The Challenge of Restoring Wild Salmon

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We think we want to save wild salmon. We say we want to save wild salmon. We can even provide a list of excellent reasons for doing it. But can we muster the will? We do still have choices about policy options, but is our desire to save wild salmon likely to be buried by the desire of so many people to live in a beautiful area, or the desire to fish however much we want, or the desire for more goods and services?

Introduction: The Challenge of Restoring Wild Salmon

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Introduction

Restoring runs of wild salmon is a widely professed goal for the region of western North America encompassing southern British Columbia, Washington, Idaho, Oregon, and California. Some people accord wild salmon mythological status, and thus, their calls for protection take on the tone of religious fervor. Substantial support for wild salmon recovery also comes from those who fish for salmon. Others fold the saving of wild salmon into broader environmental concerns.

But whatever the motivation to protect and recover wild salmon, it is *unlikely to happen* if current trajectories in human population and development continue. The implications of science findings in both biology and economics have yet to be adequately explained. And dramatic changes in salmon recovery trends would have to occur if the restoration undertaken to date were to have any measurable chance of success. For all the talk of sustainability, society has yet to make the painfully difficult choices required to achieve it.

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At best, we can say what is likely. Through the 21st century, appreciable year-to-year variation in the size of wild salmon runs probably will occur. In addition, short-term trends will continue to be confusing because of decadal fluctuations caused by cyclic climatic and oceanic changes. Most stocks of wild salmon in the region, however, likely will remain at their current low levels or continue to decline despite costly restoration efforts. Based on historical patterns, another cyclic climatic and oceanic change likely will occur early in the 21st century, extend for several decades, and stimulate modest increases in the size of wild salmon runs. However, the long-term trend is likely to remain downward (Hare et al. 1999).

The uncertainty of current predictions is obvious, but the most likely outcomes are not in doubt,

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Figure 1. Building houses converts high value salmon habitat into areas suitable for family living, but unsuitable for salmon. (Source: U.S. Army Corps of Engineers.)

particularly as the cumulative effects of outside forces interact and affect wild salmon, their habitat, and their human neighbors.

The Salmon 2100 project focuses on policy and science questions about wild salmon. We define wild salmon as those produced by natural spawning in natural or minimally altered fish habitat from parents that were spawned and reared in similar habitat. Defining exactly what a wild salmon is can be challenging and involves a blend of scientific information and implied policy preferences (I. I. Courter, Oregon State University, and R. T. Lackey, unpublished). A fuller treatment is provided in Chapter 2.

It is debatable whether feasible policy options for restoring wild salmon exist in the overlap between what is ecologically possible and what is desired by society. For most individuals, the choices are difficult, unpleasant, and preferably avoided. Considerations in the salmon policy debate include, How expensive will energy be? Where will people be able to live? How will use of private and public property be prescribed, and proscribed? Will people be allowed to harvest salmon at all, and if so, which individuals and groups will be granted the right to fish? Will human food, transportation, and energy continue to be subsidized? Will society be able to provide high paying jobs for the next generation? What personal freedoms will be sacrificed to restore wild salmon? Should society control western North America's rate of human population growth, which is driven almost entirely by immigration from outside the United States and Canada, plus some from elsewhere in the United States and Canada?

The answers to these and other questions will be primary determinants of the future of wild salmon runs. Scientists can obtain the necessary data and help evaluate the consequences of different policy options, but the wild salmon problem will remain an issue of societal choice (Smith and Steel 1997; Lackey 1999; Mills 2000).

Figure 2. New housing developments are cropping up over Pacific Northwest and California regions at astonishing rates. Many areas are experiencing population growth rates at levels comparable to some Third World countries. (Source: U.S. Army Corps of Engineers.)

Although few people appear to be happy with the present situation and a strong majority publicly professes support for maintaining wild salmon, there is little indication that society, or more correctly, its policy makers, is inclined to confront the root agents of decline (Black 1995). It may appear that political institutions are unable to act, but in fact, decisions are made daily by institutions *and individuals* on the relative importance of maintaining or restoring wild salmon. Wild salmon decline is related both to people's individual life styles and also to the overall number of people. Thus, it is likely that society will continue to chase the illusion that wild salmon runs can be restored without massive changes in the number, lifestyle, and philosophy of the human occupants of the western United States and Canada.

