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with Fish Habitat Protection?**

A Biologist's Perspective

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Reprinted from the
Alaska Fishery Research Bulletin
Vol. 3 No. 1, Summer 1996

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This question formed the basis of a session at the Alaska Chapter meeting of the American Fisheries Society in Wasilla, Alaska, in November 1995. Participants were asked to give their prognosis for the quality and quantity of fish habitat in Alaska 10–20 years from now, especially anadromous fish habitat. The legislator's perspective (see page 45), presented by Senate President Drue Pearce, was slightly modified for publication. The biologist's perspective, by Ken Tarbox and Terry Bendock, was not a presentation, per se, but was generated from questions that followed Senator Pearce's presentation.

Alaska — the word evokes visions of wide-open plains of tundra, snow-capped mountains, crystal-clear mountain streams filled with trout and salmon, abundant wildlife, and endless dazzling fiords. These extensive environs feed the illusion that all is well with our resources in Alaska, that this will last forever — that perhaps we can take a few minor liberties with such a profusion of pristine wilderness. What damage will a duck bite here or there cause? But is Alaska really protected by its environmental laws, or is it slowly dying from duck bites? If we compare our situation with factors leading to the loss of Pacific salmon in other areas on the west coast of North America, we find the same factors present in Alaska.

THE COLUMBIA RIVER

The Columbia River offers a striking example. As described by Dietrich (1995), the Columbia demonstrates man's triumph over the perils of nature, and the damage that such ignorance can inflict on nature. It is hard today to envision this once 1,200-mi cataract of wildly seasonal flows, deep canyons, impassable falls, and shifting channels that defined this river throughout the centuries. Superlatives were used to describe everything about the Columbia; it was louder, stronger, faster, higher, and more dangerous than any

other river on the continent. It had 109 rapids and waterfalls from Redgrave Canyon down to the Cascades (for which the mountains were named). It was ice-covered during the winter and flooded each summer. The perils of the Columbia were extensively documented by Dietrich. At the Dalles during the 1880s, melting snow could raise the river 52 ft over normal levels. Government surveyors clocked the river's speed at over 15 mph through Spokane Rapids. Major floods occurred every 5.3 years on average; the flood of 1894 carried 34 times the volume of its normal flow. Native fishermen frequently drowned when harvesting the river's bountiful fishes, and the Hudson's Bay Company lost nearly 300 seasoned employees to the untamed river. Immigrants traveling the Oregon Trail, which ended at the Dalles, often crossed the Cascade Mountains using a lengthy and dangerous toll road rather than complete their journey in a raft or canoe on the Columbia.

Interestingly, Dietrich described this hell-on-earth for humans as heaven for salmon and other fishes: In spite of the cataracts and shifting channels, the Columbia produced more salmon than any other waterway in the world. When settlers began arriving from the east, however, the salmon runs, which nature had sustained for centuries, declined within a few decades. Lewis and Clark visited these waters in 1805; the first steamboat plied her waters in the 1830s; and by 1873

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the U.S. Army Corps of Engineers had dynamited its first Columbia River obstruction, John Day Rock. A decade later the railroads arrived. By this time, salmon catches were already declining. In 1878 Livingstone Stone was hired by the canning industry to start the first hatchery. In 1892 he addressed the American Fisheries Society, arguing for the creation of "salmon parks" to stem the decline, but during the next 80 years the Columbia was ditched, diverted, dammed, and diked and salmon all but disappeared (Dietrich 1995).

This unfortunate scenario was repeated on most other Pacific Northwest rivers with the same consequences. Therefore, it is not surprising that the National Research Council (NRC 1996) reported that "Pacific salmon have disappeared from about 40% of their historical breeding ranges in Washington, Oregon, Idaho, and California over the last century, and many remaining populations are severely depressed in areas where they were formerly abundant." Of the thousands of wild salmonid stocks existing a century ago, only 99 native wild stocks are still considered to be healthy in the Pacific Northwest and California: 32 fall chinook *Oncorhynchus tshawytscha*, 3 spring and summer chinook, 20 chum *O. keta*, 6 pink *O. gorbuscha*, 3 coho *O. kisutch*, and 1 sockeye *O. nerka* salmon stocks and 28 winter steelhead *O. mykiss* stocks (Huntington et al. 1996).

Some argue that taming the Columbia and other salmon streams of the Northwest was a fair trade and made good economic sense. They transformed an inland desert into an inland empire, opened up extensive transportation corridors, provided cheap electricity for millions of Americans, and gave rise to industries that employ tens of thousands of workers. However, today's citizens of the Pacific Northwest are spending billions of dollars trying to restore, with little success, economic loss of a salmon fishing industry as well as indirect cultural and social losses.

