A River in Common

The Columbia River, the Salmon Ecosystem, and Water Policy

John M. Volkman
Portland, Oregon

Report to the Western Water Policy Review Advisory Commission

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The Western Water Policy Review Advisory Commission

Under the Western Water Policy Review Act of 1992 (P.L. 102-575, Title XXX), Congress directed the President to undertake a comprehensive review of Federal activities in the 19 Western States that directly or indirectly affect the allocation and use of water resources, whether surface or subsurface, and to submit a report of findings to the congressional committees having jurisdiction over Federal Water Programs.

As directed by the statute, the President appointed the Western Water Policy Review Advisory Commission. The Commission was composed of 22 members, 10 appointed by the President, including the Secretary of the Interior and the Secretary of the Army, and 12 members of Congress serving *ex-officio* by virtue of being the chair or ranking minority member of the 6 congressional committees and subcommittees with jurisdiction over the appropriations and programs of water resources agencies. A complete roster is provided below.

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This is an Independent Report to the Commission

The report published herein was prepared for the Commission as part of its information gathering activity. The views, conclusions, and recommendations are those of the author(s) and are not intended to represent the views of the Commission, the Administration, or Members of Congress serving on the Commission. Publication by the Commission does not imply endorsement of the author's findings or recommendations.

This report is published to share with the public the information and ideas gathered and considered by the Commission in its deliberations. The Commission's views, conclusions, and recommendations will be set forth in the Commission's own report.

Additional copies of this publication may be obtained from the National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia, 22161; phone 703-487-4650.

Preface

In the Western Water Policy Review Act of 1992, Congress charged the President with reviewing and reporting on federal activities in the west that affect the allocation and use of water resources. The legislation directed the Western Water Policy Review Advisory Commission to advise the President, considering many specific facets of western water issues. The Commission has done this in a wide-ranging series of studies, addressing west-wide water issues, questions related to specific themes, and analyses of the unique experiences in several western river basins. This study is in the last category.

When the Commission first raised the possibility that I undertake the study of the Columbia River Basin, I felt that I could evaluate water issues through the lens of the salmon controversies. For twelve years, I have been a lawyer for the Northwest Power Planning Council, working directly on Columbia River Basin fish, wildlife, energy and water issues. I thought I could cover these issues with some degree of thoroughness, but could not range into the many other water issues that face the Basin. The resulting study is a hybrid. It is not exactly a study of salmon policy because the main point is water and how we manage it. There are many elements of salmon policy that I mention only in passing because they are tangential to water policy. There are many elements of water policy that I do not explore because they are tangential to the salmon issues. The study looks out at the basin from a particular point where water policy and salmon policy meet, and asks how water programs, especially federal water programs, are holding up.

I carried out the study while on leave from my job with the Power Planning Council. The study is entirely my own, and the Council bears no responsibility for the statements I make. At the same time, my background and experience is rooted in my work for the Council, and that lends a particular slant to my view of these issues. While I have tried to be objective in my analysis, that slant is no doubt there. There are certain issues, such as the way the Council itself has measured up against the challenge of the salmon declines, that I decided would be foolish for me to address.

Even with these limitations, I believe there is much that can be learned from the Columbia Basin's experience, and I hope the Commission and other readers agree.

Acknowledgments

I have run up countless debts of gratitude in the course of this study. I owe thanks to Larry MacDonnell, who first had the idea for this study. The Western Water Policy Review Commission and its staff commissioned the work, and gave the study an appreciative reception. The Northwest Power Planning Council gave me a leave of absence, a rare thing in a busy and serious agency, and without which my work on the study would have been impossible. The Northwest Water Law and Policy Project at Lewis and Clark Law School, gave me office space, library privileges, e-mail access, and countless other forms of support. Jan Neuman, the project's co-director and a member of the Water Policy Review Commission, and Brett Swift of the project staff were endlessly hospitable and supportive. The project itself has produced a large number of research reports that documented many of the areas covered by this study, and as such proved to be an invaluable source of research and documentation.

I had valuable comments from a "basin support group," consisting of federal and state agency representatives organized by the Water Policy Review Commission. In addition, several interested parties submitted comments on drafts, which helped me to ensure the study's accuracy and fairness. I need to make special mention of my Council colleague John Shurts, Reed Benson of WaterWatch of Oregon, and Michael Blumm, law professor at Lewis and Clark College, who took the time to read drafts in detail and make extended and insightful comments.

Jan Carpenter edited the manuscript in its various stages and made valuable changes and additions. Angus Duncan conducted a detailed study of the Grande Ronde watershed initiative, which I have condensed and included in this study. In my view, both contributions provided richness of detail and insight.

My continuing debt to my friends Charles Wilkinson and Kai Lee will be obvious from even a quick reading of the study. In truth, I have begun to forget where my ideas begin and their ideas leave off.

Finally, my wife Stephanie and my daughters Jessie and Caitlin put up with my constant preemption of our home computer, my use of nights and weekends to write, and my vacant gazes at the dinner table as I wrestled with knotty problems of water policy while they engaged in normal conversation. I promise I won't do it again until next time.

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I. Introduction

William Jackson Turner may have had it wrong when he announced at the 1893 Columbian Exposition in Chicago that the American frontier had closed, at least if he intended to include the Columbia River Basin.[1] In the Columbia Basin, the frontier arguably didn't close until the 1990s. In 1993, the water agencies of Idaho, Oregon and Washington announced they would no longer issue permits for new water diversions in the Basin's salmon streams. In 1996, one of the federal agencies that manages the Columbia River's hydropower system said that breaching some of the federal dams on the river is a serious thing to consider. Western state water agencies have always issued new diversion permits. The federal agencies have always built and operated dams. These are their oldest and most ingrained functions. If the West is defined by its connections to water, these may be the announcements that closed the frontier in the Columbia Basin.

The development that precipitated these announcements was the realization that we, the federal government, the states, the tribes and the rest of us, have to decide what to do about the impending loss of Columbia River salmon, a key part of the Basin's natural world and cultural life. The Columbia is a big river basin whose parts seem to have little in common, but this threat resonates through much of it. Few among us are willing to say we will stand idly by while salmon fall off the edge of the world.

Beginning with this dilemma, this study explores the fact that water policy in the Columbia River Basin is no longer limited to consideration of traditional claims to water for irrigation, hydropower, municipal and industrial uses. Indian treaty claims, the Northwest Power Act, the Endangered Species Act, and the increasing awareness that humans need sustenance from the natural world are pulling the water needs of salmon from the fringes to the center of water debate. The study surveys the contribution water development has made to the salmon declines, the roles federal water agencies have played in recovery efforts, and the directions water policy might take to deal with such dilemmas in the future.

A. The Problem

The first part of the study (sections II-III) tells the story of the Columbia as a working river, and as a natural system in decline. It describes the development of the rivers, the laws and institutions that accompanied water development, the effects on salmon, and efforts to remedy the salmon losses. This survey leads to several observations:

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[1] F. Turner, *The Frontier in American History* (Tucson, 1986). Richard White, Patricia Limerick and other thoughtful western historians have already pointed out the other ways in which Turner had it wrong. *See* J. Grossman, ed., *The Frontier in American Culture, Essays by Richard White and Patricia Limerick* (California, Newberry, 1994).

First, 150 years of water development have fragmented the Basin's rivers among federal, tribal, state and private interests. The operation of the dams on the mainstem of the Columbia and Snake rivers is federal; water diversions, especially from the tributaries, are mainly the jurisdiction of the states and the Bureau of Reclamation, within a system of private property rights. This arrangement worked well enough for the purposes for which the rivers were developed: hydropower, irrigation, flood control and navigation. However, the consensus on which these arrangements were based on has eroded with the salmon declines. The old foundations for the Columbia Basin's relationship with the river are no longer serviceable, and new ones are needed.

For purposes of salmon recovery, the complexity posed by different bodies of law on an interconnected river system is itself a problem. Federal operations in the mainstem respond to federal mandates such as project authorizations, Indian treaty obligations, the Endangered Species Act, the Clean Water Act and other laws. The property interests that have been granted by the states to private parties respond to non-governmental interests and values, further from the reach of policy. So, not only are the mainstem and tributaries subject to different regulatory regimes with different constraints, but the tributaries are largely fractionated into private ownerships. The possibility that a whole river system can move in a coordinated direction seems, to say the least, optimistic.

Another less discussed source of jurisdictional fragmentation in the Columbia River system is that the Columbia is an international river. It is managed according to the terms of a treaty with Canada that is aimed at optimizing hydropower and flood control, and which does not account for ecosystem values in the river. Rather, ecosystem values are managed in economic trades. In this respect the treaty regime is not unlike traditional operations of the mainstem dams on the United States' side of the border. However, as domestic policy shifts domestic management objectives, the international treaty's focus remains static. Shared management of the river as an ecosystem has not been explored by the two nations.

A second observation: Although the Basin has had more than fifteen years experience with large-scale salmon recovery programs, the salmon declines seem to pose questions for which there are few good answers. The most recent, comprehensive scientific advice is that salmon recovery programs cannot reverse the salmon declines with the approaches taken to date. Salmon recovery programs have tried to work around the edges of power generation, navigation, irrigation, flood control, timber harvest and other uses, providing technological fixes where natural processes are gone.

Ecosystem scientists are suggesting that this approach cannot succeed, and that another model, in which human activities would be managed to protect ecological processes vital to salmon, will be required if healthy salmon populations and other fish and wildlife species are to be maintained. This suggests the idea that ecological functions in mainstem and tributary rivers should become baseline parameters in water policy and management. Until now, however, the Basin has given only limited consideration to ecological models for water management.

The third observation is that the federal role in the Columbia River will be affected not only by the needs of species, but also by market forces that have never before played much of a role in the river. Federal hydropower development created an enormous series of economic assets, the "cash register" dams. Efforts to offset the effects of the dams on salmon are financed in large part by the dams' own power revenues. The power industry and the federal hydropower system recently began a rapid transition to market competition. In a competitive market, the costs imposed on the hydropower system, including the cost of salmon mitigation, can affect hydropower's ability to compete in the market. If costs are too high, paradoxically, this can threaten funding for salmon recovery. In short, if the river can no longer be managed to optimize economic values, neither can it be managed in isolation from market conditions. These equations need more stable footing than they have now.

The last observation should now be clear: Although the Columbia Basin salmon issues have a great deal to do with water development, solutions to the ecological problems to water development take us well beyond the traditional boundaries of water policy. Ecosystem scientists tell us that rivers are ecological templates into which species fit themselves, and that rivers are simplified by development. If we want salmon populations that will survive over time, these scientists are telling us, we need to allow rivers to reestablish a more complex template. Whether, where and how we allow the basin once again to weave natural patterns will depend on the way we manage dams in two countries; private water diversions in at least three states; federal, tribal, state and private land in much of the basin; fish harvest in the ocean and in-river; the world's largest hydroelectric system; a major artery of navigation; a regional flood control system; and a sprawling system of fish hatcheries. Each of these factors is connected to all of the others, and so water policy in the Columbia River becomes part of an almost unimaginably complex calculus.

B. Policy Issues and Recommendations

From these observations, the study turns to four major policy issues and then makes a series of recommendations:

1. Ecosystem Management

The first major issue relates to how we define and measure success for water management that aims at ecosystem recovery. The Basin is a big ecological template, and if we shift it, we will shift it in small ways whose ecological significance is debatable. Thus, water management initiatives have to fit into a series of measures which, collectively, add up to healthy ecosystem conditions. But how do we define what those "healthy" conditions are? How do we measure the contribution of individual initiatives? How do we link them analytically with a large collection of other measures to determine whether they add up, or even if we have a solvable problem?

These are complex scientific questions. They have to do with how much we know about ecosystems work and respond to human interventions. Ecosystem science is itself a peculiar science—more like economics or weather prediction than chemistry or physics, and so it is likely that we will never have precise answers to the problems we face. The fact that the science is murky makes these issues more complex from a policy perspective. We have to make judgments about tradeoffs and risks based on a body of knowledge that is, at best, evolving. Communities, dams, farms and powerful economic networks are in place. They can change, but can they change in a way that is ecologically relevant? Thus do questions of science become questions of policy.

One Columbia River Basin model for dealing with these problems is called adaptive management. Adaptive management proposes a way to make political decisions in a scientifically credible manner. In substance, it means that whatever we decide to do, we must treat our actions as hypotheses, monitor them carefully, and change our approach if we find that it doesn't work. The logic of this approach is unassailable; the problem is implementation. Implementing a rigorous monitoring and evaluation program in a world of fragmented jurisdictions and political pressures requires a much more serious commitment to scientific methods than the region has so far been able to muster. To this point, it has been relatively easy for one or another set of interests to side-track adaptive management initiatives, and the questions posed by ecosystem recovery have been hard to address.

Recommendations regarding ecosystem management: If managers are to have a meaningful management guide, ecosystem science must produce a more coherent picture of relevant ecological objectives. Because this picture must be a policy guide, it must be developed in a public policy process, of the kind described in the adaptive management model. Because ecosystems are so complex and our knowledge of them so scant, this policy guide will necessarily be subject to change as more is learned. Federal water policy should actively encourage efforts to develop and improve these tools and methods. Federal agencies should lend data and expertise to help develop ecosystem models and a long-term research and evaluation program. As investment in salmon recovery increases, these initiatives will be more and more important in building accountability in ecosystem management.

2. Collaboration

A second major issue is more recognizable as one of water policy, although it involves a more disparate set of problems: How can we achieve the degree of coherence that an ecosystem approach to water policy suggests, given the current degree of fragmentation in water management?

Some of this fragmentation might be eased by decisions involving the river's mainstem. The major mainstem issue is whether to draw down some of the major, run-of-the-river reservoirs on the Snake and Columbia Rivers, or to rely instead on a combination of fish barging, bypass screens, and flow augmentation. This is where most of the scientific and policy debate takes place. From a water policy perspective, this choice could dictate a direction for water policy in many other areas. If we draw run-of-river reservoirs down, we may not need so much water from the Snake River Basin or from headwater storage in Canada and Montana. On the other hand, some drawdowns could jeopardize some power generation, irrigation and transportation, and so the ultimate choice is anything but obvious. However, the longer we avoid this choice, the more pressure and uncertainty there will be in headwater areas.

Government policy has a looser foothold in tributaries compared to the mainstem, and curing fragmentation in tributary water policy requires a different set of strategies. Tributary streams have largely been dried up by a combination of state-sanctioned water rights and federal reclamation programs. Faced with the need to restore water to these streams, federal and state policy are currently very close to being high-centered. Federal water policy gave away much of the water with the land 100 years ago and cannot simply take it back. State policy has been historically dedicated to

protecting private water uses, and responds to environmental pressures largely within that framework. And private water users still have multiple incentives to take water out of streams, notwithstanding the growing awareness of the costs of out-of-stream uses. These cross-currents are a prescription for gridlock, but they also can be an opportunity for new kinds of collaboration. The hope, obviously, is for the latter, and the question is how.

Many people are looking to local watershed-based efforts to build this collaboration. This report makes two major suggestions for federal support of such efforts: one is that government policy needs to find a way to speak with one voice to the watershed groups, and it needs to be a clear voice. This is a tall order, because it requires not just water agencies, but land agencies to speak together, and not just federal agencies, but state agencies. However, one of the easiest ways government agencies can frustrate progress in resolving watershed conflicts is to send mixed or conflicting messages. The second suggestion is that government should not burden watershed efforts with unrealistic expectations. Tributary water issues are difficult; government initiatives have failed to resolve them so far and we cannot expect watershed groups to find solutions quickly or easily. If too much is expected too soon, watershed efforts may only be hobbled.

Whether we put a lot of weight on watershed efforts or not, however, it is unlikely in the short term that they alone will be able to identify and protect baseline ecological functions. Policy decisions will continue to be required at higher political levels, and federal agency programs, subject to ecosystem recovery mandates, will remain important backstops for state and local efforts.

In the area of inter-jurisdictional collaboration, the report has several recommendations. The division of federal, tribal and state authority over water raises several interrelated problems, none of which can be addressed by any single government working alone:

Ecosystem recovery efforts can be undermined by state water rights systems that support water diversions. This problem has been addressed in part by state moratoria on new water diversions. However, the moratoria are limited in some respects, and their fates are uncertain. These uncertainties need to be addressed by the states in collaboration with federal agencies.

Issues of interstate water management, such as finding ways to protect instream water in interstate transactions, need to continue to be addressed. Pending mainstem decisions, interstate transactions can be treated as pilot efforts. To avoid surprises stemming from lack of coordination between state

and federal processes, state and federal water agencies should consider ongoing meetings to coordinate operations, air issues of common concern, and determine whether an interstate compact is needed.

In many watersheds, local interests are working with tribes, states and federal agencies to restore habitat consistent with local values. While these efforts are still young and untested, they should be encouraged, and federal agencies can help in a variety of ways. For example, the Bureau of Reclamation's water conservation pilot projects in the Columbia Basin, Bonneville's funding of monitoring and evaluation methods in the Grande Ronde, and other federal and state initiatives make real contributions to watershed efforts. In the Umatilla Basin, the Bureau has brought parties to the table to address obdurate water spreading problems. However, these efforts can also be undermined by inconsistent signals from federal and state agencies. Federal water and land agencies need to work among themselves and with tribes and local watershed groups to arrive at a clear set of expectations for watershed efforts. Local communities need assurance that federal water and land management agencies and their state counterparts will learn to speak with one voice.

Over the longer term, watershed efforts will require more stability in funding. Currently, funding for watershed recovery projects is a patchwork that begins with government funding and tries to expand outward. With innovative state and watershed experiments, it is possible to imagine leveraging these funds more widely; government programs should encourage such efforts.

Both the United States and Canada see signs of strain in current approaches to Columbia River management: not just the dilemmas posed by the salmon declines, but demands for participatory management, pressures from traditional constituencies, and the rights and concerns of native people. The two countries need to explore ways of incorporating ecological considerations into river operations on both sides of the border.

3. Financing Ecosystem Recovery

The third major issue is financial: what should be the balance between economic uses of federal dams and ecological recovery? The issue arises on the Columbia most of all, because it is one of the world's major hydropower rivers. But it is likely to arise in one form or another on most of the west's big rivers.

During the 1980s, the Northwest Power Act gave the Columbia Basin a way to get at this question, by calling for a rough balance between species recovery and power system needs. In the 1990s, Endangered Species Act listings and the emergence of a competitive electric energy industry upset this balance. The Basin needs a new equation for this relationship, and if it does not come from the Basin, Congress may impose a solution in national energy restructuring legislation. A new regional balance is likely to require at least three elements: some predictability and stability in hydropower's financial contribution to ecosystem recovery; improved accountability in ecosystem recovery programs; and some broadening of the financial basis for ecosystem recovery.

4. Governance

The last major issue is that of river governance. The debate over Columbia River governance began in the 1930s and is still underway. Over the decades, there have been proposals for federal basin management and an interstate water compact. River basin commissions have been established and allowed to lapse. *Ad hoc* forms of collaboration have been worked out, and these arrangements have shifted with the times and subject matter.

Currently, the river is shaped in a collection of power centers:

- Much of the management of the river's mainstem is oriented to the traditional purposes and coordination arrangements, which are largely federal or federally-administered.

- Since 1980, an interstate body, the Northwest Power Planning Council, has developed a plan to mitigate the fish and wildlife effects of the federal power system, ensure the region's power supply, and guide the investment of federal hydropower revenues in fish and wildlife mitigation.

- Since 1990, the federal Endangered Species Act program has largely eclipsed the Council program in river management. The Endangered Species Act program also encompasses federal habitat, fish harvest and hatchery management. These issues increasingly end up in federal court.

- Finally, Indian tribes who do not see their interests adequately protected in federal or state forums have their own mitigation plans, which they use in asserting treaty and other rights.

The question is whether this disparate collection of forces can accommodate the idea of ecosystem management, and if not, whether a more integrated governance structure is feasible.

It is possible to generalize about governance arrangements that might reflect ecosystem characteristics better. Several models for reform have been suggested. A National Research Council report, *Upstream* suggests that government for ecosystem problems should focus on three ideas: governance should follow natural rather than political boundaries; it should build in a broad range of interests, recognizing that no government can truly control an ecosystem; and management must find ways to learn from its actions. However, the Research Council concluded that there were real tensions and conflicts in applying these abstract principles, and finding ways to incorporate them in river governance is a political chore for which the Basin shows little relish. Since the Research Council's report, there have been a number of governance proposals in the political arena, but consensus has remained elusive. People are generally clear about the failings of the *status quo*, but unclear about what to do about it.

The changes suggested in the recommendations of this study would push traditional political boundaries incrementally toward the National Research Council model: toward more coincidence between governmental and ecological systems, more effective cooperative efforts backed by a government that is actively looking for ecosystem solutions, and toward systematic, organizational learning. Bolder reforms are possible, but at this point the region is far from consensus on a more integrated governance model.

C. Overview

The Columbia River is the Northwest's primary power plant, central navigation channel, biggest irrigation ditch, and storage facility for flood waters. The river and its tributaries work hard, and federal water policy plays a major role in putting them to work.

The questions that now face the Columbia are whether the river can also be allowed to work as a natural system, and these questions will shape the federal government's role on the river in the next century. In some ways, these challenges bear little resemblance to the traditional mainstream of water policy: the protection of the water resource base, the development of supplies, the management of demand, and the like. Yet, water policy has never been a thing unto itself, and it could never be addressed by attending to water alone. The Columbia River issues draw water policy onto ground

where federal water policy mixes with emerging ecosystem science, land management and energy economics.

These issues are not just salmon issues, nor are they Endangered Species Act issues *per se*. Rather, they raise a broader problem: whether we can use rivers without destroying the natural processes that support not just one or two species, but many. If Columbia River salmon go by the boards, the Northwest will be the poorer, but the underlying conflict between a burgeoning human community and the natural world that supports it will persist. The question is whether water policy can help to integrate this relationship.

If we are to unravel such questions, we have a great deal to learn. The Columbia River is not going to be set to rights as a salmon river, just as the rest of the west is not going to come to grips with its water problems, in five or ten years. There is evidence that we are groping our way toward healthier relationships with rivers and diverse species. But no one should think that shifting an ecological template is anything but heavy work. It is slow, difficult and risky. And it will take a brand of patience and good will that seems all too rare in western water issues.

II. The Setting

A. The Physical Environment

The headwaters of the Columbia River are in Canada, near the Selkirk Mountains, the "high roof of the continent."[2] The river is 1,214 miles long, measuring from the Canadian headwaters.[3] By the time it has collected contributions from all its tributaries, the Columbia carries almost 200 million acre-feet of water. On average, the Columbia carries ten times as much water as the Colorado River and 2.5 times as much as the Nile.[4] It is the fourth largest in the United States, and the eighteenth largest river in the world, ranked just behind the St. Lawrence.[5] The Columbia River estuary, where all of this water mixes with salt water, covers about 95,000 acres (150 square miles), the ninth largest in the United States. The estuary extends to river mile 46, although salinity rarely goes beyond mile 23.[6]

Geographers can point to single places where the Columbia River begins and ends, but the Columbia River Basin (figure 1) has a more complex outline. It starts at places like "The Rim," a curving ridge that divides the Columbia River watershed from the Colorado River watershed. Runoff to the east of The Rim drains into the Green River, then to the Colorado and so to the Gulf of California. On the western side, water drains into small streams like Sour Moose Creek, a seasonal brook that barely aspires to the status of mud during the summer. Water from Sour Moose Creek merges with the Hoback River near the town of Bondurant, Wyoming. The Hoback joins the Snake River near the Idaho border. The Snake crosses southern Idaho to the Oregon border, travels north into Washington and then empties into the Columbia's mainstem.

Thousands of such tributaries flow around the edge of the Basin. The southern rim runs through southwest Wyoming, southeast Idaho, the corner of northwest Utah, small parts of northern Nevada and California, and most of Oregon. The northern rim runs from Wyoming along the Idaho-Montana

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[2] Stewart H. Holbrook, *The Columbia* at 6 (Rinehart & Co. 1956).

[3] Bonneville Power Administration, Bureau of Reclamation, and Corps of Engineers, Columbia River System Operation Review: Final Environmental Impact Statement, Main Report at 1-7.

[4] Conflicts Over the Columbia River, proceedings of a seminar conducted by the Water Resources Research Institute, Oregon State University (July 1980), quoting a Pacific Northwest River Basin Commission report.

[5] L. Leopold, A View of the River, Table 6.1 at 99 (Harvard 1994).

[6] R. Moulton, "Concern Over the Columbia Estuary" in Conflicts Over the Columbia River, proceedings of a seminar conducted by the Water Resources Research Institute, Oregon State University, p. 13 (July 1980).

border, cuts east past Butte, Montana, heads north into Canada, and loops back south along the crest of Washington's Cascade Mountains, then west across southwestern Washington to the ocean. The basin covers about 259,000 square miles in the United States and Canada.[7]

In some ways it is hard to think of this sprawling area as having any singular connection. Clearly, the amount of runoff is not one. Much of the southern part of the basin is arid, with less than twelve inches of precipitation annually. The northern part of the basin and some parts of the interior are deluged with anywhere from 24 to 80 inches of precipitation, most of it snow. The Cascades generally have more than 80 inches of precipitation and in some places more than 120 inches. The Willamette Valley and southwestern Washington are watered with an average of anywhere from 24 to 48 inches of precipitation, most of it rain.[8] Excluding the area west of the Cascades, 44 percent of the runoff is Canadian.[9]

The geography of the Columbia Basin includes a vast subterranean component as well. Groundwater connects with surface water in patterns that are incompletely mapped, measured, and understood in many places, but nonetheless recognized as critical to water management. In the Middle Snake River, for example, the relationships of surface flows, aquifer discharge and recharge, flood irrigation, hydropower generation, groundwater pumping, and new irrigation efficiencies are crucial considerations in water allocations.[10]

B. The Cultural Communities

The Basin is also diverse culturally. Sour Moose Creek comes from an area circled by mountains, well along in the transition from ranching to recreation. In nearby Jackson Hole, locals say that the millionaires are being squeezed

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[7] Columbia River System Operation Review, Final Environmental Impact Statement, Main Report at 2-1 (November 1995).

[8] Pacific Northwest River Basin Commission, Water Today and Tomorrow: A Pacific Northwest Regional Program for Water and Related Resources," volume 2, figure 3-4 (June 1979).

[9] K. Muckleston, "International Management of the Columbia," in Conflicts Over the Columbia River, at 72.

[10] See Fereday and Creamer, "Swan Falls in 3-D: A New Look at the Historical, Legal and Practical Dimensions of Idaho's Biggest Water Rights Controversy," 28 Idaho L. Rev. 573 (1991-92).

out by the billionaires. Idaho Falls, a largely Mormon community across the

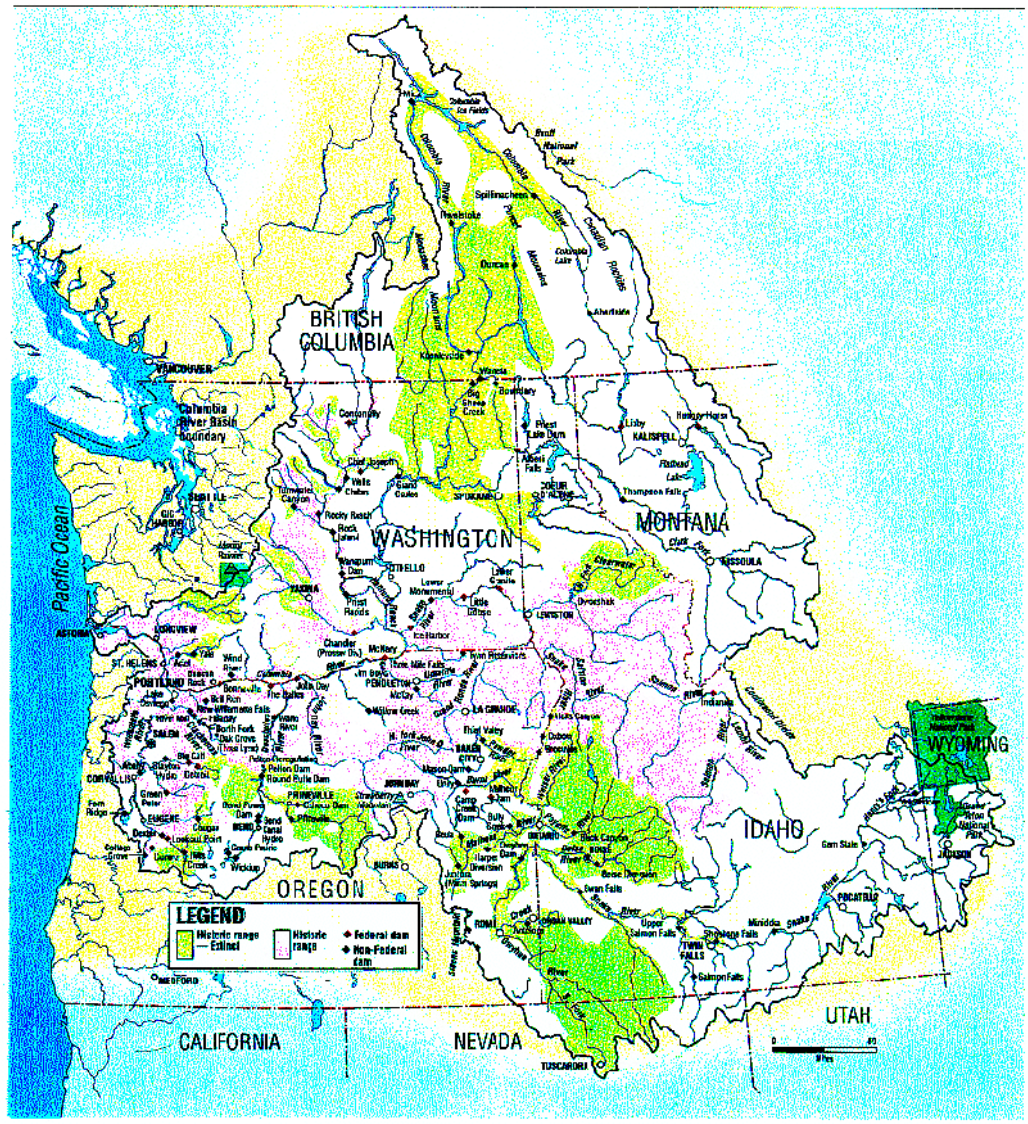

Figure 1.- The Columbia River Basin

Wyoming border downstream, is part of an irrigated landscape that covers much of the Upper Snake Basin. Boise, further west, is one of the country's fastest growing urban areas, a place of some sophistication and a noted collection of water lawyers. Lewiston, at the Idaho-Washington border, is the Basin's furthest inland port, 465 miles from the Pacific Ocean. The Dalles, located where the river penetrates the Cascade Mountains, has an aluminum plant powered by one of the river's big dams. It is also where the river becomes one of the world's most popular wind-surfing areas. The broad, calm pools on which the surfers skim lie over the former Celilo Falls, one of the great Indian fishing and trading sites now inundated by The Dalles Dam. Traditional Indian fishing sites still mark the mainstem and tributaries, and reserved Indian lands encompass tributary watersheds interspersed throughout the Basin. Further downriver, Portland is a major west coast port, a large wet cosmopolitan city, about as different from Bondurant or Idaho Falls as could be. We could take a similar trip from the Columbia's Montana or Canadian headwaters, and find similar diversity. And it is all the Columbia River Basin.

The Basin apparently has been occupied by humans for at least 12,000 years.[11] Tribal groups on the Columbia Plateau fished, hunted, trapped, and gathered to sustain themselves.[12] They fished for salmon, steelhead, sturgeon, trout and other species at Kettle Falls, Priest Rapids, Celilo Falls, Five Mile Rapids, the Cascades, and elsewhere on the Columbia River, and Salmon Falls and various rapids on the upper Snake River.[13] Following the Lewis and Clark Expedition from 1804 to 1806, Euro-Americans began to populate the area as fur trappers, traders, missionaries, homesteaders, farmers, miners, ranchers, and loggers.[14] Of the 9.5 million people currently living in the four Northwest states, about 5 million (53 per cent) live in the Columbia River Basin.[15] Much of that population is concentrated in the developed urban areas that comprise less than four per cent of the Basin's

[11] *See* U. S. Department of Agriculture and U. S. Department of Interior, Interior Columbia Basin Ecosystem Management Project, *Status of the Interior Columbia River Basin: Summary of Scientific Findings* 29 (Nov. 1996).

[12] Id. at 29-30, 61.

[13] Id. at 29-30.

[14] Id. at 30-33.

[15] Bonneville Power Administration, Bureau of Reclamation, Army Corps of Engineers, *Columbia River System Operation Review: Final Environmental Impact Statement, Main Report* 2-35 (Nov. 1995).

land on the United States side of the Canadian border.[16] Those areas include Portland-Vancouver, Spokane, Boise, Eugene-Springfield (Oregon), Bend, and Yakima, as well as Missoula and Kalispell in Montana, Nampa and Caldwell in Idaho, Lewiston and Clarkston on the lower Snake, Wenatchee in the mid-Columbia, and Kennewick, Richland and Pasco, "the Tri-Cities," near the confluence of the Columbia and the Snake.[17]

Population in the Northwest is expected to increase by 30 percent between 1990 and 2010.[18] Much of that growth will come in the urban areas, in and out of the Basin.[19] Nevertheless, the rate of population growth in the Basin may outpace the rates of growth elsewhere in those states,[20] with significant increases in counties where outdoor recreation and tourism play a large role in the economy, as well as in more densely populated metropolitan areas.[21] As of 1996, the Basin was experiencing rapid growth, with many small rural communities undergoing significant social and economic changes.[22]

Outside urban areas, the basin is sparsely populated, with about half of the land in the U.S. portion of the Columbia Basin in forests; about 33 percent in rangeland; and about 13 per cent in crops.[23] Irrigated crops include potatoes, sugar beets, hops, mint, and fruit, as well as other vegetables and hay; irrigated crop values range from about $150/acre for hay up to about $6000/acre for apple orchards and vineyards.[24]

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[16] *System Operation Review* at 2-32.

[17] Id. at 2-34, 2-35; *State of the Interior Columbia Basin* at 14-15.

[18] Id. at 2-36.

[19] Most of Washington state's growth, for example, is expected in the Puget Sound area. Mull, Transfers through the Water Code at 1, Third Annual Sinking Creek Water Law Symposium (Written Materials, Washington Law School Foundation, Seattle) (Jan. 26, 1996).

[20] For example, the rate of population growth in eastern Washington is outpacing the rate in western Washington, with population estimates indicating that 22 per cent of Washington residents live east of the Cascade Mountains (in the Columbia Basin) where population gains recently accounted for one-third of the state's total growth. Forecasting Division, Office of Financial Management, 1994 Population Trends for Washington State (1994).

[21] *Status of the Interior Columbia Basin* at 35.

[22] Id. at 14, 35.

[23] Id. at 2-32.

[24] Id. at 2-33, 2-37.

However, agricultural employment is declining in the Basin, as is employment in other "extractive" industries such as mining, fishing, and logging.[25] Throughout the Northwest, the economy is become more diverse, with notable growth in technology, transportation, trade, and service sectors.[26] The growth at the regional and basin levels, of course, is not shared equally among all communities and industries.[27] Moreover, development in the "recreation counties" is "threat[ening] the qualities that make such places attractive for recreation, retirement and new businesses."[28]

C. The Natural Heritage

When Lewis and Clark first encountered the Columbia River, they were looking for a path to the sea. What they found was a river of salmon. "The multitudes of this fish are almost inconceivable," they wrote in their journal. "The water is so clear that they can readily be seen at the depth of 15 or 20 feet; but at this season they float in such quantities down the stream, and are drifted ashore, that the Indians have only to collect, split, and dry them on the scaffolds."[29] Native people numbering in the tens of thousands were living off the bounty of something like ten to sixteen million salmon that returned to spawn every year.[30]

Historically, salmon reached far into the Columbia's Canadian headwaters to the north and Idaho's Sawtooth Mountains to the east. "June hogs," huge chinook salmon weighing as much as 100 pounds, migrated to the upper reaches of the Columbia. Salmon were a mainstay in the Northwest aboriginal societies' cultures, religions and economies. As a turn-of-the-century U. S. Supreme Court opinion put it, "The right to resort to the fishing places . . . was . . . not much less necessary [to the native tribes] than the

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[25] *System Operation Review* at 2-38 to 2-39; *Status of the Interior Columbia Basin* at 41, 56.

[26] *System Operation Review* at 2-38; *State of the Interior Columbia Basin* at 15.

[27] *Status of the Interior Columbia Basin* at 57.

[28] Id.

[29] Coues, ed., M. Lewis and W. Clark, *The History of the Lewis and Clark Expedition*, vol. II at p. 641 (Dover).

[30] *See* Northwest Power Planning Council, "Compilation of Information on Salmon and Steelhead Losses in the Columbia River Basin," Appendix D of the *Columbia River Basin Fish and Wildlife Program* (March 1986). For an excellent account of Columbia River salmon issues generally, see C. Wilkinson, *Crossing the Next Meridian: Land, Water, and the Future of the West* 175 (Island Press 1992).

atmosphere they breathed."[31] When in the 1850s, Isaac Stevens negotiated for treaties to clear title to land for a northern railway route, the tribes took care to protect their right to fish at "all usual and accustomed places" outside reservation boundaries "in common with citizens of the territories."[32]

As "anadromous" fish, salmon connect the Basin to an even larger and more diverse ecosystem which includes the Pacific Ocean. They are born in creeks, rivers and lakes and migrate downstream as juveniles. In the estuary at the river's mouth, they transform from freshwater fish to saltwater fish, then enter the ocean where they migrate far north or south, feed and mature for several years. They then return to the mouth of the river, swim upstream to their natal areas, where they spawn and die.

This cycle has ecological significance. Salmon take nutrients from the ocean, and carry them to inland headwaters, where a complex of other species feed on the bodies of spawned-out salmon. The cycle has also made salmon a regional symbol. Salmon are viewed as national, even international, treasures, part and parcel of the Columbia River Basin's natural endowment. The Columbia River Gorge National Scenic Area, the Hells Canyon National Recreation Area, a variety of wild and scenic rivers, all are part of a salmon river, and all are affected by water policies developed by federal stewards.

D. The Federal Presence

While states issue rights to water and manage fish and wildlife under state law, the federal government's influence over the mainstem of the Columbia River Basin and salmon is pervasive. Consider: the Department of State and other federal agencies negotiate and carry out the American obligations under international treaties related to hydropower production in the Basin and the harvest of fish produced in the Basin.[33] The Bureau of Reclamation and Army Corps of Engineers operate 14 large-scale mainstem water

[31] *United States v. Winans*, 198 U.S. 371, 381 (1905).

[32] *See, e.g.*, Treaty with the Yakamas, June 9, 1855, art. 3, 12 Stat. 951, 953.

[33] *See* Treaty Between the United States and Great Britain Relating to Boundary Waters, and Questions Arising Between the United States and Canada, 35 Stat. 2448 (1909); Treaty Between Canada and the United States of America Relating to Cooperative Development of Water Resources of the Columbia River Basin; Treaty Between the Government of the United States of America and the Government of Canada Concerning Pacific Salmon, Treaty Doc. No. 99-2, 16 U.S.C. 3631-3644. See also Magnuson Fishery Conservation and Management Act, 16 U.S.C. 1801-1882; Salmon and Steelhead Conservation Act, 16 U.S.C. 3301-3345.

projects, allowing navigation, flood control, irrigation, hydropower generation and recreation, and affecting salmon productivity.[34] The Federal Energy Regulation Commission licenses the nonfederal use of Basin water in the mid-Columbia, the Snake, and elsewhere for the production of power.[35] The Bureau of Reclamation operates 10 water-storage reservoirs in the upper Snake River, 16 reservoirs in the Middle Snake River, and a number of other storage projects that irrigate some 3 million acres of land:[36] 53.9% of all Washington's irrigated land, 41.8% of Idaho's, and 22.5% of Oregon's.

The U.S. Department of Energy, the Environmental Protection Agency, and the Army Corps of Engineers affect water quality in the Basin through operation of such federal facilities as the Hanford Nuclear Reservation, administration of the Clean Water Act, and regulation of dredging, fill, and other activities in navigable waters.[37] The Bureau of Land Management, the Forest Service and others manage federal lands which account for 55 percent of the total land area in the Basin, determining the land management practices which can harm or protect salmon habitat in tributary streams.[38] The Bonneville Power Administration generates billions of dollars in hydropower revenues, which support salmon rehabilitation and other public purposes.[39] The National Marine Fisheries Service and U.S. Fish and Wildlife Service determine whether to list a species as endangered and consult with federal agencies to avoid jeopardizing listed species, thereby potentially affecting a broad range of water-related actions.[40] And Congress funds, or declines to fund, projects and activities with a variety of implications for how water is used in the Basin.

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[34] *See System Operation Review*, at 1-8, Fig. 1-1, 3-1.

[35] Federal Power Act, as amended. Within the next 25 years, the FERC will make re-licensing decisions on nine mainstem Columbia and Snake hydroelectric dams and more than 20 tributary projects within the Basin. Information from Peter Paquet, Northwest Power Planning Council (Jan. 1997).

[36] *System Operation Review*, Appendix F at 2-3 to 2-7; Bureau of Reclamation, *Working Paper: Potential Options for Consideration of Development of a Management Plan to Address Issues Related to Columbia and Snake River Salmon*, at pp. 22, 45 (Sept. 1990).

[37] 33 U.S.C. 403, 1251 et. seq., 1344.

[38] *System Operation Review* at 2-31, 2-32, 2-33; *Status of the Interior Columbia Basin* at 47.

[39] *See* Northwest Power Planning and Conservation Act, 16 U.S.C. 839 et seq.

[40] 16 U.S.C. 1531 et seq.

The federal presence is formalized in a series of laws and agreements, some of which are now beginning to expire. Some of the understandings on which the United States shares the Columbia's management with Canada, and with public and private electric utilities, are lapsing. Licenses for many of the Basin's non-federal hydropower facilities are coming up for review. The laws that govern federal hydropower operations on the river are overshadowed by salmon protection and water claims under the Endangered Species Act, Indian treaties, the Northwest Power Act and other laws. Insofar as prior agreements represented consensus that governed federal operations on the river, that consensus has eroded. Any new consensus must take into account not only the long heritage of river development, described in the next section, but the importance of Columbia River salmon.

III. Putting the River to Work

In its undeveloped state, the Columbia was the mainstay of a well-developed salmon culture, and the center of a far-flung trading network. Non-Indians, however, wanted to use the river in different ways, and felt themselves constrained by the river's wild variability. The amount of water that reaches the estuary varies a great deal from season to season and year to year. Much of the basin's precipitation is snow, which falls in the mountains from October to May. With the spring freshets, the rivers swell to massive size. On average, the Columbia's flow measured at The Dalles is a little more than 100,000 cubic feet per second before the freshet in February and more than 400,000 cubic feet per second during the freshet in May and June.[41] Before it was buried by a reservoir, Celilo Falls, once one of the river's major cataracts, could disappear from view during the spring freshet and rise as high as 22 feet above the river during low water.[42] Year-to-year variations can be even more extreme. Peak flows have been as high as 1,240,000 cubic feet per second at The Dalles (in 1894), and low flows as little as 35,000 cubic feet per second (in 1937), a thirty-five-to-one variation.[43]

To the new settlers, the pre-development river was problematic. Nineteenth century sternwheelers ran the undammed river, but with difficulty. Ships could travel upriver as far as the Cascades, but then passengers and cargo had to take a portage train past the big rapids at the Cascades and The Dalles.[44] Until dams were built, river navigation was eclipsed by trains.[45] From an energy standpoint, the natural river was "180 degrees out of phase" with human needs.[46] It discharged 73 percent of its flow in the six summer months and only 27 percent in the fall and winter months when power is most needed.[47] The thirty-five to one variation between peak flows and low

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[41] *Columbia River System Operation Review, Final Environmental Impact Statement, Main Report* at 2-6.

[42] W. Dietrich, *Northwest Passage, The Great Columbia River* at 191 (Simon & Schuster, 1995).

[43] *Columbia River System Operation Review, Main Report* at 2-6; Pacific Northwest River Basin Commission, *Water Today and Tomorrow*, volume 2, "The Region" at 3-28.

[44] S. Holbrook, *The Columbia*, at 108-109.

[45] Keith Petersen, *River of Life, Channel of Death: Fish and Dams on the Lower Snake* at 75 (Confluence Press 1995).

[46] Keith Muckleston, "International Management of the Columbia" in Conflicts Over the Columbia River, at 72 (proceedings of a seminar conducted by the Water Resources Research Institute, Oregon State University, July 1980).

[47] G. Norwood, "River of Many Uses," in Conflicts Over the Columbia River, at 9.

flows meant flooding. Re-engineering the river to knock off these rough edges involved what one writer called "ironing out the hydrograph."[48]

A. Early Tributary Development

Early in the 19th century, the Hudson's Bay Company, arriving from Canadian possessions in the north, began trading in furs. Soon the Company undertook a policy of over-trapping in the Wallowas and other mountains south of the Columbia River, trying to discourage the American fur companies from crossing the Rockies. The policy, and the overall economic pressure to strip streams of beaver, caused a collapse in beaver populations from which they have never recovered. Throughout the Columbia Basin, "trapping reduced or extirpated most beaver populations, with resulting widespread loss of structural elements, floodplain processes, and vegetative diversity that had developed as a result of centuries of ongoing beaver activity.[49] "Because of their mediating role in the dynamics of streams and wetlands, creating storage and backwaters, and manipulating water levels, beaver were especially important factors in the hydraulics of tributary streams in the arid parts of the Columbia Basin.[50]

As settlers arrived, the Basin's Indian tribes were pushed out of their homelands and the landscape began to change. The pattern in Northeast Oregon was characteristic. Permanent settlement in the Grande Ronde Basin in Northeast Oregon commenced in 1860. From west across the Blue Mountains, one group found, "There were no lands in what is now called Umatilla County worth taking. All the creek bottoms had been taken."[51] In 1861, Judge Benjamin Brown and Stephen Coffin founded LaGrande and brought in cattle and horses to exploit the grass. Soon they were complaining that the grass had become "less abundant," while the Nez Perce and Umatilla Indians visiting the valley would bring "vast herds of ponies with them which sometimes trespassed on what the settlers conceived to be their rights." "[B]efore the dawn of the seventies, the pasturage of the Grande Ronde

[48] Muckleston, "International Management of the Columbia" at 69.

[49] Independent Scientific Group, *Return to the River*, at 141.

[50] National Research Council, *Upstream* at 41.

[51] Brown, McCully et al., *An Illustrated History of Union and Wallowa Counties* at 138 (Western Historical Publishing Co., 1902).

Valley commenced showing signs of exhaustion."[52] The less-accessible Wallowa Valley remained in Nez Perce control until 1870, when settlers pushed over the passes and down the Minam River. In 1872, the first cattle grazed the Wallowa bottom lands. The Umatilla Tribe lost possession of its lands in the middle and upper Grande Ronde by signing its 1855 Treaty with Territorial Governor Isaac Stephens. The Nez Perce also signed an 1855 Treaty but their chief, Old Joseph, reserved his band's rights in the Wallowa Valley. Under settlement pressure, other Nez Perce leaders executed amendatory documents in 1863, ceding the Wallowa lands. Tribal leaders challenged their validity and nearly succeeded when white settlers were ordered to leave the Valley. However, the order came under fire and was vacated. The Wallowa Band left the valley for good as Young Joseph and the Nez Perce embarked upon their fabled retreat through the Rocky Mountains, falling just short of Canada in 1877.[53]

The United States offered land and water cheap or free; federal and state water laws mostly supported control of water for mining, irrigating, and producing power. A mining boom hit many parts of the basin in the 1860s, which generated demand for food: Grain, sheep and cows. Livestock production began to take off in the 1850s and 1860s, and it boomed through the end of the century.[54]

Crops required irrigation in the Basin's dry interior. Marcus Whitman diverted water from Doan Creek to irrigate his wheat fields in 1846, and the Oblate Fathers took water from Ahtanum Creek for their mission near Yakima at about the same time.[55] In the Grande Ronde Valley in the 1860s, settlers drained Tule Lake, and excavations began for what would become the State Ditch, to reduce spring flooding. Over time, the ditch deepened, eventually capturing the entire Grande Ronde River. Four miles of State Ditch cut off 33 miles of circuitous river channel and flood plain, disconnecting them from their recharge waters. The best alluvial fish habitat in the basin was diminished dramatically.[56]

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[52] *Id.* at 174

[53] *See generally* A. Josephy, *The Nez Perce Indians and the Opening of the Northwest.*

[54] Joseph E. Taylor III, Making Salmon: Economy, Culture, and Science in the Oregon Fisheries, Precontact to 1960 at 72-80, 86, 90 (Doctor of Philosophy dissertation, University of Washington, 1996).

[55] Stewart H. Holbrook, *The Columbia* at 302 (Rinehart & Co. 1956).

[56] Catherine Creek still flowed into the old Grande Ronde channel, and through it to join the river at the downstream end of the Ditch.

Most water in streams in eastern Oregon was claimed by the early part of the 20th century: The upper Deschutes was fully appropriated by 1913; approximately 40 percent of non-tribal water rights in the Umatilla Basin were initiated before 1909; more than half the appropriations in the John Day River were initiated before 1920.[57] There were significant early diversions from the Boise, the Hood, the Wenatchee and other rivers as well. During the 1880s, Oregon, Washington and southern Idaho opened up 2.5 million acres of land for irrigation.[58] The Yakima Valley had a boom of its own between 1890 and 1910, when 5000 new irrigated farms sprouted. By 1902, it had the Northwest's largest irrigation project, sponsored in large part by railroads promoting settlement.[59]

With many of the Basin's streams fully appropriated, demand for storage projects grew. Conceding that private capital was insufficient to finance most large-scale irrigation projects, Congress supported irrigated agriculture in the Columbia Basin and elsewhere. In 1894 Congress approved the Carey Act which authorized the Secretary of the Interior to grant up to a million acres of federal land to each arid western state for irrigation, reclamation, cultivation, and occupation of those lands.[60] In 1902 Congress approved the Reclamation Act, providing federal financing for large-scale irrigation development in the Yakima and other basins.[61]

B. Mainstem Development

1. The Columbia and Lower Snake System

Development of the Columbia's mainstem initially lagged behind development in the tributaries. Navigation locks had been installed at two of the river's most difficult rapids around the turn of the century. Construction of Cascade Locks began in the 1870s and was completed in 1896; the Celilo

[57] Oregon Water Trust, Water Rights Acquisition Strategy, 1995-1997, at 10 (Jan. 1995).

[58] R. White, *It's Your Misfortune and None of My Own* at 184 (Oklahoma 1992); Taylor, *Making Salmon* at 81.

[59] D. Pisani, *To Reclaim a Divided West* at 76, 87 (1992).

[60] Carey Act of Aug. 18, 1894, ch. 301, sect. 4, 28 Stat. 422, with various subsequent amendments, 43 U.S.C. 641.

[61] Reclamation Act of 1902, 32 Stat. 388.

Canal was begun in 1903 and finished in 1915.[62] But river navigation petered out during the railroad era in the early part of the century, and there was little rationale for damming the river. As historian Richard White put it:

> *Dams would improve navigation on a river where existing navigational improvements went unused. They would bring more land into production in a country where farmers were already plagued by overproduction and low prices, and they would provide immense amounts of power which no one wanted to buy.*[63]

The river was uniquely suited to hydropower production, however. It is a relatively steep river, dropping an average of about two feet per mile (compared to Mississippi's six inches per mile). It flows in a solid rock channel suitable for dam foundations. It is generally free of silt, assuring long reservoir life. Indeed, the Columbia has been seen as a nationally unique source of hydropower. Some have said it potentially could produce about 40 percent of the nation's hydropower, at the lowest development cost of any large power source in the country.[64]

In 1925, the Rivers and Harbors Act instructed the Army Corps of Engineers to survey and report on the Columbia's potential for electric power, navigation, flood control and irrigation development. Completed in March 1932, the report was the Columbia's first "308 Report," named for the House Document that first proposed such studies.[65] The 1845-page document characterized the Columbia as the "greatest system for water power to be found anywhere in the United States," and recommended ten dams for navigation and electricity production.[66] In other circumstances, the Report

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[62] S. Holbrook, *The Columbia* at 287-92.

[63] R. White, *The Organic Machine: The Remaking of the Columbia River* at 54 (Hill & Wang 1995).

[64] R. Bessey, *The Public Issues of Middle Snake River Development: The Controversy Over Hells Canyon and Nez Perce Reaches* at 10 (Wash. Department of Power Resources Bulletin No. 9, 1964).