The latter statement, with its concept of an illusion, forms the premise of this publication. The challenge we invited authors to address was encapsulated in a single question: what is it *really* going to take to have wild salmon populations in significant, sustainable numbers through 2100? The only assumption required in addressing this question was that human population pressure would increase, as discussed in Chapter 3. Few disagree with this assumption.

> **What is it *really* going to take to have wild salmon populations in significant, sustainable numbers through 2100?**

In western North America, the most vocal public concern about salmon policy is driven by the decline of wild salmon (Smith and Steel 1997; Lichatowich 1999). The precise extent of the decline is not accurately known, but the decline and public concern are real. Public concern is not limited to loss of a
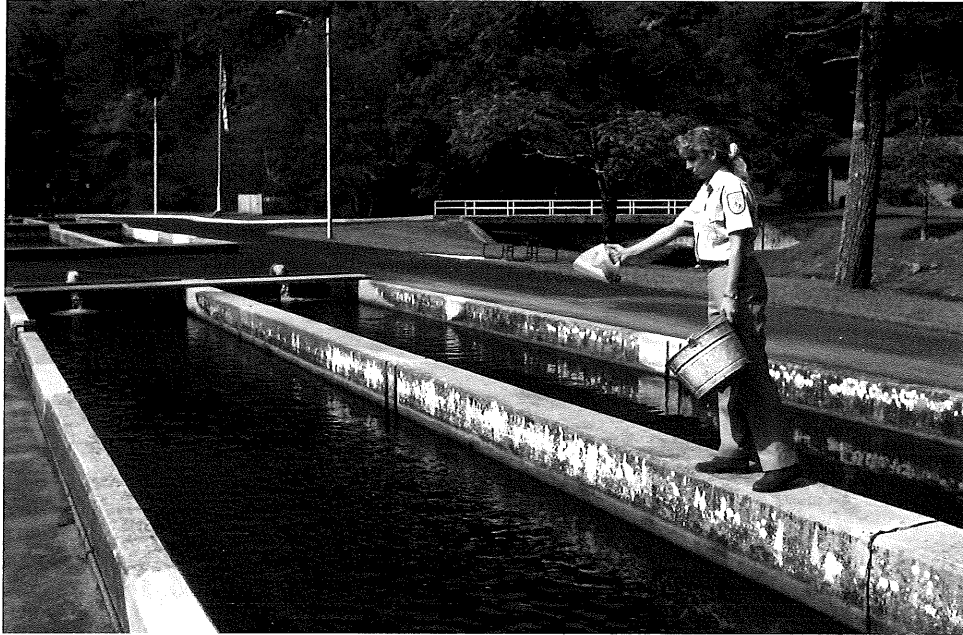
Figure 3. Some individuals view hatcheries as an integral part of keeping salmon fishing viable. Others, however, see large ecological problems for wild fish and would like to see them shut down. (Source: U.S. Fish and Wildlife Service.)

food or recreational resource because farm-raised (from many sources) and imported wild salmon (mainly from Alaska) are readily available for retail sale, and supplemental stocking could maintain at least some runs in perpetuity, albeit at high economic and ecological cost (Michael 1999).

Many people view salmon as a cultural symbol, an indicator of the region's quality of life (Lang 1996; National Research Council 1996). Those who advocate preservation of wild salmon do not necessarily always choose salmon restoration over competing priorities (e.g., flood control, inexpensive electricity, personal mobility), but maintaining or restoring wild salmon runs may be a central public policy objective for them (Smith et al. 1998).

The most important driver determining the ecological future of the region is the size, character, and distribution of the region's human population (Northcote 1996; Hartman et al. 2000), which is growing at a rate comparable to that in some rapidly growing Third World countries. From post-Ice Age waves of aboriginal immigrants from the North 10 millennia ago to the influx of North Americans (and Europeans) from the East during the past two centuries to the influx from Central and South America and Asia after the Second World War, western North America has been transformed in a few thousand years from a relatively sparsely populated region to one of the most urbanized in North America with more than 90% of the population residing in urban communities (2000 U.S. Census). Although the birth rate of residents has apparently slowed, the influx of people

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continues unabated, at least in part because of the strong attraction of unspoiled nature images such as the salmon represents. The human population surely will continue to grow, and the region probably will become even more urbanized (Hartman et al. 2000).