PARALLELS IN ALASKA

Similar taming of Alaskan rivers is not only possible but probable as resource extraction and other uses expand. Because of Alaska's size and its comparatively recent development, when one looks at Alaska as a whole, it is easy to miss the subtle changes to the resource base that are taking place. However, if one looks more closely, the increasing urbanization of Alaska and the growing use of nonrenewable resources parallels the situation on the Columbia. In fast-growing urban areas, such as Anchorage, the loss of salmon and stream resources are most evident. Even in more

rural areas, however, salmon habitat is being lost at an increasing rate. Where man treads, the historical pattern remains clear: little regard for fish over short-term self interests. While we speak today of balancing resource development and economic growth, in truth there is little balance, and aquatic production too rarely enters the discussions.

On the Kenai River, for example, salmon populations have been lost to hydroelectric development (Cooper Creek); important riparian vegetation is being lost to the infrastructure associated with recreational development and use; wetlands are being filled and drainage patterns altered; logging is increasing without adequate protection of salmon habitat (e.g., the Forest Practices Act does not require buffer zones on many private lands and buffer zone size on state and other private lands is much smaller than most experienced biologists believe is needed); sewage treatment plant failures have dumped toxic chlorine directly into the river; agricultural practices have cleared large areas of land immediately adjacent to the river; and mining activities are occurring in productive salmon-producing tributaries. In Prince William Sound the extensive use of hatcheries has made it more difficult to properly manage and protect wild salmon stocks (Peltz and Geiger 1990), and hatcheries in the sound are therefore a major contributor to wild stock loss (Eggers et al. 1991).

In the Pacific Northwest declining salmon populations have coincided with resource uses incompatible with sustainable management of the whole ecosystem (NRC 1996). In other words, short-term economic gains have prevailed over long-term resource planning and decision-making. Lee (1993) indicated that "when human responsibility does not match the spatial, temporal, or functional scale of natural phenomena, unsustainable use of the resources is likely and will persist as long as the mismatch of scales remains." Declines in salmon production due to habitat loss are masked and hard to detect relative to the time frame of institutional decision-making. The failure of institutions to adequately protect the resource over the rights of the entrepreneur is predictable because it is usually politically easier to favor economic growth over conservation. And by the time the affected natural resources have collapsed, the original policymakers are usually gone, leaving a fresh group of policymakers to respond to the public outcry to bring back these lost resources. Reclamation, however, is usually prohibitively expensive or socially or technologically impossible, leaving accomplishments largely in the token range.

In Alaska we have the same institutional function and structure that led to the decline of Columbia River salmon. These institutional factors include fragmentation of scientific effort, responsibility, and authority; a lack of accountability; boundaries of property and government that do not follow biological templates; unilateral or noncooperative decision-making; and institutions that fail to learn from experiences (i.e., adaptive management has not been embraced as a working concept; NRC 1996). In addition to these factors, Alaska has an additional impediment to habitat protection: unless harm to the resources can be conclusively demonstrated, development can proceed. This "burden of proof" is placed on the permitting agencies that all too often are understaffed, overworked, and subject to political pressures for funding. Juxtaposed against well-funded and highly motivated development interests, this mismatch continues to erode our resources.

State of Alaska agencies responsible for collecting scientific data are fragmented both between agencies and within agencies. For example, the Alaska Department of Fish and Game (ADF&G) assigns habitat responsibilities to 1 division and scientific research and management responsibilities to 3 other divisions, which are further fragmented into user-oriented divisions instead of biological subunits. Therefore, the Division of Sport Fish and the Commercial Fisheries Management and Development Division are frequently at odds over allocative issues rather than having a cohesive approach to scientific research or habitat management. According to the management coordinator for hatchery site selection, salmon hatchery permitting, which occurred mostly during the late 1970s and early 1980s, was administered by a division that was mandated responsibility for statewide hatchery development. Therefore, desirable physical attributes of candidate hatchery sites and external pro-hatchery pressures often received more weight in the permitting process than did potential detrimental impacts of the proposed hatchery on associated wild stocks (R. L. Wilbur, ADF&G, Juneau, personal communication).

Between state and federal agencies, programs are even more fragmented. Agencies have development mandates that are frequently at odds with maintaining salmon production. The decision-making process is often adversarial and not cooperative; that is, each agency, struggling to meet its perceived mission, often ignores input from sister agencies. For example, an ADF&G habitat biologist recently wrote in a memo to the director of her division that state permitting agencies involved with the Alaska Coastal Management Program need to work together with greater respect

and less acrimony and that the program, while "good on paper," unfortunately "falls apart under the press of daily work" (J. Schempf, Alaska Department of Fish and Game, Juneau, personal communication). HDR Engineering (1995) found that current practices in Alaska are inadequate for identifying, considering, and controlling cumulative impacts on the habitat. They noted that obstacles included a lack of commitment from top-level officials; unclear mandates and directives; uncertainty about the definition of cumulative impacts; insufficient resources; a lack of guidance, tools, standards, and thresholds for practitioners to apply; a lack of training and experience; lack of public understanding; inadequate information sources; and political pressure against addressing cumulative impacts.