[65] C. McKinley, *Uncle Sam in the Pacific Northwest* 65-66 (University of California Press, 1952); M. Blumm, "The Northwest's Hydroelectric Heritage: Prologue to the Pacific Northwest Electric Power Planning and Conservation Act," 58 *Wash. L. Rev.* 175, 188 n.67 (1983).

[66] McKinley, *Uncle Sam in the Pacific Northwest* at 66.

might have gathered dust. But coming in the midst of the Depression, it became part of the New Deal agenda.[67]

Construction of the first federal mainstem projects recommended by the 308 Report, Bonneville and Grand Coulee, began in 1933. The non-federal Rock Island project near Wenatchee, Washington had begun two years earlier. It was the beginning of the Dam-Building Era, an era that changed the Pacific Northwest "as nothing else since the coming of the covered wagon trains."[68]

Grand Coulee was built for flood control, navigation, and reclamation "and for the generation of electric energy as a means of financially aiding and assisting such undertakings."[69] The irrigation component is called the Columbia Basin Project. The project's pumps lift water 280 feet into Banks Lake, a 27-mile long irrigation reservoir.[70] Irrigation works take the water from there. The project first began irrigating fields in 1951.[71] It now irrigates about 560,000 acres with canals as big as rivers. It has a huge drainage system to keep the land from being waterlogged. O'Sullivan Dam and the Potholes Reservoir to capture return flows in the middle of the project. As large as the project is, there could be more. It is about half the size it was designed to be, and proposals to complete the project have never entirely died.[72]

With construction of Grand Coulee and Bonneville underway, between 1935 and 1937, Congress debated a series of bills concerning the marketing of the dams' electricity.[73] One alternative was a "valley authority," a Columbia

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[67] R. White, *The Organic Machine* at 55; Blumm, "The Northwest's Hydroelectric Heritage," 58 *Wash. L. Rev.* at 193-95.

[68] Holbrook, *The Columbia River* at 323.

[69] Act of August 39, 1935, 74th Cong. 1st Sess., Pub. L. 409, sec. 2.

[70] U. S. Bureau of Reclamation, *Working Paper: Potential Options for Consideration of Development of a Management Plan to Address Issues Related to Columbia and Snake River Salmon*, at 85 (September, 1990).

[71] Dietrich, *Northwest Passage* at 271; Holbrook, *The Columbia River* at 318.

[72] U. S. Bureau of Reclamation, *Working Paper: Potential Options for Consideration of Development of a Management Plan to Address Issues Related to Columbia and Snake River Salmon*, at 85; Dietrich, *Northwest Passage* at 291-95. In August 1994, the Bureau of Reclamation abandoned an environmental impact analysis of a proposal to complete the project. *Columbia River System Operation Review, Final Environmental Impact Statement,* Appendix F at 1-2.

[73] *Blumm, "The Northwest's Hydroelectric Heritage," 58 Wash. L. Rev. at 198.*

River version of the Tennessee Valley Authority.[74] The proposal met with intense opposition from private utilities, the Corps of Engineers and "chamber of commerce groups throughout the region."[75] Another alternative was to divide power marketing between the Army Corps of Engineers (for the Bonneville project) and the Bureau of Reclamation (for Grand Coulee), each selling power to local markets not otherwise served by private utilities. This approach was favored by business interests. During the summer of 1935, the Pacific Northwest Regional Planning Commission proposed an integrated transmission grid from which power would be sold at uniform rates region-wide.[76] The Commission, a New Deal product of the National Resources Board of the Public Works Administration, played an important role in federal inter-agency coordination and federal-state-local coordination from its birth in 1934 to its termination in 1943.[77] The Commission's proposal for an integrated grid led to a debate over the appropriate form of governance for the Columbia River. The ensuing debate led to a compromise, an agency created in 1937 within the Department of Interior, and called the Bonneville Power Administration. The agency was charged with marketing power output from the federal dams on the Columbia, giving preference to public customers. The BPA was "intended to be provisional pending the establishment of a permanent administration for Bonneville and other projects in the Columbia River Basin."[78]

World War II renewed the pressure for development. Numerous defense-related industries located in the Northwest, including several aluminum plants and a mysterious facility located on what became the Hanford Nuclear Reservation. All of these installations took their power from Bonneville and Grand Coulee dams. By 1942, 92 percent of the Bonneville Power Administration's load was committed to industry.[79] From the onset of the war through the mid-1940s, spurred by a marketing directive from the War Production Board calling for utilities to interconnect transmission facilities to

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[74] McKinley, *Uncle Sam in the Pacific Northwest* at 543.

[75] Id. at 157.

[76] Id. at 159.

[77] McKinley, *Uncle Sam in the Pacific Northwest* at 459.

[78] Bonneville Project Act, 16 U.S.C. 832-832l.

[79] Blumm, "The Northwest's Hydroelectric Heritage," 58 *Wash. L. Rev.* at 203-204.

increase efficiency,[80] BPA and the Army Corps of Engineers cooperated closely to meet these requirements.[81] Demand was projected to grow, however, and in 1944 and 1945, Congress authorized a number of water projects for the Basin, some of which, like the Lower Snake River projects, would take 30 years to complete.[82]

Peace also spurred water development. In the five years following the war, Congress authorized Chief Joseph Dam just below Grand Coulee[83] and Albeni Falls, Libby, John Day and The Dalles dams.[84] In 1948, the Corps' 308 report proposed a high dam in Hells Canyon, on the Idaho-Oregon border upstream from Lewiston, and a dam on the mid-Columbia at Priest Rapids, above the confluence of the Snake and Columbia.[85]

With the change in federal administrations in 1953, support for federal dams in Hells Canyon and the mid-Columbia faded. The Idaho Power Company applied for licenses to build three non-federal projects in Hells Canyon, and ultimately the Federal Power Commission granted a license over opposition.[86] On the mid-Columbia, Congress authorized Grant County Public Utility District to file a application for a license to build a dam at Priest Rapids.[87] That license was followed by licenses for Wanapum Dam,[88]

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[80] War Production Board Order L-94 (1942), 7 Fed. Reg. 3266 (1942), cited in Blumm, "The Northwest's Hydroelectric Heritage," 58 *Wash. L. Rev.* at 204; L. Hittle, et al., "Pacific Northwest Power Generation, Multi-Purpose Use of the Columbia River, and Regional Energy Legislation: An Overview," 10 *Env't'l Law* 235, 267 n. 142 (1980).

[81] McKinley, *Uncle Sam in the Pacific Northwest* at 201-202.

[82] Act of June 5, 1944, ch., 234 sec. 1, 58 Stat. 270, 43 U.S.C. 593a) (Hungry Horse); Flood Control Act of 1944, ch. 665, sec.1-8, 58 Stat. 887, and Rivers and Harbors Act of 1945, ch. 19 sec. 2, 59 Stat. 10, 21 (McNary and Lower Snake dams).

[83] Rivers and Harbors Act of 1946, ch. 595, sec. 1, 60 Stat. 634, 637.

[84] Flood Control Act of 1950, ch. 188 sec. 204, 64 Stat. 163, 170.

[85] H. R. Doc. No. 531, 81st Cong., 2d Sess. (1950).

[86] *In re Idaho Power Co.*, 14 F.P.C. 55 (1955). *See* Palmer, *The Snake River* at 199-214; M. Blumm, "Hydropower vs. Salmon: The Struggle of the Pacific Northwest's Anadromous Fish Resources For a Peaceful Coexistence with the Federal Columbia River Power System," 11 *Env't'l Law* 211, 238-241 (1981).

[87] Ch. 589, sec. 7, 68 Stat. 573 (1954).

[88] 14 F.P.C. 1067 (1955).

Rocky Reach Dam[89] and Wells Dam,[90] all to be operated by mid-Columbia public utility districts.

Hydropower development had accelerated, but still could not keep up with projected energy demand in a booming postwar economy. The problem was perceived to be the lack of upstream storage. As one public power advocate put it, "[s]torage is the key to complete development of the Columbia River . . . without storage only about 20% of a hydroelectric power site's potential firm capability can be realized . . . 80% of the potential power depends on storage."[91] The 308 report of the 1940s proposed 20 million acre-feet of storage for the United States part of basin. Yet, by the 1960s, only 13 million acre-feet of hydropower storage had been developed. Plans for major storage development had to contend with disagreements between upstream and downstream states, competition between public and private utilities, and growing environmental concern over proposed projects like Glacier View on the Flathead River and high dams in Hells Canyon.[92] So, without the additional storage, energy output followed the vagaries of the unregulated river, still out of phase with seasonal energy demand.

Faced with obstacles to further storage development in the United States, the region looked to Canada. In 1944, the International Joint Commission had been asked to "determine whether a greater use than is now being made of the Columbia River system would be feasible and advantageous."[93] The Joint Commission delegated the task to the Columbia River Engineering Board, which filed a 1959 report identifying three alternative plans for development and storage sites in Canada that could be operated to benefit both countries. The Commission also proposed certain principles for calculating and apportioning the costs and benefits of cooperative

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[89] 16 F.P.C. 736 (1956).

[90] 28 F.P.C. 128 (1962).

[91] Norwood, quoting Ben Torpen in "River of Many Uses," in *Conflicts Over the Columbia River*, at 8.

[92] K. Muckleston, "International Management of the Columbia," in *Conflicts Over the Columbia River*, at 72-76 (Oregon State University, July 1980).

[93] Johnson, "The Canada-United States Controversy Over the Columbia River," 41 *Wash. L. Rev.* 676 (1966). The International Joint Commission was established by the 1910 Boundary Waters Treaty with Canada, Treaty between the United States and Great Britain Relation to Boundary Waters, and Questions Arising between the United States and Canada: Treaty Series (Ottawa, Ontario: King's Printer).

development.[94] Based on these principles, the Columbia River Treaty was signed on January 17, 1961 and ratified by the United States Congress on March 16, 1961.[95] Canadian ratification came three years later.[96]

From the United States' perspective, the treaty enabled the United States to build Libby Dam in Montana, which backed up the Kootenay River into Canada; Canada to use American money to build Mica, Duncan and Arrow Lakes dams; and both countries to enjoy the benefits of power and flood control. From the Canadian perspective, the Americans got 30 years of optimized flows at little cost.[97] In addition, there is an ongoing debate in Canada regarding whether treaty storage prompted an increase in American irrigated agriculture that competes with Canadian agriculture.[98]

The Canadians acquired rights to power made possible by the Canadian storage, and half of this power is generated at United States dams. Yet, Canada would not need this power for decades. Accordingly, Canada agreed to the treaty only with the Americans' promise to buy back the Canadian power entitlement. The Northwest states had no use for so much power either, but California and the Pacific Southwest did. In 1964, Congress authorized the sale of surplus Columbia River power outside the region, along with construction of a Pacific Northwest-Pacific Southwest transmission line ("the intertie"), as long as the power could be called back if the Northwest needed it. A Southwest consortium put up the money, the treaty

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[94] Sewell, "The Columbia River Treaty and Protocol Agreement," 4 *Natural Resources J.* 309 (1964).

[95] "Treaty Between Canada and the United States of America Relating to Cooperative Development of the Water Resource of the Columbia River Basin."

[96] Johnson, "The Canada-United States Controversy Over the Columbia River," 41 *Wash. L. Rev.* at 746-749.

[97] *See* N. Bankes, *The Columbia Basin and the Columbia River Treaty: Canadian Perspectives in the 1990s* (Northwest Water Law and Policy Project Research Publication PO95-4 (1996); N. Swainson, *Conflict Over the Columbia: The Canadian Background to an Historic Treaty* (1979).

[98] The theory espoused by W. R. Holm in *Evaluation of the Effect of Downstream Benefits to Washington Agriculture Under the Columbia River Treaty on the Competitive Positioning of British Columbia Producers: Summary*, vol. I at 10 (Burnaby, British Columbia: Submitted to the Provincial Agricultural Land Commission, 1994) is that increased storage gave American farmers confidence in ample water supplies, and led to a big expansion. The theory has been disputed by the Province of British Columbia's Ministry of Energy, Mines and Petroleum Resources in a Briefing Note from Denise Mullen-Dalmer to Kirk Miller, Chair and General Manager of the Provincial Agricultural Land Commission, dated January 16, 1995.

projects were built, and headwater storage on the Columbia more than doubled.[99]

The treaty went a long way toward ironing out the hydrograph. In the river's natural state, streamflow begins to pick up in the spring, as the snow pack melts and runs off into streams. It peaks in May and June and begins to fall off after mid-July (see the "1885-1964" line on Figure 2). Unregulated flow in the October-February period (measured at The Dalles, in the lower part of the river system) was only about 20 percent of that in the middle of June.[100] The Treaty knocked the top off of the spring-summer peak. The Treaty projects, together with the storage projects built before the Treaty, nearly equalized fall-winter flow and spring-summer flow (see Figure 3). That part of the peak would be stored in the treaty project reservoirs and spread out to the fall and winter, when its value for hydroelectric generation would be higher.

The Columbia River Treaty addressed only two water uses: hydropower generation and flood control. Flow for salmon, water quality enhancement, irrigation and recreation were not specifically addressed. As a result, there is no formal way to incorporate the needs of salmon or other environmental considerations into river management other than through economic trades. The implementing entities under the treaty are, predictably, power marketers and flood control engineers: British Columbia Hydro, Bonneville Power Administration, and the U. S. Army Corps of Engineers. Adjustments can be made in system operations to accommodate such concerns, but the treaty's hydropower generation and flood control purposes require compensation for these changes. Thus, in the low-flow year of 1977 when fish interests sought water for salmon flows, Canadians were willing to help out at $6 per acre-foot. United States interests declined the offer at that price, and tried to make do.[101] The fact that the Treaty makes river operations for fish and wildlife a cost rather than a value is a subject that has yet to be addressed in negotiations between the two countries.

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[99] Dietrich, *Northwest Passage*, at 319-20; *System Operation Review, Main Report* at 3-2; Blumm, "The Northwest's Hydroelectric Heritage," 58 *Wash. L. Rev.* at 219.

[100] K. Muckleston, "International Management of the Columbia," in *Conflicts Over the Columbia River*, at 72.

[101] Muckleston, "International Management of the Columbia," in *Conflicts Over the Columbia River*, at 85.

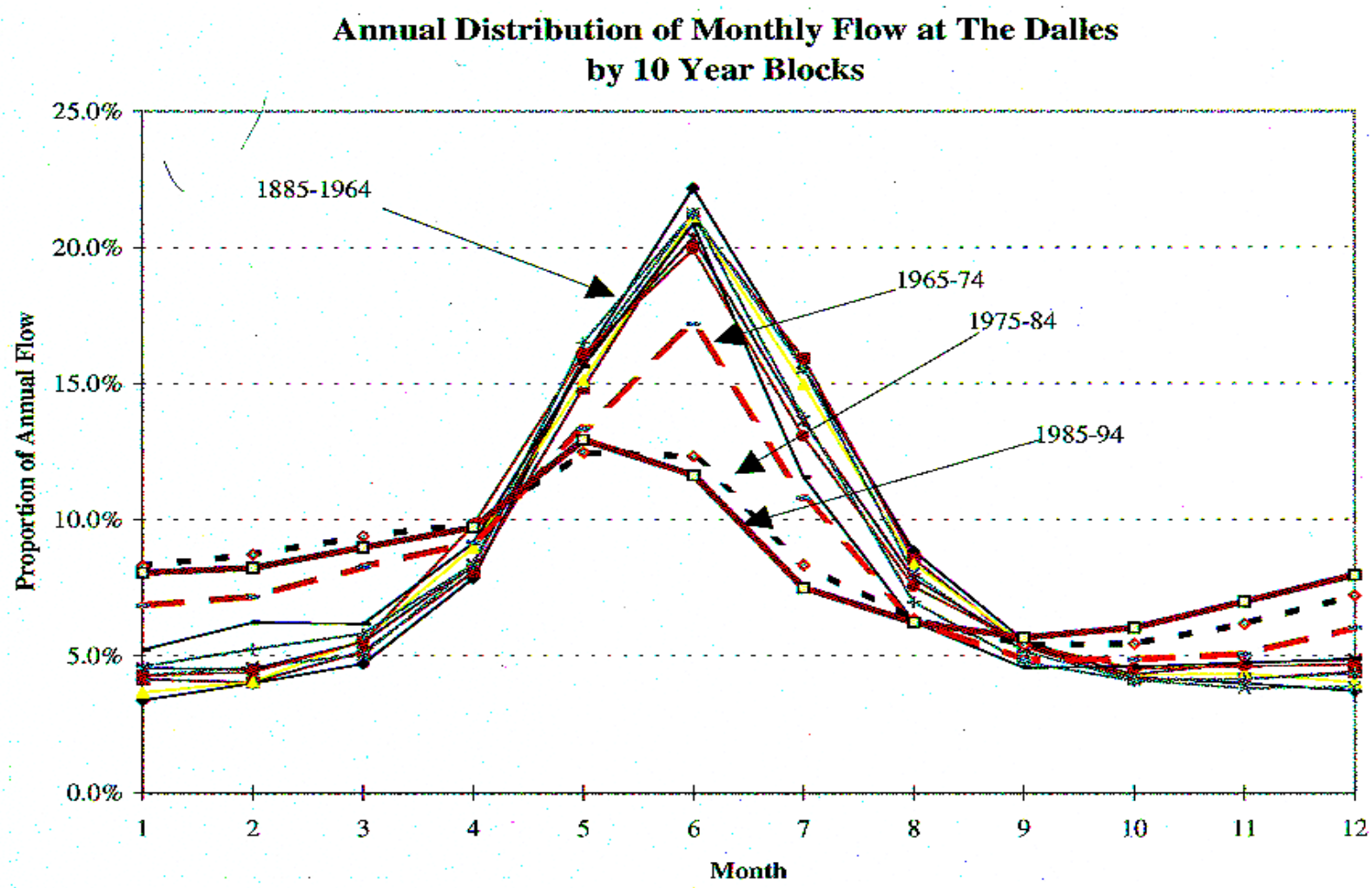

Figure 2.—Changing the shape of the hydrograph.

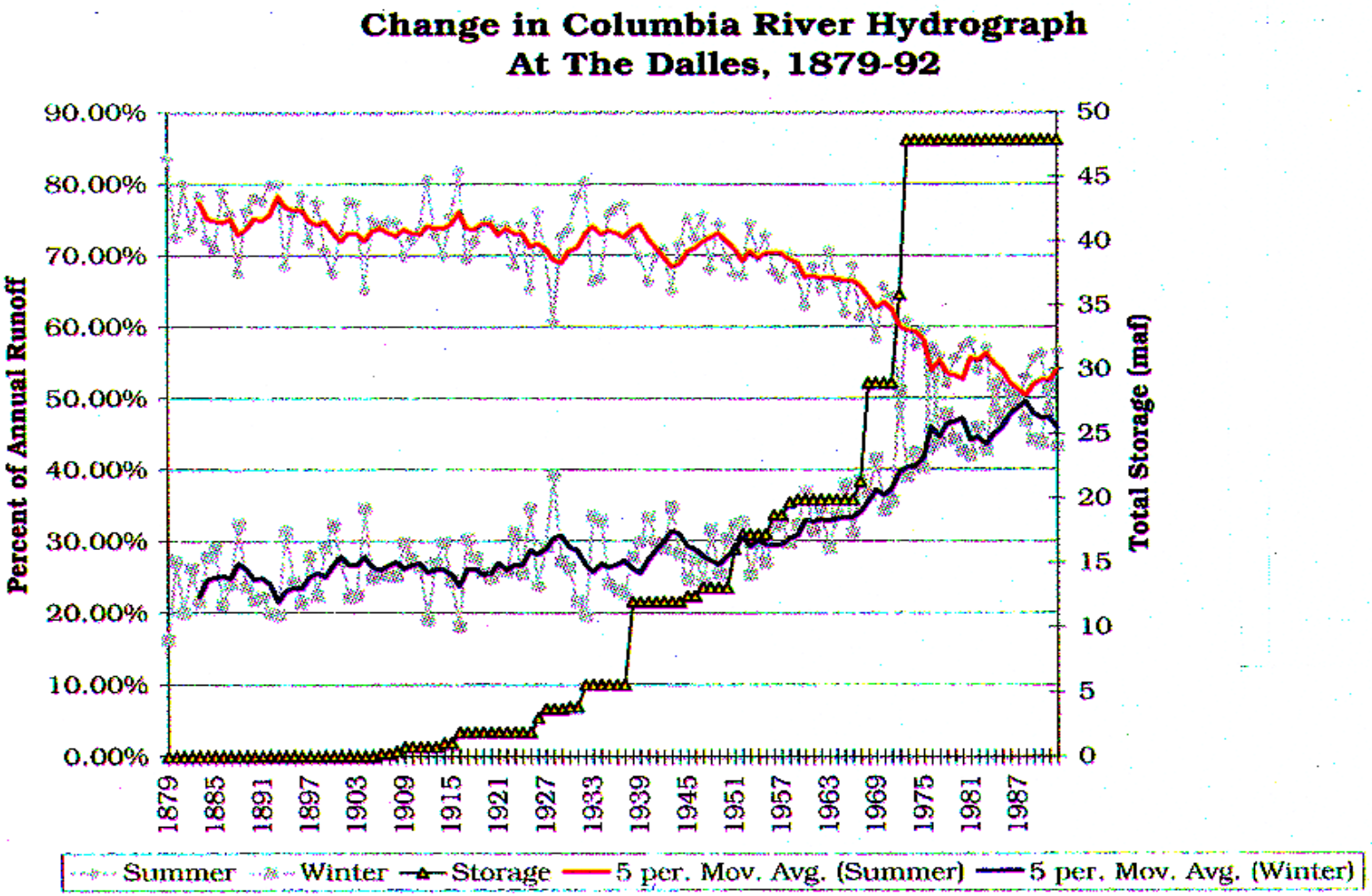

Figure 3.—The effect of storage projects on the river's seasonal flows.

2. The Snake River and the "Two Rivers" Concept

The Snake River, the Columbia's largest tributary, drains more than 40 percent of the surface area of the Columbia Basin, yet supplies only about 20 percent of the Columbia's flow.[102] Most of the Snake Basin lies in southern Idaho and the easternmost part of Oregon, a dry region whose development has been almost totally dependent on water availability. A lesser part of the basin drains western Wyoming and small pockets of northern Utah and Nevada.[103]

Although the Snake is a hydroelectric river in its middle reach in Idaho, irrigation dominates the Snake Basin in eastern Idaho and eastern Oregon. Even in its middle reaches in Idaho, the Snake River is not part of the Columbia/Lower Snake hydropower system. In fact, as important as it is, the Snake River is almost *aqua incognita* for purposes of federal Columbia River power system planning. In that context, the river above Hells Canyon is simply "treated as a 'hypothetical reservoir' that could supply varying amounts of river flow at different times of the year."[104]

The Upper Snake Basin. Hundreds of thousands of acres of cropland were developed in the Upper Snake Basin between 1880 and 1899. By the turn of the century, however, surface streams were fully appropriated during most summers.[105] Decreed surface water rights in the Upper Basin increased from 204 cubic feet per second in 1880 to 25,527 cubic feet per second by 1925.[106] It became essential to build irrigation storage facilities.[107]

Idaho had a relatively high degree of success developing private irrigation facilities under the Carey Act. Two-thirds of all claims filed under the Carey

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[102] Hydrosphere, *Water Supplies to Promote Juvenile Anadromous Fish Migration in the Snake River Basin* at I-1 (1991).

[103] D. Chapman, et al., *Status of Snake River Chinook Salmon: Report to the Pacific Northwest Utilities Conference Committee*, Section A at 30 (Feb. 19, 1991).

[104] Columbia River System Operation Review, *Final Impact Statement, Main Report* at 1-7.

[105] Chapman, supra, at sec.A, 31-32.

[106] Id. at sec. A, 32.

[107] J. Fereday and M. Creamer, "Swan Falls in 3-D: A New Look at the Historical, Legal and Practical Dimensions of Idaho's Biggest Water Rights Controversy," 28 *Idaho L. Rev.* 573, 580 (1991-92).

Act were in the Snake Basin, some 414,000 irrigated acres.[108] With the passage of the Reclamation Act of 1902, the first major federal reclamation projects in the state were authorized: Minidoka in the Upper Snake Basin (1904) and the Boise Project in the Lower Basin (1906). Managing new storage water rights with existing surface water rights created new complications, and in the 1920s irrigators and federal officials banded together to create a "Committee of Nine" to oversee Upper Basin water management.[109] By the 1930s, 31 large irrigation storage projects were in place. In dry years, all of the Snake's water could be controlled by storage,[110] and nearly 2.2 million acres were under irrigation in the Snake River Plain.[111] Today, Idaho is forty-first in population nationally and fourth in irrigated land. The Snake Basin uses more than fifteen percent of the total agricultural water in nation.[112]

While most of the storage projects in the Snake system are in Idaho, part of the Upper Snake River (more than a million acre-feet) originates in Wyoming. Jackson Lake, part of the turn-of-century Minidoka Project, has an active storage capacity of 847,000 acre-feet of water. Under the provisions of a 1949 compact between Wyoming and Idaho, Wyoming water users are entitled to divert up to four percent of the river's flow measured at the state line. A recent estimate showed that Wyoming's allocation would have averaged about 170,000 acre-feet per year since the compact was signed, enough to meet Wyoming's Upper Snake Basin's projected needs until the year 2020.[113]

Operations of the Upper Snake projects are premised on a "Two Rivers" concept, the idea that the Snake is one river in the Upper Snake Basin and another river in the Middle Snake Basin. The Two Rivers concept is explained by the river's unique geography. A dam in south-central Idaho

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[108] Tim Palmer, *The Snake River, Window to the West* 54 (1991); Fereday and Creamer, "Swan Falls in 3-D," 28 *Idaho L. Rev.* at 581.

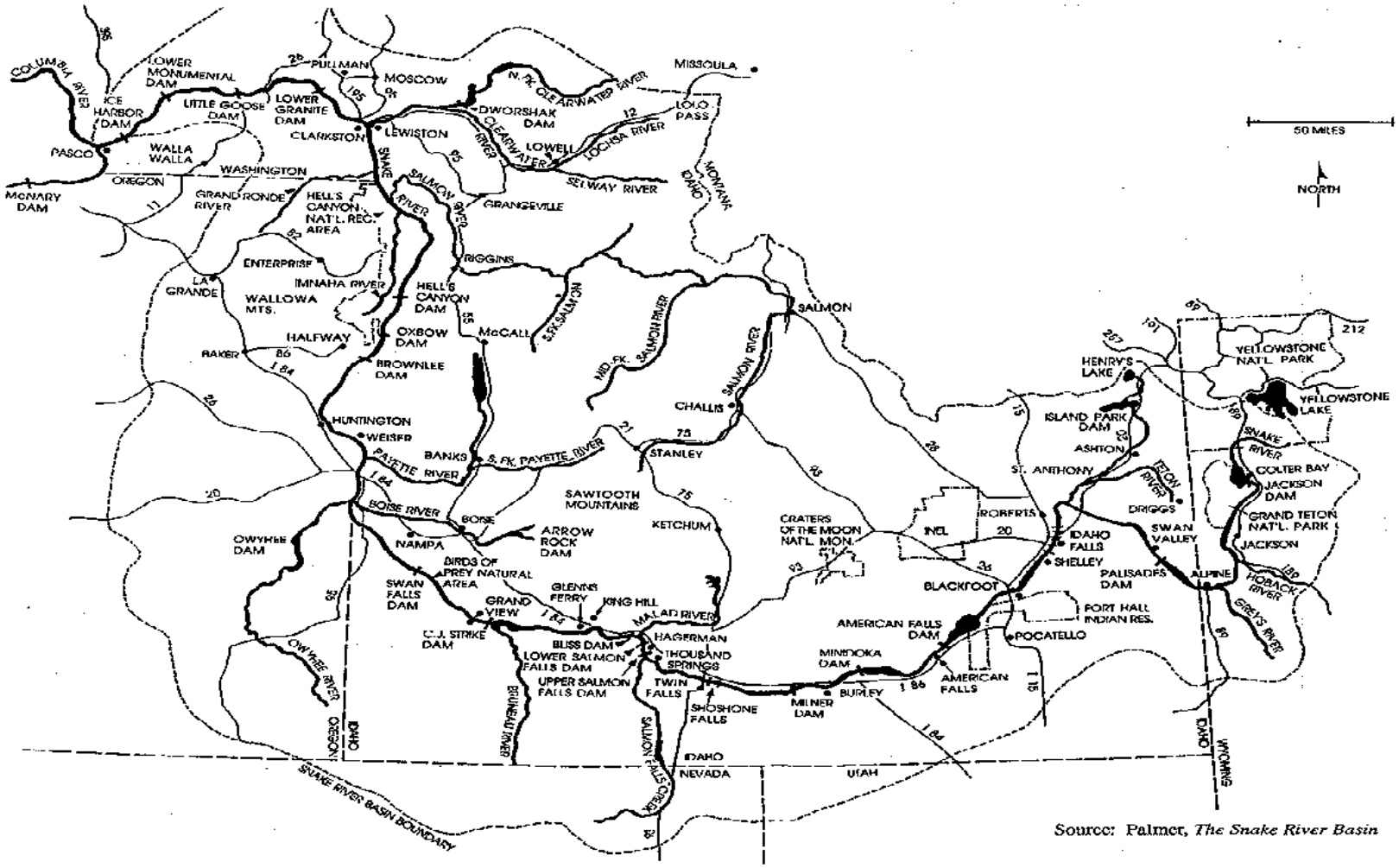
[109] M. Fiege, "Creating a Hybrid Landscape: Irrigated Agriculture in Idaho," 11 *Illahee* 6062-64 (1995).

[110] Chapman, supra, at sect. A, 17.

[111] Hydrosphere, *Water Supplies to Promote Juvenile Anadromous Fish Migration in the Snake River Basin*, citing Goodell, S. A., *Water Use on the Snake River Plain, Idaho and Eastern Oregon*, U. S. Geological Survey, Professional Paper 1408-E (1988).

[112] Id., Sect. A at 17.

[113] See Hydrosphere, section A at 30; U. S. Bureau of Reclamation, *Working Paper: Potential Options for Consideration of Development of a Management Plan to Address Issues Related to Columbia and Snake River Salmon*, at 23.



Source: Palmer, *The Snake River Basin*

Figure 4.—Snake River Basin.

called Milner Dam, built in 1905, is the last place in the Upper Snake Basin where gravity diversion is practical. Downstream of Milner, the Snake enters a deep canyon that precludes gravity diversions. For this reason, early irrigation development in the Snake Basin was primarily in the Upper Snake Basin above Milner, and that part of the river was managed regardless of what happened to the river downstream. The Two Rivers idea was first formalized in an agreement between Idaho Power and the Bureau of Reclamation regarding development of the American Falls Project in the 1920s; it was adopted by the Idaho legislature in the 1970s and 1980s. At first as a matter of practice and later as a matter of policy, water administrators have tried to operate the upper basin facilities so that no water passes Milner during irrigation season.[114]

The Bureau of Reclamation occupies a strategic place in the Upper Snake system, where it controls more than four million acre-feet of storage in ten reservoirs.[115] Bureau storage is largely contracted to 63 entities.[116] These spaceholder contracts each carry a priority date, and holders may use all, part or none of their stored water. If the water goes unused it may be held over until the next year, or it may be leased through the Upper Basin's water bank.

The Upper Basin's water bank originated in informal arrangements by which an irrigator with more water than needed could rent to water-short irrigators in dry years. The system was institutionalized by statute in 1977, following a severe drought. The bank has its own rules, developed under a state statute that recognizes water leasing as a beneficial use of water.[117] Under the rules, water users must decide by July whether to commit water to the bank. Those seeking water for irrigation in the Upper Basin have first priority on

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[114] Fereday and Creamer, "Swan Falls in 3-D," 28 *Idaho L. Rev.* at 589-591 and n. 80; J. Beeman and K. Arment, "Instream Flows and the Public Trust—Idaho," in *Instream Flows and the Public Trust*, Proceedings of the Third Annual Western States Water Council Water Management Symposium, at 31, 36-41 (1986); Palmer, *The Snake River* at 51-52, 141-42. Under the 1987 State Water Plan approved by the Idaho legislature, water is to be managed to "meet or exceed a minimum average daily flow of zero at the Milner gauging station. . . ." State of Idaho, *State Water Plan*, section 5A (1987). See Hydrosphere, Water Supplies to Promote Juvenile Anadromous Fish Migration in the Snake River Basin at 3-5.

[115] U. S. Bureau of Reclamation, *Working Paper: Potential Options for Consideration of Development of a Management Plan to Address Issues Related to Columbia and Snake River Salmon*, at 22.

[116] Id., at 25.

[117] Idaho Code sec. 42-1736B. *See generally* L. MacDonnell, et al., *Using Water Banks to Promote More Flexible Water Use* (1994); and "Water Banks: Untangling the Gordian Knot of Western Water," 41 *Rocky Mtn. Min. L. Inst.* 22-1, 22-11 (1995).

leasing. The date the water is made available determines its leasing priority date. During the 1980s, water in the water bank ranged from slightly less than 15,000 acre-feet to more than 360,000 acre-feet. The Bureau controls the price and time period for these leases. During the 1980s, the price was $2.75 per acre-foot, of which 75 cents was taken for administrative expenses and two dollars went to the lessor.[118]

The Middle Snake River. The Middle Snake, the "second river" below Milner, arises from the unique connections between surface water and the Snake Plain Aquifer, which is located largely in the upper basin. The volcanic soil that overlies the aquifer is porous, so irrigation water percolates into the aquifer relatively quickly. As surface irrigation increases, so does aquifer recharge. The Snake Plain Aquifer, one of the world's most productive, discharges much of its water at a place below Milner called Thousand Springs, and this is the source of the Snake River's rebirth. From Milner to Swan Falls, the river gains almost six million acre-feet of groundwater.[119] In the past, as irrigation in the upper basin increased, so did discharges from the aquifer and so did flows in the river below Thousand Springs.[120]

This effect, increasing surface irrigation producing more aquifer recharge and more discharge below Milner, grew during the early part of the century, leveled off after World War II, and then began to reverse itself. The reversal was due to growing groundwater pumping and increased irrigation efficiency in the Upper Basin. Between 1945 and 1966, 700,000 acres were put into production with groundwater, causing a jump in irrigated acreage from 2.5 million acres to 3.2 million acres. In the decade following 1966, irrigators began to improve the efficiency of their water use, converting hundreds of thousands of acres from flood irrigation to sprinklers: two-hundred thousand acres by 1976 and more than a million more by 1990. Further efficiencies were instituted by canal companies and irrigation districts after the 1977 drought, reducing diversions from surface and storage water by almost a million acre-feet by 1983. These efficiencies tended to reduce the amount of water spread on fields, which in turn reduced aquifer discharge and flows below Milner.[121]

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[118] U. S. Bureau of Reclamation, *Working Paper*, at 26.

[119] Chapman, sect. A, 33.

[120] Fereday and Creamer, "Swan Falls in 3-D," 28 *Idaho L. Rev.* at 582-83, 585.

[121] Id., at 587.

The Middle Snake is also the territory of the Idaho Power Company. The Company developed the Swan Falls Project in 1901 and later developed another ten dams on the Snake and five on tributaries.[122] After World War II, when irrigation boomed, Idaho Power doubled its generating capacity through the development of the Hells Canyon Complex and other facilities in the Middle Snake.[123]

The development of Hells Canyon raised major issues and extended debate: whether Hells Canyon should be privately or federally developed; what development would do to anadromous fish; whether development would foreclose later upstream irrigation development in Idaho; whether federal marketing and transmission responsibility in the Snake River Basin should be assigned to the Bonneville Power Administration or the Bureau of Reclamation; whether downstream federal dams should compensate Idaho Power for downstream benefits; and others.[124] The outcome of the debate had important consequences. The choice of private development is one explanation for the limited coordination between Middle Snake hydropower and the federal power system. The Idaho Power Company's three-dam Hells Canyon proposal was chosen in part because the dams were lower in height than other proposals,[125] and the lower height was thought to be more consistent with anadromous fish passage. The irony was hard to miss later when fish passage facilities in Hells Canyon failed and large areas of fall chinook spawning and rearing habitat were lost, apparently irretrievably. Yet, other proposals would have been worse from a salmon's-eye view. The combination of the proposed High Mountain Sheep Dam on the Snake and the big Nez Perce Dam on the Salmon River could have compounded these effects.[126]

The post-World War II period also brought new irrigation development to the Middle Snake, part of a West-wide irrigation boom.[127] The Bureau of

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[122] Palmer, *The Snake River* at 190.

[123] Fereday and Creamer, "Swan Falls in 3-D," 28 *Idaho L. Rev.* at 585.

[124] See generally R. Bessey, *The Public Issues of Middle Snake River Development: The Controversy Over Hells Canyon and Nez Perce Reaches* (Wash. Department of Power Resources Bulletin No. 9, 1964).

[125] The U. S. Supreme Court later overturned a Federal Power Commission license for the proposed High Mountain Sheep project in *Udall v. Federal Power Commission*, 387 U. S. 428 (1967).

[126] Bessey, *The Public Issues of Middle Snake River Development*, at 37-38, 64.

[127] White, *It's Your Misfortune and None of My Own* at 522.

Reclamation developed a number of storage projects below Milner: sixteen reservoirs controlling more than 3,700,000 acre-feet of water to irrigate 600,000 acres of land. Of this, about 3,100,000 acre-feet is actively managed for irrigation and flood control.[128] In addition, high-lift pumps made it practical to take water directly out of the Snake River below Milner. Hundreds of thousands of acres of desert land also were developed for irrigation under the Desert Land Entry Act and the Carey Act from the mid-1960s to 1980.[129]

Growing energy demand and continued expansion of irrigation sowed the seeds of what has been called Idaho's biggest water-rights controversy.[130] The Idaho Power Company's Swan Falls Project was the first hydropower project on the Snake (completed in 1910). The project would be affected by later upstream diversions, but the effects were neither simple nor obvious. By the early 1950s, however, flows at Swan Falls began to reflect the increased groundwater pumping and reduced aquifer recharge from more efficient use of surface waters. Aquifer discharge began to drop off, reducing flows at Swan Falls while the demand for electric energy to power irrigation pumps climbed. Demand grew even more with high-lift pumps below Milner. This pumping was depleting Swan Falls flows even more directly than groundwater pumping did. To meet this growing energy demand, which was simultaneously reducing generating capacity, Idaho Power Company first developed hydroelectric projects in Hells Canyon and then proposed to build a coal-fired generating plant.

It was in the debate over the coal plant that it began to occur to some Idaho Power ratepayers that growing irrigation was putting upward pressure on power bills. If Swan Falls had an early water right (1901 and thereabouts), why was the Company allowing junior upstream irrigators to take its water and drive up power rates? From one perspective the answer was that it had always been that way. From early on, the Idaho Power Company and virtually everyone else subscribed to the Two Rivers concept. It was accepted that irrigation development in the Upper Snake Basin above Milner would be of no concern to water users below Milner, including the Idaho Power

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[128] U. S. Bureau of Reclamation, *Working Paper: Potential Options for Consideration of Development of a Management Plan to Address Issues Related to Columbia and Snake River Salmon*, at 45 (September, 1990).

[129] Fereday and Creamer, "Swan Falls in 3-D," 28 *Idaho L. Rev.* at 588.

[130] "The resulting face-off between irrigation and hydropower became by far the biggest water rights dispute Idaho had ever seen." Fereday and Creamer, "Swan Falls in 3-D," 28 *Idaho L. Rev.* at 642.

Company. In effect, the Company had developed a policy of "subordinating the need of water for power to that of water for irrigation" upstream.[131]

Some ratepayers saw no reason to accept this, however, and they sued the Company to force it to assert Swan Falls' water rights. In defense, the Company filed suit and won judicial recognition of its early Swan Falls rights.[132] The court left open, however, the question of whether the Company had abandoned any of those rights by acquiescing in irrigation development, so both sides saw sense in settlement negotiations.

Under the ensuing settlement, signed in October, 1984, Idaho Power kept its Swan Falls water rights, but subordinated a portion of them to future upstream water rights with a *caveat*: any future rights that would have a significant effect on hydropower production could be granted by the state only if consistent with a new set of criteria designed to recognize a public interest in water, including hydropower generation and other values. Beyond a certain level of future development, the Company retained the right to assert its senior priority.[133] The settlement was approved by the Idaho legislature,[134] and, after a skirmish before the Federal Energy Regulatory Commission, by the U. S. Congress.

According to some observers, what some people expected from the Swan Falls settlement – that it would clear the way for significant new water development in the Upper Basin – has not been borne out. As two knowledgeable commentators observed in the early 1990s:

> *Development of irrigated acreage in southern Idaho will continue to be driven not by the availability of water under the Swan Falls arrangement, but by the dictates of agricultural economics. Indeed, to the extent the availability of water is an issue in any proposed new "trust water" diversion, the tension is most likely to arise between the proposed new appropriation and the rights of existing irrigators, not between the applicant and Idaho Power.*[135]

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[131] Fereday and Creamer, "Swan Falls in 3-D," 28 *Idaho L. Rev.* at 589, n. 72.

[132] *Idaho Power Co. v. State of Idaho*, 104 Idaho 575, 661 P. 2d 741 (1983).

[133] Fereday and Creamer, "Swan Falls in 3-D," 28 *Idaho L. Rev.* at 573-74, 605-607.

[134] Idaho Code section 42-203B to 203D. Fereday and Creamer trace the subsequent legislative tinkering and administrative implementation of the agreement in "Swan Falls in 3-D," 28 *Idaho L. Rev.* at 615-621.

[135] *Fereday and Creamer, "Swan Falls in 3-D," 28 Idaho L. Rev. at 642.*

The conflicts in the upper part of the basin, particularly those between surface and ground water users, seem to bear this observation out. The limitation on water use in the upper basin is more the result of objections by water users who were not party to the Swan Falls, than by the Swan Falls settlement. Indeed, the more significant developments may be emerging from the surface-ground water conflicts. For example, in *Musser v. Higginson*, the Idaho Supreme Court ordered the state Department of Water Resources to regulate pumping by junior ground water users on the Snake Plan aquifer to protect senior surface water users.[136] The Department had argued that it need not undertake to regulate ground water users pending formal determination of conjunctive management in the area. Following the Supreme Court opinion, the Department proposed administrative rules that might have been considered revolutionary in a pure, prior appropriation state. Under the new rules, surface water users may be limited to "reasonable use" to protect competing ground water uses,[137] notwithstanding the amount of water they might be able to assert in a stream adjudication.[138] Thus, while the Swan Falls settlement produced innovation in Idaho water policy and settled a potentially explosive suit, its practical effect may be less important than the developments that are occurring entirely outside the framework of the settlement.

C. The Law of the River

1. Interactions Between Federal and State Law

It would be misleading to call the laws and agreements that control Columbia and Snake River water the "law of the river" if that implied an integrated body of rules. Major parts of the river were developed in accordance with the Corps of Engineers' 308 reports, which have been called "comprehensive,"[139] but the 308 reports did not cover the whole river, or all issues. The reclamation projects in the Upper Snake, after all, had been built for decades, and their place in the system may have seemed an academic point to those writing the 308 reports. Even for those parts of the system covered by the

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[136] 871 P.2d 809 (1994). *See also Fremont-Madison Irrigation District and Mitigation Group v. Idaho Ground Water Appropriators*, 926 P.2d 1301 (1996).

[137] IDAPA 37, Title 03, Chapter 11, Rule 20.03.

[138] Idaho Code, section 42-1401A(2) (allowing an irrigator to claim "the most water consumptive crop that can be grown in the area during the period of the year when water is used for irrigation").

[139] *See, e.g.*, Bessey, *The Public Issues of Middle Snake River Development*, at 11.

308 reports, the reports were "comprehensive" only in an engineering sense. Similarly, the Columbia River Treaty "comprehensively" reduces the river to hydropower and flood control issues.

These plans and arrangements did not address many of the values that are driving the debate over the river now. Rather, planning meant development planning. Governance was reduced to the idea that the agency authorized to build a project also operated that project: The Corps of Engineers managed the projects in the lower part of the Basin where navigation was possible; the Bureau of Reclamation managed the projects in the upper parts of the Basin where irrigation was more significant, and the Bonneville Power Administration marketed the power generated at both Corps and Bureau dams. Allocation of authority was often worked out among the agencies amid flying elbows. Gifford Pinchot's characterization concerned a different set of agencies, but there was a parallel to the Columbia:

> *[E]very separate government agency having to do with natural resources was riding its own hobby in its own direction. Instead of being, as we should have been, like a squadron of cavalry, all acting together for a single purpose, we were like loose horses in a field, each one following his own nose. Every bureau chief was for himself and his own work, and the devil take all the others. Everyone operated inside his own fence, and few were big enough to see over it. They were all fighting each other for place and credit and funds and jurisdiction. What little co-operation there was between them was an accidental, voluntary, and personal matter between men who happened to be friends.*[140]

Moreover, even if the 308 reports had been more comprehensive and federal agencies less competitive, only some of the arrangements that govern the river were federal. Others were determined by state law, which allocated many surface streams long before federal development. Congress intended the reclamation program to fit itself to state water law, but the fit has often been uneasy.[141] The Bureau of Reclamation projects in the Upper Snake Basin, discussed above, are evidence of the complex relationships that

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[140] Gifford Pinchot, *Breaking New Ground* at 321 (1947); McKinley *Uncle Sam in the Pacific Northwest* at 426. See also Greenleaf, "What Kind of a 'Valley Authority?'" 32 *Iowa L. Rev.* 339, 341 (1947).

[141] *See* F. Trelease, "Uneasy Federalism—State Water Laws and National Water Uses," 55 *Wash. L. Rev.* 752 (1980). For a good survey of reclamation law, see R. Clark, *Waters and Water Rights*, sec. 110, at 111 (1967); Trelease, *Federal-State Relations in Water Law* (National Water Commission, September, 1971); and R. Benson, "Whose Water Is It? Private Rights and Public Authority Over Reclamation Project Water" (unpublished manuscript, 1996).

resulted. The Grand Coulee Project is another example. There, water is stored in accordance with Washington law, which provides a procedure by which the Bureau may notify the state that it is studying water for certain uses. The notice reserves this quantity of water from allocation.[142] Yet, the project's operations for hydropower, flood control, and salmon are governed by a separate complex of federal laws. Bureau of Reclamation projects on other tributaries, such as the Yakima and the Umatilla rivers, are subject to their own set of rules under federal and state laws.

2. The Columbia Valley Authority

The impulse to establish a more encompassing framework in which to manage the river has emerged repeatedly over the last 60 years. The Basin's first brush with the idea of comprehensive river governance ended in stalemate in 1937, when the BPA was created as a "temporary" entity to market the dams' energy output. But the 1937 compromise was only a short intermission in the debate. The idea of creating a comprehensive federal agency to plan for the development of the Basin was still alive. The original proposal envisioned an agency called the Columbia Valley Authority. The Columbia Valley Authority would have been less powerful than the Tennessee Valley Authority, but still it would have ruled the region's federal dams, transmission system, the Columbia Basin reclamation project, and any subsequent federal dam or water control project. It would have inherited general jurisdiction over development for navigation, flood control, power generation, reclamation and recreation in the Basin. It could have engaged in mining development and encouraged soil, forest and range land conservation. It also would have had the U. S. Fish and Wildlife Service's authority in the Basin. Moreover, it would have been authorized to plan for "the unified development of the Columbia Valley region," including virtually all aspects of federal natural resource development and conservation.[143]

The Columbia Valley Authority proposal generated opposition, in part due to local concerns about federal intrusion into water-rights administration[144] and in part due to fear of an autocratic super-agency. As one opponent put it: "The Authority derives its powers from the Federal Government and thereby

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[142] Rev. Code of Wash. 90.40; U. S. Bureau of Reclamation, *Working Paper: Potential Options for Consideration of Development of a Management Plan to Address Issues Related to Columbia and Snake River Salmon,* at 86.

[143] McKinley *Uncle Sam in the Pacific Northwest* at 551.

[144] Id. at 553.

political control is welded with economic and social control and creates a perfect set-up for autocracy."[145] The initial proposal was abandoned in the 1937 compromise. Subsequent proposals responded by including stronger state water-rights disclaimers, restricting the Authority's power over water planning and development, and finally limiting the agency's authority to hydropower alone.[146] These proposals persisted through the 1950s, but they bore no fruit. Instead, the 1950s were a time when the idea of comprehensive federal river development went into eclipse, most notably in the decision to allow private development of Hells Canyon.

3. The Columbia River Compact

The federal government was not the only possible vehicle for coordination. The states too attempted to write a chapter in river governance, in negotiations for a Columbia River Compact.[147] The first proposal for an interstate compact was made in 1911, by Oregon Governor Oswald West. Congress passed enabling legislation in 1925. The governors of Idaho, Montana, Oregon, Washington and Wyoming formed the Northwest States Development Association in 1943, in part to evaluate potential for a water compact. The upswing in federal water development that followed the war gave the idea new impetus. As one state water administrator put it, the "states started to feel very much left out of the action."[148] In 1949, several governors asked Washington's Governor Langlie to lead an effort to develop a compact. The compact commission met in 1950, beginning nearly two decades of active negotiations.[149]

Hydrology and politics posed formidable obstacles to agreement. Forty-four percent of the river flow originates in Canada. In the United States, 70 percent of the flow comes from headwater states (Idaho, Montana, Nevada, Utah and Wyoming). Yet, during the early negotiations, 63 percent of the

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[145] Id. at 558.

[146] Id. at 553-62.

[147] The following account is taken largely from Harvey Doerksen, *Columbia River Interstate Compact, Politics of Negotiation*, (State of Washington Water Research Center, Washington State University and the University of Washington, August 1972).

[148] Wilbur Hallauer, Director of the Washington Department of Ecology, "The Legislator's Role," in Pacific Northwest River Basins Commission, *It's Everyone's River . . . Story of the Columbia*, at 3-4, (October 1, 1975).

[149] Doerksen, *Columbia River Interstate Compact*.

population was in the lower basin, Oregon and Washington. In some ways, the numbers themselves best explain the parties' positions:

Table 1 [150]

State	Percent of water	Percent of population
Idaho	47.6	9.4
Montana	17.1	9.5
Nevada	1.0	2.5
Oregon	12.9	24.5
Utah	—	11.8
Washington	15.3	38.3
Wyoming	6.1	4.0

The upstream-downstream dynamic was hard to miss: Water originates in upstream states; most of the votes and most of the power consumption are in the downstream states. The rational upstream state will seek a *quid pro quo* for every drop of water it can control.

Building storage projects to control water posed complex problems. Upstream states need the cooperation of downstream states to finance such projects. Downstream states want the storage, but cannot secure it without upstream cooperation. Both upstream and downstream interests have trouble developing such projects on their own:

> *Headwater storage projects are distant, involve difficulties with local officials and residents, and, as multipurpose projects of a comprehensive development plan, are ordinarily too costly to be justified by power alone. In addition, there has been no way for nonfederal investors to recoup their investment from values produced for downstream federal generating projects in the case of power, or from the public treasury or otherwise for flood control, navigation, and other non-reimbursable benefits. Consequently, such projects have not ordinarily been commercially attractive.*

[150] From Doerksen *Columbia River Interstate Compact* at 27.

> *Thus, headwater developments, serving essentially multi-purpose values, have lagged.*[151]

Although the value of cash, power supply and increased state control of the river were apparent, Montana was skeptical of upstream development. In later years, after the construction of large federal facilities, Montana's willingness to participate in development seemed to dry up altogether. In 1975, the director of the state's Department of Natural Resources observed that "many of the residents in Western Montana indicated they don't want to see any more mainstem dams. If we read the public correctly, they would just as soon the Corps stayed in Seattle, Portland, or wherever."[152]

In contrast to water compacts where water allocation is the central question, the proposed Columbia River Compact raised more diverse issues. One was the allocation of electric power generated by the dams. Upstream states regarded power generation as an important benefit of collaboration. Montana wanted the downstream states to pay cash for use of Montana water, together with a block of power to be used for the state's later use.[153] Downstream states, where most of the energy demand was, wanted flexibility on the issue.

The negotiations also addressed water allocation issues in the Snake River. The Columbia River had enough water that a specific allocation was not thought to be needed. In the Snake, however, Idaho argued for the subordination of downstream non-consumptive uses to upstream irrigation.[154] The United States insisted on preventing upstream depletion in order to protect federal projects downstream.

Ongoing compact administration was another issue. There was extended debate over the need for and powers of a permanent commission. Should a compact have power to issue bonds? Should it have authority to build water projects? What should be the allocation of voting strength among the states?

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[151] W. Marple and L. Dworsky, "Regional Planning, Some Problems in the Pacific Northwest," in H. Amoss, ed., Western Resources Conference, *Water Measuring and Meeting Future Requirements* at 40 (University of Colorado Press, 1960).