Restoration—Options and Illusions

Restoration connotes assorted expectations among salmon technocrats, decision officials, and policy advocacy groups (Hyatt and Riddell 2000). At one extreme, restoration may mean nothing less than rebuilding all wild salmon runs to levels that existed prior to 1850 (e.g., runs sufficiently large to support intense, but sustainable, fishing by commercial, recreational, and Indian fishermen). To others, wild salmon restoration efforts would be considered successful if a more modest goal were achieved: maintaining stocks at levels where extinction was unlikely (e.g., endangered species recovery). Still others envision successful restoration as permitting sustainable commercial, recreational, and Indian fishing, with the preservation of individual stocks being relevant but not essential. Some people, arguing that most of salmon spawning and freshwater rearing habitat is altered beyond rehabilitation, condone a significant, even dominant, role for hatcheries to maintain runs at levels high enough to support harvest levels as high as those in the past. By contrast, some see no role for salmon hatcheries in wild salmon restoration except for the possible temporary and last ditch role of keeping a stock from disappearing. Some individuals and groups are willing to eliminate immediately all fishing for salmon, close all salmon hatcheries, and breach major dams. Conversely, others would be willing to forego some or all of the remaining wild salmon runs if the cost of their maintenance became too onerous.

   Because there is so little agreement on what constitutes successful wild salmon restoration, it is impor-

Figure 4. Many aquatic environments have been drastically altered in ways that do not favor salmon. Creation of dams provides cheap electricity, but also has created difficult migratory barriers for salmon. (Source: U.S. Army Corps of Engineers.)

Figure 5. Agriculture is a significant source of habitat alteration that puts downward pressure on salmon numbers. (Source: Adina Crisan.)

tant to define expressly how success should (or will) be determined when a particular restoration strategy is proposed. Even among the organizations that champion wild salmon restoration, there is a jumble of divergent, often contradictory, goals for restoration. At the poles are groups that view restoration as returning both commercial and recreational fishing to past, high levels and, at the opposite end, others who view restoration largely as a biological or genetic diversity concern and would close all fishing immediately. The following publicly stated restoration goals and objectives are examples extracted from documents developed by government agencies, Indian groups, and private organizations during the last few years:

> ... halt declines... and rebuild populations... to a level that will support commercial and sport harvest... . [U.S. government hydroelectric organization]

> The opportunity to catch and keep salmon in reasonable numbers for sport fishermen is the general goal of salmon fisheries management... hatchery raised fish can be substituted in any instance where natural reproduction cannot be sustained. [Recreational fishing advocacy organization]

> Our goal is to restore wild salmon and steelhead populations to harvestable, self-sustaining levels... hatcheries may be used for various purposes including to provide fisheries and in attempts to preserve or restore naturally reproducing populations. [State government fisheries agency]

> ... to ensure the long-term viability of Pacific salmon populations in natural surroundings and the maintenance of fish habitat for all life stages for the sustainable benefit of the people.... [Canadian government fisheries agency]

Salmon restoration should ultimately aim toward the production of wild adult salmon runs comparable in size to historic numbers... anything short of production of large harvestable runs makes little economic sense. [Commercial fishing advocacy organization]

... abundant harvestable wild salmon and steelhead populations in our rivers and streams, region-wide. [Environmentalist and preservationist advocacy organization]

... there is a fundamental conflict between the goal of recovering endangered wild salmon and the goal of providing fish for commercial harvest through hatchery operations... ensure that policymakers are aware of the costs associated with efforts to recover salmon.... Federal, state, and tribal fishery agencies tend to be insensitive to the significant cost of the measures they propose.... [Organization representing interests of industries that are major users of electricity]

... recovery, which is defined as abundant, self-sustaining populations that are sufficient to support the treaty-based fishery rights of Columbia Basin tribes. [Scientists in a letter sent to the President of the United States]

Restore anadromous fishes to historical abundance in perpetuity. [Organization advocating the interests of certain Indian tribes]