Accountability for decisions is nullified by time because policy decisions of detriment to the resource often are not manifest to the public until years later. For example, the ADF&G Habitat Division budget for the 1997 fiscal year included a general fund reduction, inadequate remuneration for inflationary increases, redirection of habitat protection functions to special projects, and failure to fund needed anadromous stream identification. Effects of these policy decisions on the salmon resource, however, will not be evident for at least 1–2 salmon life cycles, by which time many of the budget framers will have been replaced or retired. Had the policymakers' cuts been in salmon instead of budget dollars, the public's reaction, rather than delayed by years, would have been immediate and certain.

The boundaries of private and government property in Alaska do not conform to biological templates. The lack of bioregionalism in the decision-making process was one of the primary causes of institutional failure in the Northwest. Rivers were not treated as the center of biological processes but were used instead as perimeters of government structure (NRC 1996). In Alaska, we make property boundaries based on similar criteria. For example, jurisdictions governing land uses in the Susitna River basin include several borough governments, more than a dozen municipalities, numerous federal and state government agencies, the military, and large private landowners, such as native and other corporations. The basin is also accessible to over 70% of Alaska's population via the highway system, or a quick boat or plane ride. Resource extraction, land development, and recreational pressures within the basin increase yearly. In such a complex jurisdictional environment one might rightly question how we can incorporate bioregionalism into our decision-making. Unfortunately, a geopolitical template

based on drainages and salmon migration routes is missing in Alaska, as it was in the Northwest.

Private land transfers from public Alaskan lands also creates significant threats to the salmon resources of the state. For example, Koski (1996) reported that Duck Creek in Juneau is listed by the Alaska Department of Environmental Conservation as 1 of 30 anadromous streams imperiled by urban runoff and related mismanagement. A local advisory committee for this watershed, however, in attempting restoration, found that "many public land managers and private land owners are either unaware of common best management practices (BPM) for urban watersheds or are skeptical of BPMs that are untested in Alaska." As more Alaskan lands, including critical fish and wildlife habitats, pass into private ownership, citizen and corporate landowners instantly become enfranchised with the responsibility for sustaining public resources. The absence of incentives to do this leads to short-term, self-interest decisions and not long-term public good. The failure to maintain critical habitat lands during these transfers puts all resources at risk. As an example, over 66% of the land adjacent to the lower 50 mi of the Kenai River is now in private ownership. These high-value wetlands and riparian areas provide critical habitat for rearing salmonids, but these uses are fading as owners develop the critical areas for commercial, residential, and recreational uses (Liepitz 1994).

Finally, Alaska is failing to learn or adapt based on experiences of other areas. While there are numerous examples of practices that have led to the extirpation of salmon in areas outside Alaska, we continue to follow the same course in Alaska. A recent buffer-strip argument on the Kenai River points out our failure to learn. Narrow buffer strips along a watercourse demonstrate fundamental misunderstanding of the aquatic system, yet in the process of implementing buffer strips for the Kenai River, the Kenai Peninsula Borough not only promulgated an inadequate 50-ft buffer strip but excluded its tributaries and other watershed areas from such protection. They failed to learn and adapt from the experience of the Pacific Northwest. In addition, they chose to follow the easier political decision of

private property rights over the common property right of salmon resource protection. Like so many political decisions, the impacts will be felt by all Alaskans, but most Alaskans did not participate in, nor were even aware of, the decision-making process.

WILL ALASKANS CHOOSE SALMON?

Will Alaskans consciously choose to have salmon in their future, or will we find ourselves on the same downhill track as our neighbors to the south? The strong populations of salmon we have today will not survive without our efforts, our sacrifice, and our determination. Alaskans certainly agree that salmon are of great importance to our culture, economic future, and well-being (Meacham 1992), but the all-is-well illusion accepted by many political leaders and the general public has led to complacency. This myth must be abandoned if we choose to have salmon, and we will have to (1) change the "burden-of-proof" concept in our habitat decision-making process, (2) make decisions on watershed boundaries or bioregions rather than on political boundaries, (3) reorganize state agencies into biologically sound rather than user-oriented divisions, (4) educate and continue to train our scientific staffs on habitat-related issues, (5) learn from and adapt habitat protection policies by systematically evaluating past practices, (6) not assume that hatcheries can sustain harvest in the face of habitat and wild stock losses, (7) increase research programs on salmon life histories and enhance inventory assessments of salmon populations, and (8) take into account the long-term time frames of salmon production in cooperative, institutional decision-making. Alaska's sparse populations and remoteness has sheltered us from many of the difficulties experienced by our neighbors to the south, yet upon closer examination, we continue to see similar outcomes from comparable actions. Our wild salmon populations are doomed to follow the same pattern of loss as those in the rest of the Pacific Northwest only if we apathetically and myopically continue to practice the permissive habitat policies of the past.

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