[152] Jack Acord, DNR, "Views of the State of Montana: Major Regional Problems and Issues" in Pacific Northwest River Basins Commission, *It's Everyone's River . . . Story of the Columbia*, at 43.

[153] Doerksen, *Columbia River Interstate Compact* at 64-65.

[154] Id. at 85-86.

In addition to these issues, the compact negotiations became a forum for one of the electric utility industry's favorite pastimes: jousting between public power and private power, the scars of which were fresh from the Columbia Valley Authority debates and the Hells Canyon battles. Supporters of the compact were those who opposed a valley authority, including private utilities, business interests and others. Opponents of the compact, especially public power advocates, supported a federal valley authority and saw the compact negotiations as a conspiracy. As one opponent said:

> *The study of this compact and of the record in the minutes and news reports cannot but leave one with the uncomfortable feeling that the whole effort has been a conspiracy, financed by public tax funds, to rig the rules on use of Columbia basin water resources in favor of special power monopoly and to prevent public development of the great public resources.*[155]

Given the difficulty of the issues and the complexity of the politics, it may not be surprising that the negotiations ultimately failed. Indeed, perhaps the surprise is that the compact negotiators themselves succeeded in coming to any kind of agreement, which they did on a limited basis in 1955 and again in 1963. But the Washington legislature, responding to public power concerns, refused to ratify the compact the negotiators agreed on, and the states began to see the negotiations as futile. The compact commission's last meeting was in 1968. There has been occasional interest in reopening the negotiations since then, but nothing has come of it.

4. The Columbia River Treaty and the Coordination Agreement

Negotiations with Canada had proceeded on a parallel track (see pages 28-30). The Columbia River Treaty committed the United States to coordinate operations on the U. S. side of the border in order to take full advantage of the new storage. In 1964, the Corps of Engineers, BPA and the region's utilities entered into an agreement called the Pacific Northwest Coordination Agreement, which still governs power operations in the system.[156] The Coordination Agreement built on 20 years of voluntary cooperation through the Northwest Power Pool (begun in World War II). The

[155] Quoted in Doerksen, *Columbia River Interstate Compact* at 39.

[156] Agreement for Coordination of Operations Among Power Systems of the Pacific Northwest, September 1964. The Bureau of Reclamation officially joined in the agreement in 1981. Communication from Jim Fodrea, Water Resources Program Manager, Pacific Northwest Region, Bureau of Reclamation (Dec. 20, 1996).

agreement was premised on the fact that the Columbia River power system is hydraulically and electrically connected, and so upstream storage operations affect downstream generation. Coordinating these facilities as though they had a single owner would enable all parties to benefit more than if each were acting for its own account.

The coordinators assume flows always will be at the lowest level recorded in the last 50 years, and translate those levels into "firm power" projections used in attempting to address each party's needs and operations.[157] The Agreement requires an Annual Operating Plan for the entire Basin, and coordination of the parties' operations to maximize power production after meeting non-power water uses. The agreement obliges parties to cooperate in times of shortage, regulates payments for upstream water releases that benefit downstream generators, and calls for "in-lieu" energy payments when water held at one dam decreases generation at another.[158]

With the development of the Pacific Northwest Coordination Agreement, most of the pre-1976 institutional arrangements for the Columbia and Lower Snake were in place. The fourteen federal dams that dominate the Columbia and Lower Snake rivers are called the "Federal Columbia River Power System." The Coordination Agreement requires coordination of these dams with those of the utilities which operate the river's non-federal dams. Mechanisms to coordinate hydropower and flood control, navigation and irrigation were hammered out over a period of many years.[159] Various statutes fixed Bonneville's power marketing obligations, requiring the agency to encourage the widest possible use of federal power,[160] give preference to public customers,[161] and sell power outside the region only if it exceeds the demands of regional customers.[162] Bonneville's ability to finance its operations out of its own revenues, conferred by a 1974 statute,[163] gives it

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[157] Hittle, et al., "Pacific Northwest Power Generation" 10 *Env't'l Law* at 268.

[158] *See* Public Power Council, *Public Power Fundamentals* at 26 (1995).

[159] *See* Hittle, et al., "Pacific Northwest Power Generation" 10 *Env't'l Law* at 258.

[160] Bonneville Project Act of 1937, 16 USC 832-832l.

[161] Flood Control Act of 1944, 16 USC 825s, River and Harbor Act of 1945, 59 Stat. 10 (1945), and the Federal Reclamation Act of 1939, 43 USC 485h(c).

[162] Pacific Northwest Preference Act of 1964, 16 USC 837a, *et seq*.

[163] Federal Columbia River Transmission System Act of 1974, 16 USC 838a, *et seq*.

and the Columbia River system an unusual degree of autonomy.[164] While federal laws, agreements and projects play an enormous part in this structure, it would be misleading to say that the river had been federalized. In addition to non-federal development in the Mid-Columbia, the Coordination Agreement is a contract whose principals include mostly non-federal entities, and Bonneville's own operations are unusually free from Washington, D. C. oversight.

The Upper and Middle Snake rivers, having survived a major challenge in the Swan Falls litigation, also had workable institutional arrangements. In the Upper Basin, the compact with Wyoming, the Committee of Nine, the water bank, and the severance of the Snake at Milner had established the Upper Basin as a more or less stable, self-sufficient hydrologic unit. In the Middle Snake, irrigation and hydropower had achieved a balance of their own. If the Snake and the Columbia seemed unconnected institutionally, it was the logical result of the different patterns of development in the two rivers.

The arrangements that characterized the Columbia River's governance in 1976 were in some respects *ad hoc*, but in many respects they worked, at least from the point of view of development. Arrangements had been developed to plan and coordinate flood control and power generation. Navigation facilities were in place. Irrigation was managed as a self-contained system. This was not a comprehensive or fully integrated system of river governance, but by and large it suited the river's development.

For those looking for integration, however, these arrangements remain a patchwork of federal and state laws, varying from place to place and from subject to subject. Federal laws generally govern the licensing of most nonfederal hydroelectric projects and the management of federal dams, but require both types of project operators to obtain water rights under the terms of state laws.[165] Federal laws devoted to hydropower, flood control and navigation govern the mainstem Columbia and Lower Snake, while state laws often dominate the tributaries. State law is focused on irrigation in the Upper Snake and on private hydropower and reclamation in the Middle Snake, with both unrelated to the federal law that rules the Lower Snake. The unique Idaho arrangements and institutions, the Two Rivers concept,

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[164] *See* K. Lee, D. Klemka and M. Marts *Electric Power and the Future of the Pacific Northwest* at 189 (1980), quoting a congressional aide saying: "It's the only federal agency with a field office in Washington."

[165] *See, e.g.*, section 8 of the Reclamation Act of 1902, Act of June 7, 1902, ch. 1093, sec. 8, 32 Stat. 390, 43 U.S.C. 383 (federal reclamation projects); Act of June 10, 1920, ch. 285, sec. 9, 41 Stat. 1068, 16 U.S.C. 802(b)(federal licensing of nonfederal hydropower projects on navigable streams). *See also* A. Tarlock, *Law of Water Rights and Resources*, sec. 9.06[3].

the Committee of Nine, the rules for canal companies and irrigation districts are creations of state law.[166]

The Basin entered the 1970s with a river from which a measure of flood control was extracted, a good river for navigation, but a river that otherwise was managed to optimize power generation, particularly in the Columbia and Lower Snake. Optimizing the river for hydropower produced a situation in which the United States, like Canada, treats "natural flows" as a cost. While the economic rationale for this is clear enough, it made the Columbia yet another example of "a part of nature that had died and been reborn as money."[167]

5. Financial Interdependence Between Hydropower and Reclamation

One of the few points of institutional interaction between the Columbia and irrigation tributaries like the Snake is the financial interdependence between the federal hydropower system and reclamation projects. Hydropower generation started out as an incidental benefit of reclamation dams, but later assumed major importance.[168] Although the Reclamation Act originally required water users to repay reclamation project costs, this requirement was gradually diluted, so that in most cases irrigators pay only a fraction of the cost of their water.[169] Instead, repayment obligations have been determined by the users' perceived ability to pay, with payments spread over lengthy repayment periods at no interest. Costs not paid by irrigators are financed by hydropower revenues and federally appropriated funds.[170] In this manner, hydropower, once viewed as a minor incident of federal projects, became a primary part of reclamation's economic justification.

The hydropower system's financial commitment to reclamation is significant. In 1985, the General Accounting Office estimated that $14.1 billion in

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[166] *See* Hydrosphere, *Water Supplies to Promote Juvenile Anadromous Fish Migration in the Snake River Basin*, chapter 3.

[167] Donald Worster, Rivers of Empire: Water, Aridity and the Growth of the American West at p. 276 (Pantheon 1976).

[168] *See* R. Clark, *Waters and Water Rights*, sec. 122.1, at 244 (1967).

[169] U. S. General Accounting Office, *Water Issues Facing the Nation: An Overview* at 24 (1982). For a good summary of the changes in reclamation law governing repayment of reclamation costs, see U. S. General Accounting Office, *Bureau of Reclamation: Information on Allocation and Repayment of Costs of Constructing Water Projects* at 22 (July 1996).

[170] R. Clark, *Waters and Water Rights*, sections 112.3, 123.1, 123.2(1) and 123.2(A).

irrigation costs were scheduled on paper to be recovered through power revenues.[171] However, because of long and flexible repayment terms for reclamation projects, and because as a general matter hydropower revenues are not used to actually repay the costs of reclamation facilities until after the irrigators have repaid their share of those costs, no hydropower revenues had actually been used to repay reclamation costs prior to 1985.[172] One power marketing administration made its first irrigation repayment in 1985, and another plans to begin in 1997. As of the mid-1990s, hydropower had not yet repaid any of the reclamation costs in the Columbia River Basin.[173]

Nevertheless, the reclamation system has unquestionably been the beneficiary of a vital set of financial incentives and benefits.[174] A 1996 study by the U. S. General Accounting Office characterized the nature of the benefit from a national perspective: Long-term (typically 40 years), interest-free repayment schedules; repayment obligations shifted to other project beneficiaries, usually power generation, through "irrigation assistance;" and specific repayment relief statutes. Nationally, the aggregate benefits are considerable:

> *The Bureau has determined that $16.9 billion, or 78 percent, of the $21.8 billion investment in water projects is reimbursable to the federal government. Of these reimbursable costs, the largest portion,$7.1 billion, has been allocated to irrigators. However, when the repayment obligation is adjusted through irrigation assistance and charge-offs, the irrigators are scheduled to repay on $3.4 billion. On the basis of a determination that the irrigators are unable to pay the full amount of $7.1 billion, $3.4 billion of their obligation has been shifted to the projects' other beneficiaries for repayment, primarily through power revenues. In addition, irrigators have been relieved of $373.1 million of their repayment obligation through charge-offs.*[175]

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[171] U. S. General Accounting Office, *Additional Information Concerning Irrigation Project Costs and Pricing Federal Power* at 9 (1985).

[172] Communication from Jim Fodrea, Columbia River Basin Study Support Group and Program Manager, Water Resources Management, Bureau of Reclamation, Pacific Northwest Region (Dec. 20, 1996).

[173] Id.

[174] *See* N. Whittlesey, W. Butcher, and M. Marts, "Water Project Subsidies: How They Develop and Grow," 11 *Illahee* 77 (1995).

[175] U. S. General Accounting Office, *Bureau of Reclamation: Information on Allocation and Repayment of Costs of Constructing Water Projects* at 4.

The financial interdependence between reclamation and hydropower has not had the effect of integrating federal law and state law, however. The fault line between federal and state law, which divides the mainstem from each of its tributaries, is yet another boundary with consequences for salmon.

IV. Restoring the River of Salmon

A. Salmon and the Effects of Development

The developed river is a far cry from the river that saw the dawn of the 19th century. Storage projects have evened out the extreme year-to-year variations in flow. Calm pools backed up by a series of run-of-the-river dams now cover the cataracts at the Cascades and The Dalles. Navigation to the Idaho border is not only common, but barges can transport loads that once were unimaginable. The river that was 180 degrees out of phase with power needs now runs one of the world's great hydropower systems. The Basin is settled, and the Columbia River has been yoked to generators, mines, farms, ranches, industry, and human habitations.

Development of the Columbia and Snake River hydropower system tells only part of the story, however. Tributary and watershed development have also played a significant role in changing the Basin's ecology, as has the commercial salmon harvest. All of it has combined to create a fundamental change in the Basin's aquatic ecology. The law of natural selection, "ecology's first law," decrees that successful living populations adjust themselves to the demands of their environment; therefore all populations are evolving and all organisms are a template of their environment:

> *A corollary of the law of natural selection is that any direction change in the environment will force a population's genetic template out of focus. If the change is gradual, as in the case of some past climatic changes, a population may become refocused by the development of a new balance of characteristics through natural selection. Alternatively, the population may become extinct or it may be redistributed to more favorable locations.*[176]

These changes are by definition complex and various, but they have been anything but gradual. The span of time between now and the first major disturbances in the Basin's pre-settlement ecology is less than 200 years, and the pace of disturbance has accelerated in the last 50. This section sketches the nature and pace of development, to provide a context for the salmon and water policy mitigation experiments of the last 20 years.

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[176] W. Lewis, "The Ecological Sciences and the Public Domain," 65 *U. Colo. L. Rev.* 279, 282 (1994). Lewis provides a good, simple discussion of these principles. *See* G. Meffee and R. Carroll, *Principles of Conservation Biology* (Sinauer Assoc. 1994) for a more extended explanation, especially the discussion of genetics conservation at pp. 144-45.

1. Loss of Tributary Habitat

Salmon are particularly sensitive to habitat degradation. They need cool, clean, running streams and healthy alluvial floodplains in which to reproduce and grow.[177] They require streamside riparian cover, large, woody debris in the stream channel, adequate food sources (such as insects), and pools in which to hide and rest. In the first half of the 19th century, stream ecology first began to change when beaver were trapped and their dams largely eliminated. Settlers began major logging operations in some parts of the Basin by the 1880s. They dammed and built reservoirs to hold huge logjams which were sometimes cleared with dynamite. Stream flows fluctuated wildly, banks eroded, streams widened, and pools were buried in sawdust.[178] Miners' dams and ditches blocked and drained streams, rearranged habitat, rerouted water into nozzles and washed hillsides into streams. Spawning areas in the John Day, Grande Ronde, Yakima and Owyhee rivers and many streams in Idaho were buried under tons of hydraulic mining runoff. Salmon were eliminated from the Boise River by 1865.[179] Early overgrazing caused some grasses to disappear, soil to compact, water tables to drop, streambanks to erode, streams and spawning beds to silt up.[180] Only three percent of interior Basin lands retain a landscape pattern similar to historical patterns.[181]

A number of salmon runs were wiped out by over-fishing in the late 19th and early 20th centuries, particularly after the first cannery began operations on the Columbia in 1866. By the late 1800s, over-fishing was blamed for declines in chinook salmon runs; in 1894, a federal fisheries official said it was "beyond question" that the numbers of salmon returning to their natal streams were "insignificant in comparison with the number which some years ago annually visited and spawned in these waters;" and by 1900, certain fishing gear had been banned to protect spawning runs.[182] The drop in returning salmon meant that some streams were deprived of the nutrients that were formerly released by the decay of spawned-out salmon.

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[177] Independent Scientific Group, *Return to the River* at 132.

[178] Taylor, *Making Salmon* at 90.

[179] Id. at 72-80.

[180] Id. at 86.

[181] *State of the Interior Columbia Basin*, at 75, Fig. 8 at 81.

[182] W. Dietrich, *Northwest Passage, The Great Columbia River* 188 (1995); *Status of the Interior Columbia Basin* at 46.

The cycle in which salmon transported energy from the ocean to headwater areas began to erode.

Throughout much of the Basin, the greatest change in land patterns came from the expansion of agriculture.[183] Irrigation diversions in the 19th century often blocked migrating salmon. Diversions usually lacked screens to keep juvenile fish from being diverted onto fields; irrigation return flows warmed streams and loaded them with silt.[184] Even before federal reclamation development, the Basin's salmon rivers were degraded. In 1893, the Yakima River's temperature reached 60 degrees in the summer. In the summer of 1906, its flows had dropped from an average of 3900 to 105 cubic feet per second.[185] Salmon declines were noticed in the Umatilla River in the 1870s and in the Deschutes in the 1880s. By 1892, much of the Umatilla was blocked to salmon migration.[186] In areas of the Basin that could still be reached by salmon, irrigation diversions eliminated populations in the lower reaches of many tributaries like the Boise, John Day, Umatilla and Walla Walla rivers.[187]

Today, irrigation from surface and ground water is far and away the dominant off-stream use of water in the Basin.[188] Large areas of the Basin have been converted to irrigated farming: 7,324,000 irrigated acres, including Canada. Idaho has the largest irrigated area with 3,330,000 acres (45 percent of the total basin), Washington next with 1,879,000 acres (25 percent), Oregon with 1,310,000 acres (18 percent) and Montana with 433,700 acres (6 percent). Of this, 3 million acres are watered by Bureau of Reclamation projects.[189]

Comprehensive data on streams that are dried up by irrigation and other diversions are unavailable, but there is no reason to dispute the conclusion of the federal agencies' System Operation Review: "Most streams in the Pacific

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[183] Id. at 80.

[184] Taylor, *Making Salmon*, at 83.

[185] Id.

[186] Id. at 83-84.

[187] Independent Scientific Group, *Return to the River* at 91.

[188] *State of the Interior Columbia Basin*, at 31.

[189] Columbia River System Operation Review, *Final Environmental Impact Statement*, Appendix F: Irrigation, Municipal and Industrial/Water Supply pp. 2-1, 2-2 (November 1995).

Northwest are fully or over appropriated."[190] Low-flow problems exist in many parts of the region east of the Cascade Mountains.[191] For example, fish and wildlife agency and tribal and conservation group experts estimated in 1993 that 80 percent of 153 Oregon tributaries had low-flow problems (two-thirds of which were caused at least in part by irrigation withdrawals).[192] A 1992 analysis of water problems affecting fish production showed similar problems in many Idaho, Oregon and Washington tributaries as well.[193] The National Marine Fisheries Service has contracted with the Bureau of Reclamation to develop more comprehensive data on the extent of the problem.[194]

After the dam-building era began, so did the era of big timber harvest. A 1941 observer pointed to the intensity of timber harvest and the "constant reduction in the available spawning area."[195] In 1944, the Roosevelt Administration decided that national forests should be timber sources rather than timber reserves;[196] postwar harvest boomed.[197] Between 1945 and 1970, harvest increased about five percent per year, half again as fast as the national economy.[198] Sedimentation, turbidity, flow alteration and stream temperatures increased. Grazing, fire management, conversion to crop and

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[190] Id., Appendix F: at 2-7.

[191] R. Wissmar, et al., "A History of Resource Use and Disturbance in Riverine Basins of Eastern Oregon and Washington (Early 1800s-1900s)," 68 *Northwest Science* 1, 25-26 (1994).

[192] Memorandum from T. Kline and B. Fujii, Oregon Water Resources Department, to David Moscowitz, et al., regarding weak stocks and water supply conflicts (September 17, 1993).

[193] Northwest Power Planning Council, *Information on Water Quality and Quantity Contained in the Salmon and Steelhead Subbasin Plans (above Bonneville Dam)* (Document 93-8, September 17, 1992).

[194] Personal communication with Michael Newsom, National Marine Fisheries Service, November 26, 1996.

[195] Id. at 360, quoting Willis Rich, *The Present State of the Columbia River Salmon Resources* at 429 (Sixth Pacific Congress, Berkeley, 1941).

[196] Interior Columbia River Basin Ecosystem Management Project, *Eastside Draft Environmental Impact Statement*, Draft at p. 2-11 (July 12, 1996).

[197] C. Wilkinson and M. Anderson, "Land and Resource Planning in the National Forests," 64 *Or. L. Rev.* 7, 18 (1985).

[198] Interior Columbia River Basin Ecosystem Management Project, *Eastside Draft Environmental Impact Statement*, Draft at p. 2-11.

pasture, roads, dams, diversions and pumping all added to the problem.[199] The U. S. Forest Service compared 1936-1942 stream surveys with current conditions and found that large pool habitat has decreased by 50 to 75 percent.[200] A recent report concludes that "[m]any, if not all of the larger tributaries are degraded."[201] Of 137,100 miles of rivers in eastern Oregon and Washington, more than ten percent are considered "water quality-limited" under the Clean Water Act, due to sedimentation, turbidity, flow alteration and high temperatures.[202] Many of these streams have lost their capability to support salmon and other cold-water fish.[203]

The Environmental Protection Agency has found high water temperatures to be a persistent problem on the mainstem Snake and Columbia.[204] Throughout the Basin, water-quality problems include point-source effluents, impoundments, water withdrawals, and nonpoint source pollution, particularly from irrigation.[205] Water quality in the Snake River is considered to be degraded, in significant part because of return flows from irrigation.[206] A study of the Lower Columbia and Columbia Estuary jointly conducted by the states of Oregon and Washington, revealed potentially harmful levels of heavy metals, pesticides, dioxin/furans and other organic compounds in the water and sediment in the densely populated and industrialized stretch of the Columbia from Bonneville Dam downriver to the Pacific Ocean.[207] Fish-eating wildlife and some humans were found to be at risk from the pollutants.[208] The report also found that more than half of the

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[199] Id., Draft at p. 2-131.

[200] Northwest Power Planning Council, *Columbia River Basin Fish and Wildlife Program*, at 7-32 (1994).

[201] Independent Scientific Group, *Return to the River* at 160.

[202] Interior Columbia River Basin Ecosystem Management Project, *Eastside Draft Environmental Impact Statement*, Draft at 2-123.

[203] Id., Draft at 2-123.

[204] See discussion of *Strategy for Salmon*, infra.

[205] *System Operation Review*, at 2-6.

[206] Id., Appendix M at 2-25.

[207] Lower Columbia River Bi-State Steering Committee, *Lower Columbia River Bi-State Water Quality Program: Final Executive Summary and Steering Committee Recommendations* at 3-4 (June 1996).

[208] Id. at 4-5.

tidal swamp and marsh area of the estuary had been lost since dredging, filling, diking, and channeling of the estuary began in the 1880s.[209]

2. Mainstem Effects

If they reach the mainstem of the Columbia, juvenile fish encounter slow-moving reservoirs held back by the dams. The resulting physical changes are easier to see than are the effects on salmon. The spring freshet has been reduced and pushed back a month. So, the freshet that historically flowed in June now flows in May. In late summer and fall, water in the reservoirs is warmer than it would be if it were a free-flowing stream.[210] Habitats in alluvial reaches of the river's mainstem have been inundated. Fluctuating reservoir levels can preclude food production at the river's edge.[211] Scouring flows that create salmon gravels have been eliminated. Migratory conditions, water salinity and temperature in the estuary and ocean have been changed.[212] A juvenile fish starting in the Sawtooth headwaters now must pass not just one or two hydropower dams and reservoirs, but eight. On average, it now takes this fish more than 50 days to reach the mouth of the Columbia, compared to 22 days before the dams.[213]

While there is unending controversy about the precise impacts that these changes have had on salmon, there is little dispute about two things. First, a few mainstem projects eliminated a lot of salmon habitat. The development of Grand Coulee, Hells Canyon, Dworshak and other projects blocked an estimated 18,700 miles of historically accessible streams in the United States portion of the Basin alone, almost 38 percent of the historic 49,300 mile range.[214]

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[209] Id. at 5.

[210] Independent Scientific Group, *Return to the River* at 166.

[211] Independent Scientific Group, *Return to the River* at 147-148.

[212] Independent Scientific Group, *Return to the River* at 459, 459A.

[213] These figures are from the restoration plan of the Columbia River treaty tribes, Sy-Kan-Ush-Mi-Wa-Kish-Wit: The Columbia River Anadromous Fish Restoration Plan of the Nez Perce, Umatilla, Warm Springs and Yakama at 3-18. StreamNet, a comprehensive data base for anadromous fish in the Columbia River Basin, says that the current migration in the Snake takes ten times as long as the pre-dam migration. *Report on the Status of Salmon and Steelhead in the Columbia River Basin—1995, supra* at 28.

[214] D. Anderson and G. Christofferson, StreamNet, the Northwest Aquatic Resource Information Network, *Report on the Status of Salmon and Steelhead in the Columbia River Basin—1995*, at p. 28 (1995).

Another effect that is hard to dispute is that the mainstem dams have fundamentally altered the riverine ecosystem, its temperature, chemistry, turbidity, and nutrients, and the timing and nature of its flow. While it is difficult to tie any one of these changes to specific changes in salmon survival, they clearly have ecological consequences. With respect to regulated streams, ecological laws have an axiom. Regulated flow, temperature and nutrients favor some species, often non-native ones, and disfavor the native species that are evolutionarily adapted to the unregulated stream.[215] In short, the Columbia River has in some respects become a better habitat for squawfish and other predators of salmon than for salmon. These changes in the mainstem combine with changes in other parts of the ecosystem to create a vast network of effects on salmon populations.

3. Cumulative Impacts

All of these developments have fragmented the Columbia River salmon's habitat and destroyed connections among local populations. Scientists theorize that connections among salmon habitats and populations is important in this sense: Local populations will first occupy the most favorable habitat available, then seek out progressively less favorable niches in which survival and reproduction are achievable. These niches may move upstream where food supplies may be sparser, always adapting to local conditions. In the event a local population is weakened or destroyed by a natural event, a mudslide smothering spawning beds or a late snowmelt or flood, it can be rebuilt by recruitment from the population's center or from the edges. These collections of core and outlying populations are characterized as "metapopulations." Lack of connection among habitats compromises interchange among local populations and reduces the resilience of the population as a whole.[216]

Habitat degradation is also a cumulative problem. Declining habitat conditions are interactive: high temperatures, for example, are a function of low flows, loss of vegetation and woody debris, and loss of pools. Temperature in turn may interact with pollutant loads to support algae

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[215] Independent Scientific Group, *Return to the River* at 148.

[216] *See generally* National Research Council, *Upstream, Salmon and Society in the Pacific Northwest*, pp. 58, 135 (1995); Independent Scientific Group, *Return to the River: Restoration of Salmonid Fishes in the Columbia River Ecosystem*, at p. 76 (pre-publication copy, Sept. 10, 1996); Interior Columbia River Basin Ecosystem Management Project, *Eastside Draft Environmental Impact Statement*, Draft at 2-156.

growth, which in turn reduces dissolved oxygen required by salmonids and their food web. Habitat changes ripple throughout the local ecosystem.

The salmon resource was so large that any one of these developments might have been less dramatic. But cumulatively, they led to declines by the early part of this century. Some scientists point to 1921 as the year in which Columbia River salmon started their slide,[217] but other turning points could be argued. In 1911, the Columbia River salmon catch hit a record 49 million pounds that would never be reached again.[218] The runs were still relatively large in the 1950s, but with the closing of the floodgates at the last Snake River dam, accelerated timber harvest, and all the other changes, Snake River salmon populations went into serious decline. The declines became "synchronous" and widespread in the late 1960s.[219] From historic peaks ranging from ten to sixteen million adult fish, the Columbia runs declined to something like a million (see Figure 5). As bleak as this number is, it understates the decline of the wild salmon stocks that scientists see as the "seed corn" for the salmon runs. By the late 1980s, wild salmon populations up and down the Pacific Coast were reported to be at critically low numbers.[220] Only a handful of populations, the Hanford Reach fall chinook, the Wenatchee River sockeye and several summer steelhead stocks in Oregon's John Day River, for example, are still considered healthy.[221]

One of the continuing controversies in salmon policy is the argument over the relative contribution made by tributary and mainstem development to the salmon declines. Idaho's Salmon River Basin is one of the set pieces in the argument. The Salmon River breaks off from the mainstem of the Snake in Hells Canyon. It drains a significant part of central Idaho's mountains. Historically, the area was an incredibly prolific salmon area; it is thought to have produced more than 40 percent of the Columbia River Basin's spring and summer chinook salmon.[222] The Salmon is one of the few tributary basins that escaped significant development, and much of it is now preserved as wilderness.

So, goes the argument, the fact that the Salmon Basin's salmon stocks are now on the Endangered Species list is an unmistakable indication that the

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[217] Independent Scientific Group, *Return to the River* at 361.
[218] *The People's Chronology* (Henry Holt and Company, Inc. 1994).
[219] Independent Scientific Group, *Return to the River* at 92.
[220] *See* W. Nehlsen, et al. "Pacific Salmon at the Crossroads: Stocks at Risk From California, Oregon, Idaho and Washington," *Fisheries* 4 (Mar./Apr. 1991).
[221] Independent Scientific Group, *Return to the River* at 88.
[222] National Marine Fisheries Service, *Proposed Recovery Plan for Snake River Salmon* at II-9 (March 1995).

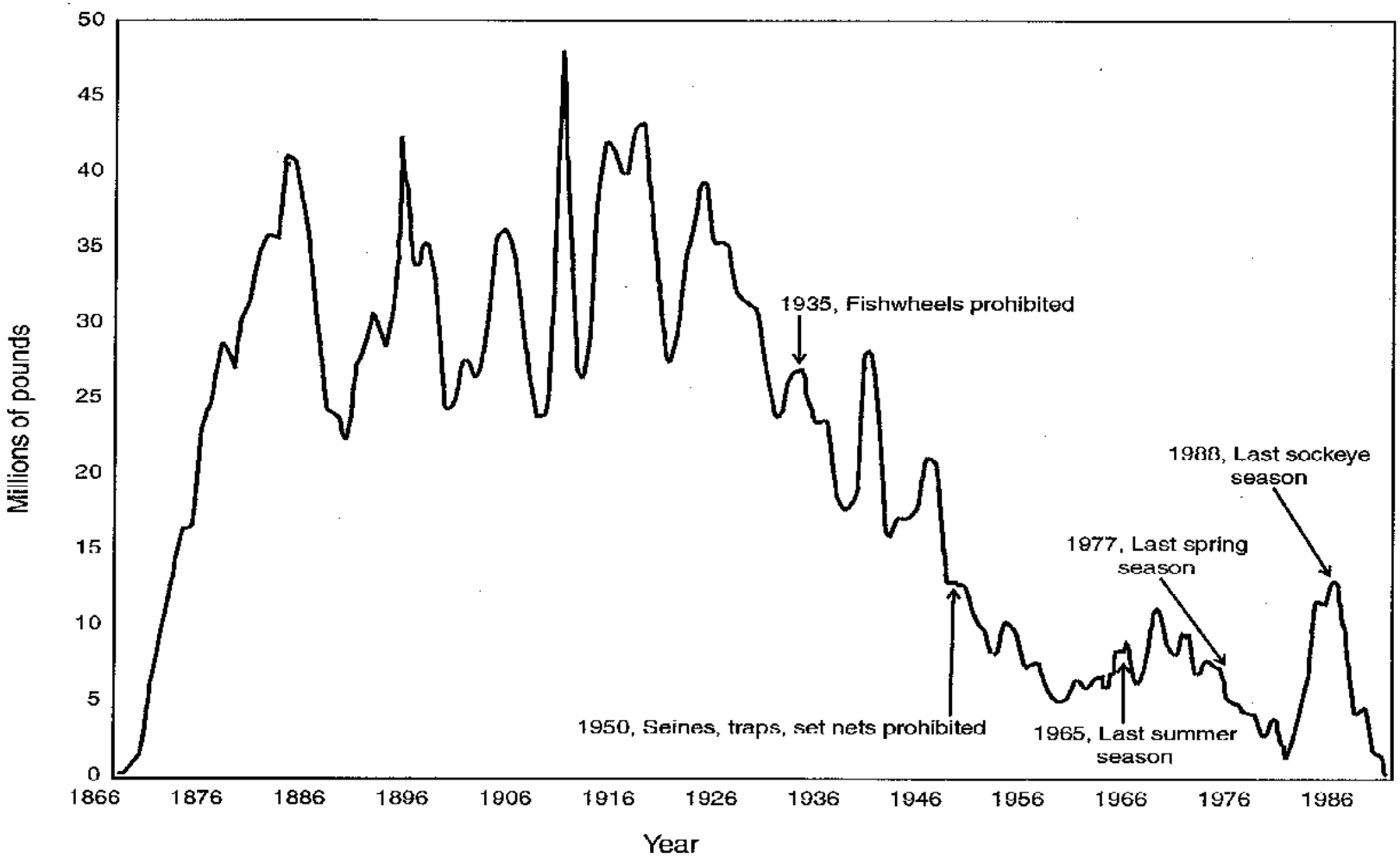

Figure 5.—Commercial landings (pounds) of salmon and steelhead in the Columbia River, 1866-1993. (Source: WDFW and ODFW 1994)

federal dams, not tributary problems, are responsible for salmon declines.[223] Wrong, say others: Look at the effects of eliminating beavers, the extensive sedimentation from logging, pollution from mining, ocean and terminal fisheries, and other damage. Salmon populations had declined significantly by mid-century before the major post-war spurt in hydropower development.[224] Hydropower is only one of the causes of the declines, and it came after the salmon declines were already well underway.[225]

Notwithstanding the quantity of ink that has been spilt over such questions, only a few things are clear. There was significant over-fishing and habitat disturbance in the Columbia River Basin long before the mainstem dams were built. Snake River populations were depleted to a considerable extent before hydropower development. At the same time, the runs that survived the development of the first half of the century have fared even worse in the second half. The Snake runs of the 1950s were still well above the Endangered Species Act listing threshold. It is surely not fair to ascribe all of the post-1950s decline to hydropower development, but there is little question that hydropower played a very large role. The causes of these declines, however, are "complex and manifold"[226] and attempts to put a fine point on degrees of fault is likely to do little but keep lawyers happy.

B. Early Mitigation

The first attempts to address the declines began only a few decades after non-Indian settlement, in the form of fish hatcheries. The rationale for fish hatcheries is primarily social and economic: Habitat degradation is unfortunate but inevitable; mitigation must aim for habitat substitutes; and hatcheries are the substitute.[227] In theory, hatcheries compensate for lost habitat by putting salmon eggs into a controlled environment, eliminating the natural forces that limit the number of eggs that hatch and survive in the wild. Hatcheries allow more intense fish harvest because harvesters only have to let enough fish escape to supply eggs for hatcheries, rather than let pass the comparatively large number of adult fish that must spawn in the wild in order to produce self-sustaining populations. It is no wonder, then,

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[223] *See* W. Whelan, "Idaho's Strategy in *Idaho Fish and Game v. National Marine Fisheries Service*," 25 *Env't'l Law* 399, 400 (1995).
[224] National Marine Fisheries Service, *Proposed Recovery Plan for Snake River Salmon* at II-13 (March 1995).
[225] D. Chapman, et al., *Status of Snake River Chinook Salmon*, report to the Pacific Northwest Utilities Conference Committee, Section E at 8 (February 19, 1991).
[226] National Marine Fisheries Service Snake River Recovery Team, *Final Recommendations* at p. II-7 (May 1994).
[227] Taylor, *Making Salmon* at 110.

that hatcheries took a firm grip on the imaginations of dam builders and fish harvest managers.[228]

In the dam-building era, the need for mitigation was obvious. Bonneville Dam was equipped with a ladder to allow returning adults to pass the dam, but no provision was made for juvenile fish migrating downstream. Grand Coulee proved to be an even more formidable barrier, and fish and wildlife managers decided that it would be easier to transplant its salmon stocks than to try to get them past the dam. The managers relocated the upper Columbia salmon stocks into other tributaries and a hatchery at Leavenworth, one of the first of many.[229]

The Lower Columbia River Fishery Development Program, funded by the Mitchell Act,[230] relocated stocks from upriver areas to areas below McNary, and gradually became dominated by hatcheries.[231] Mitigation programs associated with the Mid-Columbia public utility district dams, the Idaho Power Company's Hells Canyon Dam, and the federal Lower Snake dams more or less followed suit.[232] Hatchery programs became the primary mitigation for the effects of dams. None of them, however, accounted for the Columbia River tribes' salmon culture. [233]

C. Indian Treaty Litigation

When Isaac Stevens negotiated with the Columbia River Indian tribes to obtain title to much of the Northwest in 1855, the tribes took care to reserve "the right of taking fish at all usual and accustomed places in common with citizens of the Territory."[234] However, the tribes were not consulted when decisions were made to relocate salmon populations below the federal dams. The Columbia River tribes' "usual and accustomed" fishing places, protected by the treaties, are located largely above the dams. The hatcheries were located in the lower river, and fish returning to the hatcheries would not pass the tribes' fishing sites. Increasingly, the tribes saw the combination of non-Indian fishing, dams, habitat destruction and lower-river hatcheries as lethal

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[228] Independent Scientific Group, *Return to the River* at 382.
[229] Id. at 393; Dietrich, *The Columbia River* at 337.
[230] 16 U.S.C. 755-757.
[231] *See* R. Lothrop, "The Misplaced Role of Cost-Benefit Analysis in Columbia Basin Fishery Mitigation," 16 *Env't'l Law* 517, 522 (1986).
[232] Independent Scientific Group, *Return to the River* at 394-95; Palmer, *The Snake River* at 190.
[233] National Research Council, *Upstream, Salmon and Society in the Pacific Northwest,* at 44.
[234] Treaty of June 9, 1855 with the Yakima Tribe, 12 Stat. 951. Identical language was included in treaties with the Middle Oregon Tribes, the Umatilla Tribe and the Nez Perce Tribe, 12 Stat. 963, 12 Stat. 945, 12 Stat. 957.

to their treaty fishing rights. In the late 1960s they went to court. In a series of cases on fish harvest in the Columbia River and Puget Sound, the tribes established the right to harvest up to half of the salmon runs, including hatchery populations.[235]

In addition to harvest rights, the treaty fishing cases suggested two concepts that figured in later salmon recovery efforts. First, the cases established principles for allocating "the conservation burden" between Indians and non-Indians, that is, the relative responsibilities of the two groups to limit salmon harvest. Under these principles, the tribes are free to fish unless a state demonstrates that tribal fishing would destroy a run of salmon.[236] State harvest regulations must be equitable; they can only be "the least restrictive [limits] which can be imposed:"

> *If alternative means and methods of reasonable and necessary conservation regulation are available, the state cannot lawfully restrict the exercise of off reservation treaty right fishing, even if the only alternatives are restriction of fishing by non-treaty fishermen, either commercially or otherwise, to the full extent necessary for conservation of fish.*[237]

Second, the cases have begun to address the tribes' assertion of a right to the environmental conditions salmon need.[238] The claim is that "implicitly incorporated in the treaties' fishing clause is the right to have the fishery habitat protected from man-made despoliation."[239] Arguments about this principle have not been entirely resolved, but the concept bears on all activities that affect salmon habitat, including the operations of the

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[235] There is a large literature on the treaty fishing cases. In addition to *Felix S. Cohen's Handbook of Federal Indian Law* at 441 (Michie Bobbs-Merrill 1982); *see* C. F. Wilkinson, *Crossing the Next Meridian, Land, Water and the Future of the West* (1992); and F. Cohen, *Treaties on Trial: The Continuing Controversy over Northwest Indian Fishing Rights* (Univ. of Wash. 1986).

[236] *See, e.g., United States v. Washington,* 520 F.2d 676, 686 (9th Cir. 1975).

[237] *United States v. State of Washington,* 384 F. Supp. 312, 342 (W.D. Wash. 1974).

[238] *See U.S. v. Washington,* 506 F. Supp. 187 (W.D. Wash.), appeal dismissed *U.S. v. Washington,* No. 81-3111 (9th Cir. filed Dec. 17, 1984); *Confederated Tribes v. Callaway,* Civ. No. 72-211 (D. Ore. 1973) (requiring government to give notice to the tribe of any change in the operating limits for the Bonneville, John Day or The Dalles pools and to provide periodic status reports for five years on government fish research); *Confederated Tribes v. Alexander,* 440 F. Supp. 553, 555 (D. Ore. 1977) (dam would inundate fishing holes, cut off some runs, and therefore destroy treaty rights). *See also* M. Blumm, "Why Study Pacific Salmon Law?" 22 *Idaho L. Rev.* 629, 636-37 (1985-86); C. Wilkinson and D. Conner, "The Law of the Pacific Salmon Fishery: Conservation and Allocation of a Transboundary Common Property Resource," 32 *Kansas L. Rev.* 17, 48 (1983) ("Economic development of water resources under state law, for example, may be permissible only when undertaken in an environmentally sound manner that does not substantially diminish the number of salmon available for Indian harvest.").

[239] *United States v. State of Washington,* 506 F. Supp. at 203.

Columbia River dams.[240] Together with the conservation principle quoted above, the tribes can argue with some force that treaty fishing rights cannot be limited unless non-Indian activities that destroy salmon habitat are limited first. These principles are the bedrock for the tribes' considerable and growing involvement in all subsequent developments in Columbia River salmon policy.

Tribes also are making substantial claims to water rights in the Columbia River Basin, as elsewhere in the West, under a doctrine first recognized by the U.S. Supreme Court in 1908. In *Winters v. United States*,[241] the Court laid the foundation for Indian tribal claims to the water rights needed to support the purposes of their reservations. Water rights recognized under this doctrine can include water to support hunting and fishing, and carry priority dates as of the date of the treaty with the tribe or, in some cases, from "time immemorial." In other words, tribal water rights potentially could be senior to all or most state-based water rights in the Basin, depending on the particulars of each claim. Tribes are asserting these water rights in the Yakima and Snake adjudications (as discussed elsewhere in this section) and in negotiations with the states and local water users in the Umatilla and other watersheds in the Columbia Basin.[242] As with the fishing-based conservation principle, the full power of these water-rights claims has yet to be realized, and many legal and policy arguments remain. The potential weight of the claims adds nevertheless to the increasing status of the tribes as players in water-policy development in the Basin.

As the tribes were pursuing recognition of their conservation and water-rights claims, the State of Idaho began to press its interest in salmon harvest. The Idaho headwaters were historically the source of a large portion of the Columbia River salmon runs. When adult fish return from the ocean, however, Idaho fishermen take only from what is left of the runs after they have run a gauntlet of ocean and downriver fishermen and hydropower dams. There is sometimes too little to permit much fishing in Idaho at all, and Idaho determined to seek an equitable share of the fish. In 1975, Idaho sued the states of Oregon and Washington in the U. S. Supreme Court under the "equitable apportionment" principles of interstate water law.[243] The court

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[240] *See Authority of Bonneville Power Administrator to Participate in Funding of Program to Help Restore the Columbia River Anadromous Fishery*, 83 I.D. 589 (Nov. 22, 1976).
[241] 207 U.S. 564 (1908).
[242] In 1987, Oregon enacted a statutory framework for state-tribal water rights negotiations, *see Ore. Rev. Stat*. 539.300-539.400. 207 U.S. 564 (1908).
[243] *Idaho ex rel. Evans v. Washington*, 444 U. S. 380 (1980). *See* M. McArthur-Phillips, "Odd Man Out: Idaho's Bid for a Fair Share of Anadromous Fish," 10 *Env't'l Law* 389 (1980); M. Blumm, "Saving Idaho's Salmon: A History of Failure and a Dubious Future," 28 *Idaho L. Rev*. 667, 680 (1991-92).

agreed that equitable apportionment applies to salmon in principle: "At the root of the [equitable apportionment] doctrine is the same principle that animates many of the Court's Commerce Clause cases: A State may not preserve solely for its own inhabitants natural resources located within its borders."[244] However, the court concluded that Idaho had not proved that it had been damaged by the harvest practices of the lower river states, and so dismissed the suit.[245]

D. Remedial Programs, Circa 1980

1. Salmon Legislation

Even as the tribes were pressing treaty claims and Idaho was asserting its equitable apportionment suit, Congress was enacting a collection of remedial statutes to address salmon and salmon-related problems.[246] Congress passed the Magnuson Fishery Conservation and Management Act[247] in 1976 to regulate fish harvest in the ocean. In 1980, Congress enacted the 1980 Salmon and Steelhead Conservation Act[248] to address the chaotic system of salmon harvest management, and to provide federal funding for habitat restoration.

At the same time, the region's energy demands once again had outrun the Columbia River power system's generating capacity. In the late 1970s, Northwest utilities went to Congress to ask for authority to use revenues from the Columbia River dams to help finance new power development.[249] Congress responded with the Northwest Power Act.[250] The Act declared that the region's energy future should be planned in a public process that would consider the full environmental and economic costs of energy alternatives; emphasize energy conservation, renewable energy development and high efficiency generation; and include a program to offset the effects of the dams

[244] *Idaho ex rel. Evans v. Washington*, 462 U. S. 1017, 1025 (1983).
[245] Id. at 1028.
[246] The best summary is C. Wilkinson and D. Conner, "The Law of the Pacific Salmon Fishery: Conservation and Allocation of a Transboundary Common Property Resource," 32 *Kansas L. Rev.* 17, 48-61 (1983).
[247] Pub. L. No. 94-265, 90 Stat. 331, codified at 16 U.S.C. §§ 1801-1882.
[248] Pub. L. No. 96-561, 90 Stat. 331, codified at 16 U.S.C. §§ 3301-3345.
[249] This history is described in M. Blumm, "The Northwest's Hydroelectric Heritage: Prologue to the Pacific Northwest Electric Power Planning and Conservation Act," 58 *Wash. L. Rev.* 175 (1983).
[250] Pub. L. 96-501, Dec. 5, 1980, 94 Stat. 2697, codified at 16 U.S.C. §§ 839-839h.

on salmon and other fish and wildlife populations.[251] Plans would be made in public and guided by the Northwest Power Planning Council, composed of representatives of the Northwest states. The Council's fish and wildlife program would be based on recommendations of the region's fish and wildlife agencies, Indian tribes and others. The Act obliges the Council's program to complement the activities of the agencies and tribes.[252] The program would be financed by BPA hydropower revenues and implemented by the federal agencies that control the hydropower dams.

This is not the place to review the region's experience with these fish and wildlife mitigation efforts in detail. However, it is important to understand something about them to provide context for the review of salmon-related water management initiatives. First, following passage of the Northwest Power Act, the region's fish and wildlife managers gained ground in harvest management. In large part, these efforts were impelled by rulings in the Indian treaty fishing cases. The states and tribes proposed a management plan to coordinate fragmented harvest authorities under the Salmon and Steelhead Conservation Act.[253] The United States and Canada negotiated a treaty designed to protect each country's ocean salmon populations from the other country's fishermen.[254] In 1986, the Northwest states and the region's Indian tribes negotiated a settlement of harvest issues in the Columbia River itself.[255] The resulting Columbia River Management Program included a comprehensive set of rules and processes to deal with salmon harvest. The tribes and fish and wildlife managers were also active in the river, pushing for structural solutions at the Mid-Columbia hydropower projects and

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[251] *See* R. Hemmingway, "The Northwest Power Planning Council: Its Origins and Future Role," 13 *Env't'l Law* 673 (1983); K. Lee, "The Path Along the Ridge," 58 *Wash. L. Rev.* 317 (1983); and J. Volkman, "Rethinking Development in the Western Environment," in Udall, et al., *Beyond the Mythic West* 105, 115-17 (Peregrine-Smith 1990).
[252] 16 U.S.C. § 839b(h)(6)(A).
[253] Pub. L. No. 96-561, 90 Stat. 331, codified at 16 U.S.C. §§ 3301-3345.
[254] Treaty Between the Government of the United States of America and the Government of Canada Concerning Pacific Salmon, Treaty Doc. No. 99-2, entered into force Mar.18, 1985, codified at 16 U.S.C. 3631-3644. See T. Jensen, "The United States-Canada Pacific Salmon Interception Treaty: An Historical and Legal Overview," 16 *Env't'l Law* 363 (1986).
[255] The Columbia River Fish Management Plan, approved by the federal district court in *U.S. v. State of Oregon*, 699 F. Supp. 1456 (D. Ore. 1988), and affirmed on appeal in *U.S. v. State of Oregon*, 913 F.2d 576 (9th Cir. 1990). For background, *see* P. Harrison, "The Evolution of a New Comprehensive Plan for Managing Columbia River Anadromous Fish," 16 *Env't'l Law* 705 (1986).

securing flow protections for Hanford Reach fall chinook, one of the most productive populations in the river.[256]

Seeking to complement these activities, the Northwest Power Act forged a link between regional energy development and fish and wildlife recovery. At a conceptual level, the Act aimed for a power system that would meet energy demands through measures that impose the least economic and environmental cost on the region, while taking pressure off Columbia River fish and wildlife. For the power system, moving ahead would require modified operation of the Columbia River dams and financing for measures to offset the dams' effects on fish and wildlife. For fish and wildlife interests, mitigation would require a healthy hydropower system capable of generating sufficient revenues to finance energy and fish and wildlife conservation measures. Perhaps neither fish nor power interests perceived the connection clearly, but it is apparent in hindsight: Under the terms of the Northwest Power Act, neither fish and wildlife conservation nor power development could proceed without the other.

The Northwest Power Act led to a series of fish and wildlife programs, the first of which the Northwest Power Planning Council adopted in 1982. [257] The 1987 version of the program, which was the most fully developed program before the Endangered Species Act listings, aimed to double the salmon runs through a series of measures affecting all stages of the salmon life cycle: Mechanical screens and bypass channels at the dams, flow augmentation, habitat restoration projects and other initiatives. The program was to be implemented consistent with the principle of "adaptive management," the idea that fish and wildlife mitigation will be effective and sustainable only with extraordinary effort to learn from the implementation of remedial programs and to adjust subsequent efforts accordingly.[258] Because of concerns over the effects of hatcheries, adaptive management was especially important in implementing artificial production projects. Other

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[256] *See Confederated Tribes and Bands of the Yakima Indian Nation v. FERC,* 746 F.2d 466 (9th Cir.), *cert. denied* 105 S. Ct. 2358 (1985); F. Bodi, "FERC's Mid-Columbia Proceeding: Ten Years and Still Counting," 16 *Env't'l Law* 555 (1986); M. Blumm, "Reexamining the Parity Promise: More Challenges Than Successes to the Implementation of the Columbia Basin Fish and Wildlife Program," 16 *Env't'l Law* 461, 506 (1986); M. Blumm, "A Trilogy of Tribes v. FERC: Reforming the Federal Role in Hydroelectric Licensing" 10 *Harv. Env't'l. Rev.* 1, 34-46 (1986).

[257] Northwest Power Planning Council, *Columbia River Basin Fish and Wildlife Program* (1982).

[258] The concept was articulated by Kai Lee and Jody Lawrence in "Adaptive Management: Learning from the Columbia River Basin Fish and Wildlife Program," 16 *Env't'l Law* 431 (1986). Dr. Lee's book, *Compass and Gyroscope, Integrating Science and Politics for the Environment* (Island Press, 1993), is the fullest explanation of the principle as applied in the Columbia River Basin.

parts of the program called for aggressive research, monitoring and evaluation. The Council also launched an initiative called "system planning, " an exercise in which Indian tribes and other fish and wildlife managers would coordinate mitigation activities under Council and other programs.[259] The process called for a reversal of the bias toward lower-river hatchery production, and a priority on preserving the genetic integrity of the Basin's remaining wild salmon runs.[260] Over a three-year period, the tribes and fish and wildlife agencies gathered and analyzed data in the Basin's 31 biological provinces, ultimately producing an "Integrated System Plan" that proposed a wide-ranging restoration program, still premised in significant part on artificial production.

Perhaps the program's final landmark before the Endangered Species Act listings was the designation of "protected areas," which called for protection of specified stream miles from future hydropower development.[261] Protected areas were based on a comprehensive survey of fish and wildlife habitat to identify particularly important habitat where hydropower development would pose unacceptable risks. In 1988, the Council listed some 44,000 stream miles of habitat, including virtually all anadromous fish habitat, as protected areas. BPA agreed to deny access to the Pacific Northwest-Pacific Southwest intertie transmission line to power from facilities located in protected areas, and the Federal Energy Regulatory Commission has used the protected-area designations in deciding whether to license new facilities.

2. Key Water and Watershed Initiatives

The Water Budget. Of the major water initiatives launched under the Northwest Power Act in the 1980s, one the best known was the 1982 "water budget." For five years following the drought of 1977, the debate over Columbia River flows had centered on the concepts of "minimum" and "optimum" flows for salmon, each of which would involve significant shifts of water from hydropower operations. Both concepts "evoked bitter feelings and controversy within the river management community."[262] The water budget was the Power Planning Council's attempt to side-step this debate.

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[259] *See* K. Lee, "Rebuilding Confidence: Salmon, Science, and Law in the Columbia Basin," 21 *Env't'l Law* 745, 764 (1991).
[260] Northwest Power Planning Council, *Columbia River Basin Fish and Wildlife Program* at 40 (1987).
[261] *See* Palmer, *The Snake River* at 194-95.
[262] Jody Lawrence, Kai Lee and Richard Palmer, *The Water Budget: A Step Towards Balancing Fish and Power in the Columbia River Basin* at 94 (University of Washington Department of Civil Engineering, Environmental Engineering and Science, technical report no. 81, August 1983).