Many of the region's environments have been permanently altered in ways that do not favor wild salmon. The Columbia basin, for example, is now dominated by a series of main-stem and tributary reservoirs. Land use in much of the watershed has also changed in ways that no longer favor salmon (Bisson et al. 1997; Michael 1999). As dramatic as the environmental changes are, some fishes, especially exotics, are thriving (e.g., walleye, American shad *Alosa sapidissima*, smallmouth bass *Lepomis dolomieu*, northern pike *Esox lucius*, and brook trout *Salvelinus fontinalis*). These exotic species are well adapted to the new environment. It would be difficult—some argue impossible—to recreate the region's habitats that once existed and
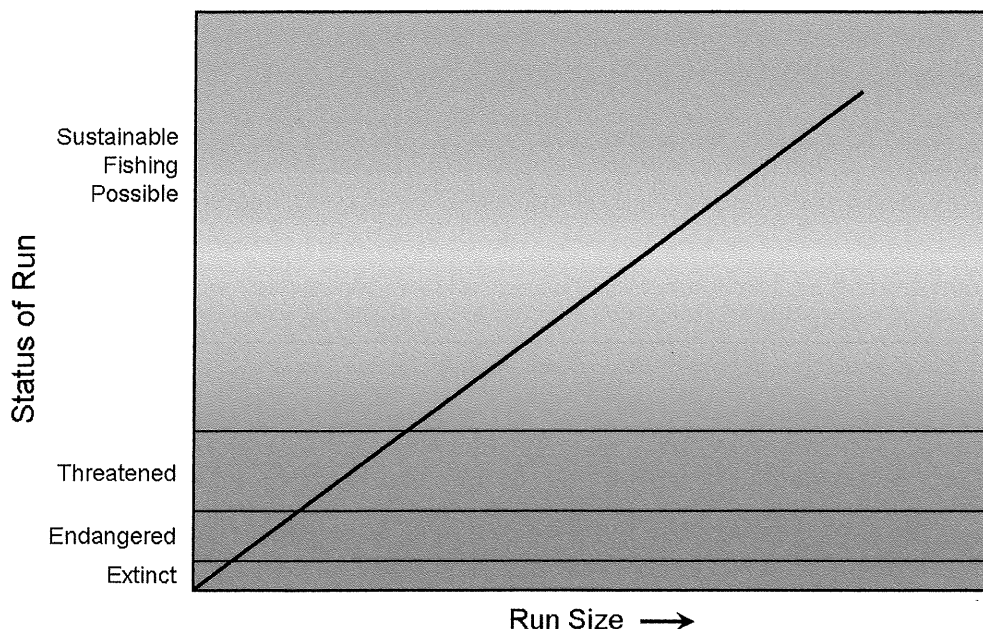

Figure 6. Meeting Endangered Species Act and Species at Risk Act requirements is a modest policy objective because it is usually insufficient for maintaining sustainable fishing. (Source: Robert T. Lackey.)
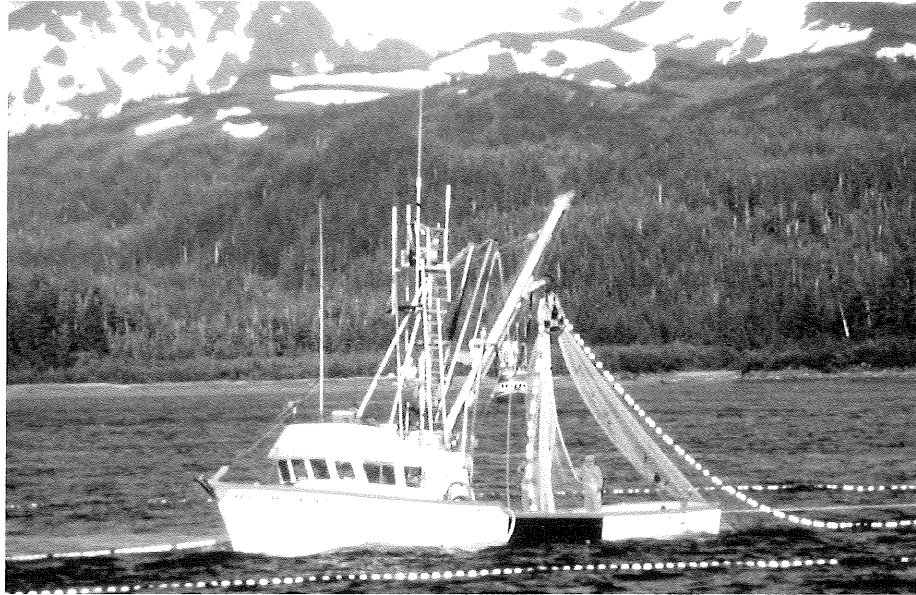
Figure 7. Both commercial and sport fishing may need to be further controlled in managing wild salmon. Competing alternatives include stopping all fishing immediately versus using supplemental stocking for hatcheries to maintain commercial and sport fishing at high levels. (Source: National Oceanic & Atmospheric Administration [top photo] and U.S. Fish and Wildlife Service [bottom photo].)

