. Pacific Northwest Extension publication PNW 406, Oregon State University, Corvallis, April 1992. Single copy 50¢

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