The Council, adapting an idea offered by the tribes, proposed a volume of water that would be stored in federal storage projects and managed by fish and wildlife managers. Flow augmentation would not be provided month-in, month-out, but only when fish managers judged there were enough fish in the river to justify expenditure of the water budget. The water volume was measured in two parts: 3.45 million acre-feet of water from the upper part of the Columbia, measured at Priest Rapids Dam in the Mid-Columbia reach; and 1.19 million acre-feet, measured at Lower Granite Dam in the Lower Snake reach. The budget could be used only in the April 15-June 15 time period, when 80 percent of the juvenile spring salmon migration moves down the river.

The water budget was a compromise: It supplied significantly less water than optimum or minimum flows. Its innovation was in suggesting that flow augmentation water could be used with discrimination, as fish needed it, and that a fixed program of flows was unnecessary. While at the time the water budget was judged "politically astute," [263] in later years some commentators found it to be "seriously flawed."[264] The federal agencies did not manage the Snake River storage projects to supply specified water budget volumes. Instead of 1.19 million acre-feet of Snake River storage water, about 400,000 acre-feet, was supplied. BPA secured another volume of water from Idaho Power Company's Brownlee Project in Hells Canyon by guaranteeing to make up any power losses the Company might experience. No water was released from the reclamation storage projects in the Snake Basin. The remaining water was to be comprised of uncontrolled natural runoff, at least as the Corps and BPA saw it. Consequently, the Snake fell well short of the prescribed water budget. A second problem with the water budget was that its flow augmentation period covered only the middle 80 percent of the spring salmon runs. Thus, it focused on the larger populations favored by fishery managers and neglected the "tails" of the migration, which tended to be wild fish. It also provided no flow augmentation for summer-migrating salmon and fall chinook.

The Vernita Bar settlement. One of the important water initiatives of the 1980s involved flows in the Hanford Reach, the last free-flowing stretch of the Columbia in the United States. The Hanford Reach "upriver bright" fall chinook population (so called because they are an unusually bright silver color when they enter the mouth of the Columbia on their upstream migration) is the Columbia's most productive remaining salmon population.

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[263] *See* Lawrence, et al., *The Water Budget* at 94.

[264] M. Blumm, M. Schoessler and R. Beckwith, *Beyond the Parity Promise: Struggling to Save Columbia Basin Salmon in the 1990s* at 26 (Northwest Water Law and Policy Project, 1996).

The brights enter the river in August and September and migrate to the Hanford Reach by November. The place where most of these fish spawn, Vernita Bar, is one of the last remaining spawning areas in what was, before the dams, an extensive spawning area.[265] Spawning is influenced by dam operations, however. If river flows are high in the river during the fall, as they are likely to be for power operations, the brights will spawn high on Vernita Bar, in nests called "redds." To survive, the eggs deposited in redds have to stay under water. If flows are low in the winter and early spring, which is preferable for power operations, the redds will be uncovered and no juvenile fish will emerge. Coordinating fall and spring flows to respect the brights' natural cycle is therefore vital: if fall flows are high during the spawning period, they must stay high through the spring emergence period. If flows are low during the spawning period, they can be correspondingly low in the winter and early spring.

Because Priest Rapids Dam, the dam immediately upstream from the Hanford Reach, is licensed by the Federal Energy Regulatory Commission, federal, state and tribal fishery managers took the issue to FERC as part of the Mid-Columbia proceeding. On the FERC equivalent of the courthouse steps, the fishery parties and hydropower operators reached a settlement. Power operators agreed to hold flows down during spawning times in the fall, and to provide flows in the winter and spring to keep the redds covered with water.[266] The agreement covers only the area at the upper end of the Hanford Reach and expires in 1998, so it falls short of comprehensive, long-term protection. But it was one of the signal accomplishments in salmon protection in the 1980s.

Spill. One of the ways to allow juvenile fish to get past dams safely is to send them through the dam's spillway instead of through the turbines. Serious problems with nitrogen super-saturation caused by spills in the early 1970s were addressed by installing "flip lips," so spill became a logical means of fish passage.[267] The practice is costly to the power system, however. In developing its program in the early 1980s, the Council rejected recommendations for increased spills, on closely divided votes. Finally, in late 1988, tribes and fish and wildlife agencies reached a settlement of the spill issue in litigation with the BPA,[268] and the Council adopted the agreement into its fish and wildlife program in 1989. Although the Army

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[265] S. Whidden, "The Hanford Reach: Protecting the Columbia's Last Safe Haven for Salmon," 26 *Env't'l Law* 265, 269 (1996).
[266] Vernita Bar Settlement Agreement, *Washington Dep't. of Fisheries v. Public Util. Dist. No. 2 of Grant County*, No. E-9569-000 F.E.R.C. 9 (1988).
[267] *See* Petersen, *River of Life* at 142.
[268] Fish Spill Memorandum of Agreement (April 10, 1989).

Corps of Engineers, which operates the dams, was not party to the agreement, it abided by its terms.[269]

The Snake River. Much of the action in the Snake River during the 1980s was controlled by the Swan Falls Agreement and its aftermath. From the very beginning of the agreement's implementation, it bumped into fish and wildlife issues. Because Idaho Power's Swan Falls Project is licensed by the Federal Energy Regulatory Commission, Commission approval was required. What the agreement's proponents may have thought would be a formality turned into a controversy. The U. S. Fish and Wildlife Service's Deer Flat Wildlife Refuge lies downstream from Swan Falls. The Service claims reserved water rights with a 1937 priority date, which is when the refuge was established. The Service and others intervened in the FERC process to express their concerns that the Swan Falls Agreement did not provide enough water in the river to protect the refuge's reserved claims. The National Marine Fisheries Service also intervened to assert the downstream needs of salmon.[270] Ultimately, the agreement's proponents secured federal legislation requiring the FERC to approve the agreement, but called for studies of environmental issues.[271] A studies committee was established with representatives of the Idaho Power Company, and fish and wildlife, tribal, federal, state and water-user interests.[272]

One of the Swan Falls studies evaluated potential sources of water for anadromous fish flows in the Snake River from existing storage, water marketing and transfers, changes in reservoir operations, and irrigation water conservation. The study, by Hydrosphere, a Colorado consulting firm, was completed in 1991.[273] The study analyzed potential water sources and the laws and agreements that govern water use in Idaho. "At this reconnaissance level of analysis," the study concluded that a combination of such sources apparently could supply the 1.19 million acre-feet Snake River Water Budget in dry years and could exceed 2.0 million acre-feet in average and above-average water years, without substantial adverse impacts on other water uses. Moreover, the consultants said such forms of instream enhancements also would enhance water-marketing opportunities for

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[269] *See* Blumm and Simrin, "The Unraveling of the Parity Promise," 21 *Env't'l Law* at 690, 699.
[270] *See* J. Jones, "The Downstream Threat to Idaho's Water: New Second Century Challenges," 28 *Idaho L. Rev*. 483, 489 (1991-92).
[271] *See* Palmer, *The Snake River* at 162-63.
[272] Joint Agreement Between the National Marine Fisheries Service, Idaho Power Company and the Department of Interior Regarding Fish and Wildlife Studies, May 20, 1988.
[273] Hydrosphere, *Water Supplies to Promote Juvenile Anadromous Fish Migration in the Snake River Basin* (January, 1991).

irrigators, and would provide them with new economic incentives for water conservation.[274]

The Swan Falls agreement had also called for a comprehensive adjudication of Snake River Basin water rights in Idaho.[275] In 1985, the Idaho legislature adopted the Snake River Basin Adjudication Statute to carry out this part of the agreement.[276] The statute was clearly not calculated to foster more efficient water use. It established a series of presumptions, one of which conferred amnesty on water users who had expanded their use in violation of "mandatory permit requirements," in the absence of harm to third parties.[277] Allowable consumptive use for irrigation rights is "the most water consumptive crop that can be grown in the area during the period of the year when water is used for irrigation."[278]

The adjudication began in 1987. Its boundaries encompass about 87 percent of the state (all or part of 38 of 44 counties), including the agricultural kingdom of the Upper Snake Basin. By 1990, 90,000 claims had been filed, and the State was negotiating with the United States regarding federal reserved rights claims.[279] Beginning in the early 1990s, the Idaho Department of Water Resources began a series of basin reports with recommendations regarding appropriative water rights and abstracts of reserved rights claims. The adjudication court also began dealing with certain "basin-wide issues." The court has established that Idaho statutes do not allow for a partial forfeiture of water rights (so that, apparently, water rights retain their maximum size notwithstanding subsequent diminution of use).[280] It has also rejected application of the public trust doctrine.[281]

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[274] Hydrosphere, *Water Supplies to Promote Juvenile Anadromous Fish Migration*, abstract.
[275] For a good account for stream adjudications in the region generally, including the Snake Basin, see D. Crammond, *Counting Raindrops: Prospects for Northwestern Water Rights Adjudications* (Northwest Water Law and Policy Project, research publication PO95-1, 1996).
[276] Idaho Code section 42-1406A. *See In re SRBA Case No. 39576*, 912 P.2d 614 (Idaho 1995).
[277] Idaho Code section 42-1416(2) (repealed 1994). See P. Rassier, "Idaho Adjudication Presumption Statutes," 28 *Idaho L. Rev.* 507 (1991-92). After these provisions were held unconstitutional by the adjudication court, the legislature adopted new amnesty statutes, reaffirming the intention of the prior presumptions. Idaho Code section 42-1425, 1426. The Idaho Supreme Court found these statutes constitutional. *Fremont-Madison Irrigation District and Mitigation Group v. Idaho Ground Water Appropriators*, 926 P.2d 1301 (1996).
[278] Idaho Code, section 42-1401A(2).
[279] *See* L. Krogh, "Injury and Enlargement in Idaho Water Right Transfers," 27 *Idaho L. Rev.* 249 (1990-91).
[280] *In re SRBA*, Case no. 39576, Memorandum Decision on Basin-wide Issue 10, District Court of the Fifth Judicial District of the State of Idaho, In and For the County of Twin Falls (April 26, 1996).
[281] *Idaho Conservation League v. State of Idaho*, 911 P.2d 748 (Idaho 1995). The Idaho legislature affirmed this result in Idaho Code, section 58-1203(2).

Tribal and federal reserved water rights claims in the adjudication are considerable. One group of claims, those of the Shoshone-Bannock Tribes for the Fort Hall Reservation in eastern Idaho, has been settled.[282] The Tribes had initially sought to lease out (to others) a substantial part of this water for salmon flows.[283] However, the settlement that quantified the tribe's water rights imposed significant restrictions on transferability. The restrictions depart from the State's "Two Rivers" concept only by allowing the Tribe an opportunity to market, through a tribal water bank, about 40,000 acre-feet of water below Milner Dam.[284] The Shoshone-Bannock Tribes also have off-reservation water claims, relating to water in the Salmon River drainage, stemming from the 1868 Treaty of Fort Bridger.[285] They succeeded initially in forcing the United States to file these claims in the adjudication, but the United States later was held not to be obligated to represent the claims, so the tribes are now asserting them on their own.[286] The Northwestern Band of the Shoshoni Nation and the Shoshone-Paiute Tribes of the Duck Valley Indian Reservation have also filed claims.

Finally, and perhaps most important, the Nez Perce Tribe, whose reservation is on the Clearwater River in Idaho, claims entitlement under an 1855 treaty to reserved water rights, in addition to environmental protection related to reserved fishing rights.[287] To meet a court-imposed filing deadline, the United States filed extensive claims on the tribe's behalf, asserting tribal rights to virtually all of the flow of the Snake, Salmon and Clearwater drainages. The litigation was stayed to permit the parties to pursue a settlement, but without success. These claims, which clearly overlap flow-related questions under the Endangered Species Act and Northwest Power Act, appear headed for adjudication in the next year or two.

The Yakima River Basin. As many as 800,000 adult salmon may have returned to the Yakima River (in south-central Washington) before non-Indian development.[288] Now, about 2.4 million acre-feet of water are diverted

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[282] *See* 101st Cong., 2d Sess., H. Rep. 101-831, Approving the Fort Hall Indian Water Rights Settlement, and For Other Purposes (Oct. 10, 1990); *Fort Hall Water Users Association v. United States*, 1996 Opinion No. 88 in the Supreme Court of the State of Idaho (July 5, 1996) .

[283] *See* Palmer, *The Snake River* at 48.

[284] *See* Fereday and Creamer, "Swan Falls in 3-D," 28 *Idaho L. Rev.* at 593-94; Krogh, "Injury and Enlargement in Idaho Water Right Transfers," 27 *Idaho L. Rev.* at 257. The rules of the Shoshone-Bannock water bank are in Idaho Admin. R. 37.02.04.

[285] Treaty of July 3, 1868, 15 Stat. 673, 674-75.

[286] *Shoshone-Bannock Tribes v. Reno*, 56 F.3d 1476 (D.C. Cir. 1995).

[287] See discussion, supra.

[288] Pacific Northwest Lab., Bonneville Power Administration, *Environmental Impact Statement, Yakima Fisheries Project* 1.6 (April 3, 1992). S*ee generally* L. MacDonnell, "Managing Reclamation Facilities for Ecosystem Benefits," 67 *U. Colo. L. Rev.*197, 208 (1996).

from the Yakima Basin's rivers in an average year, and about one percent of the pre-development number of salmon manage to return.[289] Many irrigation diversions were unscreened, or their fish passage facilities were outdated or in bad repair. In low water years, sections of the river are dried up, completely blocking fish migrations. Irrigation return flows create high water temperatures and contribute a load of sediment and agricultural chemicals to the river.[290]

Despite the starkness of the salmon declines in the Yakima, three factors made the basin an important place to restore fish. First, the Yakima River and its fish run through the Yakama Indian Reservation.[291] The moral and legal force of the Yakama Nation's treaty rights are potent, as water users had learned in litigation. In 1985, federal courts authorized the Bureau of Reclamation to operate Cle Elum Dam, part of the Yakima Reclamation Project, on an emergency basis to protect salmon redds at the expense of carryover irrigation storage.[292] Moreover, the tribe claimed reserved instream flow rights whose quantification was pending in a general stream adjudication for the Yakima River Basin.[293] The Tribe and its legal claims were not going away. Second, while there were many obstacles to fish production in the Yakima, lack of good spawning and rearing habitat was not one of them. Much of the fish habitat in the upper reaches of the Yakima Basin is in a national forest, while west of the river is the Yakama Indian Reservation. As a result, outside irrigated areas, much of the basin's habitat is relatively intact.[294] Finally, the mainstem hydropower dams did not pose as significant an obstacle to Yakima fish as they did to fish further up in the Columbia/Snake Basin. Yakima fish have to pass only four Columbia River dams after they leave the Yakima, rather than the eight dams Snake River fish must negotiate. While none of these considerations made the depth of the problems facing salmon easy to solve, it was a good list of reasons for investing in salmon mitigation in the Yakima Basin.

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[289] Pacific Northwest Lab., Bonneville Power Administration, *Environmental Impact Statement, Yakima Fisheries Project* 1.7.

[290] *Columbia River Basin Fish and Wildlife Program*, section 7.11 at 7-59.

[291] In 1994, the Yakama Indian Nation changed the spelling of its name to correspond with the spelling used in its 1855 treaty with the United States. Act of Oct. 31, 1994, Pub. L. No. 103-434, sec. 1204(g), 108 Stat. 4557 (1994). The river, town, and basin are still spelled "Yakima."

[292] *Kittitas Reclamation District v. Sunnyside Valley Irrigation District*, 763 F.2d 1032 (9th Cir. 1985).

[293] In 1993, the Washington Supreme Court determined that the Tribe has a reserved right to "the minimum instream flow necessary to maintain anadromous fish life in the river, according to prevailing conditions." *State Dep't of Ecology v. Yakima Reservation Irrigation Dist.*, 850 P.2d 1306, 1310 (Wash. 1993).

[294] Northwest Power Planning Council, *Columbia River Basin Fish and Wildlife Program*, section 7.11 at 7-59 (1994).

A variety of initiatives were begun in the Yakima in the 1980s. Under the Northwest Power Act, a substantial investment of BPA funds was dedicated for diversion screens, fish passage facilities and an experimental artificial production facility aimed at supplementing, rather than supplanting naturally spawning fish. These structural improvements would not be of much use on a dried-up river, however, and leaving more water in the river was one objective upon which the tribe and others made little progress during the 1980s. Instream flow issues extended through the 1980s and into the 1990s.

3. Evolution in State Water Programs

There was also ferment in state water law. All of the Northwest states are prior appropriation states, but the original miner's rule that actual appropriation gives the only valid right to water quickly grew into a more complicated body of law.[295] Most of the Northwest states have public trust doctrines, instream flow laws, basin-planning processes and various innovations to deal with instream flow problems.[296]

Oregon's 1987 Instream Water Rights Act allows out-of-stream private water rights to be converted to instream water rights with the same priority as the original right.[297] A conserved water statute[298] permits Oregon water users to dedicate 75 percent of saved water to new consumptive uses, while requiring at least 25 percent of the savings to be restored to the stream.[299]

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[295] Water codes were enacted in Idaho in 1881, Montana in 1885, Oregon in 1909 and Washington in 1917. Pacific Northwest River Basin Commission, *Water, Today and Tomorrow, Volume II, The Region,* at 3-69 (1979). For the original miner's law, *see* C. Jack, *Outline of Mining Law for Miners, A Concise Statement of Law Upon Questions of Most Interest to Miners, With Directions for Locating Mineral Ground* at 76 (1902). For a view of modern western water law, *see* A. D. Tarlock, *Law of Water Rights and Resources,* sec. 5.01, et seq. (1995).

[296] *See generally* "Symposium on the Public Trust and the Waters of the American West: Yesterday, Today and Tomorrow," 19 *Env't'l Law* (Spring 1989); Benson, "A Watershed Issue," 26 *Env't'l Law* at 206-218; D. Bell and N. Johnson, "State Water Laws and Federal Water Uses: The History of Conflict, the Prospects for Accommodation," 21 *Env't'l Law* 1, 10-15 (1991). In 1996, the Idaho legislature curtailed the power of state courts to apply the public trust doctrine in land and water decisions, and broadened the power of the State Land Board to alienate the beds of navigable waters subject to the public trust in Idaho. House Bill 794, 53d Idaho Legislature, 2d Sess., codified at Idaho Code section 58-1201. *See generally* M. Blumm, H. Dunning and S. Reed, *Renouncing the Public Trust Doctrine: An Assessment of the Validity of Idaho House Bill 794* (Northwest Water Law and Policy Project, 1996).

[297] Ore. Rev. Stat. 541.332.360.

[298] Ore. Rev. Stat. 537.455-500.

[299] Montana also has a salvaged water statute, but without any provision dedicating water to instream flows. Mont. Code Ann. 85-2-419.

Washington's "Trust Water Rights" program is intended to "facilitate the voluntary transfer of water and water rights, including conserved water, to provide water for presently unmet and emerging needs."[300] Under the program, water users may transfer their water or water rights to the State. The transferred water keeps the priority date of the original water right, so the water user with the next junior priority has no right to take it.

In Idaho, development of "public interest" criteria, which also have evolved in other states, evidence a growing sense that "traditional" water uses are not the only important consideration in water allocation decisions. During the 1980s, the Idaho Supreme Court interpreted the public interest to require consideration of minimum stream flows, water conservation, aesthetic and environmental values and an assessment of the appropriation's effect on local fish and wildlife and recreation.[301] These criteria led to the denial of at least one permit for a hydropower project because of its local fish and wildlife and recreational impacts.[302]

Idaho also was one of the first states to develop water banking to facilitate water transfers among users. It has attracted attention for its potential to help with salmon,[303] though its rules currently are designed to maximize its usefulness to irrigators in the Upper Snake Basin. Agricultural uses inside the district have first claim on the water bank; non-agricultural uses outside the district have last priority. Water cannot be rented until July, which minimizes its usefulness for spring flow augmentation. While rental outside the district is allowed, the rental price is about three times higher than for in-basin rentals. Moreover, any water user who rents water to a user outside the Upper Basin is relegated to last refill priority in the next year. In addition, Idaho law requires legislative approval of any change in water use for more than 50 cubic feet per second or 5000 acre-feet for more than three years.[304] The water bank is organized to ensure that water is used as efficiently as possible in the upper basin, and as little as possible outside the upper basin.

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[300] Rev. Code of Wash. 90.42; *see* L. MacDonnell and T. Rice, "Moving Agricultural Water to Cities: The Search for Smarter Approaches," 2 *Hastings W-NW J. of Env. Law and Pol.* 27, 41-43 (1994).
[301] *Shokal v. Dunn*, 109 Idaho 330, 338, 707 P. 2d 441, 449 (1985).
[302] Western Governors Assoc.-Western States Water Council, *Park City Briefing Paper: The Proposed Bear River Narrows Power Project and Public Interest Protection in the State of Idaho* (Oct. 10-12, 1991).
[303] *See* MacDonnell and Rice, "Moving Agricultural Water to Cities: The Search for Smarter Approaches," 2 *Hastings W-NW J. of Env. Law and Pol.* at 48.
[304] Idaho Code sec. 42-108.

Indian treaty rights litigation in Washington state's Puget Sound produced two major agreements concerning fish and wildlife habitat restoration, both related to water-management issues. One, the Timber, Fish and Wildlife Agreement, focused on watershed problems and aimed primarily at correcting problems caused by timber harvest in western Washington, though it could serve as a model for similar agreements elsewhere.[305] The second, called the Chelan Agreement,[306] provided a framework for developing water policy in Washington according to hydrologic boundaries. The Chelan Agreement emerged from a mediation among a wide range of interests in the late 1980s. The Agreement called for five public caucuses and three government caucuses (tribal, local and state) to make water planning decisions for different areas of the state, in cooperation with local interests. A Water Policy Forum, with representatives of each of the caucuses, was intended to shape state policy and address policy issues that arise in planning. Plans are to encompass groundwater, surface water, consumptive and nonconsumptive needs, and the relationship between ground and surface water.[307] They are subject to review by the Washington Department of Ecology, which is also expected to help sort things out if river basin groups stalemate. The Agreement called on the state to select at least two pilot planning basins. One is the Methow, located in a headwater area of the Columbia River Basin.

In Montana, a 1975 law allowed state agencies to petition the State Department of Natural Resources for a reservation of stream flows for future uses, including biological, scenic and recreational purposes. While part of the motivation for the statute was to protect Montana water from downstream claims, the process also lent itself to river protection. In the late 1970s and early 1980s, the Department granted a reservation for the Yellowstone River.[308] Ten years later, the reservation process also figured in the Upper Clark Fork Watershed. Montana's water planning process, revamped in the late 1980s, was credited with facilitating passage of important state laws on drought management, water right transfers, water conservation and water storage policy.[309] Montana also allows temporary water leases for instream purposes.[310]

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[305] *See* K. Lee, *Compass and Gyroscope* at 120-124; C. Halbert and K. Lee, "The Timber, Fish and Wildlife Agreement: Implementing Alternative Dispute Resolution in Washington State," 6 *Northwest Environmental Journal* 139.
[306] Resolution from the Office of the Governor of Washington, *Chelan Agreement* (Mar. 8, 1991); *Wash. Admin. Code* section 173-500-040 (1995).
[307] *Chelan Agreement* at 10-11.
[308] D. Snow, "River Story: A New Chapter for Montana's Clark Fork," in 1 *Chronicle of Community* 17, 20 (Autumn 1996).
[309] Western Governors Assoc.-Western States Water Council, *Park City Briefing Paper: The Montana State Water Plan Policy and Management Dispute Resolution System* at 3.
[310] Mont. Code Ann. 85-2-141, 85-1-204, 85-2-407, 85-2-408, 85-2-436, 85-2-438.

These developments in state water law established infrastructure. They created rules and tools that could be used to put water back in streams. They did not themselves restore water, however. Because of previously-established consumptive water rights, the amount of water remaining in the states' streams has so far been little affected by these developments.[311] Instream flow protections usually carry junior priorities in fully appropriated rivers, enforcement of instream flow protection is spotty,[312] and multiple-use basin plans tend to end up as "shelf art."[313]

E. Prospects for River Management in the Late 1980s and the System Operation Review

By 1989, some observers thought that the Columbia River salmon issues were well in hand. The water budget was in place; spawning at Vernita Bar was secure; protected areas limited new hydropower development; the troublesome spill issue was thought to be resolved; and the hydropower system was providing important financial support to subbasins like the Yakima and Umatilla. While not all populations in the Basin were healthy, in the aggregate the runs were increasing as they had not in years. Populations that were the subject of bitter fights between Indians and non-Indians in the early 1980s were no longer a concern.[314] The Hanford Reach fall chinook salmon had increased from about 100,000 fish in the early 1980s to more than 400,000 adults,[315] still short of the 1940s level of about 600,000 adults,[316] but impressive. Charles Wilkinson described the mood of the time:

> *By 1988, the legal structure erected during the previous decade and a half, the Magnuson Act, the Indian treaty decisions, the Northwest Power Act, the water budget, the protected areas program, and the 1985 treaty with Canada, had created cautious but widespread optimism.... Representatives of the utilities, the BPA, and the Army Corps of Engineers were beginning*

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[311] Relatively small amounts of water were restored to stream in Montana and Oregon under provisions allowing the temporary use of senior consumptive water rights for instream purposes. See discussion in text, above.

[312] *See* Carpenter, *Enforcement of Instream Water Rights* (Northwest Water Law and Policy Project Study Paper No. 3, May 1995).

[313] *See, e.g.,* Western Governors Assoc.-Western States Water Council, *Park City Briefing Paper: The Montana State Water Plan Policy and Management Dispute Resolution System* 1 (Oct. 10-12, 1991).

[314] Oregon's unsuccessful attempt to close tribal fishing on this stock is reported in *U.S. v. Oregon*, 718 F.2d 299 (9th Cir. 1983).

[315] Oregon Department of Fish and Wildlife, Washington Department of Fisheries, *Status Report, Columbia River Fish Runs and Fisheries, 1938-92* at 50, figure 25 (1993).

[316] Id. at figure 24 (1993).

> *to say in private that the problems with the runs had been solved and that we could begin to think about scaling back the protection programs.*[317]

To be sure, none of the remedial programs had proved flawless, and some were outright failures. The programs promised by the Salmon and Steelhead Conservation and Enhancement Act were never funded. The management proposals of the commission appointed under that Act were rejected by the Secretary of Commerce.[318] The Pacific Salmon Treaty between Canada and the United States hit a series of potholes and within ten years of its signing was reported to be in "grave danger."[319] The harvest controls of the 1980s have since been criticized as suited to the appetites of harvesters rather than the needs of wild salmon populations.[320] State instream acquisition programs secured little actual water for streams.[321] The Snake River still ran dry at Milner Dam. The Federal Energy Regulatory Commission's license modification process in the Mid-Columbia was criticized as ineffective and untimely.[322] The Northwest Power Planning Council was chastised for failing to insist on more aggressive changes in hydropower operations, deferring too little or too much to fishery managers,[323] and spending too much money.[324] While some of these criticisms were off the mark, others were fair, and in general it was hard to argue with the commentators at the beginning of the 1980s that this plethora of remedial programs was uncoordinated.[325]

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[317] Wilkinson, *Crossing the Next Meridian* at 214.

[318] In 1984, the Salmon and Steelhead Advisory Commission, under the auspices of the National Marine Fisheries Service, produced a report called *A New Management Structure for Anadromous Salmon and Steelhead Resources and Fisheries of the Washington and Columbia River Conservation Areas* (July 31, 1984). The report proposed a program of policy planning, dispute resolution, management structure auditing, and enforcement coordination whose implementation was to be funded after approval of the report by the Secretary of Commerce. Two and one-half years later, the Secretary declined to approve the report, as failing to meet the Act's requirements. Letter from Malcolm Baldridge to William Wilkerson, November 5, 1986.

[319] "Canada-U. S. salmon pact said to be in peril," *Daily Astorian* (April 18, 1996). *See* L. Rutter, "Salmon Fisheries in the Pacific Northwest: How Are Harvest Management Decisions Made?" in D. Stouder, P. Bisson and R. Naiman, eds, *Pacific Salmon and Their Ecosystems: Status and Future Options* at 355, 358-365 (1997); P. Koberstein, "Shipwreck! Is the Pacific Salmon Treaty Lost at Sea?" 3 *Big River News* 1 (Fall 1996).

[320] Independent Scientific Group, *Return to the River* at 362.

[321] *See, e.g.*, discussion of Oregon experience in MacDonnell and Rice, "Moving Agricultural Water to Cities," 2 *Hastings W-NW J. of Env. Law and Pol.* at 44, and Oregon Water Trust, *Fish Flow News* (Fall/Winter 1996).

[322] Bodi, "FERC's Mid-Columbia Proceeding," 16 *Env't'l Law* at 581.

[323] *See* Blumm and Simrin, "The Unraveling of the Parity Promise: Hydropower, Salmon, and Endangered Species in the Columbia River Basin," 21 *Environmental Law* 657 (1991).

[324] Petersen, *River of Life* at 171.

[325] "The key weakness of the prevailing system can be summed up thus: control over the harvest and control over the environment and production of anadromous fish are not now united in any single management entity, nor even in any alliance of entities, and incentives to produce and to conserve are weak when the interests of producers and harvesters differ." Wilkinson and Conner, "The Law of the Pacific Salmon Fishery," 32 *Kansas L. Rev.* at 105.

Nevertheless, taken together, the initiatives of the 1980s comprised a salmon recovery effort that was unprecedented for the time, and it appeared to be paying off. With salmon populations apparently on the rise, the hydropower system turned its attention to the fact that some of the basic agreements underlying the river's management would begin to expire around the turn of the century. The Pacific Northwest Coordination Agreement is scheduled to expire in 2003. Under the Columbia River Treaty, the "Canadian entitlement," power that Canada sold to the United States when the treaty was signed in 1964, was to be returned to Canada beginning in 1998.[326] The allocation agreements between federal and non-federal utilities in the United States, which govern each parties' responsibilities with regard to the Canadian entitlement, expire in 2003.[327]

The three federal agencies that operate the Federal Columbia River Power System, the Army Corps of Engineers, the Bonneville Power Administration and the Bureau of Reclamation, decided to stand back from the specific issues posed by the expiration of these agreements and look at the system as a whole. They proposed to use the National Environmental Policy Act process to develop a joint "system operating strategy" for the coordinated operation of the system; explore an ongoing forum to review and update the strategy from time to time; and consider issues associated with a new Pacific Northwest Coordination Agreement and a new set of Canadian entitlement agreements. With these objectives, the "System Operation Review" began with scoping sessions in 1990 and included an extensive collection of working groups to address each task.

The System Operation Review was an analytical process of enormous breadth and complexity, but with some important limitations including, for example, the fact that it treated the Snake River system above Hells Canyon as a "hypothetical reservoir." Much could be said about the analysis. However, for our purposes, three points are key. First, the System Operation Review is another reminder, if we needed one, that the future is unpredictable. The world the System Operation Review envisioned ceased to exist while the ink was drying on its scoping documents. The System

[326] In November, 1996, the Bonneville Power Administration and the Province of British Columbia reached agreement on the value of the entitlement, which British Columbia believes will total some $5 billion through 2024. The two countries are continuing to negotiate how much of the entitlement will be sold to the United States for a second 30-year term. A portion of this money will be committed to the Canadian Columbia Basin Trust, an independent entity that works with Canadian communities to identify economic and environmental investments in areas affected by the Columbia River Treaty storage projects. J. Harrison, "U. S., Canada Agree on Return of Power Under Columbia River Treaty," *Energy News* (1997).

[327] Columbia River System Operation Review, *Final Environmental Impact Statement, Main Report* at 1-3, 1-4.

Operation Review was promptly high-jacked by the Endangered Species Act process. As the final Environmental Impact Statement of the System Operation Review said in 1995:

> *While one of the primary goals of the SOR is to decide on a coordinated operating strategy to balance conflicting demands on the system, the reality is that the need to help conserve endangered salmon specifically, and all salmon generally, has taken precedence over all other considerations. Much of the trading off that will be done in deciding on a system operating strategy will hinge on what can be gained for endangered salmon at what cost to other uses.*[328]

Second, the SOR made clear just how well the river had been adapted to these "other uses," especially hydropower. An apocryphal story has a System Operation Review computer modeler complaining that virtually all of the alternatives that had been identified for analysis hurt the power system. "Of course," said his colleagues, "the river *has* been optimized for power. There are no alternatives that would leave the power system better off."

The third lesson is that the Review, despite its being overshadowed by endangered species concerns, allowed the federal agencies to play a much more constructive role in the salmon debates than they would have otherwise. The System Operation Review gave the federal agencies a broad analytical base with which to understand the consequences of changes in river operations, and a tool that could help inform the entire region. Its scope was limited in some ways, especially in omitting most of the Snake River system, but the breadth and adaptability of its analytical process played an important role in the Endangered Species era.

F. From the Endangered Species Listings to the Present

1. The Decline of the Wild Runs

Not everyone was enthusiastic about the apparent upswing in the salmon populations in the late 1980s. By the mid-1980s the replacement of wild fish

[328] Columbia River System Operation Review, *Final Environmental Impact Statement, Main Report* at 1-1.

by hatchery fish was far advanced. The runs were only about 25 percent wild,[329] and wild populations seemed to be careening downhill even as aggregate salmon numbers grew. Decades of expanding hatchery programs meant that fishermen had grown to expect the large harvests that hatchery fish allow. At the same time, the fish populations were less diverse genetically, less adapted to their environment, more prone to disease, and apparently more vulnerable to changes in ocean conditions. As hatchery production increased, the Basin was trading vigorous wild fish populations for dull-witted hatchery fish.[330]

An article in *Fisheries*, the Journal of the American Fisheries Society, showed wild salmon populations up and down the Pacific coast at critically low numbers.[331] The message was not entirely surprising; wild fish advocates had claimed for years that wild stocks were in trouble. The *Fisheries* article documented the trend in a way that was impossible to ignore. This realization was soon followed by the beginning of what turned out to be a seven-year drought and persistently poor ocean conditions for salmon. Since 1988, the data showed a coast-wide downturn in salmon populations of all kinds. Populations that had looked healthy in 1988 were weak in 1990, at critically low levels in 1994, and in 1995 much worse.

Swings in salmon abundance are not themselves a concern. Salmon are subject to natural cycles. Changes of thousands of percent over two or three year periods have occurred.[332] These swings may reflect the effects of drought, poor ocean feeding conditions and other natural factors. Robust salmon runs can survive fluctuating natural conditions. But extremely weak runs, like many of the wild Columbia and Snake runs, cannot.

2. The Endangered Species Act Petitions and the Salmon Summit

[329] *See* Northwest Power Planning Council, *Compilation of Information on Salmon and Steelhead Losses in the Columbia River Basin, Appendix D,* at 212; Wilkinson and Conner, "The Law of the Pacific Salmon Fishery," 32 *Kansas L. Rev.* at 81-84; Northwest Power Planning Council, *Columbia River Basin Fish and Wildlife Program,* at 7-13 (Dec. 1994).
[330] *See* R. Hilborn, "Hatcheries And The Future Of Salmon In The Northwest," 17 *Fisheries* 5, (1992); M. Goodman, "Preserving the Genetic Diversity of Salmonid Stocks: A Call For Federal Regulation of Hatchery Programs," 20 *Envtl L.* 111, 148-155 (1990).
[331] *See* W. Nehlsen, et al. "Pacific Salmon at the Crossroads: Stocks at Risk From California, Oregon, Idaho and Washington," *Fisheries* 4 (Mar./Apr. 1991).
[332] *See e.g.,* Oregon Department of Fish and Wildlife, Washington Department of Fisheries, *Status Report, Columbia River Fish Runs and Fisheries, 1938-92,* at 56, figure 29 (estimated numbers of sockeye entering the Columbia River and escapement).

The pervasive weakness in the wild runs prompted several petitions to list salmon populations under the Endangered Species Act.[333] When the ESA petitions were first filed in 1990, political leaders saw that the salmon issue had broadened and deepened. During the 1980s, the public debate over salmon was often approached as one limited to salmon and hydropower. With the listing petitions, a more encompassing discussion was thought to be essential. Oregon's Senator Mark Hatfield proposed a "Salmon Summit," in which the full spectrum of interests would explore ways to respond to the salmon declines.[334] The ensuing process in 1991 and 1992 introduced a broad range of players to the complexity of salmon issues. Representatives of salmon and hydropower interests found themselves seated next to representatives of state water agencies, the Forest Service, port authorities, ranchers and others whose activities affect watersheds surrounding salmon streams. The summit produced a number of voluntary mitigation efforts by federal agencies and others.[335] At the same time, however, consensus was missing on the more difficult issues.

During the Salmon Summit, two proposals sparked special interest. The first was Idaho Governor Cecil Andrus' proposal of what has become known as the "drawdown strategy." The drawdown strategy is not to be confused with "drawing down" headwater storage projects. Releases from headwater storage projects are flow augmentation releases, which actually increase the amount of water in the river downstream from the storage project. The drawdown strategy, in contrast, refers to lowering the operational level of run-of-the-river reservoirs below the storage projects. The logic of the drawdown strategy was this: Assume the problem for Snake River salmon is the mainstem federal dams, which themselves slow the flow of water by backing the river up into broad, deep and warm reservoirs. Because of the

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[333] Endangered and Threatened Species; Endangered Status for Snake River Sockeye Salmon, 56 Fed. Reg. 58,619 (1991) (codified at 50 C.F.R. § 17.11), Endangered and Threatened Species; Threatened Status for Snake River Spring/Summer and Fall Chinook Salmon, 57 Fed. Reg. 14,653 (1992) (codified at 50 C.F.R. § 17.11). Spring/summer and fall chinook were later reclassified as endangered on an emergency basis in Endangered and Threatened Species; Status of Snake River Chinook Salmon and Snake River Fall Chinook Salmon, 59 Fed. Reg. 42,529 (1994). The National Marine Fisheries Service has proposed to make the emergency reclassification permanent. *See* Endangered and Threatened Species; Status of Snake River Chinook Salmon and Snake River Fall Chinook Salmon, 59 Fed. Reg. 66,764 (1994).

[334] *See Endangered Species Petitions on Columbia and Snake Rivers: Joint Hearing before the Subcommittee on Energy and Water Development of the Senate Committee on Appropriations and the House Committee on Small Business,* 101st Cong., 2d Sess. (1991).

[335] *See Oversight Hearing on Petitioned Salmon Stocks for Endangered Species Listing, a Hearing before a Subcommittee of the Senate Committee on Appropriations,* 102nd Cong., 1st Sess. (1992). Two articles taking very different views of these events were published at about the time the salmon summit concluded its work: Blumm and Simrin, "The Unraveling of the Parity Promise," *supra,* and Kai Lee, "Rebuilding Confidence: Salmon, Science, and Law in the Columbia Basin," 21 *Environmental Law* 745 (1991).

size of the reservoirs, virtually any amount of water that is released from upstream storage will only spread out over the top of the reservoirs, and provide exceedingly small increases in flow. Instead of looking for bigger water releases from storage, the governor argued, the region should lower the level of the four Lower Snake reservoirs. Drawing the reservoirs down would create a smaller river channel and increase the speed of the river's flow much more than water releases ever could. The deeper the drawdown, the faster the river would move, the faster the salmon would migrate and, hypothetically at least, the more salmon would survive. This argument was appealing to some participants in the Salmon Summit, but others disputed its scientific merits, its cost, and its practical feasibility. Despite the lack of consensus, however, the drawdown proposal became central in the continuing salmon debate.

The Bureau of Reclamation offered a second set of ideas. In response to Senator Hatfield's urging, the Bureau prepared a creative working paper looking at a variety of options for the Snake system, including the proposal that the Upper Snake Basin might contribute water to salmon flows. The most promising source, the Bureau suggested, was the Upper Basin water bank. To steer around the various obstacles imposed by water bank rules, the river's hydrology, and the Hells Canyon dams, the Bureau sketched this scenario: A lessee could rent water in July (which is the earliest permissible time under water bank rules), move it down river to the Idaho Power Company's Brownlee reservoir in the fall, and release it from Brownlee the following spring, when fish would need it.[336] The Bureau also identified water that could be made available from the Shoshone-Bannock water bank (assuming it was established), power head storage, off-stream storage facilities, and other sources.[337] These too became continuing subjects in the salmon debates.

3. The 1992-1993 Biological Opinions and the *Strategy for Salmon*

The National Marine Fisheries Service listed Snake River sockeye salmon as endangered in late 1991,[338] and Snake River chinook listings soon followed.[339] With little time to consult with dam operators on the effects of federal hydropower operations, the Service had to scramble to establish a framework

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[336] U. S. Bureau of Reclamation, *Working Paper: Potential Options for Consideration of Development of a Management Plan to Address Issues Related to Columbia and Snake River Salmon*, at 26.
[337] Id. at 42.
[338] National Marine Fisheries Service, "Endangered and Threatened Species: Endangered Status for Snake River Sockeye Salmon," 56 *Fed. Reg.* 58,619 (Nov. 20, 1991).
[339] National Marine Fisheries Service, "Endangered and Threatened Species: Threatened Status for Snake River Spring/Summer Chinook Salmon," 57 *Fed. Reg.* 14,653 (Apr. 2, 1992).

within which to evaluate whether the system's operations posed jeopardy to the listed populations. For purposes of the 1992 consultation, the agency judged that jeopardy would be avoided if operations provided better conditions for the migration than in 1991. The agency concluded that the 1992 operations passed muster. [340]

With the Endangered Species Act process beginning to engage, the region's governors asked the Northwest Power Planning Council to take salmon recovery a step further. The Council began an 18-month process that produced a revised program called the *Strategy for Salmon*. The *Strategy* put emphasis on protecting weak, wild salmon populations. Among other things, it called for "no appreciable risk to biological diversity" of salmon and other fish populations[341] and a more cautious approach to hatchery-related programs.[342] It expanded the Council's original water budget by more than half, adding three million acre-feet of water to the Columbia River water budget, with an estimated power impact of $100 million in lost power revenues annually. The *Strategy* doubled a $40-50 million per year program to address habitat, hatchery and other areas, including a large-scale effort to screen irrigation diversions,[343] and endorsed comprehensive watershed approaches to problems in tributaries. Past habitat efforts had been characterized by piecemeal measures, bank stabilization projects, placement of large woody debris in channels, and the like, which the Council concluded were ineffective. The Strategy called for "ridgetop-to-ridgetop" watershed efforts that employ natural habitat functions where possible.[344] The *Strategy* also called for state water management agencies to explore a regional agreement to protect instream flows for salmon and to deny new water appropriations that would harm anadromous fish.[345]

The Council also left some issues open. The Council's analyses showed that the measures that could be implemented in the short-term were probably not enough to allow weak wild populations to recover.[346] But the Council saw too little information to justify more significant measures. Fish and wildlife

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[340] National Marine Fisheries Service, *Endangered Species Act Section 7 Consultation/Conference Biological Opinion: 1992 Operation of the Federal Columbia River Power System* 15 (Apr. 10, 1992).
[341] *See* Northwest Power Planning Council, *Strategy for Salmon* 18 (1993).
[342] Id. at 54 (section 6.1A) (peer review of production measures to evaluate risk to biological diversity), 57 (section 6.2A) policy on wild and naturally spawning populations) and 61 (supplementation planning and policy).
[343] The irrigation screening program is reviewed in D. Crammond, *Screening Water Diversions: A Survey of Policy, Practices, and Compliance in the Pacific Northwest* (Northwest Water Law and Policy Project, Study Paper No. 6, May 1995).
[344] Northwest Power Planning Council, *Strategy for Salmon*, sec. 7.6C.
[345] Id. at 38 (1992).
[346] Id. at 23.

managers and conservation groups had urged the Council to adopt a long-term goal for its flow augmentation program, high flow/velocity levels in both the Columbia and Snake rivers, and to commit to drawing the Lower Snake projects down to achieve these targets. The managers based their recommendations on their own review of the relationship between higher river flows and salmon survival.[347] Finding the information on the flow-salmon survival relationship, drawdowns and other issues still inadequate, however, the Council called for further evaluations of new mitigation measures, additional sources of water for salmon flow augmentation, and in particular, drawdown strategies.

In addition, the Council referred some issues to other forums. One such issue involved temperature problems in the Snake River. There, fish and wildlife agencies had detected a "thermal barrier" that they suspected was killing adult fish returning to spawn in the summer and fall. One of the few immediate solutions for this problem is to release cold water from Dworshak Reservoir on the Clearwater River. Yet, without significant increases in water from the Upper Snake, Dworshak is also the source of most of the storage available for spring flow augmentation.[348] One question was whether Dworshak should be used to help the spring juvenile salmon migration or the fall adult migration. Wanting both, the Council assigned this question to fish and wildlife managers working with dam operators on the Council's Fish Operations Executive Committee.

Another problem arose from high levels of spill specified in the National Marine Fisheries Service biological opinions. The spill levels were high enough at some times of the year to create gas supersaturation that can be lethal to salmon. Managers were forced to judge whether the risk of these mortalities were greater than risks posed by letting fish go through bypass systems and turbines or loading them into barges. On this issue, the Council deferred to the fish and wildlife managers and state water quality permitting entities with jurisdiction over gas supersaturation questions.

The Council looked to the U. S. Environmental Protection Agency for help in identifying water quality issues in the mainstem. The agency completed a

[347] Columbia Basin Fish and Wildlife Authority, *The Biological and Technical Justification for the Flow Proposal of the Columbia Basin Fish and Wildlife Authority* (February 1991).
[348] Dworshak is unique among the federal projects in that it is authorized to make cold water releases to aid fish and wildlife. H. R. Doc. No. 403, 87th Cong., 2d Sess., vol. 1 at 313 (1962).

summary report of mainstem issues in June, 1992.[349] The report recommended steps to coordinate data collection, institute research and evaluation basin-wide, and to initiate a pilot project to address water-quality problems in the Grande Ronde Basin in Oregon.

Finally, the Council's call for additional water from the Snake River Basin for flow augmentation raised a variety of concerns regarding interstate mechanisms to provide and protect water for salmon. If water were leased in the Upper Snake Basin, for example, could it be protected from diversion in Washington and Oregon? The Council called on the water managers for the Northwest states to address these interstate water questions.

In 1993, shortly after publication of the *Strategy for Salmon*, the National Marine Fisheries Service issued its 1993 biological opinion on the operation of the Columbia River dams.[350] In the 1993 opinion, the Service refined its "jeopardy" criterion. The Service would evaluate whether the proposed operations would reduce salmon mortalities below those seen in a 1986-90 base period. Then the agency would determine whether these operations, in combination with other actions concerning salmon habitat, fishing, and so forth, would be likely over the long term to allow the population to survive.[351] After evaluating the proposed operations and specifying a variety of mitigation measures, the agency again concluded that the proposed power system operations would not jeopardize listed populations. In its listing decisions, the National Marine Fisheries Service had identified water withdrawals and inadequate water regulations as factors contributing to species declines,[352] and so, among other things, the 1993 opinion called for another two million acre-feet of water to be provided for flow augmentation in the Columbia River, in addition to that identified in the *Strategy for*

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[349] Federal funding problems have hampered progress on these recommendations, but further steps have been taken regarding high water temperatures in the Columbia. In 1996, in response to a provision of the National Marine Fisheries Service's Proposed Recovery Plan, EPA notified the Corps that persistent high temperatures in the mainstem of the Columbia and Snake Rivers violated the Clean Water Act.

[350] Section 7 of the Endangered Species Act, 16 U.S.C. § 1536(a)(2), requires federal agencies proposing to take action that may adversely affect a listed species to consult with the relevant federal fish and wildlife agency (the National Marine Fisheries Service in the case of salmon) to ensure that the proposed action is not likely to jeopardize the continued existence of the species or its critical habitat. As part of the consultation process, the Fisheries Service must issue a biological opinion detailing how the proposed action would affect the species. If the Service believes the action would jeopardize the species, it must suggest "reasonable and prudent alternatives" that would avoid jeopardy. 16 U.S.C. § 1536(b)(3)(A).

[351] National Marine Fisheries Service, *Biological Opinion of 1993 Operation of the Federal Columbia River Power System* (May 26, 1993).

[352] National Marine Fisheries Service, *Factors For Decline: A Supplement to the Notice of Determination for Snake River Spring/Summer Chinook Salmon Under the Endangered Species Act* 37-38 (1991).

Salmon. The opinion also endorsed the *Strategy for Salmon* measures, including additional water from the Snake River Basin.

4. Implementing the Biological Opinions and the *Strategy for Salmon*

a. Interstate Water Issues.—The *Strategy for Salmon* called on the region's state water managers to address a variety of interstate water issues, particularly whether and how water secured in the Snake River Basin for salmon flows could be protected from downstream diversion. To respond to the Council's request, the managers initiated several processes. First, they formed a "Water Resources Interstate Agreement Work Group," the purpose of which was to "formulate consistent and compatible state water policies which balance, on a sustainable basis, the appropriative uses of water and the environmental requirements of the Columbia River Basin."[353] One of the group's aims was to "reach agreements which will contribute to the cooperative management of the waters of the Columbia River Basin, with an initial emphasis on implementation" of the Northwest Power Planning Council's program.

The Interstate Work Group discussions centered in three areas: Using state water-permit processes to protect salmon; locating sources of water for salmon in the Snake River Basin, relying on nonstructural water alternatives; and developing an interstate agreement governing water use.

Using water-permit processes to protect salmon. The states' primary responses to the Council's request that water permit processes be used to protect salmon was to enact various forms of moratoria on new water diversions.[354] Idaho imposed a moratorium on all new diversions from the Salmon River Basin to avoid harm to salmon. It also closed the Snake River to new diversions because of a multi-year drought.[355] The Idaho moratoria applied to all new diversions, regardless of whether they were filed before or after the Endangered Species Act listings. Oregon imposed a seasonal restriction on new diversions for which applications were filed after the listings.[356] Washington's moratorium also applied only to applications filed

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[353] Water Resources Interstate Agreement Workgroup, *Mission Statement, Principles and Objectives*, May 22, 1992.
[354] *See generally* J. Ellis, "Drafting From an Overdrawn Account: Continuing Water Diversions From the Mainstem Columbia and Snake Rivers," 26 *Env't'l Law* 299, 300-301 (1996).
[355] Idaho Department of Water Resources, *Amended Moratorium Order: In the Matter of Applications for Permits for the Diversion and Use of Surface and Ground Water Within the Eastern Snake River Plan Area and the Boise River Drainage Area* (April 30, 1993).
[356] Or. Admin. R. 690-120(2)(a).

after the listings, and only to the mainstems of the Columbia and Snake rivers.[357] Oregon and Washington both had substantial backlogs of diversion applications, so the moratoria were not expected to cut off all new diversions right away. The Oregon Water Resources Department may issue new diversion permits if: (1) the proposed use is consistent with the Power Planning Council's fish and wildlife program; (2) there is assurance that the water applied for will be there at least 80 percent of the time after satisfying senior priorities, including existing instream flow rights; and (3) the use meets certain "public interest" criteria.[358] In response to a 1994 petition by Oregon WaterWatch, a public interest organization, the Oregon Water Resources Commission adopted special rules for "sensitive" fish. Under those rules, adopted in 1996, no new diversion that may affect species listed as threatened, endangered or "sensitive" (an Oregon Department of Fish and Wildlife categorization) will be approved if it would result in a net loss of essential habitat.[359]

Washington followed a separate process for its tributaries. There, the Department of Ecology put diversion applications on hold while it plotted water availability on maps and asked fish experts to identify tributaries with weak salmon stocks and water problems. It also identified relatively pristine streams with salmon that should be protected. As a result, thirteen high-priority streams were recognized as needing either further instream-flow or water availability studies. Many other streams were being adjudicated, already had instream flow protection, or were not regarded as vulnerable to development. For most of the streams requiring further study, the Department processed diversion applications filed before the Endangered Species Act listings. Oregon developed a similar process for its tributaries. The water managers saw these tributary analyses and measures as a more practical way to ensure water availability than organizing a region-wide water availability assessment, which the *Strategy for Salmon* had envisioned.

Finding instream water in the Snake Basin. The first challenge in finding sources of water for salmon in the Snake River Basin arose not in the work of the Interstate Group, but in an Idaho water transfer proceeding. The *Strategy for Salmon* and the 1993 biological opinion called for 427,000 acre-feet of flow augmentation water from the Snake River Basin. Idaho had some experience in supplying water for salmon, but it was limited. In 1990, fish and wildlife agencies and tribes had reached a settlement with the BPA related to its negotiations with Canada over water in Canadian projects. In a

[357] Wash. Admin. Code 173-563-015 (Columbia), 173-565-040 (Snake).
[358] *See* Or. Admin. R. 690-33-120(1).
[359] WaterWatch of Oregon, *Instream* at 6 (Summer 1996).