Figure 8. At the core of any salmon policy is the question of whether there are feasible policy
options available, given society's other priorities. (Source: Robert T. Lackey.)

were ideal for wild salmon. A simpler, cheaper policy option would be to manage for those fishes, typically
exotics, best suited to current habitat. Such an approach, while relatively easy and cheap to accomplish,
would be an explicit decision to terminate many stocks of wild salmon.

There have been serious efforts to systematically prioritize wild salmon stocks to allocate society's efforts
to restore runs (Allendorf et al. 1997; Wu et al. 2000). A similar option, creating salmon sanctuaries, is to
preserve stocks in watersheds, such as those surrounding coastal rivers, where some reasonably healthy wild
stocks still exist and thus the chances of restoration are greater (Rahr et al. 1998; Michael 1999). Also, some
stocks (e.g., Chinook salmon *Oncorhynchus tshawytscha* using Hanford Reach on the main stem of the
Columbia River) are better adapted to the highly altered environment of the region because they spawn at
times of the year when water flows are more natural and in locations relatively less altered. Others argue that
perhaps we should stop focusing on stocks and accept that no *species* of salmon is in danger of extinction.

This acceptance of the inevitable is countered as merely admitting defeat in the face of difficult, expensive, and divisive policy choices.

People of the United States and Canada now devote considerable resources toward earnest, and often futile, attempts to restore wild salmon stocks (Independent Scientific Group 1999). Will society conclude that maintaining wild salmon in ecologically suboptimal environments of the region carries economic costs that are too high? More fundamentally, will society question and reverse, as some suggest, the economic expansionist ideology that has long been the hallmark of western society (Lichatowich 1999; Salonius 1999)? Michael (1999), in one of the few cases of someone trying to answer such questions, concluded that "... society has already decided that anadromous salmonids in the Pacific Northwest will exist in low numbers and less diversity than historically."

> **We take no position on any policy, nor do we even assert that society ought to do what is required to restore and sustain wild salmon.**

Current and past attempts to cope with the inexorable increase in human population of the region (primarily land use planning and zoning) have met with limited success from an ecological perspective (Northcote 1996; Kline and Alig 1999). Even strict land-use laws, such as those passed in Oregon, are regularly challenged in the courts and through democratic means. An example is a 2004 voter-approved Oregon initiative that potentially overturns some aspects of Oregon's long-established land-use planning laws. Even when strict land-use laws or policies are in place, they often merely accommodate growth rather than control it. Growth management, including the various permutations of land-use zoning, balanced growth, sustainable growth, smart growth, or environmentally sensitive growth have merely attempted to adjust to human population growth in the least disruptive way. As long as people insist on an ever higher standard of living, it is a delusion to expect that wild salmon runs can be maintained, much less restored, alongside a doubling, tripling, or more of the region's human population (Hartman et al. 2000). Most people would assuredly find the prerequisite changes in policies on human population growth rate and associated economic reorientation to be draconian; there is little evidence of the willingness of most people even to consider such choices.

The essays which follow provide a spectrum of policy choices on how significant runs of wild salmon might be sustained in this region through 2100. We take no position on any policy, nor do we even assert that society ought to do what is required to restore and sustain wild salmon. These are choices that society at large must make with a clear understanding of the various policy options. It is our hope that this book will provoke a rigorous and honest analysis of the science and policy surrounding society's professed but possibly delusional goal of sustaining wild Pacific salmon in western North America.

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