Non-Treaty Storage Agreement,[360] United States and Canadian operators addressed control over an additional 2.5 million acre-feet of water not covered by the Columbia River Treaty or prior agreements. Some Columbia River tribes and fish and wildlife agencies, objecting that the agreement might change river operations and harm salmon, sued and subsequently reached a settlement with Bonneville. Among other things, the settlement committed Bonneville to supply one million dollars a year for an experimental program to rent water in the Snake River Basin for salmon flows.[361] The water rental pilot project had given Idaho parties and others some experience with transactional approaches to securing instream water by the time the *Strategy for Salmon* and the 1993 biological opinion were adopted in 1992 and 1993.

Snake River flow augmentation water identified in the Salmon Summit had been provided without incident during the 1991 salmon migration. However, in late 1991 the Idaho Department of Water Resources notified the Bureau that it would have to comply with Idaho water transfer procedures before water could be used to augment salmon flows during the 1992 salmon migration. The Bureau filed a transfer application in early 1992, attracting more than 600 protests.[362] Ultimately, the proceeding was mooted when the Idaho legislature adopted a law approving this water use on a temporary basis.[363] The legislature also approved a memorial to the Power Planning Council endorsing a drawdown strategy and construction of new storage facilities, noting that "in a spirit of regional cooperation we concur that water for flow augmentation may be needed on an interim basis on a willing seller-willing buyer basis. However, our willingness to provide water from Idaho water storage facilities on an interim basis for flow augmentation is specifically conditioned upon there being a comprehensive effort to implement the drawdown strategy . . . ."[364]

At about the same time, the Interstate Work Group organized a Snake River water committee consisting of fish managers, Indian tribes, water users, conservation groups and water managers to develop a work plan and retain an engineering firm to perform a detailed analysis of nonstructural measures, water use efficiencies, water leasing, conjunctive water

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[360] Bonneville Power Administration, *Non-Treaty Storage Agreement with BC Hydro* (1990).
[361] *See* Blumm and Simrin, "The Unraveling of the Parity Promise," 21 *Env't'l Law* at 709, n. 303.
[362] Before the Department of Water Resources of the State of Idaho, *In the Matter of Applications for Transfer Nos. 3883, 3884 and 3885 in the Name of the United States Bureau of Reclamation* (1992).
[363] Idaho Code, sec. 42-1763, 1763A.
[364] 51st Legislature, Second Regular Session, House Joint Memorial No. 17 to the Northwest Power Planning Council et al., by Resources and Conservation Committee (1992).

management and other approaches that could secure at least another one million acre-feet of flow augmentation water in the Snake River Basin. The committee and this objective had been specifically outlined by the Council program. The committee's contractors, Bookman-Edmonston Engineers, consulted with a broad array of water users in communities throughout the Snake Basin. The resulting study, conducted over a two-year period, identified a portfolio of possibilities, ranging from an ambitious and costly conjunctive use program in the Upper Snake Basin, to smaller-scale savings in the Owyhee basin in Oregon, to weather modification projects that might increase runoff. Taken together, these options could produce more than a million acre-feet of water, some at higher cost and lower feasibility than others.[365]

Meanwhile, the Bureau of Reclamation was implementing the Council's 1992-93 fish and wildlife program, which called for the Bureau to acquire water for salmon in the Snake River Basin (the 1993 Endangered Species Act biological opinion and the Council program called for 427,000 acre-feet; in 1994 the Council called for an additional million acre-feet). Following the 1992 Idaho water transfer proceeding, the Bureau began gaining experience in acquiring this water.[366]

To begin with, the Bureau faced a dilemma. Many Snake Basin water users considered use of this water for salmon flow augmentation a waste. This was based on the idea that any flow augmentation water would just spread out over the top of the reservoirs and be of little help to salmon. In truth, this is a problem that confronts virtually any salmon recovery measure: The incremental benefit of any remedial action is almost always small. It is only when the increments accumulate that benefits become significant. But this was not a very satisfying answer for the irrigators with whom the Bureau was dealing. Apart from the issue of biological merit, the Bureau faced adamant legal arguments on both sides. Some water users contended their water rights and contracts were supreme. Some tribes contended that the Bureau had a trust obligation to provide water for salmon before providing water for irrigation. Some environmentalists contended that the Endangered Species Act trumps irrigation rights.[367]

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[365] Bookman-Edmonston Engineering, Inc., *Report of the Snake River Basin Water Committee, Water Management Opportunities Within the Snake River Basin, Oregon and Idaho* (July 1994).

[366] Much of the following discussion is drawn from a very useful 1996 speech by Rich Rigby, the Bureau's Water Acquisition Specialist, which is summarized in a paper entitled "Acquiring Water for Flow Augmentation" (on file with the author).

[367] *See, e.g.*, M. Estes, "The Effect of the Endangered Species Act on State Water Rights," 22 *Env. L.* 1027 (1992).

Amid rumors that federal lawyers believed federal obligations superseded water rights, and faced with what the Department of Interior perceived as "the specter of an all-out fight over authority in the face of serious declines in salmon runs,"[368] Interior Secretary Bruce Babbitt assured Idahoans that Interior would look for water through voluntary transactions, not condemnation.[369] The Bureau also determined that it would seek the water only in accordance with state law, for two reasons. For one thing, state water law and administration would be the best way to protect any water that was acquired. For another, the Bureau judged that complying with state law would, over the long term, promote wider consensus over providing water for salmon.[370]

Finding this water proved to be anything but straightforward. The Bureau's primary sources were to be uncontracted space in Bureau reservoirs, rental water from the Idaho water banks, and storage space the Bureau planned to reacquire from water users. However, in the drought years of 1993 and 1994, these sources were inadequate. The Bureau had to resort to unused "power head space" in several different reservoirs. By 1995, when the Bureau and the National Marine Fisheries Service were consulting over Endangered Species Act compliance, the Bureau was adamant that finding anything more than 427,000 acre-feet was unrealistic. Not only was the experience of the two prior years discouraging, but the Bureau expressed concerns that state water agencies would balk.[371] The Fisheries Service's 1995 biological opinion said that 427,000 acre-feet would avoid jeopardy to the salmon, more should be provided if possible, but acquisition should only be from willing sellers and in accordance with state law.

These are the basic terms of Reclamation's Snake River water acquisition program. The Bureau's experience implementing the program is characterized in Table 2:

[368] Rigby, "Acquiring Water for Flow Augmentation" at 4.
[369] Letter of April 1, 1994 to Hon. Larry Craig from Daniel P. Beard, Commissioner of Reclamation, and Rollie Schmitten, National Marine Fisheries Service, quoted in Rigby, "Acquiring Water for Flow Augmentation" at 4, note 3.
[370] Rigby, "Acquiring Water for Flow Augmentation" at 11.
[371] February 10, 1995 letter from John Keys, Bureau of Reclamation to National Marine Fisheries Service and U. S. Fish and Wildlife Service, cited in Rigby, "Acquiring Water for Flow Augmentation" at 5, note 4.

Table 2 [372]

	1991	1992	1993	1994	1995	1996
Upper Snake						
USBR space	15,000		206,617	285,954	22,396	22,896
Rentals	84,000		65,000	44,325	232,839	194,667
Subtotals	99,000		271,617	330,279	255,235	217,563
Payette						
USBR space	28,874	90,000	95,000	61,883	94,242	95,000
Rentals	73,651		34,971		50,758	56,300
Subtotals	102,523		129,971	61,883	145,000	151,300
Boise						
USBR space			23,000	35,950	35,000	38,000
Rentals					2,000	
Subtotals			23,000	35,950	27,000	38,000
Oregon Natural Flows						
Skyline						20,073
OR Wtr Trust						64
Subtotal						20,137
Grand Totals	201,525	90,000	424,588	428,112	427,235	427,000

In putting these transactions together, the Bureau cited a number of lessons: Decisions had to be made about whether to treat an acquisition as akin to a land title acquisition (logical for acquiring a natural flow right) or a contract matter (logical for reacquiring a storage right). The Bureau learned that few title companies will ensure title to water rights; a special arrangement had to be worked out with a Texas title company. Paths had to be found between the requirements of state law and federal law, including U.S. Department of Justice regulations. Conventions had to be developed for valuing water, which varied with the type of right acquired. Further water-transfer proceedings had to be initiated. In contrast to the 1992 transfer process, only 90 protests were filed in later transfer proceedings. Again, the Bureau and the protesters reached a settlement that led to state legislation authorizing such transactions through 1999.

Protecting interstate water. When the Council asked the water managers to explore an interstate compact, it was concerned with how the states could protect additional flows for salmon and against new consumptive water uses. This turned out to be a question for which the water managers had no ready answer. They could see ways to ensure that water secured by a lease or purchase was not diverted at some place downstream, as complicated as that could be. But the harder problem was fitting such protections into long-term

[372] Rigby, "Acquiring Water for Flow Augmentation" at 3.

water management. How could they ensure, in effect, that "protected" water would not be riding on a river that was gradually being depleted by new diversions over a period of decades? The Interstate Work Group agreed that it could not protect this water without an interstate water agreement, and perhaps by permanently closing the rivers to further appropriation. However, there was continuing uncertainty about mainstem flow objectives in the Snake. The amount required would depend in part on the outcome of the drawdown debate. Accordingly, some of the managers saw little point in taking the interstate water discussions further. With temporary moratoria in place to protect against additional depletions, further action could wait.

Uncoordinated state policies continue to be a problem in protecting water secured for salmon. An illustration arose in 1996 with the Skyline Farms transaction noted in the Bureau table above. The Environmental Defense Fund, Bonneville, the Bureau of Reclamation and others put considerable time and energy into a water rights transfer of water owned by Skyline Farms on Oregon's Malheur River. The Malheur feeds the Snake River as the Snake becomes the Oregon-Idaho border. From there, the Snake passes through eastern Washington and then heads west, where it forms the Washington-Oregon border. Along the way, there are ample opportunities to test the states' ability to protect instream water. The Skyline Farms transaction began as a lease option between the farm owners and BPA in 1994, brokered by the Defense Fund. In 1996, the Bureau of Reclamation agreed to pay the cost of purchasing the water rights to help meet its commitment to supply 427,000 acre-feet from the Snake River Basin.[373] The Oregon Water Resources Department is in the process of approving the transfer. If it occurs, it could be one of the more significant water marketing demonstration projects in the region.[374]

The efficacy of the transaction was called into question by a development with roots in the early 1960s. The State of Oregon had leased 93,000 acres of land to the Boeing Corporation in 1963. The land lies along the Columbia River near Boardman, Oregon. Between 1971 and 1985, a Boeing agricultural subsidiary acquired nine water use permits to develop 63,000 acres of this land, of which about 28,000 acres were actually developed. Controversy erupted in 1995, when the Oregon Water Resources Department extended the time in which Boeing could perfect a water right application to

[373] Bureau of Reclamation, U. S. Department of the Interior, *Subject: Scoping of Issues—Proposed Purchase of Natural Flow Rights From Skyline Farms for Snake River Salmon Flow Augmentation* (July 3, 1996).
[374] Willey and Diamant, "Water Marketing in the Northwest," 10 *Water Strategist* at 18.

develop the remaining 35,000 acres of undeveloped land.[375] The Boeing land is downstream of the Malheur River, which would soon be carrying water from the conversion of Skyline Farms to dry-land farming. WaterWatch of Oregon sued the Water Resources Department. Upper Snake Basin irrigators notified the Oregon Department that they would "be extremely hesitant to cooperate further with the Bureau of Reclamation in providing water for future years if the water will simply be used to facilitate development downstream."[376] Because the diversion would require a Corps of Engineers dredge-and-fill permit, the National Marine Fisheries Service and the Corps began an ESA consultation on the matter. Recently the Fisheries Service ruled that the Corps could not issue the permit if the new water withdrawal would diminish fish flows (see section IV.F.7, "State Water Moratoria and the *Inland Lands* Biological Opinion," below). The controversy, which is still brewing, underscores the obdurate issues that face interstate water transactions that are part of species recovery programs.[377]

b. Mainstem and Headwater Storage Measures.—The *Strategy for Salmon* also called for a number of evaluations. One of the matters that had long vexed the Council was that scientific data concerning the biological benefits of flow augmentation were unsatisfactory. The data simply were not very good and, while the flow-survival connection was intuitively logical, the Council was uncomfortable relying solely on intuition and judgment. In 1993, the Council commissioned an independent review of the data by a scientist outside the region, who concluded that the data, while limited, showed "the general relationship of increasing [salmon] survival with increasing flow."[378]

Immediately following this report, in the spring and summer of 1994, the Council conducted an administrative rulemaking to put its mainstem program on an explicitly experimental "adaptive management" footing. The process was prompted by continuing controversy over the relative biological value of augmenting flow and leaving juvenile fish to migrate down river

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[375] WaterWatch of Oregon, *Instream* at 5 (Summer 1996); and WaterWatch of Oregon, *Background Information on Boeing's Water Permits and Land Leases*.

[376] Letter from Don Kramer, Chairman, Committee of Nine, to Martha Pagel, Director, Oregon Water Resources Department, April, 1996.

[377] For further discussion of the multi-jurisdictional and constitutional issues raised by the Skyline Farms proposal, *see* Carpenter, *Enforcement of Instream Water Rights*, Northwest Water Law and Policy Project, Study, Paper No. 3, at 10-12 (May 1995) (noting that enforcement of state-based instream rights in the mainstem rivers of the Columbia Basin may be difficult without sophisticated measuring capability and an interstate compact or equitable apportionment).

[378] G. Cada, *et al.*, *Review of Information Pertaining to the Effect of Water Velocity on the Survival of Juvenile Salmon and Steelhead in the Columbia River Basin*, (Oak Ridge National Laboratory, February 1994).

versus loading them into barges and transporting them downstream.[379] To address the controversy, the Council convened two scientific workshops, where areas of scientific agreement and disagreement were discussed. Hypotheses were developed to clarify the assumptions underlying each approach. In this so-called "mainstem hypothesis" rulemaking, the Council called for a technical committee with broad expert participation to develop approaches to test the hypotheses. The hypotheses laid important groundwork for the Council's evaluation of further mainstem measures for the Council's 1994 program amendments.

Five other evaluations were conducted to clarify choices in the mainstem. First, the Corps did an extensive series of drawdown studies as part of a National Environmental Policy Act process concerning operation of the mainstem dams. To provide non-federal parties with assurance that the Corps' studies overlooked nothing important, the Council chartered a drawdown committee with representatives of fish and wildlife agencies, tribes, utilities and others, staffed by an engineering firm, to review the Corps' work.[380] Second, the Interstate Work Group, the Snake River Water Committee and a contractor had completed their analysis of nonstructural alternatives for supplying another million acre-feet from the Snake River Basin (discussed above). Third, the Bureau of Reclamation completed a study identifying eleven potential water storage sites in the Snake Basin.[381] Some of these possibilities would impound free-flowing tributaries, while others would be off-stream pumped storage sites that could store surplus water in better water years, to be released for flow augmentation when salmon need it. Fourth, the Council asked the Environmental Defense Fund to develop a cost-effectiveness methodology for comparing mainstem measures. The resulting study put the costs of drawdowns, nonstructural measures and new storage in comparable economic terms, and ranked each alternative according to its cost and contribution to increased flow velocity.[382] The study concluded that various land-fallowing alternatives would be the most advantageous economically, but drawdowns would produce the biggest gains in river velocity.

Finally, as more aggressive salmon measures were adopted, questions were raised regarding effects on other species. Libby and Hungry Horse reservoirs in Montana and Grand Coulee reservoir in north-central Washington, for

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[379] *See* Northwest Power Planning Council, *Meeting Summary, Flow/Velocity Workshop*, February 22-23, 1994; *Meeting Summary, Workshop II*, June 17, 1994.
[380] Harza and Associates, *Review of Reservoir Drawdown, Final Report to the Northwest Power Planning Council Columbia/Snake Drawdown Committee* (April 1994).
[381] U. S. Bureau of Reclamation, *Snake River Basin Storage Appraisal Study* (January 1994).
[382] The Environmental Defense Fund, *Water for Salmon: An Economic Analysis of Salmon Recovery Alternatives in the Lower Snake and Columbia Rivers* (April 1995).

example, are in areas that either never had salmon or no longer have salmon because of dam blockages. When asked to contribute water to augment salmon flows, people in these areas balked. Tribes in upriver areas have not pressed their interests in court as lower river tribes have, but they have significant interests in resident fish and wildlife that inhabit the upriver reservoirs. In many cases, these resident fish populations were all the tribes had left after salmon were blocked by dams from reaching upriver areas, and the loss was considerable. As one tribal member put it:

> *I feel even though we have been moved from one part of the Columbia River to another part, we had some happiness and we knew that we could live because we had a food supply. When 'progress' came and the dams were built, progress did not come to the Indian people. It just destroyed our food sources and it took the purity out of the water, because when water sits it gets stale. And we've lost the fish; there was nothing provided for them to continue to the areas where they naturally spawned.*[383]

The dams' effects in other upriver areas had not been so catastrophic, but upriver storage reservoirs had been yo-yoed up and down by power and flood-control drafting over the years. These effects were somewhat easier for local areas to accept because power generation and flood control benefitted areas neighboring the reservoirs. However, salmon flow releases have no immediate benefit for upriver areas; they only raise concerns. Big "bath tub rings" exposed by reservoir releases had grown and become persistent through seven years of drought and the expanding program of salmon flows on the mainstem.

To address these concerns, BPA, the Bureau of Reclamation, the Confederated Salish-Kootenai Tribes, the Corps of Engineers, the Montana Department of Fish, Wildlife and Parks, the Northwest Power Planning Council staff and others worked over the course of seven years to develop "integrated rule curves" to govern the operation of two of the headwater reservoirs.[384] The integrated rule curves started out as operational rules designed to protect resident species in and around these headwater reservoirs by limiting the frequency and duration of deep drafts from the reservoirs. Limiting these drafts is intended to protect food supply, optimize water temperatures and ensure tributary passage for fish, including species

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[383] Lucy Covington, Colville Tribal Council, in Pacific Northwest River Basins Commission, *It's Everyone's River . . . Story of the Columbia*, transcript of proceedings at 10 (October 1, 1975).

[384] For a description of this process, *see* B. Marotz, C. Althen and W. Lonon, *Model Development to Establish Integrated Operational Rule Curves for Hungry Horse and Libby Reservoirs, Final Report* (Bonneville Power Administration Project No. 83-467, January 1996).

that either are or appear to be headed for Endangered Species Act protection on their own. Over a period of years, these rules were adjusted to attempt to better integrate them with hydropower and other operational needs. This work also was completed by mid-1994.

c. Water Conservation Pilot Projects.—In many watersheds, government agencies such as the Bureau of Reclamation and the Natural Resources Conservation Service, local soil and water conservation districts, state water agencies and others have supplied important technical expertise to increase efficiency in water uses. The Bureau of Reclamation's pilot water conservation project is an example. The Strategy for Salmon called on the Bureau to plan and implement tributary water conservation demonstration projects to help salmon. One purpose of the measure was to learn more about whether and how water conservation could help fish. Another purpose was to see whether local landowners and agencies could implement such measures cooperatively, especially in concert with other watershed initiatives.

By 1996, the Bureau had gained substantial experience with these measures. Demonstration projects were implemented in the Wallowa and John Day rivers in Oregon, the Lemhi in Idaho and the Yakima in Washington. Each set of projects was shaped by factors unique to each area. In the John Day River, for example, there are a number of "push up" dams, temporary dirt and gravel diversion dams that ranchers push into rivers with bulldozers. Very often, the material for the dam is scraped from the river channel itself. A single ranch may require several such dams to irrigate different fields. These temporary dams don't damage stream habitat just once; they may wash out several times each year, releasing sediment downstream and requiring replacement dams that multiply the damage. When they are not washing out, diversions take water in unlined ditches to fields some distance from the stream, so that the diversion has to be big enough to account for large conveyance losses. Water is spread over fields, where it warms up, picks up chemicals, drains into drainage ditches and returns to the stream. In their demonstration projects, the Bureau, soil and water conservation districts and others worked with ranchers to replace "push up" dams with pumps or permanent diversion structures that wouldn't wash out. Open ditches were replaced with closed pipes, and pipe drainage systems were installed to reduce conveyance losses and warming. The permanent dams do not wash out, pose less of an obstacle to fish, allow more precise diversions, and carry less soil and chemicals back to streams. Pipe drainage systems provide cooler return flows to streams.

The concern about these projects is similar to the concern expressed about the Umatilla and Yakima watershed efforts: what assurance is there that they will restore streamflows, and not simply free up water for more irrigation? At the same time, however, these pilot projects have benefits even if they don't leave more water in rivers. They can remove barriers to migrating fish, help avoid destructive push-up dams, and produce cooler return flows. The concern over stream flows merits attention, but these projects still make a valuable contribution to tributary restoration efforts.

5. Litigation

Although much of the work called for by the *Strategy for Salmon* had been accomplished, in other ways neither the biological opinion nor the *Strategy for Salmon* fared well. In response to a challenge filed against the National Marine Fisheries Service's 1993 biological opinion,[385] a federal court faulted the biological opinion and sent it back for further work. The holding of the case was technical, based on the court's finding that the Fisheries Service had used the wrong baseline from which to measure the species' decline and had inexplicably relied on optimistic assumptions about the merits of mitigation measures. The court did not stop at technical defects, however, and added far-ranging observations on the underlying substantive issues:

> *[The biological opinion is] seriously, 'significantly' flawed because it is too heavily geared towards a status quo that has allowed all forms of river activity to proceed in a deficit situation, that is, relatively small steps, minor improvements and adjustments, when the situation literally cries out for a major overhaul. Instead of looking for what can be done to protect the species from jeopardy, NMFS and the action agencies have narrowly focused their attention on what the establishment is capable of handling with minimal disruption.*[386]

The court also counseled the federal parties to open up the closed process in which the biological opinion had been developed, to ensure that state fish and wildlife agency and tribal scientists were heard: "The underlying root of the litigation problem is the feeling of these parties that the federal government is simply not listening to them."[387] The court noted that the ESA imposes an

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[385] *Idaho Department of Fish and Game v. National Marine Fisheries Service, et al.*, 850 F. Supp. 886 (D. Ore. 1994). The case was dismissed as moot on appeal in light of the fact that a new biological opinion already had been developed at the time of the court's opinions. *Idaho Department of Fish and Game v. National Marine Fisheries Service*, 56 F.3d 1071 (9th Cir. 1995).
[386] Id. at 36.
[387] Id., at 36-37.

obligation on the Fisheries Service to consider data from well-qualified fish and wildlife agency and tribal biologists.[388] Following the opinion, the federal parties organized a large-scale consultation process with the states and tribes to reanalyze the technical merits of the biological opinion.

The Council was the next to feel the courts' sting. In *Northwest Resource Information Center v. Northwest Power Planning Council,*[389] a federal court of appeals found that the *Strategy for Salmon* too was procedurally flawed. Again, the procedural holding was accompanied by expansive *dicta,* including an interpretation of the Northwest Power Act under which the Council should give "a high degree of deference" to the fish and wildlife agencies' and tribes' judgments on fish and wildlife mitigation. The court also criticized the scope of the Council's action: "The Council's approach seems largely to have been from the premise that only small steps are possible, in light of entrenched river user claims of economic hardship."[390]

The litigation went beyond river operations. In *Pacific Northwest Generating Cooperative v. Brown,*[391] the federal court of appeals held that utility and industrial groups had standing to challenge Endangered Species Act processes affecting fish harvest, land management and hatchery operations. Simultaneously, however, the court held that the industry claims were moot. In *Pacific Rivers Council v. Thomas,*[392] and *Pacific Rivers Council v. Intermountain Forest Industry Association,*[393] courts held that the U. S. Forest Service must consult under the Endangered Species Act on its land resource management plans. Until consultations occurred, various activities, including timber sales, grazing and road building, were enjoined. The injunctions were dissolved when the National Marine Fisheries Service's biological opinion on habitat management was issued in early 1995, and the U. S. Supreme Court declined to review the matter.[394]

Litigation added another conservation tool in a 1994 decision from the Supreme Court of the State of Washington. In *PUD No. 1 of Jefferson County v. Washington Department of Ecology,*[395] the U. S. Supreme Court

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[388] Id., citing 16 U.S.C. § 1536(2) (agency "shall use the best scientific and commercial data available").
[389] 35 F.3d 1371 (9th Cir. 1994).
[390] 35 F.3d at 1395.
[391] 38 F.3d 1058 (9th Cir. 1994), reversing 822 F. Supp. 1479 (D. Ore.)
[392] 30 F.3d 1050 (9th Cir. 1994).
[393] Civ. No. 94-0159-S-HLR (D. Idaho 1994).
[394] A newspaper reported that the Service's biological opinion on habitat management, issued in the spring of 1995, had been softened at the request of the U. S. Justice Department in an effort to strengthen the government's position in the *Pacific Rivers* cases. *See* Laatz, "Documents fault salmon decision," *The Oregonian*, April 21, 1995.
[395] 114 S. Ct. 1900 (1994).

decided that states may deny water quality permits to hydropower projects based on their salmon impacts. In effect, the lack of flow to support an existing salmon population is a form of pollution, the court held. Based on this ruling, American Rivers and other conservation groups petitioned the Washington Department of Ecology to protect streams from diversions and restore "flow-impaired" streams. To protect streams, American Rivers argued, the Department should implement metering programs, and develop model flow restoration plans.[396] The Environmental Protection Agency, the Washington Department of Ecology and American Rivers have since then developed criteria for listing "flow-impaired" streams, and gathered data for listings. In June 1996, Washington listed 48 streams as flow impaired; Oregon listed 55; and the Environmental Protection Agency has listed 192 in Idaho.[397] The next question is what measures can be adopted to address these flow problems.

6. New Council, NMFS and Tribal Programs

Bolstered with the evaluations called for by the *Strategy for Salmon* and spurred by a rebuke from the court, the Council completed an extensive revision of its fish and wildlife program in December 1994, three months after the *Northwest Resource Information Center* ruling.[398] To respond to the court's procedural criticisms, the Council took care to explain how the program responded to fish and wildlife agency and tribal recommendations. Substantively, the new program endorsed recommendations calling for reservoir drawdowns at two projects and a 1.3 million acre-feet expansion in the flow augmentation program for the Columbia River, among other things. These measures were put in an experimental context: Building from the Council's "mainstem hypotheses" rulemaking, each measure would figure in a head-to-head comparison of the survival of fish that are transported by barge and fish that are left in the river. Cutbacks in the juvenile fish barging program were justified in part by experimental design requirements. In this manner, the Council proposed to implement major changes in the mainstem of the river without ignoring the underlying scientific uncertainties. To address concerns about resident fish, the Council adopted integrated rule curves for Montana's storage reservoirs and called for the development of similar rule curves at other storage reservoirs.

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[396] Letter from Katherine Ransel, American Rivers, to Mary Riveland, Washington Department of Ecology, October 22, 1996. *See also* K. Ransel, "The Sleeping Giant Awakens: *PUD No. 1 of Jefferson County v. Washington Department of Ecology*," 25 *Env't'l L.* 255 (1995).

[397] Personal communication from Katherine Ransel, American Rivers, April 21, 1997.

[398] Northwest Power Planning Council, *Columbia River Basin Fish and Wildlife Program* (December 1994).

The Council's membership changed in January 1995. The new Council was unfamiliar with the reasoning underlying the controversial 1994 program, and in some cases represented different governors than those in office in 1994. Accordingly, it called for a scientific review of the 1994 program to see if it was founded on good science. The review was conducted by the Independent Scientific Group, a respected group of scientists without institutional affiliation to the program. Meanwhile, an industry lawsuit challenging the 1994 program was filed, but then abandoned.[399]

While the Council was at work, the National Marine Fisheries Service had initiated two processes under the Endangered Species Act. First, in 1992 it had appointed a recovery team to develop recommendations for a recovery plan.[400] In a departure from usual Endangered Species Act practice,[401] the team operated almost autonomously, issuing draft recommendations for public comment, publishing final recommendations,[402] lobbying for them in Congress and elsewhere, and later criticizing the Fisheries Service's draft recovery plan. The Service used the Team's recommendations to develop a proposed recovery plan, released in March, 1995. The proposed plan is an ambitious document, addressing not only the mitigation needs of salmon, but also proposing an institutional structure in which the Service would assume responsibility for coordinating a wide array of recovery actions.[403] In substantive areas, the proposed plan incorporated the biological opinions the

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[399] The amendments initially were challenged by the Idaho Power Company, which operates the Hells Canyon dams on the Snake River. A coalition of aluminum companies and other industrial interests moved to intervene in support of Idaho Power's challenge, while the Yakama Indian Nation and a coalition of environmental fishing organizations moved to intervene in support of the Council. After taking a closer look at the Council's record and the intervenors, Idaho Power withdrew its challenge.

[400] The Service is authorized to retain help from outside the agency, and may form "recovery teams" to provide advice on recovery plan development and implementation, 16 U.S.C. § 1533(f)(2). Team recommendations are purely advisory. See U. S. Fish and Wildlife Service, *Policy and Guidelines for Planning and Coordinating Recovery of Endangered and Threatened Species*, May 1990, p. II-1. Notwithstanding their advisory function, the Act provides that recovery teams are not subject to the Federal Advisory Committee Act (16 U.S.C. § 1533(f)(2)).

[401] Under U. S. Fish and Wildlife Service guidelines, recovery team draft plans do not represent the position of the agency; recovery teams may or may not be asked to prepare final recovery plans; without the approval of the agency, recovery team members may not seek to influence agency policy outside agency channels; and recovery plans are final only when they are adopted by the agency (U. S. Fish and Wildlife Service, Policy and Guidelines for Recovery Planning and Coordinating Recovery of Endangered and Threatened Species, Appendix II: Organizing the Recovery Effort: Roles and Options. *See also* National Oceanic and Atmospheric Administration, National Marine Fisheries Service Office of Protected Resources, *Recovery Planning Guidelines*, at 3 (October 1992)).

[402] Snake River Recovery Team, Final Recommendations to the National Marine Fisheries Service (May 1994).

[403] National Marine Fisheries Service, Proposed Recovery Plan for Snake River Salmon (March 1995).

agency had previously issued for all stages of the salmon life cycle: habitat, hydropower operations, harvest and hatcheries. In tributaries, the plan described "habitat conditions such as lack of pools, high water temperatures, water chemistry, low flows (often associated with water withdrawals and diversions), poor overwintering conditions for juvenile salmon, and high sediment loads."[404] It called for "[a]n ecosystem-based approach that considers entire watersheds and river subbasins," focusing particularly on protecting riparian areas and restoring instream flows and other essential habitat requirements on federal lands.[405] The plan also incorporated hydropower operation standards from a longer term (1994-1998) biological opinion, which was issued simultaneously.

Next, the National Marine Fisheries Service developed a 1994-1998 hydropower biological opinion in a process intended to respond to the ruling in *Idaho Department of Fish and Game v. National Marine Fisheries Service.* Over the course of several months, federal agencies, state fish and wildlife agencies and tribes met to develop biological requirements to guide flow operations. The resulting biological opinion was, for the first time, a "jeopardy" opinion: hydropower operations would jeopardize listed populations unless a "reasonable and prudent alternative" operation were implemented.[406] The reasonable and prudent alternative called for even more storage water to be used for flow augmentation in the Columbia, continued reliance on barging, and a variety of other measures. It proposed to defer a decision on reservoir drawdowns until 1999. The biological opinion's consideration of resident fish impacts was limited. It was developed in coordination with the U. S. Fish and Wildlife Service, however, which has Endangered Species Act jurisdiction over resident species.[407]

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[404] National Marine Fisheries Service, Proposed Recovery Plan for Snake River Salmon at V-1-2.

[405] National Marine Fisheries Service, Proposed Recovery Plan for Snake River Salmon at V-1-7, V-1-9.

[406] Section 7 of the Endangered Species Act requires federal agencies proposing to take action that may adversely affect a listed salmon species to consult with the relevant federal fish and wildlife agency (the National Marine Fisheries Service) to ensure that the proposed action will not jeopardize the continued existence of the species or its critical habitat. As part of the consultation process, the Fisheries Service must issue a biological opinion detailing how the proposed action would affect the species. If the Service believes the action would jeopardize the species, it must suggest "reasonable and prudent alternatives" that would avoid jeopardy. See 16 U.S.C. § 1536(b)(3)(A).

[407] Kootenai River white sturgeon, which are listed as endangered, affect operations at Montana's Libby Dam. See 59 *Fed. Reg.* 45989 (Sept. 6, 1994). Snail species that inhabit hot springs in central Idaho also are listed and can affect Snake River flow operations; bull trout have been the subject of listing petitions, which the U. S. Fish and Wildlife Service has found warranted but precluded by its other priorities.

There were many similarities between the Fisheries Service's biological opinion and the Council's 1994 program, but there were also important differences. The Council's 1994 program emphasizes solutions for Snake River fish in the Snake River Basin. Not only does the program call for Snake River reservoir drawdowns, but it proposes to use hydropower revenues to fund Snake River water leases, water conservation and other measures that could leave an additional million acre-feet in the Snake River for salmon. In contrast, the biological opinion offers a limited endorsement of these measures. Instead, it relies more heavily on barging juvenile fish out of the Snake River and augmenting Columbia River flows. It establishes no specific target for additional water from the Snake River Basin for flow augmentation.

In April, 1997, the same federal judge who had thrown out the Fisheries Service's 1993 biological opinion rejected challenges to the Service's revised biological opinion. In *American Rivers v. National Marine Fisheries Service*,[408] environmental groups argued that the Fisheries Service's new biological opinion was arbitrary and capricious and that, even if the opinion passed muster, the federal agencies had not implemented the biological opinion's reasonable and prudent alternative. The court rejected the challenge. On the biological opinion's adequacy, the court observed that the new biological opinion was significantly different from the opinion the court had struck down, particularly in acknowledging the need for substantial change in the configuration of the Columbia River dams: "NMFS has concluded that without major modifications to the Snake and Columbia River dams, it is unlikely survivals can be sufficiently improved to ensure that the operation of the FCRPS [Federal Columbia River Power System] does not impede the survival and recovery of listed Snake River salmon."[409] Absent this finding, the court would have faced a very different issue. The court also found that the Service had significantly altered its jeopardy analysis based on its consultations with the parties, state and tribal fish analysts, and independent peer review. The court rejected technical challenges to the Service's analysis, emphasizing the court's obligation to defer to the Service's evaluation of risk to the species:

> *[T]he scientific data and analysis available for these listed species is complex and poses questions for which there are currently no complete answers. . . . The fact that NMFS selected the least attractive option from the states and tribes point of view does not make the decision an arbitrary or capricious one; the ESA requires consideration of the best scientific*

[408] *American Rivers, et al. v. National Marine Fisheries Service, et al.*, Civil No. 96-384-MA (D. Ore., April 3, 1997).
[409] *American Rivers, et al. v. National Marine Fisheries Service,* slip opinion at 11, 23.

> *information available, it does not require that federal agencies select the 'best' conclusions among a range of options which even the plaintiffs conceded at oral argument are not driven by scientific considerations. . . . I find that NMFS' selection of an acceptable probable recovery range is largely a question of policy rather than science as it necessarily depends upon the agencies' comfort level for risk tolerance. No further explanation of this recovery standard is required under the law.*[410]

The court's opinion is likely to be only a respite in Endangered Species Act litigation on the Columbia. The same group of environmental plaintiffs plans to challenge the Bureau of Reclamation's failure to consult under the Endangered Species Act regarding the effects of the Bureau's Snake River projects, and the Federal Energy Regulatory Commission's failure to consult on the operations of the Idaho Power Company's Hells Canyon projects. Nor is the field going to be left to environmental plaintiffs. With the U. S. Supreme Court's opinion in *Bennett v. Spear*,[411] a coalition of industry groups has mounted what promises to be a spirited assault on the Endangered Species Act process.

Meanwhile, not fully satisfied with the Council program or the National Marine Fisheries Service plan, the Columbia River treaty tribes undertook their own planning process, issuing a draft plan in May 1995. While the plan was not developed pursuant to a specific statute, the tribes characterized it as "a foundation for the United States and its citizens to honor their treaty and trust obligations to the four tribes."[412] The plan's introduction explained the tribes' view of the problem:

> *Much of what is recommended to benefit salmon is what has been needed for a long time and what many have known was needed. More than 50 years ago, federal biologists warned that the consequences of continuing habitat degradation and additional hydroelectric development would be devastating to salmon populations. They were joined by tribal leaders and, over the years, by government commissions and citizen groups.*
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> *However, until the enactment of the Pacific Northwest Electric Power and Conservation Act of 1980 and its fish and wildlife program, there was no comprehensive salmon restoration for the Columbia Basin. Had Northwest Power Planning Council's salmon plans been implemented, the people of the Northwest would not be facing a salmon crisis as today's.*

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[410] *American Rivers, et al. v. National Marine Fisheries Service,* slip opinion at 11, 24.
[411] 1997 WestLaw 11956 (March 19, 1997).
[412] Wy-Kan-Ush-Mi-Wa-Kish-Wit: The Columbia River Anadromous Fish Restoration Plan of the Nez Perce, Umatilla, Warm Springs and Yakama Tribes at 1-2 (Review draft, 1995).

> *It was known then that passage conditions in the mainstem Columbia River were inhospitable to salmon. Yet changes in river operations were minute especially given the prevailing drought conditions. It was also known that many salmon runs and stocks had declined to such an extent that their best hope was the application of artificial production strategies. But hatcheries were eschewed without regard to the best available science. Instead, some of the stocks that might have been helped by enactment of fish program measures became listed under the Endangered Species Act.*[413]

Like the National Marine Fisheries Service Recovery Plan, the tribal plan addresses a range of issues, including institutional structures, economic considerations, and a spectrum of measures to help salmon. The plan called for one to three million acre-feet of water from the Upper Snake, water to meet ambitious flow targets in the Columbia, year-round reservoir drawdowns at several projects, and termination of the salmon barging program. Additional water withdrawals from salmon tributaries would be prevented, water meters would be required, and water rights enforced. Because the tribes are skeptical that habitat restoration alone can save declining wild populations, hatchery-produced fish would be planted in the wild, with the hope that naturally-spawning populations would be reestablished in recovering habitat.[414]

So, the Northwest now has three major salmon restoration plans: the Council's, the National Marine Fisheries Service's, and the treaty tribes'. The three plans differ in key respects regarding the merits of fish barging, the balance between providing water for salmon and protecting fish in upriver reservoirs, water contributions from the Snake River Basin, and the risks and benefits of hatcheries.[415] The Council's and the Fisheries Service's are mandated by statute, while the tribes' plan embodies their view of treaty requirements. But the three plans also have much in common. All three portray a salmon ecosystem that is in trouble from its headwaters to the ocean; dedicate a high volume of water to the river for salmon flows; call for serious limits on water withdrawals from tributaries; and emphasize that these measures can work only if they are part of an effort that encompasses the entire ecosystem.

7. State Water Moratoria and the *Inland Lands* Biological Opinion

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[413] Wy-Kan-Ush-Mi-Wa-Kish-Wit at 1-2.
[414] *See,* e.g., Wy-Kan-Ush-Mi-Wa-Kish-Wit at 5B-21.
[415] *See* M. Blumm, "Columbia Basin Salmon and the Courts: Reviving the Parity Promise," 25 *Env't'l Law* 351, 362 (discussing differences between the Council and NMFS plans).

In mid-1997, two developments pulled river policy in opposite directions. One was legislation in the State of Washington that lifted the state's moratorium on processing new water diversion permit applications from the Columbia's mainstem.[416] Washington's newly-elected Governor Locke wrote to Idaho's Governor Batt promptly after the legislation's enactment to say that although Governor Locke would sign the new legislation, "the State of Washington will not process any pending or future applications for new appropriations until instream flows are established and a determination is made that water is available for withdrawal. . . Washington will not make decisions for new appropriations that would jeopardize regional salmon recovery efforts, or undermine your state's conservation efforts to add to stream flows in the upper Snake River basin."[417] Governor Locke also suggested that the states renew efforts to coordinate interstate water issues.

Almost simultaneously, the National Marine Fisheries Service issued a new Endangered Species Act biological opinion on the Boeing Farms water diversion,[418] now called the "Inland Lands" project.[419] The Fisheries Service became involved in the Boeing Farms case because the Clean Water Act requires a dredge-and-fill permit before the diverter could install pumps and other facilities for the proposed diversion. The Army Corps of Engineers, which administers the permit program, initially found that the permit would not jeopardize listed salmon, and in the *Inland Lands* opinion, the Fisheries Service disagreed.

The opinion is based largely on a Bureau of Reclamation evaluation of the streamflow effects of cumulative water withdrawals from the Columbia system. The study evaluated streamflows with and without diversions, to compare natural conditions to current conditions, and identify the extent to which power operations, flood control operations and irrigation withdrawals have contributed to the river's flow problems. The study showed that for the Snake, "[i]rrigation withdrawal is the principal reason for missing flow objectives." Without irrigation withdrawals, summer flow objectives at Lower Granite would be met 100% of the time; with withdrawals, the objectives are met less than 15% of the time. In the lowest eight water years, the Snake at Lower Granite would be 250% greater without irrigation withdrawals than it is with irrigation withdrawals. Spring flow objectives would be met 94% of the time without irrigation withdrawals, compared to 64% with withdrawals. In the Columbia, power and flood control cause the

[416] Engrossed Substitute House Bill 1110, May, 1997.
[417] Letter from Hon. Gary Locke to Hon. Philip E. Batt, May 19, 1977.
[418] See page 97, above.
[419] National Marine Fisheries Service, *Endangered Species Act Section 7 Consultation, Biological Opinion, Inland Land, Inc., Columbia River* (May 16, 1997).

largest reductions to flows at McNary. Nevertheless, without irrigation withdrawals, summer flow objectives would be met 74% of the time, versus 26% with withdrawals. In the spring, flow objectives would be met 92% of the time without withdrawals, compared to 72% with withdrawals.

The Service put these rather dramatic figures together with several other factors. First, the Service observed that the environmental needs of the listed populations are not currently being met, and so there must be significant improvements if they are to recover. Second, the biological opinion on hydropower operations puts "heavy burdens on upstream storage and irrigation," and downstream diversions tend to vitiate the results of upstream contributions. Moreover, the fact that a single diversion may itself have a small impact on listed fish ignores the cumulative effect that the proposed diversion has in combination with preexisting diversions. If this diversion were approved, additional diversions could be expected, which would only exacerbate stream flow problems for listed fish. Writing in words that may have been directed at state legislatures, the opinion observed:

> *The states of Oregon, Washington and Idaho all have in place moratoria on further withdrawals in the Basin. In some cases, however, these moratoria have significant exceptions. For example, the action considered under this Opinion involves a pending right that has been repeatedly extended. These moratoria are also subject to legislative modification. As the interior Columbia Basin grows and develops it is foreseeable that demand for water will continue to grow as well. For the Federal agencies to allow additional future withdrawals to proceed, on the logic that each one by itself has a small impact, would undermine one of the major improvements in habitat conditions and further degrade the environmental baseline.*

In view of the Service's jeopardy conclusion, it was obliged to suggest a "reasonable and prudent alternative" operation that would avoid jeopardy. The Service decided to condition the permit on a requirement that the applicant provide an equivalent amount of water from other sources. In other words, the reasonable and prudent alternative is a "no net depletion" requirement. This requirement applies only when flow objectives are not being met. Finally, in a non-binding "conservation recommendation," the Service asked the Corps to develop a list of existing dredge-and-fill permits to consider their impacts on listed salmon.

The *Inland Lands* biological opinion is important in several ways. It illustrates the disconnect between the traditional thrust of state water law and the requirements of the Endangered Species Act. Indeed, the gulf between the *Inland Lands* opinion and the Washington legislature's

suspension of its water diversion moratorium is so wide that it is hard to imagine it being bridgeable. The spotlight now will be on the Washington Department of Ecology, which will have to give serious attention to *Inland Lands* when the department determines water availability in light of the new state legislation. *Inland Lands* also points to a much broader set of issues, however. Before *Inland Lands,* by far the primary culprit in the mainstem was the dams. No doubt they will remain the primary culprit, but not by so large a margin. For the first time, data seem to point to irrigation diversions as a significant contributor to the Columbia's streamflow problems.

V. Watershed Initiatives

Hydropower is much less a factor in the tributary streams than in the mainstem. Tributaries are more often dried up by water diversions, warmed and polluted by agricultural use and grazing, and silted up by timber harvest and other land uses. An entirely different set of strategies is needed to address these problems, and many people look to watershed initiatives for answers. Watershed initiatives have been in some cases linked with the Northwest Power Act or the Endangered Species Act, but in many cases the connection was incidental and in some cases there was no connection at all. Some grew directly out of long-standing tribal efforts to restore salmon to particular tributaries. Others originated in the independent activities of conservation groups and local communities.

This section first gives a quick survey of watershed initiatives in the Basin, to give the Commission a sense of their diversity. That survey is followed by an extended account of the watershed program in Oregon's Grande Ronde basin, which provides a deeper sense of the organizational, scientific and political challenges involved in these initiatives.

A. General Survey

The Yakima River Basin. As discussed earlier, the Yakima Basin had a head start. By the early 1990s, the Yakama Indian Nation had been addressing salmon issues for years, developed working relationships with the Washington State Department of Ecology, the Bureau of Reclamation and local irrigators, and had begun a lengthy series of negotiations to identify opportunities for supplying water for salmon with tolerable effects on irrigators. One of the early milestones was the development of a "flip-flop" approach to managing the basin's water storage facilities. The flip-flop program was designed to avoid operations that dried up salmon redds in the winter when water was being stored in anticipation of irrigation needs, and then flooded them with artificially high water levels during irrigation season. Under this operation, storage facilities on different branches of the Yakima system are managed to ensure that the redds are watered in a way that more closely corresponds with their needs and to minimize the water required to keep the redds viable.[420]

The same parties collaborated in water conservation measures to address instream and out-of-stream needs. Working with the Environmental

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[420] *See* L. MacDonnell, "The Yakima Basin, Washington,"in Natural Resources Law Center, University of Colorado, *Restoring the West's Waters: Opportunities for the Bureau of Reclamation*, vol. II (1996); D. Getches, "Changing the River's Course: Western Water Policy Reform," 26 *Env't'l Law* 157, 167 (1996).

Defense Fund, they developed a water marketing pilot project to work in conjunction with Washington's Trust Water Rights law to save water for instream uses.[421] In July, 1994, Congress adopted the Yakima River Basin Water Enhancement Program to provide federal funding for many of the same purposes. In December, 1994, the Power Planning Council approved Bonneville funding to match federal funding.[422] In the spring of 1996, as part of the water marketing pilot project, irrigation water rights were transferred temporarily into the Teanaway River, a tributary of the Yakima.[423] Currently, an advisory group of four biologists is preparing a report to Congress on what would be needed to establish biologically-based flow targets in the Yakima River, which could become part of an operating strategy that the Enhancement legislation calls for.[424]

The political base for water initiatives broadened in 1994 with the creation of the Yakima Watershed Council which grew out of a smaller group interested in pumping water out of the Columbia into the Yakima Basin.[425] In its broader incarnation, the group aims to "integrate a broad spectrum of water-based interests" to address the basin's long-term water needs.[426] Its August 1996, draft plan identifies ambitious goals for irrigation water supply and an instream flow goal higher than that of the Yakima River Basin Water Enhancement Project. In order to meet these goals, the Yakima Council sees the need for 170,000 acre-feet of new storage. The Council also supports conservation and watershed restoration, but contends that new storage is essential too.

Plenty of questions remain in the Yakima. Throughout the development of the water conservation initiatives, environmental groups expressed concerns that conserved water would find its way into fields rather than the river.[427] The same groups worry that new storage would come to be seen as a panacea that would supplant conservation and other nonstructural measures.[428] While these concerns need to be addressed, the Yakima remains one of the

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[421] Environmental Defense Fund, *Restoring the Yakima River's Environment: Water Marketing and Instream Flow Enhancement in Washington's Yakima River Basin* (1994).
[422] Northwest Power Planning Council, *Columbia River Basin Fish and Wildlife Program*, sec. 7.8G.4 at 7-48 (1994).
[423] *See* Z. Willey and A. Diamant, "Water Marketing in the Northwest: Learning by Doing," 10 *Water Strategist* 1, 7 (Summer 1996).
[424] Personal communication from Katherine Ransel, American Rivers, April 21, 1997.
[425] R. Benson, "A Watershed Issue," 26 *Env't'l Law* 191.
[426] Yakima Watershed Council, *The Yakima River Watershed Council* at 1 (1994-95).
[427] *See, e.g.*, letter from Katherine Ransel, American Rivers, to Hon. Bill Bradley, Chair of the Senate Water and Power Subcommittee, August 3, 1994, in Northwest Water Law and Policy Project, *Water Policy and Sustainability in the Columbia River Basin* (conference proceedings, May 19-20, 1995).
[428] *See* C. Peak and E. Lemelson, "Yakima Watershed Plan Sees New Storage as Panacea," 3 *Big River News* 10-12 (Fall 1996).

basins in which forward momentum is being maintained on difficult water issues.

The Umatilla. Oregon's Umatilla River is similar to the Yakima in that it rises in a mountainous area with good habitat, runs through an Indian reservation whose tribe has treaty fishing rights (the Confederated Tribes of the Umatilla Indians), and has been dried up by irrigation diversions in the summer and fall.[429] Like the Yakima salmon runs, the Umatilla runs were significant before development but were decimated by irrigation diversions relatively early.[430] By the 1930s, salmon were gone from the river.

Beginning in the 1960s, the Umatilla Tribes began building coalitions, working from the premise that the tribe's future was inseparable from the future of the surrounding community.[431] The coalition-building approach began to pay off in the early 1980s. In its 1982 fish and wildlife program, the Northwest Power Planning Council approved significant ratepayer investments in fish passage and production facilities. In 1988, a coalition consisting of the Tribes, the State, the Bureau of Reclamation and local irrigators proposed a water exchange, whereby the Bureau of Reclamation would reallocate irrigation water in McKay Reservoir to instream uses, irrigators would forego diversions at critical times of the year and be supplied with water from the nearby Columbia River. The exchange could be implemented on a small scale with temporary pumps and a commitment of free electricity for the pumps.[432] For the long term, a large-scale federal investment was required. Congress approved this investment in the 1988 Umatilla Basin Project Act.[433]

Implementing the Umatilla Basin water exchange was harder than might have been expected. Because the Umatilla Basin Project Act contemplated changes in water rights, approval by the Oregon Water Resources Department was required. However, when the change applications were filed, environmental groups protested. The groups supported the Act's stream flow restoration objectives but were concerned, among other things, that water users in the Umatilla Basin would "spread" exchange water to unauthorized

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[429] *See* U.S. Bureau of Reclamation, *Umatilla Basin Project Final Environmental Statement* 1-1 (Feb. 1988).
[430] *See generally* J. Neumann, "Run, River, Run: Mediation of a Water-Rights Dispute Keeps Fish and Farmers Happy—For A Time," 67 *U. Colo. L. Rev.* 259 (1996).
[431] *See* E. Chaney, "The Last Salmon Ceremony: Implementing the Columbia River Basin Fish and Wildlife Program," 22 *Idaho L. Rev.* 561 (1986); Neumann, "Run, River, Run," 67 *U. Colo. L. Rev.* at 267.
[432] Northwest Power Planning Council, *Notice of Final Amendments to the Columbia River Basin Fish and Wildlife Program Regarding Umatilla River Flows* (1988) (amending section 703(a)(17) and 1403(4) of the Council's fish and wildlife program).
[433] Umatilla Basin Project Act, Pub. L. No. 100-557, 102 Stat. 2791, 2794 (1988).

lands, as they had in the past. Water spreading is a long-documented problem in the Umatilla Basin and in other parts of the West. In general, it involves the distribution of Bureau water to land with no state water right or Bureau contract, and that is outside official irrigation district boundaries.[434] Oregon WaterWatch, an environmental group, had documented occurrences of water spreading even while irrigators were purportedly helping to restore streamflows for fish.[435] WaterWatch's protests led to extended efforts to settle the controversy.[436]

The water-spreading controversy has west-wide implications and this makes it an especially difficult matter to resolve. However, in the absence of a stable solution, the Umatilla parties could only piece together fragile, temporary settlements. In early 1992, after a mediation process, the parties reached one agreement: the Bureau and irrigators committed to negotiate contracts to temporarily supply irrigation water outside district boundaries; and irrigators agreed to support fish and wildlife releases from the Bureau's McKay reservoir for fish flows in the Umatilla River. The long-term water spreading issues were not directly addressed, however, and the settlement turned out to be only a temporary cease-fire. In 1993, the parties were again at swords' points until another temporary settlement was reached. This settlement fell apart in 1995.

In 1995, the parties finally began to address the substantive water spreading issues, and a more enduring settlement may have been reached. The irrigation district that was most vulnerable to spreading claims agreed to pay the Bureau of Reclamation compensation for past water spreading. Irrigators withdrew their objections to fish-passage releases from McKay reservoir, and WaterWatch withdrew its objections to some out-of-district irrigation water rights. The Oregon Water Resources Department crafted water permits to implement the settlement.[437]

Not all of the water issues are resolved in the Umatilla, obviously. Issues still remain regarding further expansion of irrigation district boundaries, for example. However, once all the parties were at the table and the substantive

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[434] Office of Inspector General, U. S. Department of the Interior, Audit Report: Irrigation of Ineligible Lands, Bureau of Reclamation, Rep. No. 94-I-930 (July 1994). *See* R. Benson and K. Priestley, "Making a Wrong Thing Right: Ending the 'Spread' of Reclamation Project Water," 9 *J. Env't'l. & Litig.* 89 (1994); Neumann, "Run, River, Run," 67 *U. Colo. L. Rev.* at 274; W. Holmes and G. Achterman, "Bureau of Reclamation Contract Renewal and Administration: When Is a Contract Not a Contract?" 41 *Rocky Mt. Min. L. Inst.* 23-1 (1995).
[435] A. Perrault, WaterWatch of Oregon, *Umatilla Basin Project Report* at 33 (1991).
[436] *See generally* Neumann, "Run, River, Run," 67 *U. Colo. L. Rev.* 259.
[437] *See* WaterWatch of Oregon, *Background Information on the 1995 Umatilla Basin Water Rights Agreement* (June 29, 1995).

water spreading issues were addressed, they were able to clear up questions that had plagued prior settlement efforts.[438]

Oregon Watershed Programs. The Oregon legislature established a watershed enhancement program in 1987, administered by the Governor's Watershed Enhancement Board.[439] The program's goal was to "[e]nhance Oregon's waters through the management of riparian and associated upland areas of watersheds in order to improve water quality and quantity for all beneficial purposes."[440] The Board administered a small grant program for watershed education and demonstration projects, and by the mid-1990s, had distributed almost $2.3 million.[441] Under separate legislation, the state created a Watershed Health Program directed by the Strategic Water Management Group (consisting of state agency heads) to initiate watershed management projects. The latter process led to the creation of local watershed councils in 36 basins, and two pilot watershed programs, one in the Grande Ronde area of the Columbia River Basin. In 1995, the legislature merged the Watershed Enhancement and Watershed Health programs under the aegis of the Governor's Watershed Enhancement Board.[442]

After Oregon passed laws encouraging water conservation and allowing the conversion of consumptive water rights to instream rights, one of the central questions was whether anyone would take advantage of them. In 1993, a nonprofit group called the Oregon Water Trust was formed to make sure these laws did not just gather dust. The result has been a series of transactions that in some ways are important models of how state programs, water users and conservation organizations can work together to find water for streams. In 1994, four leases were negotiated with water users. There were ten in 1995, and more than 25 in 1996.[443] In 1996, the Trust acquired the first water right under Oregon's conservation statute. Funding was supplied by the Oregon Watershed Health Program, the Trust contributed a thousand dollars, two farmers' crop consumption was cut in half, and all of the saved water was returned to the stream with an 1896 priority date.[444] The Trust has also obtained its first permanent water rights transfer, a .16

[438] WaterWatch of Oregon, "WaterWatch, Irrigators Agree on New Water Rights in the Umatilla Basin," July 11, 1995.
[439] Ore. Rev. Stat. 541.350-395 (1995).
[440] Ore. Rev. Stat. 541.355(2)(a)(A).
[441] R. Benson, "A Watershed Issue: The Role of Streamflow Protection in Northwest River Basin Management," 26 *Env't'l Law* 174, 183 (1996).
[442] Ore. Rev. Stat. 541.370 (1995).
[443] Oregon Water Trust, *Fish Flow News* (Spring 1996 and Fall/Winter 1996).
[444] *See* Oregon Water Resources Department, *Proposed and Final Order for Allocation of Conserved Water* in the application of Zellen, Smith and the Oregon Water Trust, volume 51 (November 13, 1996); Oregon Water Trust, *Fish Flow News* at 1 (Fall/Winter 1996).

cubic feet-per-second irrigation right for $8,800.[445] It is working as well with the Bureau of Reclamation on a Snake River water acquisition.[446]

In general, Trust transactions are relatively small in scale, targeted to benefit small tributaries with critical fish populations or other ecological values. The increasing pace of these transactions has helped to iron out kinks in Oregon's instream flow mechanisms, but the kinks are still a concern. After all, it took nine years for the first transaction to be conducted under Oregon's conservation statute. All but one of the transactions to date are leases, and the lack of long-term instream water acquisitions is a concern. Enforcement remains an issue. As the Trust's director put it, "[p]rotecting instream water rights consistent with priority dates is one of the biggest challenges."[447] Some people think that water marketing is a mistaken enterprise: Water is a public resource. Irrigated agriculture is a subsidized use of water, they argue, and irrigators should not be paid to leave water instream. There also is skepticism that such transactions can make much of a dent in the region's dried-up tributaries.[448] Nevertheless, in a Basin that is looking for new approaches to restoring streamflows, the Trust is an important experiment.

The Deschutes Basin. The Confederated Tribes of the Warm Springs Reservation, working with the Environmental Defense Fund, the Oregon Water Resources Congress and local irrigation districts, developed a strategy for improving instream flows and water quality in Oregon's Deschutes River through market-based water transactions. The proposal involves a basin-wide implementing entity with authority to invest public and private funds in a variety of conservation projects.[449] In 1996, Congress passed legislation authorizing "Deschutes Basin Ecological Restoration Projects," including such an organization.[450] The project also negotiated an innovative lease-option contract with an irrigation district by which varying amounts of conserved water will be returned to the stream. Funding responsibilities are to be determined based on an after-the-fact evaluation of amounts actually conserved through district efficiency improvements. The arrangement is

[445] Memorandum to the author from Jan Neumann, Oregon Water Trust board chair, January 17, 1997.
[446] Rigby, "Acquiring Water for Flow Augmentation" at 3.
[447] Oregon Water Trust, *Fish Flow News* at 2 (Fall/Winter 1996).
[448] R. Benson, "Water Rights Deals, Water Law Reform: Restoring Water to Northwest Rivers," 11 *Illahee* 12 (1995).
[449] Confederated Tribes of the Warm Springs Reservation, and Environmental Defense Fund, *Restoring Oregon's Deschutes River, Developing Partnerships and Economic Incentives to Improve Water Quality and Instream Flows* (1995).
[450] S. 1662, title III, 104th Cong., 2d Sess. (1996).

designed to address concerns that water users had expressed about participating in the Oregon conserved water program (discussed above).[451]

The Methow Valley. Washington has several watershed programs, including one in the Methow Valley, a test basin for the Chelan Agreement (see pages 78-79). The Methow and most of its tributaries are heavily appropriated, but they still support salmon.[452] The basin's scenic beauty has attracted real estate development and put increasing pressure on its streams. Before the watershed process, the state Department of Ecology had established instream flow levels, suspended groundwater permitting in some areas, and established a system of priorities for future diversions to protect fish and senior water rights.[453] Few were satisfied with these measures, however. The Methow watershed planning process brought together representatives of tribal, state and local governments and private interests to address these problems. The process produced a draft plan in 1994.[454] One of its major conclusions is that instream flows need to be restored "to improve fish and wildlife habitat and preserve and enhance the unique water quality of the Methow Valley while allowing for growth."[455] The plan recommends efficiency standards for water use, a water bank to administer saved water, a commitment to return 90 percent of saved water to streams, increased enforcement and requirements for measuring devices.[456] The Department of Ecology is in the process of adopting rules to implement these recommendations.

The Henry's Fork. The Henry's Fork Watershed Council in northeast Idaho, near Yellowstone National Park, is one of the Basin's better-known watershed planning processes. The Henry's Fork is a world-class trout stream, cherished by anglers. The Watershed Council was formed by an alliance between the Henry's Fork Foundation, a local fish conservation organization, and the Fremont-Madison Irrigation District. The Council was formed with no government involvement. Rather, the irrigation district accepted the Foundation's invitation to co-chair a watershed council to implement a state water plan for the basin. Reportedly, the Council has approved several projects in which farmers are proposing to restore water to streams. However, finding a way to fit these actions into Idaho's water law is evidently proving to be a problem.[457]

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[451] Willey and Diamant, "Water Marketing in the Northwest," 10 *Water Strategist* at 2.
[452] F. Bambrick, "New Visions: Watershed Restoration and Sustainable Development," in Northwest Water Law and Policy Project, *Water Policy and Sustainability in the Columbia River Basin* (conference proceedings, May 19-20, 1995).
[453] F. Bambrick, supra.
[454] Methow Valley Water Planning Pilot Project, *Draft Methow Basin Plan* (Jan. 27, 1994).
[455] Id. at vii.
[456] Id. at vii-ix.
[457] Benson, "A Watershed Issue," 26 *Env't'l Law* at 187, 205.

The Lemhi Basin. A watershed effort has succeeded in restoring limited amounts of water for salmon in Idaho's Lemhi River. The Lemhi Basin is a predominantly agricultural area in east-central Idaho. The Lemhi River is completely appropriated for irrigation.[458] Working with the Idaho Departments of Fish and Game and Water Resources and other parties, irrigators agreed to forego diversions for a 12-hour period up to three times a year if low flows cause problems for fish in a particular reach of the Lemhi. Reportedly, the agreement produced impressive flows in the summer of 1994. As promising as the agreement is, the National Marine Fisheries Service has noted its limitations: "(1) The river is over-appropriated for irrigation, and (2) major tributaries are regularly dewatered for irrigation. No significant improvement in spring/summer chinook salmon passage and rearing habitat for the Lemhi River as a whole is likely to occur unless changes in local agricultural practices are made."[459] Nonetheless, the parties involved, including the Shoshone-Bannock Tribes, want to build on their successes in the belief that watershed efforts are likely to achieve better solutions than litigation.

The Middle Snake. The "Two Rivers" concept, whereby the Snake is one river above Milner Dam and another river below Milner began to show cracks in 1993. Under a 1988 law, Idaho's Comprehensive State Water Plan is written by the Idaho Water Resources Board with substantial local input, watershed by watershed.[460] The 1993 plan for the Middle Snake noted that the State Water Plan specifies zero flows at Milner, but committed to work for higher flow levels to "improve some aspects of water quality and fish habitat, and restore some of the scenic beauty to Twin Falls, Shoshone Falls, and many of the smaller, less famous waterfalls within the reach."[461]

The Upper Clark Fork. Although salmon do not reach Montana and watershed efforts in Montana may have little direct impact in the salmon disputes, innovations are transferable. One innovative process is in the Upper Clark Fork, a Montana stream that has long been fully appropriated.[462] In 1989, the Montana Department of Fish, Wildlife and Parks was preparing to file a request to reserve instream water in the Upper

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[458] Idaho Department of Fish and Game, et al., *Salmon River Subbasin Salmon and Steelhead Production Plan, a Columbia Basin System Planning Report* at 28 (Sept. 1, 1990).
[459] National Marine Fisheries Service, *Proposed Recovery Plan for Snake River Salmon* at V-1-49 (March 1995).
[460] Idaho Code 42-1730, 1731, 1734A-I.
[461] Idaho Water Resource Board, *Comprehensive State Water Plan, Snake River: Milner Dam to King Hill* at 74 (1993).
[462] *See* D. Snow, "River Story: A New Chapter for Montana's Clark Fork," in 1 *Chronicle of Community* 17 (Autumn 1996).

Clark Fork, which raised concerns among out-of-stream water users. The Northern Lights Institute convened discussions which led first to a temporary moratorium on out-of-stream water rights from the Clark Fork. In 1991, the Upper Clark Fork River Basin Steering Committee was created by legislation.[463] The Committee's 1994 plan recommended closure of the Upper Clark Fork to new diversions, investigation of structural and nonstructural storage options, water quality measures and a ten-year instream water leasing pilot program.[464] In 1995, the Montana legislature codified most of the plan's elements (except a moratorium on groundwater permits) and called on the Steering Committee to continue its work.[465]

B. The Grande Ronde [466]

1. The Setting

The Grande Ronde and Imnaha rivers drain 5300 square miles in the far northeast corner of Oregon. Both rivers empty into the Snake River's Hells Canyon, which forms the basin's eastern boundary. The watershed is typical of basins in the arid west, with substantial snowpack in upper elevations melting in a spring freshet, then diminishing to summer flow levels sustained by groundwater seepage and upwellings. The Blue Mountains bound the drainage to the southwest, while the Wallowas, with peaks close to 10,000 feet high, form a central spine. Three large valleys are spaced between Hells Canyon and the Blue Mountains: the Imnaha, the Wallowa and the Grande Ronde. The last is the largest and most developed, an open bowl of a valley through which the Grande Ronde River once meandered in a wide circle of grasslands, wetlands and lakes; hence the name.

Settlement of the Grande Ronde Basin followed the general pattern of many other basins: early trapping, followed by mining, agriculture and timber harvest. The basin is different from the Snake, Umatilla and Yakima Basins in one sense, however: there are no major federal water projects. The basin is far more influenced by federal land management than by federal water management. Water development consists of private diversions,

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[463] Mont. Code Ann. 85-2-338(1) (1995); Upper Clark Fork River Basin Steering Committee, *Upper Clark Fork River Basin Water Management Plan* (Dec. 1994).
[464] Upper Clark Fork River Basin Steering Committee, *Upper Clark Fork River Basin Water Management Plan* at 4-7, 50-63.
[465] Benson, "A Watershed Issue," 26 *Env't'l Law* at 189.
[466] This section is a distillation of Angus Duncan's study, *History, Science, the Law and Watershed Recovery: Pitfalls and Progress in the Grande Ronde, A Case Study of a Columbia Basin Model Watershed* (February, 1997 draft).

groundwater pumping, and an extensive system of irrigation and drainage ditches.

The U. S. Forest Service, and to a lesser extent the Bureau of Land Management, manage a sizable amount of federal lands in the Grande Ronde. The Forest Service is the principal federal landowner in the watershed, managing some 45 percent of the drainage, principally in the Wallowa-Whitman and Umatilla national forests. The Bureau of Land Management has small, scattered holdings.

Some 20,000 spring chinook were estimated returning to the basin in 1956, declining to 8,400 in the early 1970s. Twenty-one major streams throughout the basin provided spawning and rearing habitat for these fish. Fall chinook occupied the lower reaches of the system, but few specimens have been observed for the last 25 years. Historically, the Grande Ronde provided the largest production of coho in the Snake Basin, the furthest inland in the Columbia Basin.[467] Since 1986, Snake River coho have been considered extinct. Sockeye disappeared from the Grande Ronde when the dam at the outlet of Wallowa Lake was raised in 1916, preventing passage to lake spawning sites. Summer steelhead runs of 15,000 or more may have occurred prior to the construction of the Snake River dams and the low runoff period that began in the 1970s, but they have declined dramatically since.[468]

2. The Wallowa County-Nez Perce Initiative

Watershed efforts first took shape in Wallowa County, the ancestral home of the Wallowa band of Nez Perce Indians (also known as the Joseph band). Headwaters begin in the steep canyons in the northern Grande Ronde Basin and flow to the open country where they join the Wallowa River. From the mountains just east of Wallowa Lake, for example, Prairie Creek flows around the town of Joseph, along the highway to Enterprise, then through town to join the Wallowa River. The stream, now hardly more than a ditch itself, primarily irrigates fields along its short length.

In 1991, the Power Planning Council called on the Bureau of Reclamation to undertake three water conservation projects in the Columbia Basin (see "Water Conservation Pilot Projects," above). In Oregon, the Bureau dusted off a plan to enclose Prairie Creek in pipe, dramatically reducing water loss. Irrigators agreed to the project after assurances they would lose no water

[467] Pacific Rivers Council. "Cop-Copi: The People and the Ecology of the Grande Ronde," at 6 (1994) (unpublished).
[468] Columbia River Fish and Wildlife Authority,"Grande Ronde Subbasin Plan" (1990).

and might gain some. Some savings would also go back into the Wallowa River for salmon.

When the plan was disclosed to the communities of Joseph and Enterprise, it quickly unraveled. Prairie Creek was not only an irrigation ditch, it turned out. It was a stream that wandered through backyards and graced a city park. Seepage along its course fed groundwater that supported domestic wells. The biggest complaint, however, was that a watershed decision had been made for the community by regional and federal agencies, in consultation with some local water users but not a broadly representative group. City and county officials invited the agencies to go elsewhere. The stage was set for one of two classic scenes: a full-scale retreat, as occurred with the Forest Service's Upper Grande Ronde Plan (discussed below), or a classic confrontation between local interests and distant governments.

The Council and the Bureau backed away from the Prairie Creek project, but on condition that the community come up with comparable water savings and improvements that would pass scientific and technical review. The community agreed, and set about organizing the committee that would develop the Wallowa County-Nez Perce Tribal Plan.

In 1992, County Commissioner Pat Wortman and Nez Perce representative Si Whitman agreed that organizing to cope with anticipated Endangered Species Act listings made sense. The Nez Perce sought the return of harvestable salmon. Wallowa County wanted fish back, but also to protect livelihoods, many of which depended on the forests, pastures and streams of this scenic, isolated valley.

From this meeting a process emerged, at first informal, involving landowners, business representatives, county and tribal officials, and one environmental representative. State and federal officials provided technical assistance and data to produce, in August, 1993, the Wallowa County-Nez Perce Tribe Salmon Habitat Recovery Plan. The Plan acknowledged State of Oregon standards for salmon habitat, and surveyed deficiencies in each stream reach of the Wallowa and Imnaha subbasins. Potential solutions were proposed, including "upstream impoundments, commercial timber thinning, exclusion fencing, weed control, woody material removal, grazing rotation, surfacing roads and relocating campgrounds.[469]

A 1995 proposal by the Nez Perce Tribe was not part of the country-tribal recovery plan, but it illustrates the value of the working relationship that

[469] Wortman, *Sustaining Rangeland Ecosystems Symposium*, at 188 (1993).

began in the planning process. The Nez Perce Tribe proposed to acquire a 10,000-acre private ranch in Joseph Creek Canyon for fish and wildlife habitat. If the proposal had come from the state or the environmental community, it could have been threatening to local interests. Wallowa County supported the Tribe, however, with a few conditions: although the land would be managed principally for fish and wildlife, it would also be managed as range; a noxious weed control program would be allowed; and "in lieu" taxes would be paid to the county. With the Tribe's agreement to these conditions, it acquired land in its ancestral valley for the first time since the Joseph band left in the 1870s.

The Wallowa County Plan has been recognized for its initiative and its inclusive review of watershed problems.[470] It has been criticized for emphasizing active intervention by land managers."[471] While the plan has measures to reduce human impacts, it does not propose setting aside a stream reach and allowing natural restoration processes to unfold.[472]

The tribe and county sent the Wallowa County Salmon Plan to the National Marine Fisheries Service for review, but generated little response. Finally, in the summer of 1995 a series of meetings among local, state and federal fish and wildlife officials began talking about developing a watershed-wide Habitat Conservation Plan under section 10 of the Endangered Species Act. Such a plan could give private landowners protection against "take" violations of the Endangered Species Act for a range of species. The federal agencies assigned a staff member to work with local parties for a period expected to last six to twelve months. Eighteen months later, there was no working draft of a Wallowa County Habitat Conservation Plan. The Fisheries Service offered a "framework" for a Habitat Conservation Plan process, but there are many substantive issues. Local representatives would like the plan to include national forest lands, protect the local economy against new injunctions, and provide assurance against ever-changing constraints on federal land. The Fisheries Service is receptive to linking federal management plans to the plan, but the Habitat Conservation Plan process is statutorily limited to private parties, not federal agencies. Local interests are unreceptive to setting aside land from active management and

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[470] *See* Northwest Power Planning Council, *Strategy for Salmon*" section 7.6C *supra*, at 7-35.
[471] For example, Joseph Creek recommendations include: "Provide optimum tree densities for building and retaining snowpack by planting and preserving trees where they are too thin, and thinning trees to allow precipitation to reach the ground where they are too thick." *See* Wallowa County-Nez Perce Plan, *supra* at 83.
[472] There are extensive wilderness and wild and scenic areas set aside in Wallowa County. *Return to the River* notes that "... headwater reaches are predominantly high gradient within constrained channels and are generally unproductive owing to low concentrations of plant growth nutrients." See *Return to the River* at 353.

economic use. Wilderness areas already claim too much of their county, they argue. But this poses a problem for species recovery: wilderness headwaters are often the least productive salmon habitats. It is more often the low-gradient stream habitat and river valleys that are most productive.

3. The Grande Ronde Model Watershed

As Wallowa County and the Nez Perce were developing their plan in 1992, both were cooperating with Union County and the Confederated Tribes of the Umatilla Reservation to organize watershed recovery for the entire Grande Ronde Basin. In April, 1992, Governor Barbara Roberts designated the Grande Ronde as part of Oregon's Model Watershed Program. It became one of three state programs developed in response to a Power Council proposed for cooperative "locally-based, bottom-up, voluntary approach" to habitat restoration on private lands, and coordination of activities on federal and private lands to achieve comprehensive watershed management.[473]

The Model Watershed Board, appointed by the Union and Wallowa County governments, met for the first time that summer. Representatives of local economic interests filled the largest numbers of seats, but the Umatilla and Nez Perce tribes also were represented. A Union County Commissioner chaired the board; a representative of environmental interests was named vice-chair.

Union and Wallowa counties had a history of cooperative community activities in the Grande Ronde watershed. Although much of the basin's development has been individual, irrigation ditches and flood control works were often cooperative efforts among farmers. In Union County, the community came together in the 1870's to cut the first increment of what became the State Ditch, to open new farmland and reduce seasonal flooding from the sinuous Grande Ronde. In modern times, flood control has been high on the community's agenda. The Corps, the Bureau of Reclamation, and the local Soil and Water Conservation District developed plans for dikes and headwater dams to control flooding and accommodate irrigation diversions. An extensive diking system completed in 1975 has not put flooding concerns to rest. Landowners surveyed by the Union County Soil and Water

[473] Northwest Power Planning Council, *Strategy for Salmon*, at 71 (1994). Idaho designated the Lemhi watershed and Washington named the Tucannon watershed in response to the Council recommendation.

Conservation District in 1996 still list upstream storage and levee modification as preferred solutions.[474]

Two county commissioners assumed the task of organizing a local watershed policy board, which convened in June, 1992. The board's composition was an issue from the outset. Its membership closely resembled that of the Wallowa County group: representatives from the county commissions and tribes, farmers, ranchers, timber interests and an environmentalist. This composition was criticized as being heavily weighted toward local economic interests, interests that were, after all, responsible over time for degraded watershed conditions. The Governor's office was openly critical of board makeup. It asked the board to add seats for environmentalists and community activists from LaGrande as a condition of funding from the state's new Watershed Health Program. Local representatives resisted. It was hard to argue that the makeup was *un*representative of these communities. Arguably, tribal representation and the board's one environmental representative provided adequate breadth of perspective. The impasse was finally resolved through creation of a new Union County-only watershed advisory committee with broader representation. Locals left with a bad taste in their mouths, however.

Suspicions were further stimulated by staffing issues. The local community first looked locally, to the Soil Conservation Service (now the Natural Resources Conservation Service) and its district staff, but neither group was equipped to take the staffing lead. The default was a state interim coordinator paid for and assigned by the Oregon Water Resources Department. The board's minimal involvement in the hiring and the coordinator's accountability to the state raised local concerns. At its first official meeting in June, 1992, the Watershed Board moved to take control of the hiring process for a permanent staff director, to be paid by the board with funding from the Bonneville Power Administration. Unhappily, disagreements over state efforts to influence the board's staff and processes continued over the next two years.

In membership and staffing issues, the board and the state grappled with questions of control. What are the lines of accountability? How much deference should the state give to a local board? How much authority can outside funders demand before a local reaction sets up? How could state or federal standards be applied without eclipsing local efforts? How could local efforts avoid diluting legal standards?

[474] Soil and Water Conservation District, *Draft Grande Ronde Cooperative River Basin Study*, at 7.2 (1997).

In 1993, the Oregon legislature enacted Governor Roberts' watershed health proposal, and allocated $10 million for the Grande Ronde and a second watershed project on Oregon's South Coast. The Water Resources Department was given the state lead, a director was hired, and a strategy for watershed assessment and project development was adopted. While local councils were expected to play a central role in the program, the state/local relationship was ill-defined. One important feature was that the state would have both a core team of technical experts in Salem, and a field team to work in-basin.

In the Grande Ronde it was a rocky relationship from the start, beginning with confusion over which would come first: technical assessment or projects. Although most participants agreed that investing in additional assessment would produce better-targeted projects, there was pressure to get projects on the ground soon. Enough was known about sources of salmon mortality (e.g., passage barriers; unscreened diversions) to justify early projects that would generate momentum.

The question of who decides which projects merit state funding also erupted. The state generally agreed that local approval should be required, but reserved authority to disapprove projects. The core and field teams, which could have been used as technical tools by both the State and local decision makers, became gatekeepers for a series of approval gates the board had to negotiate. Projects approved by the board and field team would be subject to review by the core team, the Water Resources Department leadership, and the Governor's Strategic Water Management Group. What might have been a collaborative decision-making model became cumbersome and hierarchical. Frustration, bruised feelings, and "top down/bottom up" arguments ensued.

The dynamics of state government influenced this. On the one hand, the Watershed Health Program was under pressure to show results for the legislature's $10 million, two-year investment. On the other, it would be held accountable for money badly spent. On top of this, the state's Strategic Water Management Group was composed of agency heads who did not always agree among themselves, and were not always capable of delivering their agency's cooperation.

To the board, already wary of outside pressure, the slow approval process and perceived second-guessing became sources of discontent. These problems simmered through the first twelve months of the program, finally coming to a boil when the state changed signals and insisted that no projects would be approved without a completed assessment of sub-basin conditions. The Board agreed that assessments were important, but took exception to the unilateral declaration, and to a tortuous process that first slowed project

approvals, then stopped them altogether. It required a summit meeting in Portland of local and state policy leaders, facilitated by the Power Council, to resolve the immediate conflict. The Board agreed to continue to forward projects for state approval on an interim basis. When sub-basin assessments were in place, the State's field team would be authorized to approve projects without further state review.

The agreement addressed an immediate cause of friction, and appeared to promise a more stable basis for state and local collaboration. Meanwhile, the field team was building a solid local working relationship. There was substantial agreement on a process for rating and ranking projects. Technical experts assembled the subbasin assessments and plans. In April, 1994, a report from Clearwater Biostudies consultants provided a more complete technical survey. With the pressure for immediate results eased, state and local teams focused on identifying the critical subbasins and planning recovery strategies. Local staff and board recruited among private landowners in the two counties, seeking project volunteers.

In 1995, the Grande Ronde experiment came up for legislative review, where it was criticized for its apparent lack of on-the-ground progress. The South Coast initiative was held up as a success, having committed funds to projects far more aggressively. The Grande Ronde responded with a 1995 program of more than 100 projects, most clustered in five critical subbasins, two-thirds of them involving private landowner participation. The council obviously preferred projects that were non-controversial and welcomed by landowners: reconstructing diversions with screens, for instance, or rip-rapping banks for stability. Not all the projects were uncontroversial, however. The virtues of exclusion fencing to prevent grazing in sensitive riparian areas, for instance, were disputed in the community and on the Board, but fencing projects were implemented. In general, though, environmental interests were critical of the watershed council's approach as giving comfort to local economic interests. Ultimately, the legislature allowed the Grande Ronde to carry over some of the uncommitted state funding beyond June, 1995, but no further state support was guaranteed. It was the end of the legislative experiment. A new Governor adopted a watershed strategy that still emphasized local councils but spread funding in smaller amounts across the entire state. The Grande Ronde field team was disbanded, although the watershed council itself continued in operation.

4. Instream Flow Initiatives

In the area of water rights and instream flows, the Grande Ronde plan acknowledges that water leasing should be considered a tool. However, in 1995, on a closely divided vote, the watershed board turned down its first

voluntary water lease proposal. Early in 1996, a second proposal, at the Dawson ranch on Crow Creek in Wallowa County, was supported. The Board is now working with the Oregon Water Trust, which arranged the Dawson lease, on additional opportunities in the Grande Ronde. In December, 1996, the Trust was invited to join the Model Watershed process and to submit their proposals through the Board, qualifying them to compete for Bonneville funding. The watershed board and the soil and water conservation districts in both counties have supported this collaboration with the Water Trust. As a side benefit of the Dawson lease, the local watermaster agreed that a gauging station should be installed on Crow Creek. This helps ensure that no other water user would be disadvantaged by the lease and collect badly needed flow data useful to stream restoration over time.

5. The Grande Ronde and Federal Agencies

The Forest Service is the primary federal player in the drainage. Most of the headwater streams that feed the river originate in the high valleys of the Wallowa-Whitman National Forest. Cooperation with the Forest Service is critical to addressing downstream watershed conditions associated with logging and grazing, and protecting refuge in wilderness areas where good habitat can still be found.

The Forest Service's principal planning tools are forest plans adopted under the National Forest Management Act.[475] For the last ten years forests such as Wallowa-Whitman have been managed in the shadow of Endangered Species Act implementation west of the Cascade Mountains. Anticipating Endangered Species Act challenges on the east side, the Forest Service has developed and superimposed new requirements on its east-side forest plans. The so-called PACFISH strategy applies to anadromous fish-occupied federal areas in the Pacific Northwest and Alaska. It seeks to set watershed standards and practices for the ecosystem needs of anadromous fish. Because its habitat standards are often stiffer than those in adopted forest plans, it is controversial in the Grande Ronde and elsewhere.

On their Oregon and Washington lands east of the Cascades, the Forest Service and the Bureau of Land Management propose to supplant PACFISH with standards developed in the Interior Columbia Basin Ecosystem

[475] Pub. L. No. 94-588, 90 Stat. 2949 (codified at 16 USC 1600-1614).

Management Project.[476] The project aims to develop ecologically sustainable management standards (as opposed to managing for economic production, or for sustaining one species).

Relations with the Forest Service vary at different levels of the bureaucracy, generally with much better cooperation at the forest level than at the regional level. The Forest Service made an abortive attempt to address salmon concerns in 1992. The Forest Service and the Umatilla Tribe jointly documented conditions and proposed recovery strategies in the upper Grande Ronde subbasin. The proposed Upper Grande Ronde Plan evoked a chorus of criticism from logging interests and others. Instead of arranging for further review to address these concerns in a public process, the Regional Forester shelved the document. In another instance, a 1994 commitment of regional forest funds to high-priority Wallowa-Whitman habitat projects was offered and then retracted; apparently west side forests and owls were considered more important.[477]

The summer of 1994 also witnessed an intramural conflict between the Forest Service and the National Marine Fisheries Service that nearly derailed the local watershed process altogether. The Fisheries Service had been seeking to consult with the Forest Service under the Endangered Species Act on timber sales in the Wallowa-Whitman and other east-side forests. The Forest Service argued that it had provided sufficient consultation. Four environmental groups went to court to compel consultation. In *Pacific Rivers Council v. Thomas*,[478] the federal court ordered the Forest Service to consult, and the order threatened to shut down large sections of forest. Ranchers feared they would have to pull their cattle off the range without forage alternatives. Town meetings were held. Newspapers quoted a local rancher: "If you play with a rattlesnake, you are guaranteed to get bit. . . . And that's who we're playing with, a rattlesnake, the government."[479] One watershed board member threatened to quit, and more were thinking of following suit. In the end, the Forest Service complied

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[476] *See* U. S. Department of Agriculture and U. S. Department of Interior, Interior Columbia Basin Ecosystem Management Project, *A Framework for Ecosystem Management in the Interior Columbia Basin and Portions of the Klamath and Great Basins; An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins; Integrated Scientific Assessment for Ecosystem Management*, all summarized in *Status of the Interior Columbia River Basin: Summary of Scientific Findings* (November 1996).

[477] See letter from Angus Duncan, Northwest Power Planning Council, to the Regional Forester, John Lowe (taking exception to "Forest Service policies that will expend millions to clean up a train wreck in the west-side forests but can't come up with a penny of new money to prevent one in the Columbia Basin east of the Cascades") (July 21, 1994).

[478] 30 F.3d 1050 (9th Cir. 1994).

[479] *The Oregonian*, (Portland, August 13, 1994).

with the order and matters were worked out, but not before local citizens' images of remote and indifferent government forces were reinforced.

The National Marine Fisheries Service has been much less involved in the Grande Ronde. Apart from the *Pacific Rivers* litigation, the Fisheries Service's role in the Grande Ronde has been limited primarily to negotiations over the Wallowa County habitat conservation planning process, discussed above.

The Bureau of Reclamation and the Corps of Engineers had been involved in flood control efforts in the Grande Ronde for decades, despite the absence of any significant civil works by either. In the 1990's, the Bureau provided funding and technical support to assist local community and Soil and Water Conservation District officials in water efficiency and watershed activities of the kind discussed in "Water Conservation Pilot Projects," above.

Outside of Oregon's Watershed Health Program, the largest share of funding for the Grande Ronde Model Watershed Program came from the Bonneville Power Administration. The Grande Ronde council competes with tribes and fish agencies for Bonneville fish and wildlife funds under the Power Planning Council's fish and wildlife program. In 1977, Model Watershed staff, administrative costs and project funding added up to $325,000. Bonneville has been more than a banker, however; it has been a visible and engaged participant as well. It has largely avoided the impulse to second-guess at a project level, while contributing actively to development of tools for stream assessment, monitoring and evaluation.

The Environmental Protection Agency operates in the Grande Ronde directly, and through Oregon's Department of Environmental Quality. The EPA has Clean Water Act enforcement responsibilities for streams in the basin. With the state, it establishes total maximum daily loads (TMDLs) for certain pollutants and for excessive water temperatures. It also mandates measures to bring streams into compliance with these standards. It appears to have several hundred thousand dollars in active projects in the basin, but is largely disengaged from the model watershed process. It provides technical and financial assistance through the state and, often, through the Umatilla tribal staff.

6. Watershed Science in the Grande Ronde

Data on the status of fish stocks and watershed habitats have been gathered in the Grande Ronde for decades. Historical changes in river ecosystem conditions have been documented. Yet because of the complexity of such

ecosystems and scientific disagreements over the requirements of sustainable fish habitat, the work of the Model Watershed began without a solid, detailed scientific foundation.

Some fish killers, such as unscreened diversions and passage barriers, were obvious. Some, such as high late-summer water temperatures, were equally obvious, but there were gaps in the data and complications in distinguishing causes and designing cures. How much of the problem was low flow and how much absence of shade? Is it more important to reduce water withdrawals, add upstream storage, or reduce grazing and timber harvest?

The Watershed Board and the Wallowa County committee began by surveying stream reaches for limiting conditions, adopting "desired habitat conditions" using state and other standards, and prescribing site-specific fixes. The resulting plans were reasonably well grounded in available data. Suggested remedies were conventional, sometimes controversial and not always grounded in cutting-edge watershed science.[480] The plan proposes fencing, water leasing, and other potentially divisive measures. It also assumes active management rather than allowing natural restorative processes to operate.

The Grande Ronde group saw itself as facing three scientific issues. First, how could it translate the data it had into a practical strategy for identifying and prioritizing projects? Second, how could it fill in the gaps in stream reach data, and then maintain the data base to measure results? Third, what more sophisticated scientific model could it adapt to give a more complex view of watershed conditions and dynamics?

Local residents and fish and resource managers acknowledged from the beginning that their plans had to be dynamic and able to change with new knowledge and changing conditions.[481] In March, 1994, a day-long board and staff session resulted in a project-prioritization matrix. Highest priority was given to measures that would protect existing high quality "biodiversity areas" that would be addressed before damaged reaches. Next were projects that addressed major limiting factors (passage obstacles, high temperature, and so forth), and projects that were part of "a comprehensive solution."[482] Other criteria, including costs, cost-sharing, maintenance requirements, and public support, would help rank projects at the margins. In practice, this apparently objective project-selection process was often compromised,

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[480] *See, e.g.*, R. Doppelt, et al., *Entering the Watershed: An Action Plan to Protect and Restore America's River Ecosystems and Biodiversity* (Pacific Rivers Council, 1993).
[481] Wortman, *supra*.
[482] *Grande Ronde Model Watershed Operations-Action Plan* (1994).

particularly as opportunities arose that might evaporate if not seized upon (e.g., a private landowner wanting to install a permanent diversion screen to replace a less effective screen). Ultimately, the 1994 matrix became a checklist. Priority is now given to projects in "focus areas:" Catherine Creek, the Upper Grande Ronde, Bear Creek, Big Sheep Creek and others in which more sophisticated analysis has been completed. Greater recognition is given to connecting spawning and rearing areas with migration corridor conditions.

Filling gaps in the data has proceeded more fitfully, as funding allows. In 1993 the Model Watershed contracted with Clearwater Biostudies Inc. to: (1) compile and synthesize recent fish habitat data on salmonid streams in the basin; (2) identify data gaps in the information; and (3) provide a basis for prioritizing near-term restoration activities."[483] The Clearwater study noted the absence of standard data from reference sites in the basin. In the absence of these data, the study identified "five habitat parameters common to all available stream survey databases." The study also established stream reference conditions based on fish habitat requirements: stream shading, bank stability, fine sediment, pool frequency, and woody debris. Each stream reach was measured against the reference standards, and problems were indicated. The report also identified priority stream reaches: healthy aquatic ecosystems, or areas with "sensitive" fish stocks at risk of extinction.[484] Recovery activities within these areas were then ranked.

The Clearwater study reinforced awareness that scarcity of data affected project selection. In the absence of good data, sub-optimum projects would be selected, and funds would be invested inefficiently. This observation highlighted a difficult choice in watershed recovery: whether to spend resources on data collection or in getting projects on the ground. The dilemma may be little noticed in the beginning, when obvious problems require attention. However, as the most obvious projects are completed and project choices become less obvious, data gaps become greater handicaps.

The Model Watershed staff now uses a related "patient/template" description of environmental attributes in each basin stream reach to indicate the collection of actions needed to close the gap between existing conditions (the "patient") and those needed to sustain salmon populations (the "template"). The effects this more refined approach has on project selection are not yet clear. Project selection remains opportunistic to a significant degree. However, the usefulness of objective scientific methods in bypassing

[483] Huntington, *Stream and Riparian Conditions in the Grande Ronde Basin*, at 12 (Clearwater Biostudies Inc., 1993).
[484] Huntington, *Stream and Riparian Conditions* at 71.

ideological problems is undeniable. If the data say low streamflows and high temperatures undermine productivity, there is less room to evade the obvious solution.

Bonneville is funding the development of a more sophisticated analytic tool for the Grande Ronde called "Ecosystem Diagnosis and Treatment."[485] Rather than focus on limiting conditions in freshwater habitat, the methodology prioritizes stream reaches, and describes an inventory of threshold conditions for salmon. The methodology accounts for upstream migration, spawning, hatching, rearing and outward migration. In this manner it seeks to address the cumulative effect of many mortality factors operating on salmon.[486]

The hope is that as people understand the science better, and are more capable of evaluating data and opinions, they may be able to focus on problems and solutions rather than politics and control. For example, in October 1996, the Board heard a proposal from the Oregon Department of Fish and Wildlife to dump hatchery salmon carcasses in several basin streams. The Department sought to replicate the nutrient replenishment in streams historically provided by salmon spawning and dying. The Department is viewed with suspicion throughout much of eastern Oregon. Some ranchers refuse entry to department scientists and technicians. The board's first reaction reflected this distrust. Did the Department propose to intentionally pollute basin streams, floating carcasses downstream into people's backyards? Then the questions became more searching. Where would the carcasses come from, inside the basin or out? What was the risk of introducing exotic pathogens? What kind of baseline data collection and monitoring had the department prepared? The tone of the discussion changed. One board member agreed that introducing the carcasses could restore a measure of the department would measure nutrient levels before and after? Would reference streams (without carcasses) be monitored? Was the department prepared to make its case in a public meeting? In the end the board took the question under advisement, but the board did not bog down in ideology. Science not only informed the discussion, but shifted it to a level that would have been difficult to imagine four years earlier.

[485] Lichatowich, Mobrand, Lestelle and Vogel, "An Approach to the Diagnosis and Treatment of Depleted Pacific Salmon Populations in Freshwater Ecosystems," 20 *Fisheries* no. 1, at 10-18 (1995).
[486] Lestelle and Mobrand, *Application of an Ecosystem Analysis Method to the Grande Ronde Watershed*, at 8 (Mobrand Biometrics Inc., 1995).

C. Summary

The Grande Ronde, Clark Fork, Henry's Fork and other processes are heartening for the trust and cooperation they have built between what are too often warring factions in the West. They have resulted in innovations that might be unattainable through lengthy and costly litigation. Yet, they are clearly works in progress. They leave many questions unanswered, not the least of which are their seriousness, their sustainability, and their "fit" with federal statutory requirements and agency activities. I return to these issues in Section VII of the study (see pages 181-190).

VI. Seismic Events in Salmon and Hydropower Policy

Many of the activities of the 1980s rested on a certain set of assumptions about the relationships of rivers, salmon, and human activities. In the 1990s, three developments called these assumptions into question, and raised new issues about river-related policy. The first is a development the mechanics of which have already been described: the Endangered Species Act listings, which substantially rearranged the Basin's policy landscape. The second is recent scientific reports that call for a re-examination of current approaches to salmon recovery. The third is a revolution in the electric power industry that is recasting the financial foundations of current river operations.

A. The Endangered Species Act, the Northwest Power Act and Water Management

The Endangered Species Act has had significant effects on federal power system operations and federal land management, especially through the biological opinions that resulted from the Act's federal consultation process. The Act's impacts beyond the federal system, including effects on water diversions and tributary water uses, are uncertain but potentially substantial, evidenced by the *Inland Farms* biological opinion (see page 110). It remains to be seen what role the Act will play in the FERC relicensing process for the Hells Canyon and other tributary hydroelectric facilities. There have been no consultations regarding the Bureau of Reclamation's storage facilities in the Snake River Basin, and this has become an issue in a lawsuit filed by environmental groups against the Fisheries Service and other federal agencies.[487] It is likely, then, that the Act will have an important effect on diversions and tributary water management.

To date, however, the Endangered Species Act's effects on tributary water management have been through what has been called the Act's "incentive structure": the "perception that the ESA's mandate is absolute and nonnegotiable," which prompts other actors, including state water agencies, to address the problems that cause species declines.[488] It is no coincidence that state water agencies have become much more sensitive to species declines since the Endangered Species Act listings. In 1996, out of 600 applications for new water diversions, the Washington Department of Ecology denied 300, which is probably as many denials as were issued in the

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[487] *American Rivers, et al. v. National Marine Fisheries Service*, U. S. District Court, District of Oregon (March, 1996).

[488] S. Yaffee and J. Wondolleck, *Negotiating Survival: An Assessment of the Potential Use of Alternative Dispute Resolution Techniques For Resolving Conflicts Between Endangered Species and Development*, p. 55 (School of Natural Resources and Environment, The University of Michigan, September 1994).

last 100 years.[489] It would be an oversimplification to say that the Endangered Species Act caused all of these denials, or all the salmon-related developments of 1991-1994. Others did much of the heavy lifting; the region's political leaders in the Salmon Summit, the Power Planning Council and state and tribal fish managers in the Northwest Power Act processes, litigants in the court proceedings, water administrators in water permitting processes, and a wide range of interested parties throughout. Yet the Endangered Species Act certainly provided a powerful impetus for these actions.

The Act also changed the burden of proof in salmon restoration. Protecting salmon from the effects of development is difficult and costly. Often, the short-term economic benefits of development are obvious, while the benefits of environmental recovery are harder to predict, rarely appraisable in economic terms, and easy to discount. Although the Northwest Power Act tended to shift this burden, the Endangered Species Act listings made the shift unmistakable. For essentially the first time, federal proponents of development must prove to a fisheries agency that weak salmon populations will not be jeopardized by the development.

It is also important to understand the limitations of the Endangered Species Act. One of the important limitations of the Act in the Columbia River is that its implementation is focused more on individual salmon populations than on ecosystem functions that support a range of species. The salmon listings were premised on the idea that an individual salmon population may be an "evolutionarily significant unit," i.e., a population that is important in and of itself. Much of the Act's machinery is geared to protecting these individual population units. Thus, the Snake River sockeye program is investing millions of dollars in a captive broodstock program in which the fish never see the wild, so that their genes can be incubated and cultured to increase their numbers.

As will be more apparent later in this paper, this salmon-centric approach can be a problem from the perspective of ecosystem science. To conservation biologists, microorganisms may be more significant than animals, and the overall structure and complexity of an ecological system are more important than individual species.[490] Salmon protection can tend to emphasize what Aldo Leopold called "show pieces": individual species like salmon, which

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[489] Personal communication with Ken Slattery, Washington Department of Ecology, December 23, 1996. *See generally,* R. Paschal, "The 'Statewide' Litigation: Denying Water Rights to Preserve Streamflows," in *Proceedings of the Third Annual Water Conference,* Northwest Water Law and Policy Project, Lewis & Clark Law School (May 1-2, 1997).
[490] *See* A. Leopold, *A Sand County Almanac,* p. 253.

people treasure. In focusing on show pieces, we pay attention to one set of issues and neglect others that may be more important.

The Endangered Species Act does not completely ignore the importance of ecosystems. One of the Act's purposes is to "provide a means whereby the ecosystems upon which endangered species or threatened species depend may be preserved."[491] For many years, however, this seemed to be primarily a rhetorical principle, and critics contended that the Act actually diverted attention from the more important task of preserving biodiversity.[492] This emphasis may be changing. In a July 1994 policy statement, the departments of Interior and Commerce committed to develop recovery plans in a way that "restores, reconstructs, or rehabilitates the structure, distribution, connectivity and function upon which . . . listed species depend."[493] However, implementation of the Act remains focused on individual species, and to this point there have been only limited efforts to take an ecosystem approach to the Columbia.

Another limitation in the Endangered Species Act's implementation is its emphasis on federal resources and activities rather than the broader collection of federal, state and private activities that an ecosystem approach to restoration would suggest. The point is illustrated by the contrast between the approach to the Snake River taken in the Power Planning Council's 1994 program and that in the Endangered Species Act biological opinion. The Council's 1994 program emphasizes solutions for Snake River fish within the Snake River Basin. Not only does the program call for Snake River reservoir drawdowns, but it proposes to use hydropower revenues to fund water leases, water conservation and other measures that could leave an additional million acre-feet in the Snake River for salmon. The biological opinion offers limited Snake River measures and instead relies more heavily on barge transporta-tion and infusions of Columbia River water to augment flows. In one sense, the biological opinion's approach is entirely understandable. The number of hurdles that have to be leaped for the Power Planning Council's approach to succeed—the legal, political and social

[491] 16 USC § 1531(b). In addition, the consultation regulations require federal agencies to consider "the direct and indirect effects of [their] action[s] on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action . . . ." 50 C.F.R. § 402.02.
[492] Doremus, "Patching the Ark: Improving Legal Protection of Biological Diversity," 18 *Ecol. L. Q.* 265, 30 (1991); Goodman, "Preserving the Genetic Diversity of Salmonid Stocks: A Call For Federal Regulation of Hatchery Programs," 20 *Envtl L.* 111, 148-155 (1990). Winckler, "Stopgap Measures," *Atlantic Monthly* pp. 74, 78 (Jan. 1992).
[493] *See* Department of Interior, U. S. Fish and Wildlife Service and Department of Commerce, National Marine Fisheries Service, "Endangered and Threatened Wildlife and Plants: Notice of Interagency Cooperative Policy for the Ecosystem Approach to the Endangered Species Act," 59 Fed. Reg. 34274 (July 1, 1994).

barriers to acquisition of private water rights, and the difficulty of shaping any water that is acquired—is daunting. The biological opinion follows a path of less resistance, pointing to federal resources and activities. But this path also indicates a key problem for ecosystem recovery. The salmon ecosystem is a patchwork of federal and private property interests. If an ecosystem approach is essential, some way must be found to provide an ecosystem for fish even in the face of divided jurisdictions and diverse property interests.[494]

A third limitation is that much of the problem faced by salmon is due to development that has already occurred. Where ecosystem recovery requires that development be undone, legislation is likely to be required and the Endangered Species Act cannot require legislation. The problem is illustrated by the reservoir drawdown debate. Reservoir drawdown advocates argue that lower reservoirs will increase the speed of the river (hence of fish migrating downstream) and help reestablish productive riparian areas at the edge of the river—a benefit to fish and wildlife, listed and otherwise. But drawdowns require significant changes in the dams themselves. Depending on their nature and timing, drawdowns could interfere with and perhaps preclude river transportation. Even intermediate-level drawdowns can adversely affect the operation of juvenile and adult fish passage facilities at the dams. As noted above, the Power Planning Council program calls for drawdowns while the National Marine Fisheries Service remains undecided. Congress, seeing risks and uncertainty, has withheld funding for some drawdown evaluations. If a biological opinion issued under the Endangered Species Act endorses drawdowns, implementation would probably require Congressional action, either through authorizing legislation or appropriations or both. Biological opinions do not bind Congress. For proposals such as reservoir drawdowns, the Endangered Species Act can provide impetus for change, but it cannot require change.

The fact that the Act takes little account of economic considerations[495] reflects problems of a different kind. Species are in trouble because of the habitat impacts of economic development. If the Endangered Species Act

[494] *See* J. Volkman and K. Lee, "The Owl and Minerva: Ecosystem Lessons From the Columbia," 92 *Journal of Forestry* 48 (April 1994).

[495] The Act requires critical habitat designation to be accompanied by an assessment of economic effects. 16 USC § 1533(b)(2). Reasonable and prudent alternatives under section 7 of the Act must be "economically and technically feasible." (50 CFR § 402.02). The Act also requires an estimate of the cost of recovery plans. 16 USC § 1533(f)(1)(B)(iii). However, the Act's listing process, jeopardy standard, prohibition on takings involve no economic judgments.

were well funded (which it is not in most parts of the country),[496] it might contend with some of the effects of this development. But there are limits to the effectiveness of even the best-funded regulatory programs. Acknowledging this, some students of the Endangered Species Act have suggested that the Act's regulatory tools should be augmented with economic incentives, so that economics work for species recovery.[497] Addressing economic problems of this kind requires tools that are rarely in evidence in agency-administered species conservation processes—analytical capacity to explore the economic implications of alternative recovery strategies, financing to reshape existing development, and economic incentives for appropriate development. The Endangered Species Act has not had these tools in abundance, and no one has a very clear idea of whether they could compete with the powerful engines of economic development. Yet, ignoring economic issues simply means that large obstacles to recovery remain unaddressed.

A further, increasingly problematic aspect of the Endangered Species Act process in the Columbia is procedural. Decisions in the Endangered Species Act consultation process are strictly federal, made by the federal agency that is proposing to act and the federal agency that administers the Act, in this case the National Marine Fisheries Service. If there is reason to think that a federally-licensed, privately-developed project will affect a listed species, a federal permit or license applicant may also participate.[498] However, there is no explicit provision for participation by a broader range of parties.

There is a rationale for a relatively closed process: the consultation process is supposed to last for only 90 days and broad participation could make this impossible, particularly if involving outside parties requires compliance with the Federal Advisory Committee Act.[499] The judgments that are made in the

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[496] There are several analyses of the funding history. *See* Campbell, "The Funding History," in *Balancing on the Brink of Extinction, supra* at p. 134; Bean, "Issues and Controversies in the Forthcoming Reauthorization Battle," vol. 9 *Endangered Species Update* (November/December 1991).

[497] *See* J. McKinney, M. Shaffer, J. Olson, "Economic Incentives to Preserve Endangered Species Habitat and Biodiversity on Private Lands;" M. Bean, "Incentive-Based Approaches to Conserving Red-Cockaded Woodpeckers in the Sandhills of North Carolina; W. Reid, "Creating Incentives for Conserving Biodiversity;" R. O'Toole, "Building Incentives Into the Endangered Species Act;" J. Baden, "Toward a True ESA: An Ecological Stewardship Act."

[498] Endangered Species Act, § 7(a)(3); "Interagency Cooperation—Endangered Species Act of 1973, as amended, Final Rule," 51 Fed. Reg. 19926, 19939 (June 3, 1986).

[499] 5 U.S.C. App. 2 (1993). Several Endangered Species Act processes have run afoul of the Advisory Committee Act, *see Alabama-Tombigbee Rivers Coalition, et al. v. U. S. Fish and Wildlife Service, et al.*, Civ. No. 93-AR-2322-S (N.D. Ala., decided Nov. 23, 1993); (Fish and Wildlife Service enjoined from "publishing, employing and relying upon the Advisory Committee report . . . for any purpose whatsoever, directly or indirectly, in the process of determining whether or not to list the Alabama sturgeon as an endangered species");

consultation process are primarily scientific and technical, an area where expertise would seem more appropriate than the views of interested parties.

In the Columbia River, however, a closed process poses special problems. For ten years before the Endangered Species Act listings, the Columbia River treaty tribes, the Power Planning Council, the region's fish and wildlife agencies, utilities, environmental groups and others worked to open up the federal process in which river management decisions were made. The result was no doubt messy—endless meetings, reams of issue papers, noisy debate and friction—but the decision making process was at least accessible. Under the Endangered Species Act process, interested parties, unable to watch or participate in the decision making process, have had little trust in Fisheries Service determinations. Indeed, the court in *Idaho Fish and Game v. National Marine Fisheries Service* attributed the hydropower litigation to this factor as much as any other: "The underlying root of the litigation problem is the feeling of these parties that the federal government is simply not listening to them."[500]

The reality is that the problem is not just procedural. Some of those affected by Endangered Species Act decisions are not just looking for a process in which they can make their concerns known, but a process in which their concerns will be accommodated. If the problem were only procedural, it might be easier to address. The Administration has adopted a policy intended to involve a broader range of interested parties in recovery plan development generally.[501] Since 1995 the Fisheries Service has made a concerted effort to bring state and tribal fishery managers into an organized structure for hydropower system operations and recovery plan implementation.[502] But, in 1997 after the federal court upheld the Fisheries Service biological opinion on hydropower operations based in part on the Service's implementation process, the process began to fall apart. The State of Montana withdrew, saying that the process had failed to account for resident fish and other values residing in its headwater reservoirs. Montana's seat was still cooling when the four Columbia River treaty tribes withdrew. "The process does not facilitate collaborative decision making

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Northwest Forest Resource Council v. Espy, Civ. No. 93-1621 (D.D.C., March 21, 1994) (declaratory judgment that Forest Ecosystem Management Assessment Team was an advisory committee that should have been constituted and conducted under the Advisory Committee Act).

[500] Slip opinion at 36-37.

[501] *See* Notice of Interagency Cooperative Policy on Recovery Plan Participation and Implementation Under the Endangered Species Act," 59 *Fed. Reg.* 34272 (July 1, 1994).

[502] A challenge to the process based on its failure to observe the requirements of the Federal Advisory Committee Act was rejected in *Aluminum Co. of America v. NMFS*, 92 F.3d 902 (9th Cir. 1996).

among sovereigns," said the director of the tribes' fish commission. "It only provides a shield to cover ongoing federal hegemony."[503] These things are evidence not just of a procedural failing in the law, but a range of deeper concerns: the concerns of headwater areas that are taxed by downriver power, flood control and salmon flow augmentation uses; the sense of Montana and the tribes that their sovereignty is being treated too lightly; the tension between the tribes' interest in fish harvest and the Endangered Species Act's interest in protecting particular, listed fish populations; and, probably, the tribes' sense that the federal process is not headed toward salmon recovery, but continued decline.

The Endangered Species Act process has had profound effects on the Columbia River. The Act's "incentive structure" has played a major role in the Basin's recovery activities, and has gone a long way toward coordinating formerly disparate federal activities on the river. However, the Act can either bring nonfederal activities into the recovery effort or scare them away, depending on how it is administered and perceived. New thinking in ecosystem science poses a challenge to the Act's traditional focus on individual species. Depending on how these pluses and minuses are balanced, the Act may be a catalyst for salmon recovery, or a prescription for gridlock.

The Northwest Power Act process can play an important role in achieving a more workable balance. Because the Northwest Act addresses both listed and unlisted species affected by hydropower, it can more directly account for diverse species than can the Endangered Species Act. Moreover, the Power Planning Council brings a different set of political constituencies, the governors of the four states and the managerial interests of the region's fish and wildlife agencies and Indian tribes, into the recovery effort. And because the governors' influence is maximized by Council unanimity, the Act has built-in incentives to find broader political consensus. The Northwest Act can soften the Endangered Species Act's more intimidating aspects by looking for solutions that take into account impacts to all species, including humans, and to the regional power system.

However, while it is easy to see how the two statutory processes could complement each other at one level, the reality is that there are also real differences between the two. The Endangered Species Act has legal muscle, but also has the potential to rivet the region's attention on individual, weak populations at the expense of many other populations and species, even as it

[503] Ted Strong, Executive Director, Columbia River Intertribal Fish Commission, *see* "Tribal sovereignty, treaty rights at core of tribes' rejection of NMFS's salmon management forum," *The Northwest Salmon Recovery Report* at p. 11 (May 30, 1997).

raises political hackles. The Northwest Power Act process can incorporate a broader range of ecological and political considerations, but it also could lock the region into a single-minded effort to pump up salmon populations to harvestable levels and give short shrift to controversial limitations in land and water use. Both processes have potential for relying more on technological solutions than restoring essential ecological functions. One important question is whether new species recovery advice from ecosystem science provides a more stable and productive ground for these two processes to work together.

B. New Advice From Ecosystem Scientists

In 1996, the Power Planning Council's Independent Scientific Group, commissioned in early 1995 to review the Council's fish and wildlife program (see page 105), filed its report. The Independent Scientific Group is comprised of scientists, but not social scientists. They were not asked to evaluate the economic or political issues in salmon policy. They were asked only to look at the Council's fish and wildlife program, evaluate the scientific assumptions that underlie it, and offer an alternative set of footings for the program if an alternative approach is needed. They approached the task from the point of view of a fish, not a policy maker, a utility ratepayer, or any other kind of *homo sapiens*.

The Independent Science Group's report, *Return to the River*, is in some ways unremarkable. Much of it echoes a body of thought that took root in ecosystem science long before 1996, which is also reflected in an important 1995 report by the National Research Council, *Upstream: Salmon and Society in the Pacific Northwest*.[504] Indeed, some of *Return to the River's* recommendations closely resemble not just those of the National Research Council study, but also the National Marine Fisheries Service's proposed recovery plan, the treaty tribes' restoration plan, and the Council's own program.

The *Return to the River* report portrays two competing views of the Columbia as a "working river" and explores the consequences of each view. The contemporary working river does the work of power generation, irrigation, flood control and navigation, and it works because we have simplified the natural river's complexity. The dams' storage capacity enables us to manage flow releases to respond to human demand for electric energy, protect against

[504] National Research Council, *Upstream: Salmon and Society in the Pacific Northwest* (1995).

floods, and float over the cataracts that once made the river so difficult to navigate. Dams have made the river simpler and more manageable. With hatcheries, barges, water budgets, turbine screens and other mitigation programs, we have followed a similar path. We have aimed for a simplified salmon population, one that migrates in time periods that fit with harvest plans and minimize conflicts with hydropower generation. Over time, we have achieved a simpler working river with simpler, more manageable species. It is more of an industrial river.

The biological problem, according to *Return to the River*, is that biologically-productive rivers are complicated. They have braided channels, intricate hydrologic processes, and huge populations of insects. They have rapids and falls. They may flood and recede, change channels, and push sediment and gravel around. These more complex rivers are "working rivers" because their natural functions work to transform energy into nutrients and support a rich diversity of species and a bountiful food chain. If the Columbia were this kind of working river, there would be a resilient salmon population with many salmon stocks migrating at different times, returning to different habitats, and interacting in obscure and unpredictable ways.

In *Return to the River* 's view of the world, we are spending hundreds of millions of dollars a year on a fish and wildlife effort that tries to make up for the work that the natural river could perform *gratis*. Whether or not a natural river makes sense industrially, *Return to the River* argues that the industrial river cannot work for salmon over the long run, even with the technological and other fixes we have devised over the last twenty years. The choice, *Return to the River* maintains, is between a more complex working river with healthy salmon populations and a simpler river without them.

Return to the River urges that salmon recovery be premised on the restoration of a working salmon ecosystem, a collection of healthy salmon habitats connected by healthy rivers. *Return* calls this a "normative river," one that meets specific functional norms that are essential to productive salmon populations. The report takes the Basin to task for the mechanistic ideas that have characterized recovery programs to this point, and thereby poses a central problem for species recovery policy: How can normative conditions be restored when the wild ecosystem has vanished, replaced by an ecosystem that has been reengineered to meet the consumptive demands of a large human population?

Insofar as the questions posed by *Return to the River* are site-specific, answers may be relatively clear. In a dried-up tributary, it may be obvious that stream flows and riparian cover need to be restored before fish populations can survive. But larger questions, for example, the benefits of

flow augmentation above certain threshold levels in the mainstem of the river, or the interactions between tributary, mainstem, estuary and ocean conditions, will rarely be this clear. And, because the connections between site-specific and ecosystem-scale questions are obscure, even the advisability of site-specific measures may be questioned: What if water and riparian habitat were restored in a tributary, but no fish returned to spawn because of problems elsewhere in the system?

Moreover, *Return to the River's* prescription is more ambiguous than it may sound. The report's idea of a normative ecosystem was developed by looking at less constrained river systems with productive salmon populations.[505] But what do these norms imply for a developed system like the Columbia? The report does not argue that the river must return to its pre-development condition. Nor does it try to spell out exactly how far toward "normative" conditions the river should go. Rather, the report suggests a direction: if productive salmon populations are to be reestablished, the rivers' natural functions have to be restored *to some degree*. This is an important statement, but it is not definitive. It tells us that natural functions, not technology, have to form the backbone of recovery efforts. But it only hints at where we should focus our efforts, and how far we need to move toward specific norms. Deciding whether to focus effort in this geographic spot, with these techniques, in this community, will depend not just on a conception of a normative river, but on a complex of scientific, economic, legal and equitable questions.

For example, the scientific arguments for reservoir drawdowns may be relatively clear in some places and not in others. And even where the scientific logic is clear, currently the case is made by argument, not actual data. Does this suggest a cautious approach to the subject, experimenting with drawdowns where their theoretical merits are relatively clear? Or do the salmon declines require a bolder gamble, and if so, what of the river's value as a navigation channel, hydropower generator and irrigation ditch? *Return to the River* raises these questions, but does not resolve them.

To take a second example, what does *Return to the River* imply about areas like the Umatilla Basin? In the Umatilla, fish were extirpated decades ago by irrigated agriculture. Efforts to restore salmon to the Umatilla have relied on large investments in technology, such as the water exchange project, fish passage facilities, and a hatchery. These arrangements would be more recognizable to Rube Goldberg than Mother Nature. And the Umatilla is not unique. In other over-appropriated tributaries, getting water and fish

[505] Independent Scientific Group, *Return to the River*, at xvii.

back in streams without seriously threatening surrounding communities suggests a willingness to invest in technology. *Return to the River* does not say that relying on technology in such instances is necessarily unjustified, but it suggests that restoring ecological conditions that are healthy for salmon will require a good deal more than technology. Whether it is politically, socially and economically possible to mount such an effort is a political judgment, not a scientific one.

Weighing these considerations, shuttling back and forth among policy makers, scientists, affected communities, financing agents and lawyers will remain central to the enterprise, and these considerations will shape results even in an ecosystem framework. Nevertheless, *Return to the River* points to questions that have not been at the top of the Basin's list, and it suggests the need for a new set of ecological ideas to guide recovery efforts. In this sense, *Return to the River* may be more valuable for the questions it raises than the answers it gives.

C. A Brave New Energy World

Many of the most difficult questions that face the Basin have to do with the hydropower system. Decisions over river operations and reservoir drawdowns are coming. Science notwithstanding, these decisions involve big stakes for the hydropower system. As *Return to the River* was being finalized, the Basin found itself having to comprehensively rethink the energy system, the Columbia River and, necessarily, the financial future of salmon recovery.

The continuing availability of hydropower funds as a source of financing for salmon recovery, irrigation assistance and other public purposes has been a basic assumption about the way the river operates, and the assumption has deep roots in law. The pattern was established early in the Basin's development. The first projects in the Basin were not built for hydropower, but for reclamation in the Upper Snake Basin, the Yakima Basin and elsewhere. Although these projects were originally intended to be self-financing, over the course of several decades they became a dependency of Congress and the hydropower system.[506] Hydropower dams are often called "cash register dams," capital investments that generate revenues with which to repay the U. S. Treasury and subsidize activities that do not pay for

[506] D. Worster, *Rivers of Empire: Water, Aridity and the Growth of the American West* at 52-53 (1985); Reisner, *Cadillac Desert* at 319-24.

themselves.[507] The authorizing legislation for Grand Coulee is characteristic: the project was authorized for flood control, navigation, reclamation "and for the generation of electric energy as a means of financially aiding and assisting such undertakings."[508] Since the turn of the century, federal hydropower dams have been the locus of a large collection of obligations, benefits, subsidies and cross-subsidies, some running in favor of the hydropower system and some not. When the dams were built, the federal government paid the cost. Hydropower ratepayers were expected to repay the cost of hydropower facilities, but the nation bore the cost of flood control and navigation features. And the hydropower repayment would occur over long time periods at low, non-market interest rates. In turn, the hydropower system is statutorily obliged to repay the cost of the dams' irrigation features.[509] Hydropower rate structures have their own set of benefits and concessions, often established by statute, such as the public power preference, preferential rates for irrigation pumping, and the "residential exchange" for customers of investor-owned utilities[510] and sometimes established for business or other reasons. Similarly, the hydropower system was used as security for investments in defunct nuclear plants that eat up more than $500 million in hydropower revenues annually.[511] Most recently, the Northwest Power Act required the system to invest in energy conservation initiatives to help meet the region's energy demands, and to pay the cost of offsetting the system's fish and wildlife impacts.

Columbia River fish and wildlife policy was particularly influenced by the availability of hydropower revenues during the 1980s. Because the market for hydropower generation has so much influence on the dam operations that affect salmon,[512] because mitigating fish and wildlife impacts is a cost of producing power,[513] and because we don't know how to fully offset the dams'

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[507] M. Reisner, *Cadillac Desert: The American West and Its Disappearing Water* 140 (Penguin 1986).
[508] Act of August 39, 1935, 74th Cong. 1st Sess., Pub. L. 409, sec. 2.
[509] *Id.*, § 112.3(C) at 146 and § 123.1 at 255; Roos-Collins, "Voluntary Conveyance of the Right to Receive a Water Supply from the United States Bureau of Reclamation," 13 *Ecology L. Q.* 773, 784 (1987); U. S. General Accounting Office, *Water Issues Facing the Nation: An Overview* 24 (1982).
[510] *See* Northwest Power Planning Council, Staff Issue Paper, "The Role of the Bonneville Power Administration in a Competitive Energy Market," Document 95-14 (July 28, 1995).
[511] Id.
[512] *See* Hittle, Larson, Randall and Michie, "Pacific Northwest Power Generation, Multi-Purpose Use of the Columbia River, and Regional Energy Legislation: An Overview," 10 *Env't'l L.* 235, 276 n. 178 (1980); Hemmingway, "The Northwest Power Planning Council: Its Origins and Future Role," 13 *Env't'l Law* at 678-79.
[513] The Northwest Power Act's fish and wildlife provisions require the federal power system to pay the full cost of producing power, including the cost of mitigating the dams' impacts on fish and wildlife. *See* 16 U.S.C. § 839(4) (electric power customers must pay all costs of producing power); and H.R. Rep. No. 96-976, Part I, 96th Cong., 2d Sess. 49 (1980) (customers must pay all costs, including fish and wildlife costs.); M. Blumm, "Hydropower vs.

effects, it has been thought fair to look to the hydropower system to fund a large share of fish and wildlife mitigation. A similar phenomenon occurred in the way the Columbia River fish and wildlife issues have come to be characterized. Although some of the federal dams were built primarily for non-hydropower purposes,[514] the Northwest Power Act refers to the projects generically as "hydroelectric facilities" or "hydroelectric projects."[515] The Columbia River debate is often characterized as "hydropower versus salmon."[516] Some argue, however, that hydropower has borne a disproportionate part of the burden. Programs such as those promised by the Salmon and Steelhead Conservation and Enhancement Act were never funded.[517] Other beneficiaries of the dams such as irrigators, navigation interests and flood control beneficiaries pay little if any of the cost of fish and wildlife mitigation. But with federal deficit pressures acting as a wolf at the door, Congress has been satisfied to see hydropower revenues as the primary financier for fish and wildlife measures on the Columbia River.

Since 1990, any number of long-settled assumptions of the hydropower industry have been thrown into a cocked hat. Beginning around 1990, changes in technology, law, and the availability of large supplies of cheap natural gas began to transform a highly regulated electric industry into a competitive industry.[518] A utility executive recently described a transaction in the new, competitive energy world:

> *Last week my company, Portland General Electric, bought a supply of power from the Palos Verde Nuclear Plant in Arizona. We then sold it to the Los Angeles Department of Water and Power (LADWP). LADWP sold it to Louis Dreyfus, a trading company that got in the electric business a couple of years ago. Louis Dreyfus in turn sold it to a Canadian utility.*

Salmon," 11 *Env't'l L.* at 234 .

[514] *See* T. Price and A. Radin, *Federal Water Project Costs* (1990).

[515] *See* 16 U.S.C. §§ 839b(h)(1)(A), (2)(A), (4), (6)(E)(I), (8)(A), (10), (11).

[516] *See e.g.*, M. Blumm, "Hydropower vs. Salmon: The Struggle of the Pacific Northwest's Anadromous Fish Resources for a Peaceful Coexistence with the Federal Columbia River Power System," 11 *Env't'l L.* 211 (1981).

[517] In 1984, the Act produced a report of a Salmon and Steelhead Advisory Commission under the auspices of the National Marine Fisheries Service, *A New Management Structure for Anadromous Salmon and Steelhead Resources and Fisheries of the Washington and Columbia River Conservation Areas* (July 31, 1984). The report proposed a program of policy planning, dispute resolution, management structure auditing and enforcement coordination whose implementation was to be funded after approval of the report by the Secretary of Commerce. Two and one-half years later, the Secretary declined to approve the report as failing to meet the Act's requirements. Letter from Malcolm Baldridge to William Wilkerson, November 5, 1986.

[518] *See* J. Watkiss and D. Smith, "The Energy Policy Act of 1992, "A Watershed for Competition in the Wholesale Power Market," 10 *Yale J. Reg.* 447 (1993).

> *The Canadian utility resold that power to Washington Water Power Company. And then, we bought the same power back from Washington Water Power Company, for less than we originally paid.*[519]

This, from an industry whose past adventures rarely strayed from the seductive pleasures of building a generating plant and persuading a public utility commission to adjust rates.

For the first time, Bonneville Power Administration is expected to compete for customers, and in an open market that was unthinkable ten years ago. For decades, hydropower was the cheapest energy source on the block by a good measure, and potential competitors had to face the reality that building power plants was a risky, expensive undertaking. In recent years, natural gas prices have fallen through the floor, and advances in generating technology have removed much of the risk in building power plants. Hydropower is now more expensive than some of the alternatives, and building an efficient power plant that burns cheap natural gas is relatively simple.[520]

These developments touched off a series of cost-control efforts on Bonneville's part. Near the top of Bonneville's list of concerns were projected increases in fish and wildlife recovery costs, which had risen dramatically since the Endangered Species Act listings in the early 1990s. In 1995 and 1996, some members of Congress proposed to help out by legislating a cap on Bonneville's fish and wildlife expenses. The idea became more complex, however, as more utilities sought to hang ornaments on the tree, and to secure their own fish and wildlife funding caps.

To offer an administrative alternative, federal and regional parties, encouraged by Senator Hatfield and the Clinton Administration, agreed to a six-year budget for Bonneville fish and wildlife funding.[521] The Agreement

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[519] A. Alexanderson, "Rethinking the Federal Role in a Competitive Electric Market," 26 *Env't'l L.* 657 (1996).

[520] *See* T. Johnson, "Coping with Change: Energy, Fish and the Bonneville Power Administration," 26 *Env't'l Law* 589 (1996); R. Hemmingway, "Restructuring the Northwest Power System," 26 *Env't'l Law* 669 (1996).

[521] "Memorandum of Agreement among the Department of the Army, the Department of Commerce, the Department of Energy and the Department of the Interior Concerning the Bonneville Power Administration's Financial Commitment for the Columbia River Basin Fish and Wildlife Costs" (September 16, 1996). The September 1996 Memorandum of Agreement puts the finishing touches on a draft agreement negotiated by the National Marine Fisheries Service, the Bonneville Power Administration and the chairman of the Northwest Power Planning Council in the fall of 1995 in response to Congressional pressure to protect Bonneville's finances. The Administration's Office of Management and Budget endorsed the draft agreement as "providing greater financial certainty to BPA and its customers relating to its fish and wildlife obligations while simultaneously assuring that the

commits Bonneville to use $252 million per year in hydropower revenues for fish and wildlife projects arising under the Council program and the ESA biological opinion. In addition, Bonneville agrees to bear the financial consequences of implementing project operations, flow augmentation and spill aspects of the biological opinion. Finally, under certain circumstances Bonneville may tap a federal "contingency fund" aspects of the biological opinion: several hundred million dollars in Treasury credits for Bonneville's financing of fish and wildlife measures not allocable to the dams' hydropower features.[522] The U. S. Treasury and the Office of Management and Budget, jealous guardians of the contingency fund, played significant roles in the agreement's development. Not incidentally, the Agreement commits the federal agencies to collaborate much more closely with the region in developing federal funding requests. The Agreement also incorporates an annex in which the parties agree to collaborate in federal budget matters and in monitoring and evaluation of fish and wildlife recovery.

The Memorandum of Agreement adds an important element of stability to fish and wildlife costs, but it is limited stability. The agreement is an interagency understanding, not legislation. It lasts only through 2001, and even in this period it is possible that a court or Congress could impose other obligations on Bonneville. Perhaps more important, the agreement was negotiated before *Return to the River* was published, before any clear understanding of the implications of the "normative river" concept, and

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1995 Biological Opinion and the Northwest Power Planning Council's Fish and Wildlife Program will be implemented in a way which helps assure recovery of the dwindling salmon runs." Letter from Alice Rivlin to Honorable Mark Hatfield (October 24, 1995). The Agreement is part of a larger package of measures intended to guarantee Bonneville's health.

[522] The Columbia River dams were authorized for multiple purposes: hydropower generation, flood control, navigation and other purposes. Under the Northwest Power Act, the Bonneville Power Administration is authorized to allocate its fish and wildlife expenditures "among the various hydroelectric projects . . . [and] to the various project purposes in accordance with existing accounting procedures for the Federal Columbia River Power System." 16 U.S.C. § 839b(h)(10)(C). The House Interior Committee Report's analysis of this provision noted that "[a]ll expenditures by BPA are to be made on a reimbursable basis vis-a-vis other project purposes, although BPA will have the flexibility to treat expenditures in excess of its allocated share as being payments for other project costs for which BPA is responsible under existing law." 96th Cong., 2d Sess., Rept. 96-976, Part II at page 45. This section and its legislative history have been interpreted as authorizing Bonneville to credit fish and wildlife expenditures for which hydropower is not strictly accountable against sums Bonneville owes the Treasury for the dams' construction. The theory was first raised by a law student, adapted by Bonneville (*see* S. Brown, "Breathing Life into a Drowned Resource: Mitigating Wildlife Losses in the Columbia Basin under the Northwest Power Act," 18 *Env't'l Law* 597 (1988); Memorandum from Harvard Spigal, General Counsel, to Randy Hardy, Administrator and Chief Executive Officer of the Bonneville Power Administration, regarding Interpretation of Section 4(h)(10)(C) of the Northwest Power Act (June 6, 1994)) and, ultimately, endorsed by the Administration in the Rivlin letter, cited in the prior note.

before any decisions about major changes in the Columbia River dams were made.

These uncertainties about the implications of the Endangered Species Act, ecosystem science, hydropower finances and ecosystem recovery costs open up significant questions about the management of the Columbia River. The next sections discuss what remains to be done to narrow these areas of uncertainty and develop new approaches to managing the river.

VII. New Footings for Water Policy on the Columbia River

If the next generation of water policy requires a river system that is consistent with the ecological needs of salmon, the new realities of the power industry, and the constraints of water law, how will we get there? To pose the question more sharply, recall the observations made in the introduction:

First, 150 years of water developments have fragmented the Basin's rivers among federal, tribal, state and private interests. The dams on the mainstem of the Columbia and Snake rivers are federal or federally-licensed; water diversions, especially from the tributaries, are mainly managed by the states and the Bureau of Reclamation. This poses the obvious problem of different bodies of law governing an interconnected river system, and the conflict to which it can lead. There is a still more serious problem: not only are the mainstem and tributaries subject to different regulatory regimes with different constraints, but the tributaries are fractionated into private ownerships and the Columbia itself is shared with another nation. Bringing tributary watersheds and the Canadian projects into the recovery effort poses a series of challenges that are quite different and in some ways more imposing than those in the domestic part of the mainstem.

Second, although the Basin has had more than fifteen years experience with large-scale salmon recovery programs, the salmon declines seem to pose questions for which we have few good answers. The most recent, comprehensive scientific advice is that salmon recovery programs cannot reverse the salmon declines unless human activities are managed to protect ecological functions vital to salmon, at least in some places and to some degree. Thus, ecological conditions in mainstem and tributary rivers could become key variables, but in an equation yet to be worked out.

Third, the federal role in the Columbia River is shaped not only by the needs of species, but increasingly by market forces. Federal development created an enormous series of economic assets: the hydropower dams. Efforts to offset the effects of the dams on salmon are financed in large part out of the hydropower till. However, as the power industry and the hydropower system have entered the era of market competition, the costs imposed on the hydropower system, including the cost of salmon mitigation, affect hydropower's ability to compete. If costs are too high, paradoxically, salmon recovery funding can be threatened. In short, if the river can no longer be managed to optimize economic values, neither can it be managed in ignorance of market economics. However, this new ecological/free market equation is only starting to take shape, and the relationship needs a more stable footing.

These three points tend to bound the discussion of ecosystem management for the Columbia Basin: ecosystem recovery measures could demand a great deal from the current system, yet economic and legal factors impose limits on the system's adaptability. What does an ecosystem recovery program operating within these kinds of constraints suggest about the shape of the next generation of agreements on the river, and what role does it suggest for federal water policy?

This section of the study takes a closer look at the scientific, financial and governmental implications of several questions: Can policy be organized around ecological functions that are still undefined by an evolving science? Can the Basin reestablish ecological connections among tributaries and with the mainstem? How does the Basin make changes in the hydropower dams without stalling the system's financial engine? And finally, are there governance structures that lend themselves to answering these questions and implementing solutions?

A. Water Policy, Science and Adaptability [523]

One of the key lessons of the Columbia is that water policy in western river basins can be, and increasingly is, driven by scientific and ecological issues. Questions of this kind, however, draw water policy onto unfamiliar ground. Some sense of ecological science and its navigational instruments is essential.

The first major issue is how we can define and measure success for water management initiatives that are geared to protect ecosystem functions. The Basin is a big ecological template, and if we shift it, we shift it in small ways whose ecological significance is debatable. Thus, water management initiatives have to fit into a much broader series of recovery measures which, collectively, add up to healthy ecosystem conditions. But how do we define what those "healthy" conditions are? How do we measure the contribution of

[523] The inspiration for much of this section is Kai Lee's work in adaptive management, which he describes in his book, *Compass and Gyroscope: Integrating Science and Politics for the Environment* (Island Press, 1993). For other discussions of adaptive management in the Columbia River, *see* K. Lee and J. Lawrence. "Adaptive Management: Learning From the Columbia River Basin Fish and Wildlife Program," 16 *Env't'l L.* 431 (1986); J. Volkman and W. McConnaha: "Through a Glass, Darkly: Columbia River Salmon, the Endangered Species Act and Adaptive Management," 23 Envtl L. 1249 (1993); and W. McConnaha and P. Paquet, "Adaptive Strategies for the Management of Ecosystems: The Columbia River Experience," 16 *American Fisheries Society Symposium* 410 (1996). The National Research Council report, *Upstream*, puts adaptive management on the Columbia River into a useful institutional context. *See Upstream* Chapter 13, "Institutional Analysis."

individual initiatives, and how do we link them analytically with a large collection of other measures to determine whether they add up, or even if we have a solvable problem?

These are complex scientific questions. They have to do with how much we know about ecosystems work and how they respond to human interventions. Ecosystem science is itself a peculiar science—more like economics or weather prediction than chemistry or physics, and so we probably will never have the clear answers we would hope for. Moreover, these are anything but pure scientific questions. Communities, dams, farms and powerful economic networks are in place. They can change, but can they change in a way that is ecologically relevant? This is largely a political question. The fact that the science is murky makes these issues more complex from a policy perspective. We have to make judgments about tradeoffs and risks based on a body of knowledge that is, at best, evolving.

1. The Prospect of Error

History is not encouraging. Political leaders have rarely had much patience with scientists who urged the world to stop while nature is examined so that policy can be squared up with scientific theory. John Wesley Powell's irrigation survey was intended to identify the West's best irrigation sites, and to use this information to organize federal resource policy in the West. After a hopeful start, the survey was defeated, "stomped to death" by Congress, due partly to politics and pressures for western settlement.[524] But, in an era in which rain was thought to follow the plow, scientific disagreement also played a role. Powell and other scientists were divided on important questions: Were artesian wells viable substitutes for surface irrigation? Would forests increase rainfall and help control flood waters, or reduce surface flows through evapo-transpiration? In the public arguments over these questions, the scientific foundations for resource policy, including Powell's survey, were called into question.[525] Policy makers wanted scientific advice, but they lost patience with the slow pace of the irrigation survey and the messy scientific squabbles that surrounded it.

Yet, if policy makers lack patience for science, they run other risks. The complexity of marine ecosystems has repeatedly led humans into error, in which the wrong factors were identified as problems and purported solutions

[524] W. Stegner, *Beyond the Hundredth Meridian* at 337 (1954). Parts of this history are also described in a U. S. Supreme Court opinion, *California v. U.S.*, 438 U. S. 645, 659 (1978).
[525] *See* Pisani, *To Reclaim a Divided West* at 153-163.

only compounded error and unfairness. Richard White tells a tale of 19th century California abalone fishery:

> *From the 1860s onward, Chinese fishermen harvesting the abundant abalone of the coast unknowingly benefitted from the earlier slaughter of otters by fur traders. During the late nineteenth century, however, other fishermen began to accuse the Chinese of depleting not only the abalone fisheries but also fisheries in general. Fisheries were declining, but climatic factors unrelated to Chinese activities were largely responsible for the decline. Indeed, the Chinese, by eliminating abalone and thus increasing the growth of kelp, were actually helping to increase the fisheries. Nevertheless, whites drove the Chinese from the fishing grounds and believed that they had saved the fishing, as fish increased at the end of the century. The fish returned not because of a decline in Chinese fishing pressure but in response to the decline of abalone; the simultaneous elimination by hunters of marine mammals, such as seals and sea lions, that preyed on fish; and more favorable climatic variations. In this case, ecological, social, and environmental change intertwined to influence the lives of humans who never understood the ramifications of their own actions.*[526]

Federal fishery policy has its own cautionary tales of the missteps into which scientists and decision makers can lead each other. In the 1800s, scientists proposed that fish hatcheries could offset the effects of habitat degradation and over-fishing. Nineteenth century scientists who supported hatchery technology had distorted ideas about the "plasticity" of salmon, misconceptions about salmon life histories, and false expectations about their ability to improve on nature's "wasteful" production of fish.[527] Prone to choose the science that offered easier political and economic choices, Congress accepted hatcheries as a panacea.[528] Nineteenth century hatchery technology rarely performed up to expectations. Yet, more than a hundred years later, hatcheries remain a linchpin in fishery management.

The Columbia River has a similar history. Hatcheries and other technologies were offered as the antidote to dams. When Grand Coulee blocked salmon from the Columbia's upper reaches, upper basin fish stocks were transplanted to hatcheries below the dam. The Mitchell Act, passed to mitigate the effects of other federal dams, began a hatchery-dominated program. At the Idaho Power Company's Hells Canyon projects, it took several years after the projects were built to find out that they could not be

[526] R. White, *It's Your Misfortune and None of My Own* at 215 (Oklahoma, 1992).
[527] Taylor, *Making Salmon* at 129.
[528] Id. at 107.

equipped with workable fish passage facilities; instead hatcheries were built. The federal government's primary compensation for the construction of the Lower Snake River hydropower dams was a collection of hatcheries built under the Lower Snake River Compensation Program. Even now, some 40 percent of the Bonneville Power Administration's direct fish and wildlife program budget is devoted to artificial production.[529]

The troubling thing in this history is not that risks were taken or that choices were wrong. Regardless of how closely policy makers listen to scientists, science is a debate, and policy makers can only get a snapshot of a long-term dialectic. If hatcheries were the wrong choice, it was hard to fault those who made it. Alternatives such as harvest reductions and widespread regulation of activities that degraded habitat were unappealing. Hatchery technology showed promise. What sensible person would not at least try the hatchery alternative, and what 19th century body of science would counsel against it?

The troubling thing is that these choices were not seriously evaluated after the fact to see how they were performing. If they had, policy makers might have curbed their commitment to traditional hatcheries. It was the lack of scientific evaluation, not the goofiness of the initial hypothesis, that was disturbing in the evolution of the hatchery program. As one historian put it, "the more salmon declined, the less curious Congress seemed about the cause of decline and the more basic research dwindled and 'practical' appropriations increased."[530] Once having found a "practical" answer to a problem, the program acquired its own momentum. The appeal of a technological answer that mooted the need to control habitat degradation, dam building and other forms of development was irresistible. Neither Congress nor bureaucrats were interested in upsetting apple carts with research and evaluation.

2. Adaptive Management in the Columbia River

More than one hundred years after the Northwest began these mitigation experiments, one of life's bracing experiences is coming to salmon policy fresh and untutored, and finding out how much is unknown about salmon recovery. As a newcomer in the early 1980s, the Power Planning Council had this experience when it faced the task of developing a fish and wildlife program based on the "best available scientific knowledge."[531] Congress assumed that

[529] Personal communication with Doug Marker, Northwest Power Planning Council (March 7, 1997).
[530] Taylor, *Making Salmon* at 145.
[531] 16 U.S.C. 839b(h)(6)(C).

this knowledge would be provided by the region's fish and wildlife agencies and Indian tribes. However, it was soon apparent that this was disparate knowledge. Hatcheries were or weren't a solution; fish barging did or didn't work; flow augmentation did or didn't make sense past a certain point; degraded habitat was or wasn't a serious problem. Different fish and wildlife managers and scientists gave different answers. While it was possible to listen to a battle of experts and ascertain a center of gravity on some answers, a center of gravity is not always sound scientific footing.

The science that traditionally informed salmon management tended to be geared to managing fish harvest.[532] The objective of this type of resource management is "produce commodities and services 'for the greatest good of the greatest number for the longest time' so that wild nature was not to be preserved, but actively manipulated by scientifically informed experts to improve and sustain yields."[533] In the context of fish harvest, conservation could be as simple as ensuring that enough adult fish return to provide eggs for a hatchery. Conservation in the Endangered Species Act sense was not the objective. Indeed, as recently as 1987, fish managers were unconcerned when Snake River coho, seen as more an obstacle than a contribution to harvest management, became extinct.[534]

In 1984, Professor Kai Lee, then a member of the Power Planning Council, suggested that the Council's job required a brand of scientific skepticism. Fish and wildlife recovery measures should be seen as a series of experiments. Experimental designs and monitoring and evaluation protocols should be an integral part of recovery measures so that critical questions could be addressed, errors corrected, and successes identified.[535] In this fashion, the Council could work with fish and wildlife managers to acknowledge their uncertainties, frame their judgments as hypotheses, and test them. In effect, salmon managers would be asked to challenge their own assumptions and consciously learn from experience. This is the essence of what is called "adaptive management."

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[532] U. S. Department of Agriculture, Forest Service, *Status of the Interior Columbia Basin: Summary of Scientific Findings,* General Technical Report PNW-GTR-385 at p. 113 (1996).
[533] C. Meine, "The Oldest Task in Human History," in R. Knight and S. Bates, *A New Century for Natural Resources Management* at 12 (Island Press 1995).
[534] *See* Transcript of Northwest Power Planning Council meeting at Post Falls, Idaho, at 9-12 (July 8-9, 1987).
[535] Lee and Lawrence: "Adaptive Management: Learning From the Columbia River Basin Fish and Wildlife Program," 16 *Environmental Law* 431 (1986). Experience with adaptive management in fish harvest is described in Walters and Hilborn, "Adaptive Control Of Fishing Systems", 33 *J. Fish. Res. Board Canada* 145 (1976); McAllister and Peterman, "Experimental Design In The Management Of Fisheries," 12 *North American Journal of Fisheries Management* 1 (1992).

The theory of adaptive management departs from traditional management in several ways. Traditional managers base action on existing knowledge and established modes of operation. They will alter unproductive programs, but managers tend not to put a high priority on questioning their programs. So, if information is gathered, it is drawn from a relatively narrow range of conditions.[536] In contrast, adaptive management implies a commitment to actively question programs, to think of programs as hypotheses, and test them.

To account for social implications in salmon recovery, Lee proposed a modified approach developed by C. S. Hollings and his colleagues.[537] Hollings called for scientific, economic, and social concerns to be explicitly considered when experiments are designed. No one would be forced to pretend that scientific inquiry alone mattered. Scientists, managers, policy makers and the public, all bringing their own political, economic and cultural concerns, should be involved in identifying appropriate cases for scientific probing. To help these parties think through these problems, computer models would be developed to simulate the ecosystem and analyze the effects of alternative management actions under different assumptions. So, the adaptive management model proposed for the Columbia had two special elements. One was the idea of using computers to simulate an ecosystem. By using an ecosystem model, participants could see the system-wide consequences of site-specific actions. The second new element was social—the idea that subjects for management experiments would be identified in an inclusive process that involved a range of interested parties.

This model of adaptive management offered the Council two opportunities: a way to proceed in the face of uncertainty, and a counter-weight to the assumptions of traditional management. The uncertainty of mitigation would be explicitly acknowledged, and the easy assumption that technology could save us from the consequences of development would be open to question.

3. Obstacles to Adaptive Management

[536] Silvert, "The Price of Knowledge: Fisheries Management as a Research Tool," 35 *J. Fish Res. Board Can.* 208 (1978).
[537] C. Hollings, ed., *Adaptive Environmental Assessment and Management*, 3 Wiley International Series on Applied System Analysis (Chichester, UK: Wiley 1978).

The problematic side of adaptive management appeared in implementation:[538]

Difficulties in agreeing on a common model of the ecosystem. Adaptive management called for the development of a model of the ecosystem, so that changes in one part of the salmon life cycle could be seen in their system-wide context. And in fact, it was not hard to develop a computer model of the salmon life-cycle. The Power Planning Council's first model was developed in a series of workshops with fish managers in 1987. However, it was difficult to develop a model upon which people outside the workshops could agree. The model the Council developed incorporated much of the basin's thinking about the salmon life cycle and stirred up a healthy debate about the assumptions that underlie fish management. But other models emerged based on other assumptions, and the models had differing levels of detail and resolution. By the early 1990s, there were at least three models at work in the basin. The idea that a single model could be a Rosetta Stone that would ground salmon planning in a common vision has proved elusive.

Moreover, the models developed are based on simplified pictures of the salmon life-cycle, informed by many of the assumptions of traditional fisheries management. If, as *Return to the River* suggests, salmon recovery should focus on ecological functions rather than salmon *per se*, it is not clear that these models are properly geared. If we want to think through how varying conditions might affect the productivity of a metapopulation, for example, it is not clear that these models help. And so, just as the premises that adaptive management hopes to test are in flux, models must be susceptible to rethinking.

Managing ecosystems for experimental purposes. Adaptive management seemed to assume that problems in the Columbia River would lend themselves to laboratory-style testing in which some variables could be controlled, others manipulated, and changes in population size ascribed to certain causes. In fact, however, few variables in a complex and changing salmon ecosystem are controllable, and population fluctuations may be explained by countless factors. The analogy to laboratory experimentation may be fundamentally misleading. Trying to experiment in an ecosystem may be more like trying to experiment with the weather. One ecosystem scientist described the distinction in these terms:

[538] For a thorough discussion of these matters, readers should consult Lee, *Compass and Gyroscope*.

> *The present capabilities of ecosystem science are quite substantial and are essential for rational management of public lands. However, they do not now and never will approach a deterministic pinnacle comparable to predictions of the attraction of two bodies in space, as shown by Newton's law of universal gravitation. Predictions about ecosystems must be framed in probabilistic terms.*
>
> *The potential of ecosystem science is most easily shown by analogy with more familiar disciplines that have similar inherent characteristics. For example, atmospheric science and economics both deal with complex integrated systems, are sciences of immense practical importance, and both show their value primarily through broad-brush analysis, illustration of mechanisms, and short-term predictions rather than long-term detailed forecasts. The same will be true of ecosystem science.*[539]

Learning about the effects of various mainstem operations poses problems of this kind. To test the efficacy of flow augmentation, an adaptive management approach might suggest that we should radically vary river flow from one year to the next to generate robust information about the connection between flow augmentation and salmon survival. Yet, it does not appear that we could generate such fluctuations even in theory. Recall that the natural, year-to-year variation in Columbia River flows can be enormous, as much as a 35-to-1 ratio between high and low flows. However, because the Columbia system has much less storage capacity compared to total runoff than do many other western river systems, manipulating the amount of stored water in the Columbia system can do little in comparison to natural fluctuations. The dashed line on Figure 2 (page 31) shows the kind of change in the hydrograph we have achieved through storage releases since the early 1980s. Even with the relatively large amounts of flow augmentation prompted by the Endangered Species Act, the change is small. The variation in fish survival that could be expected from the Council's water budget was within the margin of measurement error,[540] and the same is probably true of the Endangered Species Act flows. So it is not at all clear that we can produce experimentally significant variations through flow manipulation.

Moreover, even if there were enough storage, extreme year-to-year fluctuations would not necessarily make sense in other ways. Consider a regime that heightens year-to-year flow differences by providing no flow augmentation in low water years and maximum augmentation in wet years. Such a regime could run counter to salmon recovery efforts. Magnifying year-

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[539] W. Lewis, "The Ecological Sciences and the Public Domain," 65 *U. Colo. L. Rev.* 279, 290 (1994).
[540] *Compass and Gyroscope* at 47.

to-year flow differences could actually hurt prospects for rebuilding salmon. Fish managers concerned with declining salmon stocks want to augment flows the most in dry years, when the experimental approach would provide least.

And, of course, the politics of such an experimental regime would be daunting. For utilities that had been lining up for a civil war over access to federal hydropower in the 1980s,[541] proposals to manipulate the river for a salmon experiment could be taken as fighting words.

These were some of the considerations that led to the proposal developed in the Power Planning Council's 1994 "mainstem hypotheses" rulemaking exercise. In that exercise, the Council convened a group of scientists to clarify two key assumptions underlying the mainstem program related to the merits of flow augmentation and the merits of barging fish. Instead of trying to measure the merits of each individually, with something resembling laboratory-style methods, the Council proposed a head-to-head comparison between barged fish and fish migrating in the river. A comparison would not tell us in absolute terms how beneficial a given increment of flow augmentation or transportation might be, but it should give us a comparative measure of the merits of each method, which would help resolve one controversial question in salmon recovery. The same comparison could be made over several years, to observe the combined effects of human mitigation measures and fluctuating natural conditions to see if the comparative efficacy of the two techniques varied with different climatic conditions. Because natural flow fluctuations are more extreme than artificially-induced fluctuations, this year-to-year comparison could also provide valuable insight into the flow-survival relationship. This is a more opportunistic approach to adaptive management than the pure doctrine might suggest. However, it more realistically reflects the social, political and legal context in which adaptive management must function.

The lesson may be as obvious as this: We can rarely expect to manipulate a complex ecosystem for experimental purposes. We have to look for other ways to learn. Learning is likely to be a slow, opportunistic process, orders of magnitude slower than the Powell irrigation survey with which Congress lost patience in the 19th century.

Confessing ignorance. Adaptive management is premised on an admission of ignorance, that we don't really know that what we propose to do will work.

[541] *See* Blumm, "The Northwest's Hydroelectric Heritage: Prologue to the Pacific Northwest Electric Power Planning and Conservation Act," 58 *Wash. L. Rev.* 175, 228 (1983).

This poses a problem recognizable by anyone who has lobbied a bill in a legislature: "Mr. Congressman, I want you to invest large sums of public money in ways that may or may not help species at the brink of extinction. But I can guarantee you that we will learn as much from failure as success." No one would express it quite so baldly, but however phrased, emphasizing the uncertainty involved in ecosystem recovery can erect political barriers. Why single out ecosystem protection measures to emphasize risk and uncertainty? Huge sums of public money are invested in national defense initiatives with little assurance of success and no expectation of learning whether the investment was necessary. As government budgets are cinched tighter, the idea that policy can be based on confessions of ignorance may be hard to sustain.

Yet, if we pretend to know more than we do, we may fail to evaluate results, and, like the hatchery system, compound the consequences of error. Sooner or later, error is likely to be too obvious to ignore, and the political foundations for ecosystem recovery will be the worse for it.

Studying the problem to death. For some people and some issues, adaptive management is seen as a ruse, an excuse either for taking a misguided action, or for not acting more boldly. The need for more research, valid enough in its own right, can be a delaying tactic, like environmental litigation in which those who oppose development argue for more research and analysis before development is allowed. On the Columbia River of the 1980s, the roles were reversed, but the scenario was otherwise familiar. Utilities who pay for salmon mitigation insisted on more research before undertaking the most costly salmon recovery efforts, and sometimes for good reason. Fish managers, who thought they already knew that flow augmentation and hatchery supplementation were positive goods, saw an experimental approach as a delaying tactic. When the Council called for research into the flow-survival relationship to accompany the water budget, for example, or approved hatchery supplementation projects only on an experimental basis, it ran into resistance. And because fish managers control crucial aspects of any research and evaluation effort, they were in a position to block scientific inquiry.

There is a more subtle variation of this problem. When species are in decline, funds are limited, and the choice is between funding an on-the-ground measure that we know will do some good and long-term research and monitoring, it takes a special measure of commitment to invest in long-term research and monitoring. Research, monitoring and evaluation are expensive. They can easily eat up a large part of any budget, and they do need a budget discipline. But they also can be too easy a mark in budget debates.

Adaptive management as window dressing. Following the initial enthusiasm for adaptive management came the realization that virtually anything anyone wanted to do could be justified as "adaptive management" if a monitoring component were tacked onto it. Forgotten was one of the fundamental aspects of adaptive management, that it is supposed to be organized and directed rather than *ad hoc*. Two exponents of adaptive management recently reminded us that an "overt and directed" adaptive program should have specific elements:

> *(1) the goals for the management process; (2) the hypotheses, assumptions and information describing the current beliefs about ecosystem function, which form the basis for current management action; (3) actions designed to address immediate biological information needs, including management experiments; (4) critical uncertainties regarding achievement of management goals based on the existing belief system; and, (5) research, monitoring, and management programs (including experiments) designed to address these uncertainties.*[542]

Nevertheless, during the 1980s these elements were often glossed over, and adaptive management too easily became a code word for passive data collection.

Problems of coordination. Organized learning requires an enormous effort of coordination. In the mainstem, hydropower operators must collaborate with fish and wildlife agencies, tribes, and constituent groups to conduct any kind of experimental work. In hatchery reform, fish and wildlife agencies, tribes, funding agencies and environmental groups each have leverage. Collaboration can be urged but not enforced, and dissatisfied parties can erect obstacles to implementation or assert other priorities. Experimental initiatives that emerge from policy debates can be recast or bled to death in implementation. Initiatives that died in policy debates can be revived and pushed in over the transom.

Merely calling something a learning process doesn't absolve it from a burden of history, mistrust and politics. In attempting to develop mainstem experiments, the dams' role as cash registers for other programs, their enormous energy output, their connections to inland ports, the obstacles they pose to salmon, and the social and economic problems they create for tribes and others must be addressed. Experimentation with hatchery techniques requires us to deal with the history of programs that were not just a fix for

[542] McConnaha and Paquet, "Adaptive Strategies for the Management of Ecosystems," 16 *American Fisheries Society Symposium* at 419.

dams, but a rearrangement of the cultural landscape: the movement of salmon production from upriver to downriver, the powerful lure of the lower-river fisheries, and the inequities for Indian tribes. There is no easy way to escape these problems.

4. The Need for Policy Support

Given these problems, what is the prospect that adaptive management will offer a practical way to refine scientific ideas of the salmon ecosystem into a meaningful management guide for recovery efforts? The rationale for a management strategy that puts a high priority on learning is, if anything, stronger than ever. We know even less about complex ecosystems than we thought we knew when we operated with mechanistic site-specific assumptions. There is more support for the idea of adaptive management among scientists and managers than ever before. By 1995, all of the basin's recovery plans, *Return to the River*, and the National Research Council's *Upstream* report urged an adaptive approach.[543]

Other essential pieces of an adaptive management infrastructure seem to be falling into place. An aquatic resource information center called StreamNet, funded under the Northwest Power Planning Council's fish and wildlife program with Bonneville revenues, has gathered, organized, and made readily available a large body of data on salmon abundance, distribution, habitat, harvest, and mitigation efforts.[544] A group of ecosystem analysts working with the National Marine Fisheries Service is using salmon life-cycle models to "mine" data, sharpen alternative hypotheses, and explore key uncertainties.[545] The National Marine Fisheries Service's recovery plan implementation process is based in part on an adaptive management model.

In 1995, the Northwest Power Planning Council and the National Marine Fisheries Service, with help from the National Academy of Sciences, created an Independent Scientific Advisory Board to help provide scientific advice to

[543] Independent Scientific Group, *Return to the River*; National Research Council, *Upstream, Salmon and Society in the Pacific Northwest* at 291 (1995); National Marine Fisheries Service, *Proposed Recovery Plan for Snake River Salmon* at III-4 (1995); Northwest Power Planning Council, *Columbia River Basin Fish and Wildlife Program*; *Wy-Kan-Ush-Mi-Wa-Kish-Wit, Spirit of the Salmon, The Columbia River Anadromous Fish Restoration Plan of the Nez Perce, Umatilla, Warm Springs and Yakama Tribes* at 5B-1 (1995).
[544] See StreamNet's homepage at http://www.streamnet.org. For StreamNet's most current status report on the Columbia River salmon runs, *see* D. Anderson and G. Christofferson, StreamNet, the Northwest Aquatic Resource Information Network, *Report on the Status of Salmon and Steelhead in the Columbia River Basin – 1995* (1995).
[545] See PATH, Plan for Analyzing and Testing Hypotheses, *Conclusions of FY96 Retrospective Analyses* (January, 1997).

the two agencies' fish and wildlife programs. The board includes most of the authors of *Return to the River,* all of whom are strong advocates of rigorous research and evaluation. The science board's role was strengthened by 1996 legislation requiring the Council to bring independent scientific oversight to the allocation of Bonneville fish and wildlife funds. The Council appointed most of the members of the Independent Scientific Advisory Board to implement this aspect of the legislation, along with several authors of the National Research Council's *Upstream* report. So, for the first time, a group of independent scientists with strong commitment to adaptive management is advising federal and regional policy makers on recovery strategy (*Return to the River* and *Upstream*), implementation issues under Endangered Species Act and Northwest Power Act programs, and Bonneville fish and wildlife expenditures.

The 1995-1995 memorandum of agreement that established a budget for Bonneville fish and wildlife funding[546] also imposes a budget discipline that should create new pressure for accountable fish and wildlife investments. By establishing a fixed fund for which projects must compete, the agreement gives fish and wildlife managers an extra incentive to ensure that funds are invested wisely. Moreover, the agreement explicitly commits the parties to collaborate in monitoring and evaluating fish and wildlife recovery.

Yet, there are also missing pieces of infrastructure. Part of the reason for adaptive management's continuing popularity is that it carries different meanings for different people. Different interests support evaluation of different issues (usually, those that don't threaten one's own programs). As a result, what seemed like support in policy debates fades in implementation, when managers allocate resources. Decision makers have to be willing to live with the ambiguity that comes with long-term evaluation of a complex, shifting ecosystem, and resist the impulse to short-circuit research and evaluation in response to exigencies. Ultimately, they may have to act on the basis of new information, even if it means less funding for their own programs. It is by no means clear that adaptive management has hard-edged support in any of these senses.

It is possible that economic pressures will produce a hardier process for research and evaluation. There is a rising chorus in Congress and elsewhere demanding evidence that investments in salmon recovery actually help salmon. In 1996, a Council fish and wildlife governance review found broad

[546] Memorandum of Agreement among the Department of the Army, the Department of Commerce, the Department of Energy and the Department of the Interior Concerning the Bonneville Power Administration's Financial Commitment for the Columbia River Basin Fish and Wildlife Costs (September 16, 1996), see pp. 151-153.

consensus for improving accountability in fish and wildlife policy.[547] In October, Congress enacted legislation requiring the Council to form an independent scientific panel to advise on the efficacy of projects funded with Bonneville Power Administration funds.[548] Near the end of 1996, a regional energy panel urged greater accountability in fish and wildlife recovery initiatives.[549] There are many different voices in this chorus: Some are saying that a lot of money is spent on salmon recovery, salmon are still declining, and so the money must be poorly managed. Others are concerned that no single entity has responsibility for these investments and so no one can be held accountable. Some think that True Science, if we would only let it loose, would tell us exactly what to do. One thing all of these voices have in common is that none of them can be answered without rigorous scientific evaluation. It is possible, then, that a well thought-through approach to a long-term research and evaluation program will emerge from current managerial efforts, combined with political demands for accountability.

Ultimately, however, it may be naive to expect that scientific, political and budget pressures will be enough in themselves to bring fractious parties together into a serious monitoring and evaluation effort. Such an enterprise will, if it does its job well, periodically threaten agency budgets, challenge hoary scientific truths, and offend powerful political interests. At any given time, its enemies are likely to far outnumber its friends. And if this is true, then monitoring and evaluation will never happen without an extraordinary effort of political will. Any program that purports to evaluate the interactions between people and the Columbia River ecosystem, and report them without fear or favor, will need stable and independent footing.

5. Federal Ecosystem Data and Expertise

In addition to policy support, federal agencies have developed extensive data and expertise in ecosystem planning in the Basin and in other parts of the country, which could help the Basin to develop a more coherent model of the salmon ecosystem.

Common data. The last five years have seen unprecedented federal efforts to define the meaning of ecosystem management in Northwest forests, and to

[547] D. Getches, *Report to the Northwest Power Planning Council from the Workshop on Fish and Wildlife Governance* at 8 (February 12, 1996).
[548] Fiscal Year 1997 Energy and Water Development Appropriations Act, Pub. L. 102-206, sec. 512 (Sept. 30, 1996).
[549] Comprehensive Review of the Northwest Energy System, *Final Report: Toward a Competitive Electric Power Industry for the 21st Century* at 5 (Dec. 12, 1996).

systematize data and analysis of the Basin's forest resources. The Administration's ecosystem plan for westside forests,[550] and the reports of the Interior Columbia Basin Ecosystem Management Project[551] on eastside forests are unique experiments, which attempt to bring science and policy development together to address difficult and controversial natural resource issues. There is obvious sense in seeking to join these efforts, which are aimed primarily at terrestrial ecosystems, with the Basin's salmon recovery programs. The development of computerized geographical information systems has made it possible to overlay information regarding various resources to generate a more complete ecosystem picture.

The Interior Columbia Basin Ecosystem Management Project demonstrated one model of collaborative data development. Rather than inventing its own data base for the Basin's rivers, the Project borrowed the StreamNet data base, which had an organizational structure for the Basin's rivers borrowed from EPA's river-reach system and data on fish, wildlife and other values in each stream reach. The Ecosystem Management Project improved on the data base by adding much more extensive data on terrestrial resources and gave back a more valuable data base than it had borrowed.

Efforts should also be made to build better water information into the data base. Water gauge information compiled by the U. S. Geological Survey has long been available. However, many of the region's tributaries are ungauged, and a number of water uses are unmetered, so that water availability on these streams can only be estimated. State water-rights information has been a missing ingredient. This gap may be remedied at least in part by a National Marine Fisheries Service-Bureau of Reclamation project that is gathering water-rights information for the Basin (see page 111).

The important point is that federal, state and tribal agencies could make it a priority to link their data systems into a growing network of ecosystem information. To do so, agencies should work toward consistency of data standards and resource classification systems. At the national level, the Department of Interior's National Biological Survey is coordinating information development by Interior agencies. However, this effort needs to

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[550] U. S. Department of Agriculture, et al., Forest Ecosystem Management Assessment Team, *Forest Ecosystem Management: An Ecological, Economic, and Social Assessment* (July 1993).
[551] *See* U. S. Department of Agriculture and U. S. Department of Interior, Interior Columbia Basin Ecosystem Management Project, *A Framework for Ecosystem Management in the Interior Columbia Basin and Portions of the Klamath and Great Basins; An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins;* and *Integrated Scientific Assessment for Ecosystem Management*, all of which are summarized in *Status of the Interior Columbia River Basin: Summary of Scientific Findings* (November 1996).

be both broader and narrower. It needs to be broader because the Department of the Interior is not the only department generating important ecosystem information. For example, the National Marine Fisheries Service, a Department of Commerce agency, is developing a new framework for describing and identifying essential fish habitat under the Magnuson-Stevens Fishery Conservation Act.[552] But the effort also should be narrower, because different areas of the country may already have coordinated data systems that offer a data template for issues in those parts of the country. The model, again, is the Interior Columbia Basin Ecosystem Management Project's productive relationship with the StreamNet data base.

State agencies need to join more actively in this work. Constrained by agency budgets and internal politics, they have too often been reluctantly willing to collaborate in data development efforts. However, the states will pay a price if they are passive participants. Rather than shaping these efforts, the states will react. The more data and energy the states can bring to the effort, the more their interests will be addressed.

Analytical tools. The computer models of the salmon life cycle that are now in use play an important part in salmon recovery. They draw decision makers' attention to particular questions. Their quantitative output influences decisions. The structure of these models is limited, however. The current salmon models are primarily accounting models. They convert assumptions about salmon mortality factors into equations, run imaginary fish through these equations, and tell us how many salmon survive under varying assumptions. None of these models attempts to look at ecological functions, or connections between these functions. Existing models make no assumptions, for example, about connections between the numbers of juvenile salmon emerging in headwater areas and the carrying capacity of the Columbia River estuary. Available data may not allow us to quantify these relationships with much confidence. However, models are important for their ability to clarify assumptions and point to key questions. An analytical model focused on ecological relationships is therefore an important piece of infrastructure. Until we have such models, the debate over ecosystem recovery is likely to be less rigorous than it should be.

The nuts and bolts of developing such a model are beyond the scope of this study, but the Basin has a skilled group of analysts who have developed the

[552] Section 305(b)(1)(A) and (B) of the Magnuson-Stevens Fishery Conservation and Management Act, as amended, 16 U.S.C. 1801, et seq. *See* National Marine Fisheries Service, "Framework for the Description, Identification, Conservation and Enhancement of Essential Fish Habitat," Jan. 2, 1997 (http://kingfish.ssp.nmfs.gov/rschreib/html/guidev5c.htm).

current models. *Return to the River* provides an ecosystem concept in some detail. It is hard to imagine that these elements can't combine with federal expertise developed in forest ecosystem planning and the System Operation Review to provide a fuller conceptual picture of the Columbia River Basin ecosystem.

6. Learning and Acting

Assuming we make strides in organizing ecosystem recovery efforts so that we learn from them, what will we do with the knowledge? Adaptive management asserts that we have to learn from recovery efforts so that we can improve on them. But ecosystems are dynamic; they change in response to human actions; they rebalance themselves to adjust to new conditions. If we build a dam and create an new obstacle to the salmon migration, the world doesn't pause while we try to figure out how to restore fish passage over the dam. Habitat above the dam does not empty out, it fills up with new species. If we find that fish passage facilities won't work, there is nothing simple about responding to this knowledge. The dam is built. There is a different web of life upstream. We can't entirely undo what we have done. The new world that evolved from our earlier actions puts new constraints on our ability to adapt.

The dilemma resembles the dilemma of the Administration's "no surprises" policy under the Endangered Species Act. The Endangered Species Act allows private parties to satisfy the Act's requirements by developing "habitat conservation plans" that secure nonfederal commitments to species recovery. Once approved by the federal government, the habitat conservation plan permits private parties to proceed with development as long as it is consistent with the plan. But what happens when the habitat conservation plan fails to protect the species? If new advances in ecosystem science show that the assumptions of the habitat conservation plan are unfounded, does the plan and its legal protection for development evaporate? Under the no-surprises policy, the Administration assured developers that if they implement an approved conservation plan, they will not be required to commit additional land or financial compensation beyond that required in the original plan, except in extraordinary circumstances.[553] The judgment is delicate. If habitat conservation plans afford developers little security, why should a developer make a sizable investment in developing one? The no-surprises policy can help species by encouraging habitat conservation

[553] U.S. Fish and Wildlife Service and National Marine Fisheries Service, *No Surprises: Assuring Certainty for Private Landowners in Endangered Species Act Habitat Conservation Planning* (August 11, 1994).

planning, but it also gambles on the validity of current expertise and judgment. If the plan turns out to be wrong, the species will bear the consequences.

Adaptive management faces a similar reality. We may learn as we go, but we cannot act freely based on what we learn. Action, once taken, changes the ecological and political landscape. After we have learned better, we cannot go back to the old landscape because there is a new one in its place. Knowledge may be a form of power, but it is power that can be dissipated by the consequences of our actions.

Learning to monitor the response of ecological processes and learn from the results is a task we are only beginning to think through. It is likely that so far we have approached the task with the wrong tools and perspectives, expecting something more or different than nature allows. If ecosystem science is closer to economics than physics, ecosystem monitoring may have more to learn from the Federal Reserve Board than from the laboratory. The importance of finding a workable model for sensing our effects on ecosystems, however, should not be treated as a sidebar in a more important conversation. It may be the more important conversation.

B. Collaboration Among Fragmented Jurisdictions

With the current degree of fragmentation we see in water management, how can we achieve the degree of coherence that an ecosystem approach to water policy suggests? Jurisdiction over Columbia River Basin waters is fractured between federal, state and private ownerships and jurisdictions in the United States, and between United States and Canadian governments. Essentially, the Endangered Species Act program has helped to pull federal programs and agencies together in the river's mainstem on this side of the border, and this is no mean accomplishment. But it still leaves many unconnected pieces:

1. The Tributaries

Even with the persisting frictions in the mainstem, federal, state and private interests are much better integrated in the mainstem than they are in the tributaries. Western water rights, which have a firm grip on the tributaries, are the last word in local control, the result of "a decentralized system of government that encouraged the allocation of natural resources by users

rather than by public officials."[554] For decades, state water agencies' primary task was to issue diversion permits, not to manage water as a public resource. By 1898, claimants to the Boise River had asserted rights to 6,361,800 miners' inches of water, although in the late summer the river had only 35,000 miners' inches.[555] This *laissez faire*, decentralized pattern was carried over into reclamation program in section 8 of the Reclamation Act. The law of the Snake River (see pages 33-41), the most reclamation-intensive watershed in the Basin, demonstrates just how deeply tributaries have been woven into the pattern of local usage and custom.

While the law of the Northwest states and Bureau of Reclamation operations have begun to evolve in new directions, the legacy of locally-driven water policy and long-held "prior" claims is powerful. The legacy includes a set of incentives, state and federal, to take water out of streams and put it on fields.[556] Irrigation water is free. Reclamation projects provide water at a fraction of the cost of supply. "Irrigation assistance" is provided by hydropower rate payers. Irrigation pumpers pay lower power rates. State water law "use it or lose it" principles can discourage conservation. Some of these factors are now moderated to a degree, but there are still many incentives for water diversions.

a. Federal and State Presence in the Tributaries.—Federal and state water agencies both have strengths and weaknesses on tributary watershed issues. For the states' part, many state water officials believe that they have a pivotal role in resolving water disputes.[557] In most of the Basin states' constitutions, water is considered a public resource.[558] The property interest that underlies water rights is in significant part defined by state law. State doctrines of beneficial use and waste define key parameters of water rights.[559] States control the machinery of water permitting, transfers, instream flow protection and other matters.[560] State legislatures control purse strings. State courts play a vital role in the continuing evolution of

[554] Pisani, *To Reclaim a Divided West*, at xvi.
[555] Pisani, *To Reclaim a Divided West*, at 37.
[556] *See* C. Wilkinson, "Aldo Leopold and Western Water Law: Thinking Perpendicular to the Prior Appropriation Doctrine," 24 *Land & Water L. Rev*. 1 (1989).
[557] *See* Western Governors' Association and Western States Water Council, *The Park City Workshops: A New Paradigm for Managing Western Water* (February, 1993).
[558] Idaho Const. Art. 15, § 1; Mont. Const. Art. IX, § 3; Wash. Const. Art. XXI, § 1. In Oregon, this principle is expressed in a statute, Ore. Rev. Stat. 537.110-130.
[559] *See Department of Ecology v. U. S. Bur. Of Reclamation*, 118 Wash. 2d 761, 827 P.2d 275, 282 (1992); *Department of Ecology v. Grimes*, 121 Wn. 2d 459, 852 P.2d 1044 (1993).
[560] Tarlock, *Law of Water Rights and Resources*, § 5.01.

water law.[561] In these respects, the states are a logical focus for tributary water issues.

At the same time, however, state assertions of authority in environmental water rights issues have a mixed history.[562] It is tempting for politicians and water administrators to fall into postures in which federally-sponsored environmental programs play the role of the outside threat to indigenous (state) interests.[563] Moreover, notwithstanding some progress in instream flow legislation and programs, out-of-stream water uses have a firm beachhead in the states. In Washington, the state supreme court has pulled the carpet from under the state water agency's ability to administer water rights,[564] its legislature has lifted the moratorium on Columbia River diversions, and legislative reactions to the locally-initiated Methow Basin proposals are reportedly chilly. In Idaho, the Swan Falls settlement on the Snake River establishes minimum flows that are much lower than the river's current average flow, leaving plenty of water for new development.[565] In the early 1990s, two Oregon agencies filed applications to reserve more than 4.3 million acre-feet of water from many of the state's river basins for future economic development, primarily irrigation.[566] The appetite for new water development is still insistent, and the states' water rights machinery is well oiled.

But if the states are ill-equipped to take an ecologically-based approach to water management, the federal water agencies are hardly better situated. Congress long ago conceded most water-allocation authority to the states,

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[561] For the argument that the evolution of the prior appropriation doctrine for environmental values has led to a convergence between the appropriation and riparian doctrines, *see* Tarlock, "New Water Transfer Restrictions: The West Returns to Riparianism," 27 *Water Resources Research* 987 (June 1991); Moore and Willey, "Water in the American West: Institutional Evolution and Environmental Restoration in the 21st Century," 62 *U. Colo. L. Rev.* 775 (1991).

[562] *See* F. Trelease, "Water Rights of Various Levels of Government—States' Rights vs. National Powers," 9 Wyo. L. Rev. 189 (1965).

[563] *See*. e.g., J. Jones, "The Downstream Threat to Idaho's Water: New Second Century Challenges," 28 *Idaho L. Rev.* 483 (1991-92).

[564] *Rettkowski v. Department of Ecology*, 858 P.2d 232 (1993).

[565] Chapman reports that average annual flows at Swan Falls are 10,719 cfs (7,820,000 af), while the settlement and state water plan have 3,900 cfs minimum flow April-October and 5,600 cfs November through May. Chapman, et al., *Status of Snake River Chinook Salmon*, report to the Pacific Northwest Utilities Conference Committee, Section A at 33-34.

[566] Letter of November 6, 1992 from Bruce Andrews, Director of the Oregon Department of Agriculture, to Lorna Stickel, Chair of the Oregon Water Resources Commission; Memorandum from Andrews to Martha Pagel, Director of the Oregon Water Resources Department regarding "Request for reservation of the unappropriated water of the Snake River for future agricultural economic development." *See also* WaterWatch of Oregon, "Reservations Will Dictate Future Water Allocation, *Instream* at 1 (Summer 1996).

which have in turn over-allocated many streams to private users.[567] Tributary water use occurs in large part under a regime of private property rights. Accordingly, tributary streams are often only marginally influenced by state and federal water policy. However ambiguous these private property interests may be, some property interest is there, and sorting it out involves the most intricate kind of legal tangle.[568] Nor are the equities in these situations clear by any means. Just as ecosystem recovery represents important values, there is, and ought to be, reluctance to alter water allocation policies without regard to the consequences for rural communities.[569] Ideas of this kind fall into the category of "the War on the West," and the Columbia River Basin equivalent, "the Downstream Threat."[570]

All of the federal water and land programs that affect tributaries have significant limitations. While the Bureau has been trying recently to shift to effective and environmentally sensitive water management,[571] its history is in large part the history of western irrigation. The Bureau is a water proprietor that often seeks to protect its water rights. Its statutory obligations, once apparently clear, are no long so obvious in the endangered species era. The Bureau finds itself challenged to undo the effects of prior programs, and faces ambiguity in its authorities. As the Bureau cuts back on unauthorized water uses, can it put the water back in streams? Can it manage reclamation projects to help with fish and wildlife recovery programs? Can it require water freed up by conservation projects to be dedicated to instream uses?[572] Without answers to these questions, can the Bureau play much of a role in tributary water issues in which ecosystem issues are central?

The Federal Energy Regulatory Commission is playing a growing federal role in relicensing tributary hydropower projects. The Idaho Power Company's

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[567] F. Trelease, "Water Rights of Various Levels of Government, States' Rights Versus National Powers," 19 *Wyo. L. Rev.* 189, 196 (1965).
[568] *See* C. Bell and N. Johnson, "State Water Laws and Federal Water Uses: The History of Conflict, The Prospects for Accommodation," 21 *Env't'l L.* 1, 5 (1991); C. Wilkinson, "Aldo Leopold and Western Water Law: Thinking Perpendicular to the Prior Appropriation Doctrine," 24 *Land & Water L. Rev.* 1; R. Benson, "Whose Water Is It? Private Rights and Public Authority Over Reclamation Project Water" (unpublished manuscript, 1996).
[569] W. Holmes and G. Achterman, "Bureau of Reclamation Contract Renewal and Administration: When Is a Contract Not a Contract?" 41 *Rocky Mt. Min. L. Inst.* 23-1, 23-42 (1995).
[570] U. S. Bureau of Reclamation, *Assessment '87: A New Direction for the Bureau of Reclamation* at i.
[571] *See* J. Jones, "The Downstream Threat to Idaho's Water: New Second Century Challenges," 28 *Idaho L. Rev.* 483 (1991-92).
[572] *See* Holmes and Achterman, "Bureau of Reclamation Contract Renewal and Administration," 41 *Rocky Mt. Min. L. Inst.* at 23-8.

Hells Canyon complex, the City of Tacoma's Cowlitz River project, and Portland General Electric's Pelton-Round Butte project on Oregon's Deschutes River all raise significant instream flow and salmon recovery issues. Many environmental interests see these projects as having supplied "cheap" electric power only because they have not paid full freight for their fish and wildlife impacts. Relicensing proceedings supply a forum to address this issue, but FERC itself has a checkered history in environmental protection.[573]

The federal land management agencies play key roles in tributary watersheds. The U. S. Forest Service and Bureau of Land Management in particular manage a large part of the Basin's salmon habitat. Under pressure from spotted owl controversies on the western side of the Cascades and salmon listings on the eastern side, the two agencies have launched ambitious ecosystem planning processes in an attempt to find new foundations for land management.[574] In watersheds like the Grande Ronde, the land management agencies are important influences in tributary water conditions, but have not to this point been effective facilitators of ecosystem recovery.

The fact that all of these programs are federal can itself be a major limitation. The extent to which federal agency decisions are influenced by inside-the-beltway considerations will vary from one situation to another, but the suspicion in local communities is that Washington, D.C. largely ignores local values. True or not, this can mean that federal initiatives, especially federal tributary water initiatives, generate their own political opposition.

If state and federal programs have limitations, coordination between the two jurisdictions is often spotty. While federal and regional policy makers consider major investments for ecosystem recovery in the river's mainstem, the state water-rights machinery may continue to approve water diversions from salmon streams; and a Bureau of Reclamation program may spread conserved water on unauthorized land. As the Bureau leases water in the Snake Basin, and Bonneville finances the Skyline Farms water acquisition on the Malheur River, the State of Oregon feels bound to consider Boeing Farms' application to divert water downstream. Notwithstanding significant efforts to avoid these anomalies, many people believe they are inevitable and

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[573] *See, e.g.,* F. Bodi, "FERC's Mid-Columbia Proceeding: Ten Years and Still Counting," 16 *Env't'l Law* 555 (1986); M. Blumm, "Reexamining the Parity Promise: More Challenges Than Successes to the Implementation of the Columbia Basin Fish and Wildlife Program," 16 *Env't'l Law* 461, 506 (1986); M. Blumm, "A Trilogy of Tribes v. FERC: Reforming the Federal Role in Hydroelectric Licensing" 10 *Harv. Env't'l. Rev. 1,* 34-46 (1986).

[574] *See* U. S. Department of Agriculture, *Status of the Interior Columbia Basin: Summary of Scientific Findings* (Nov. 1996).

unavoidable in a pluralistic government with weak central control over water.

Notwithstanding these limitations, state and federal governments cannot simply observe tributary water issues with indifference. The large federal land holdings in the Basin, the interstate scale of the salmon issue, the strategic connection between salmon and the federal power system, the obligations of the Endangered Species Act, and the commitments of Indian and international treaties hardly permit a passive federal presence. Moreover, the problem is not just federal. Because the federal presence in the West is so significant, the states are directly affected by any gridlock in federal resource policy. Controversies like the water spreading conflicts in the Umatilla can divide communities. State water administrators, legislators and others cannot sit on the sidelines.

If government agencies find themselves in an awkward position, rural communities are hardly more comfortable. For one thing, the political dynamics of this problem are changing as a consequence of the Basin's urbanization,[575] and rural communities know it:

> *The rural West feels itself betrayed by the cities with whom its fate has so long been linked. More than a century of brushing off the last bust and waiting for the next boom has left scars both upon the land and the people. Some rural westerners console themselves that amidst the explosive growth of the metropolitan areas, they alone are the last remnants of a real West, a true West. But in a region whose people have always defined themselves,*
>
> *for better or worse, in terms of the future rather than the past, such a guarding of the flame has an aura of defeat. The small towns, the ranches, the family farms have come to share with the Indian reservations and the Hispanic villages that once seemed so separate and alien not only a common place and a common history but a common anxiety over a future which seems to belong to someone else. But even in the midst of what increasingly seems common misfortune, the various peoples of the rural West seek their own separate solutions.*[576]

All of this boils down to a federal, state tribal and local dilemma. If state agencies have largely given away their authority, if federal agencies are

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[575] *See* T. Jensen, "The Politics of the Relationship," remarks at symposium on Water Quality, Water Quantity: The Reluctant Marriage (Lewis & Clark Law School, February 22-23, 1991).

[576] White, *It's Your Misfortune and None of My Own* at 634.

paralyzed by agency missions and considerations of federalism, and if water users' only strategy is to guard a "flickering flame," they all leave themselves open to the not-so-tender mercies of litigation and political debilitation. The *Pacific Rivers* cases[577] illustrate the effect the Endangered Species Act can have on land management near salmon streams. Indian water claims in the Snake River adjudication are large enough to take most of the water that is now diverted from Idaho's part of the river. The Clean Water Act provides leverage over linked water quantity and quality problems.[578] Because hydropower is predominant in the Basin, Federal Energy Regulatory Commission relicensing proceedings are likely to provide fertile grounds for contention. The rural timber communities still living through the northern spotted owl controversies can attest that such issues do not just go away. Absent meaningful recovery efforts, watersheds with important fish and wildlife resources can expect to hit these kinds of land mines.

Given the lack of appealing options on all sides, there is obvious sense in exploring new understandings on tributary water issues. Neither state nor federal governments can leave local communities to "their own separate solutions."

b. Looking for Common Ground in Watersheds.—The prospect that there may be common ground among federal, state, tribal and local interests is what gives local watershed initiatives their appeal. The watershed efforts surveyed in section V of this study are all premised on the idea that local communities may be as interested in healthy ecosystems as anyone else, and government may need to get out of the way and let watershed groups innovate.

The gamble is that rural communities really are willing to make hard choices in favor of ecosystem recovery. In some ways, the models for watershed efforts are the Basin's Indian communities. It is no coincidence that most of the activity in tributary watersheds in the 1980s, before the Endangered Species Act listings, was in the Umatilla, Yakima, Clearwater and Deschutes basins, sites of Indian reservations. Like non-Indians, the tribes are resource users, not museum conservators. Salmon are food and articles of commerce, as well as religious objects to tribes. There is a fundamental difference between Indian and non-Indians' relationship to salmon, and it translates into different values. The tribes built pressure for watershed restoration in many ways: they resorted to the courts, they looked for

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[577] *Pacific Rivers Council v. Thomas* 30 F.3d 1050 (9th Cir. 1994), and *Pacific Rivers Council v. Intermountain Forest Industry Association*, Civ. No. 94-0159-S-HLR (D. Idaho 1994).
[578] *See* discussion of *PUD No. 1 of Jefferson County v. Washington Department of Ecology*, ___ U.S. ___, 114 S. Ct. 1900 (1994), above.

alliances with local non-Indian communities, they established pipelines to hydropower funding, and they secured legislation. The methods varied, but the engine was the tribes' determination to rebuild salmon. The watershed initiatives that have emerged since the Endangered Species Act listings can be seen as experiments to see if non-Indian communities have a similar sense of determination.

It is certainly true that local watershed initiatives have put watershed conservation on the agendas of non-Indian communities. The innovations that have emerged from places like Wallowa County and the Methow Valley could never have been imposed from above, and if they had been, they would take a long time, if ever, to work. It is also true, however, that these are tender, budding efforts whose long-term futures are unclear. For all of the reasons that lead to the dilemmas outlined above, it is critically important that watershed initiatives have the right kind of support from federal and state water policy. But in deciding what that support should be, there are important issues and *caveats:*

Degree of management. Return to the River encourages "restoration of natural vegetation and ecological processes that create and maintain fish habitat."[579] In an area like the Grande Ronde, this might mean reattaching streams to their floodplains, allowing rivers to flood. These issues are hardest where human development is most prevalent and human-salmon competition is most intense, in low-gradient valleys and stream bottoms. Riparian grazing and logging activities, most economically attractive where they have the greatest effect on stream conditions, can be nearly as difficult. Watershed efforts face a difficult task finding ways to avoid such polarizing differences.[580]

Balance? A second, and closely related issue is how to reconcile strategies of "balance" or "multiple use" with the biological requirements of species. A

[579] Independent Scientific Group, *Return to the River* at 140. The Power Planning Council's fish and wildlife program provides: "The Council anticipates that there will be intervention; otherwise, restoration actions such as removing man-made stream barriers and controlling road erosion would be precluded. But the Council also cautions moderation in devising intervention measures where complex and still poorly understood natural systems are at work. . . . Habitat interventions should seek to restore and employ natural healing mechanisms wherever possible . . . ." *See Columbia River Basin Fish and Wildlife Program* at 7-35.

[580] Likewise, *Return to the River* recommends "that the region move from a strategy of 'fixing' ecosystem damage to one that places greater reliance on re-expression of the natural and biological processes of the Columbia River. . . ." See *Return to the River* at xxiii. Huntington demonstrates that "roadless catchments (in the Clearwater Basin, Idaho), even those that had intensely burned earlier this century, provided higher quality habitat to more diverse and abundant native fish populations than did nearby heavily 'managed' catchments." See Huntington, Eastside Ecosystem Management Project, quoted in *Return to the River* at 139.

local commitment to find a balance between irrigation withdrawals from a stream and leaving water for salmon has value, but only if it recognizes that there can be no compromise with the threshold requirements of fish. Where a biological threshold exists and is known, a compromise that falls short of the threshold is a failure. Currently, much of the Grande Ronde Basin is designated by the state as "water quality limited" for high temperatures and other conditions, for example. Will the community be willing to establish a balance that curtails irrigation withdrawals and protects streamside shade from grazing to meet temperature thresholds?

Private and Public Lands. Land ownership in many watersheds is largely public on the ridge tops and private in the stream bottoms which are critical to spawning and rearing. How can a watershed recovery strategy enlist these private landowners, respecting their histories while persuading them to modify many of their traditional ideas about using and improving the land? Equally, there must be coordinated restoration of a drainage from ridgetop to ridgetop. Can the actions of government agencies, regulators and land managers, be integrated into a single subbasin watershed strategy, so that they reinforce and complement each other? Will this result in setting and meeting standards consistent with basic biological requirements, or in least-common-denominator packages?

Us or Them? Is it possible to avoid the false choice between "local control" and "outside regulation"? Many participants in watershed initiatives will acknowledge there are legitimate national and state interests in the watershed. They will comply with the law of the land even as they contest its interpretation and application by agency officials. Often, "local control" is code. It will sometimes mean unalloyed defense of the local *status quo,* but often it expresses apprehension that people from outside, with little knowledge and less respect for local values and livelihoods, will impose drastic change; that the economic and social fabric of the community will be transformed without its consent.

Leadership for watershed efforts is likely to vary from place to place. In the Henry's Fork, the Clark Fork and elsewhere, watershed initiatives are primarily indigenous, not a creation of government. The co-founders of the Henry's Fork initiative emphasize that they organized out of frustration with government resource agencies, not in response to government leadership. One of the enduring lessons of the Grande Ronde watershed efforts is that controversy over state versus local control costs time and good will. In many cases, it may be important for government agencies to stay out of the way of such initiatives, except to offer support where it can be given. In other places, a stronger government role may be needed, and the logical lead is a federal, state or tribal entity.

Establishing Government Expectations. Another lesson from the Grande Ronde is that collaboration depends not on a heavy regulatory hand or government capitulation to local terms and conditions. It depends rather on being clear about expectations, both of law and policy, based on standards that can be defended in terms of good watershed science. Collaboration involves mutual deference of locals, to federal and state policy on watershed conservation; and of outside officials, to local knowledge, cultural values, history, and livelihoods. Officials can establish firm expectations as to results and timing. In fact, equivocation instead of forthright declaration leads to local suspicions, fears of hidden agendas, and so on. Watershed initiatives are likely to function best in response to clear signals.

Funding Projects or Process. Watershed recovery initiatives are always short on patience. Fish stocks are close to disappearing, while the worst habitat problems are easy to identify. The first fixes appear straightforward: remove blockages, screen irrigation diversions, plant willows. The political leadership demands visible, tangible projects, getting the money out onto the ground. As opening strategies go, there are worse ones. Early-action projects are likely to address real problems, although not often the most critical ones. They will be consensus choices, not controversial ones. Politically, they afford opportunities to build a collaborative process. Trying to build landowner understanding of the science and making watershed recovery part of community values may lead to more durable watershed recovery than on-the-ground projects. Yet, at some point the choices become hard. Without careful, scientifically grounded plans, early consensus may run aground on more controversial issues.

Science and Ideology. If logging and grazing are to be reconciled with stream health, the mediating agent will be watershed science that can transcend history and ideology. Aside from its essential technical contribution, science must also serve as a common currency to which all parties have equal access, in which they have a shared confidence. A rancher who will resist on principle ideological pressures, whether direct or disguised as agency regulations, may find it easier to respond to evidence perceived to be objective and unbiased.

The limitations of this device are obvious. Where the science is inconclusive, or the observer more than ordinarily obtuse, good science will have less impact than it should. Where the science arrives in the hands of one interested party and is inaccessible to others, it may provoke conflict. If science is to contribute to solutions, it must empower more broadly. A priesthood of technical experts may be reluctant to share its knowledge, the source of its authority. But only by sharing will it enlist the informed support

of those being asked to embrace change that often seems at odds with self interest.

Monitoring and evaluation can be orphaned in local efforts. The pressure to do, not just to study, will always militate against baseline data gathering, pre-project assessments and post-project evaluations. At some early point, government agencies and watershed groups must choose a process driven by technical criteria, stream reach conditions, and objective solutions, or one that trades off technical merit for political acceptance. Funding sources need to value the technical elements of watershed recovery, and to fund them together as a multi-year commitment to selected stream reaches. Absent such commitments, the biological end of watershed efforts may be disappointing. This suggests the value of the approach Bonneville has taken in the Grande Ronde, funding the development of analytical, monitoring and evaluation tools that can be employed in local efforts. It also suggests the need for government to act as a backstop for local watershed efforts, to provide some assurance that on-the-ground efforts are meeting appropriate standards.

Sustainability. Finally, there is a question about the sustainability of watershed initiatives. In the Umatilla and Yakima basins, restoration efforts are spearheaded by tribes, whose history and intentions are inseparable from salmon. Will watershed efforts in other areas have similar staying power? Will they ultimately need a permanent home in some level of government?

c. Federal Support for Watershed Initiatives.—These observations raise a number of issues for federal agencies. Federal agencies can provide valuable help for watershed efforts, but they can also frustrate them, either through indifference or mixed signals from multiple agencies. Gauging the type of support that helps will require some practice. From a policy perspective, however, four conclusions seem safe.

First, it is hazardous to generalize about watershed initiatives. They come in different varieties and capabilities. The hopes for watershed efforts are fairly clear, but their ability to deliver on these hopes is not. Given this, was the Grande Ronde watershed initiative more hurt than helped by the high level of funding and political attention the State of Oregon devoted to it? Water policymakers need to consider the dangers of putting too heavy a burden of expectation on watershed efforts. They should support watershed efforts without expecting them to readily resolve dilemmas that have taken many decades to create.

Second, federal agencies should help meet the technical needs of watershed initiatives. The water conservation pilot projects discussed in section IV provide a model for the kind of experience. Such federal agencies as the Natural Resources Conservation Service, the Bureau of Reclamation, and the U.S. Geological Survey have shared valuable knowledge about water-conservation technology and water-management techniques. If monitoring and evaluation are often orphaned in local efforts, one of the constructive roles government can play is in filling this gap. The approach Bonneville has taken in the Grande Ronde in development of analytical, monitoring and evaluation tools for local efforts, is one such model.

Third, if collaboration in these efforts is a priority, it needs to be translated into clear and consistent federal participation. There should be no illusion that this will be easy. Even at the federal, inter-agency level, this poses a formidable challenge, and the problem is not just federal. In the Grande Ronde and elsewhere, it has been difficult to align state agencies in support of watershed efforts. In part this has been due to the conflict many agencies experience as they are asked to reconcile historic missions with new watershed conservation goals. In part, it is due to the sheer number of agencies involved. Oregon's Strategic Watershed Management Group had nine state agencies with decades of history moving them in nine separate directions. But if state and federal agencies cannot make such transitions and find common directions, they cannot possibly play a constructive role in watershed initiatives. Federal water and land agencies need to work among themselves and with local watershed groups to arrive at a clear set of mutual expectations. At this point, it may not be possible to specify precisely how this coordination should occur, much less to formulate a general policy structuring it. However, if watershed initiatives are to be encouraged by government, it is important not just to say so, but to make a policy commitment to deliver consistent government support and clear expectations.

Fourth, over time, government needs to develop policy on funding for watershed initiatives. In the short term, funding is likely simply to be cobbled together opportunistically. Again, the water conservation demonstration projects provide one model of how federal agencies can act as brokers for multi-party ventures in which landowner, agency, hydropower and other funding sources are combined. Bonneville has invested strategically in the Grande Ronde to develop valuable technical evaluation tools that help provide focus for watershed efforts. Over the long term, however, federal and state agencies will need to work out more stable arrangements. In doing so, it will be important to consider whether there are sources other than federal appropriations and hydropower revenues with which to finance recovery measures. One variation was explored in the Deschutes Basin, which lies downstream from the Columbia River's

confluence with the Snake. In 1996, Congress passed legislation authorizing creation of the Deschutes Basin Resource Conservancy, sponsored by Senator Mark Hatfield. The Conservancy idea had been proposed by the Warm Springs Indian Tribe and the Environmental Defense Fund, working with a coalition of local interests and government agencies. The Conservancy, with a governing board of public, private, and tribal representatives, is authorized to develop plans for ecosystem recovery projects, especially to put more water in the Deschutes River and its tributaries to address water quality problems. To finance its projects, the Conservancy is authorized to use $1 million in federal appropriations, which federal agencies may match dollar-for-dollar. By ensuring agency and private participation on its board, the Conservancy hopes to use this conservation fund to leverage federal agency, state, and private funding for ecosystem recovery projects.

However, it is also instructive to note funding sources that were not included in the Deschutes Conservancy legislation. Earlier versions of the legislation would have authorized the Conservancy and federal agencies to impose fees for activities such as river rafting, hunting, fishing, grazing, irrigation, logging and water pollution discharges.[581] These fees would have put the Conservancy's ecological restoration fund on a more self-sustaining basis, with less reliance on federal appropriations and agency budgets. The Deschutes bill that ultimately emerged from Congress stopped well short of this, and adopted a more traditional cost-sharing formula. Moving beyond traditional financial arrangements is difficult. The reality is that in the Deschutes, the Umatilla and elsewhere, funding for ecosystem recovery projects is currently a patchwork that begins with government. The question is whether it can expand outward.

With innovative state and watershed experiments, it is possible to imagine leveraging these funds more widely, and government programs should encourage such entrepreneurial efforts. For example, Washington's Methow Valley watershed plan proposes a comprehensive policy framework for instream flow restoration: efficiency standards and improved monitoring to discourage excessive water use, a water bank to administer saved water, and a commitment to return 90 percent of saved water to streams. With the policy context advocated in the Methow, Bureau of Reclamation technical assistance, and seed money for water conservation projects could find a ready home. The hydropower system, seeing an opportunity to leverage hydropower funds, could see a natural place to make its investments in

[581] *The Deschutes River Basin Ecological and Economic Sustainability Act*, section 4(h) (October 19, 1995 draft).

ecosystem recovery. Farmers, who would receive ten percent of saved water and perhaps better crops from controlled water use, might chip in part of the cost. The state could provide facilitation, legal protection, and a share of funding. Perhaps it is not too far-fetched to imagine local watershed councils organizing improvement districts to share the cost of projects that enhance the Valley's natural amenities, as proposed in the initial Deschutes bill. These may be the directions that watershed funding will take if ecosystem recovery is to become part of the fabric of local communities and economies.

2. Linking Tributaries, Ecosystems, and Federal Mandates

To be meaningful, watershed efforts need some assurance of autonomy: that they will not be treated as just another input in federal decision-making processes. Finding real solutions in tributary watersheds is hard work. Who will be willing to make the effort if they have little influence on federal decisions?

On the other hand, watershed decisions cannot be made in isolation from interactions with the larger ecosystem, or from law. If efforts in different parts of the Basin are going to satisfy legal norms and add up to a healthy ecosystem, they need to support rather than undermine each other. Thus, it is not enough for tributary and mainstem actions to make sense in their own frame of reference; they also need to be linked into a pattern that makes sense in wider ecosystem and legal contexts.

One set of linkages needs to be made between tributary water issues and mainstem water operations. Currently, the Columbia River Basin lacks a complete strategy for the mainstem. Federal, regional and tribal plans disagree on the need for flow augmentation and reservoir drawdowns, although all three anticipate the need for significant changes in the dams. As the discussion of "Interstate Water Issues" in section IV illustrates, a variety of state water issues, including diversion moratoria, will be influenced by mainstem choices. In particular, if federal run-of-the-river reservoirs are operated at significantly lower levels, there may be less need for flow augmentation from headwater storage projects. Indeed, it is commonly assumed that drawing down the lower Snake reservoirs would largely moot demands for additional water from the Snake River Basin for fish. This may or may not turn out to be true, but the fact that this mainstem decision had not been made was a primary barrier in the work of the Interstate Water Committee in the early 1990s. Thus, the sooner decisions are made about the role of flow augmentation versus reservoir drawdowns, the more certainty there will be in tributary water policy.

Pending these mainstem decisions, issues of interstate tributary management still must be addressed. As the Bureau and others succeed in acquiring water for flow augmentation in the Snake River Basin, there is a growing need to avoid surprises stemming from lack of coordination between state and federal processes. State and federal water agencies should coordinate operations, air issues of common concern, and consider whether a more formal set of interstate agreements is needed. They also need to work closely with state water-rights holders, Indian tribes, and others on creative solutions to ecosystem-recovery problems created by water diversions in the tributaries. No single entity, federal or state, public or private, can do it alone. The duties are mutual.

Allowing watersheds the autonomy they need without sacrificing broader national mandates will require experimentation. The controversy over the Prairie Creek irrigation ditch in the Wallowa watershed provides one model. There, when a regional and federal water conservation proposals stirred up a storm of local opposition, federal and regional agencies backed off, but only on condition that the community come up with comparable water savings that would pass scientific and technical review. Local interests had freedom in deciding how federal and regional standards they would be met. When this model works, there may be no inherent conflict between an active and clearly-defined government presence and a successful watershed initiative. These situations bear out the observation that an ambiguous governmental position can itself frustrate local efforts, and that a clearer and more active federal presence may be an ingredient of success.

The Prairie Creek model assumes that government agencies can establish clear expectations for watershed efforts, and that local interests will not bridle in reaction. There is little reason to think that either part of this equation will come easily, however. Developing a common federal-state position in areas where there may be unclear or inconsistent statutory guidance is likely always to be difficult. Expecting local interests not to be threatened by federal initiatives that are rife with value conflicts may be naive.

No universal policy solution is in sight for these issues. To a degree, it is inevitable that state and federal land and water agencies will find themselves in the middle, with overlapping and sometimes conflicting responsibilities, which may be a fair reflection of conflicting values in watersheds. In the face of such conflicts, government agencies can raise the issues for which government is responsible, and seek to focus government and private energies on resolving them. After a few false starts, the Bureau began to handle the Umatilla water spreading controversy by raising the need to comply with the law, and by bringing parties to the table to explore

solutions. Raising such issues may be an unenviable task, clouded by history and ambiguity. It is, however, an important task of government, and it may be an important way to create momentum for creative solutions in tributary water conflicts.

3. Sharing the Ecosystem With Canada

Although only 15 percent of the Columbia River Basin's land mass is in Canada, Canadian snow pack accounts for about 30 percent of the river's total discharge. Excluding tributaries west of the Cascade Mountains in the United States, Canada supplies about 44 percent of the river's discharge.[582]

The Columbia River Treaty was in many ways a remarkable achievement, but it was not designed to foster management of the river as part of an ecosystem. The Treaty is a hydropower and flood control agreement, and this is reflected in the composition of the two nations' treaty implementing agencies: British Columbia Hydro on the Canadian side and Bonneville and the Army Corps of Engineers on the U.S. side.[583] The treaty takes no account of salmon or other environmental values in river management. To date, when the treaty entities have adjusted hydropower and flood control operations to account for salmon flow releases, the adjustments have required economic compensation. Decisions become power versus non-power trade-offs. Ecosystem operations can only be costs, never benefits. This may not be the best way of handling decisions on the river in today's world. However, because the two countries have never explored other ways to incorporate ecological considerations into river operations, it is not possible to say whether other approaches would better serve the countries' broader interests.

Both countries see signs of strain in current approaches to river management: not just the dilemmas posed by the salmon declines, but the rights and concerns of Indian tribes and First Nations, the interest in more participatory management processes that allow interested parties insight into treaty decisions, and the growing pressures on the river from traditional constituencies.[584] Moreover, broader concerns on both sides of the border motivate such initiatives as British Columbia's proposed "Sustainability Act,"

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[582] K. Muckleston, "International Management of the Columbia," in *Conflicts Over the Columbia River*, at 72.
[583] Columbia River System Operation Review, *Final Environmental Impact Statement, Appendix P, Canadian Entitlement Allocation Agreements*, at 2-1 (November 1995).
[584] *See* J. C. Day, K. Boudreau and N. Hackett, *Binational Water Management in the Columbia River Basin*, prepared for the Commission on Environmental Cooperation (Montreal, Quebec, January 15, 1997 draft).

a provincial land-use strategy,[585] the U.S. Forest Service's ecosystem management plans, and the regional and federal programs to restore salmon.

It is by no means clear at this point how the two nations' concerns, interests and initiatives may fit together in the Columbia River. However, there are several mechanisms that might be used to explore these issues. The Columbia River Treaty was based on the careful, long-term work of the International Joint Commission and the Columbia River Engineering Board. The Commission is still functioning. The North American Free Trade Agreement, or NAFTA, created a Commission for Environmental Cooperation to work toward cooperation on environmental issues. Its council, which is composed of environmental representatives of the three signatory nations, is authorized to make recommendations on cross-boundary matters. A study conducted by J. C. Day and his colleagues for the Commission on bi-national water management issues provides a foundation for further inquiry.[586] Recently, environmental groups on both sides of the border filed a petition asking the Commission to examine the environmental effects of Canadian hydroelectric projects.[587] Ferment on both sides of the border suggests an opportunity to look for common ground.

As these issues are addressed, moreover, the importance of the mainstem decisions on the U. S. side of the border should not be overlooked. Just as it is true that the mainstem flow augmentation/reservoir drawdown decisions inform tributary water policy, so also will they affect trans-boundary water management issues.

C. Federal Hydropower Financing and Ecosystem Recovery

1. Hydropower and Salmon

If the scientific and governmental premises for ecosystem management are in flux, so is another premise for ecosystem recovery: that we have the financial

[585] British Columbia Commission on Resources and Environment, "A Sustainability Act for British Columbia," volume 1 *The Provincial Land Use Strategy* p. 5 (November 1994).
[586] Day, Boudreau and Hackett, *Binational Water Management in the Columbia River Basin*.
[587] *Submission Pursuant to Article 14 of the North American Agreement on Environmental Cooperation*.

wherewithal to make ecosystem recovery work. With the competitive revolution in the energy industry, a new balance point between hydropower economics and ecosystem programs is needed.

There are many issues surrounding the hydropower system's role in salmon recovery. Reservoir drawdowns, flow augmentation, Snake River water and other issues remain very much alive. It is likely that big-ticket decisions will be made over the next couple of years, and these will have an enormous impact on water policy in the Basin. Regardless of which choice is made, it will be necessary to address uncertainties in the financial balance of federal hydropower, ecosystem recovery and other uses of the river.

Competition in the electric energy industry and the Endangered Species Act listings largely broke the link between the energy system and fish and wildlife costs that the Northwest Power Act had created. Under the Power Act, fish and wildlife mitigation was a cost of producing power, but the Council's fish and wildlife program had to assure the region "an adequate, efficient, economical and reliable power supply."[588] This balance between fish, wildlife and power needs was a key point in the Northwest Power Act. The balance was expressed in murky terms, but it gave the energy industry a sense that fish and wildlife costs would be kept within limits.[589]

This bargain has been superseded twice over. First, the Endangered Species Act listings meant that the dams simply could not be operated in a way that jeopardized listed species. Cost can be an issue under the Endangered Species Act only in limited circumstances.[590] Second, if a competitive power industry allows utilities to choose where to buy their power, fish and wildlife measures at the Columbia River dams will burden only those consumers who choose to be burdened, at least in theory. By definition, the marketplace will ensure the region adequate and affordable power.

In place of the Northwest Power Act limitation on fish and wildlife costs is a new, more circular one: fish and wildlife costs remain a cost of producing power; but if fish and wildlife costs drive up the cost of federal hydropower, power customers may turn to other energy supplies, hydropower revenues will drop, and funding for fish and wildlife could be undermined. The

[588] 16 U.S.C. § 839b(h)(5).
[589] "The objective is to give flexibility to all concerned to devise effective and imaginative measures that are also reasonable and will not result in unreasonable power shortages or loss of power revenues. Some power losses, with resultant loss in revenues, may be inevitable at times if these fish and wildlife objectives are to be achieved. Such losses, however, should not be a burden on the consumers of the region." 96th Cong., 2d Sess., H. R. Rep. No. 96-976, part I, 57 (1980).
[590] 16 U.S.C. § 1536(b)(3)(A).

circularity of this formula leaves power generators and fish and wildlife interests with a large area of uncertainty. As the implications of competition in the energy industry have become clearer, so has the need for more clarity in the relationship between the industry and salmon.

In 1996, public and private energy officials considered challenges posed by the transition to competition in a process called the "Comprehensive Review of the Region's Energy System." After a year's work, they largely came together on a proposal that was aimed at protecting a cost-based energy system for the region while responding to the new opportunities and constraints posed by national energy competition.[591] The Comprehensive Review proposed that regional utilities and other customers should subscribe to the hydropower system's output, agreeing to new, long-term contracts for the system's power. Even though federal hydropower is more expensive than other energy now available on the market, it is likely to be a bargain again ten or fifteen years from now. By then, the system will have retired its $600,000,000 per year nuclear debt, and gas prices may have risen. Those who pay more for hydropower subscriptions now may pay less in the longer term, and the benefits of the hydropower system would be kept in the region. The proposal also called for a legislative separation between Bonneville's transmission and generation functions, to ensure against undue market power in Bonneville's hands.

But, as important as the Comprehensive Review proposal is, retired Senator Mark Hatfield recently pointed out some limitations: "[T]he current debate is being driven by money," he said.

> *Now don't get me wrong. I'm not saying there is anything inappropriate about the current debate, and I strongly agree that a free market is the most efficient way to allocate resources. I only want to make sure everyone is clear about what's driving the discussion. And to make sure that in our hurry to reconfigure the financial pie, we not lose sight of two important things: First, any changes to current national laws or regulations will have to be balanced. In other words, changes to current laws and regulations that will benefit primarily the monied interests will not be made unless concessions are made to the so-called "public interests." To put it more bluntly, revisions that allow the industry to compete will not be acceptable unless provisions are included that: protect our environment; provide for recovery of salmon and other fish and wildlife; ensure that the nation's poor are not denied access to affordable electricity; prevent rural*

[591] Comprehensive Review of the Northwest Energy System, *Toward a Competitive Electric Power Industry for the 21st Century, Final Report* (December 12, 1996).

> *communities from being gouged; promote conservation and renewable resource; ensure that the security of the nation is not diminished; and protect the interests of native Americans.*[592]

In other words, the viability of the Northwest's proposal for energy system restructuring will hinge in part on how well it addresses equity and environmental issues. And at this point, there is no regional consensus on one of the most important of these issues: the balance between salmon recovery, hydropower production, and other uses of the Columbia River.

Finding this balance is likely to be anything but straightforward. Hydropower customers must see that they will share in the long-term dividend, or they will have little incentive now to subscribe to the system. They might just as well pay the market price. Salmon advocates have to see that salmon will share in these long term benefits, or they have little to gain from the subscription proposal. They might just as well oppose the proposal and gamble that the Endangered Species Act or other strategies will more effectively push ecosystem recovery.

Both sides run a risk. If the region comes to gridlock on this question, national energy legislation may allocate the system in ways that benefit neither the region's energy interests nor fish and wildlife. As one of the participants in the Comprehensive Review put it:

> *It appears certain that there will be national energy industry restructuring legislation in the next Congress, perhaps in the next year. [We have] been told by members of Congress and the Clinton Administration that the region has a chance to write the Northwest chapter of that legislation, but only if there is a clear consensus in the region. If there is not, we have been warned that forces outside the region will have a field day. They will figure out that there are billions of dollars of long-term benefits in the Columbia River hydrosystem and they will take those benefits.*[593]

Because of this threat, energy and fish and wildlife interests risk a lose-lose proposition, the "field day" in which national energy entrepreneurs and federal deficit cutters would revel, if the Northwest fails to unite. Regional energy transactions and ecosystem recovery initiatives both need stable footing that they are unlikely to get from national energy legislation.

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[592] Address by Mark O. Hatfield to the "Energy Restructuring in the Northwest" conference, May 30, 1997.
[593] R. Applegate, "Much to Change, Much Remains the Same" an address to the Northwest Water Law and Policy Project's "Who Runs the River?" conference, November 15, 1996.

2. Hydropower, Salmon and Other River Users

These issues have the potential to go well beyond the usual hydropower-salmon debate. Hydropower's role as the primary financier of salmon recovery tends to mask the contributions others make to the salmon declines. The dams themselves serve purposes other than hydropower: flood control, navigation, irrigation and recreation, for example. Moreover, the dams are not the only source of salmon problems: habitat conditions, harvest and hatchery operations also contribute.

Many of these activities have economic incentives, concessions and subsidies of their own. Navigators on the river pay lockage fees at the federal dams, but taxpayers finance the capital cost of the dams that is attributable to navigation. Downstream cities pay nothing for federal flood control. Irrigators divert free water from streams. When they receive reclamation water, part of the cost is defrayed by hydropower revenues. Miners pay little for minerals taken from public land. Timber harvesters benefit from road subsidies; grazers from low-priced grazing allotments.[594]

There is nothing intrinsically wrong with these benefits. Foundations, churches, homeowners and others have concessions too. These are either subsidies, a word that is often considered pejorative, or sensible and fair arrangements, depending on one's perspective. The beneficiaries guard these arrangements jealously. However, when the beneficiaries contribute to an ecosystem problem, it is fair to ask whether they should make some contribution to ecosystem recovery.

The reallocation of benefits and subsidies is not a new issue. The landscape is littered with the wreckage of past battles over mineral royalties, grazing fees, and the like. However, there are reasons why these issues should not be completely closed. One is a central theme in this study: financing a scientifically credible ecosystem recovery program may be a precondition to the new agreements on the river. If the cost of an ecosystem program goes beyond the financial limits of hydropower, it would be particularly logical to spread the responsibility to others who contribute to the problem.

A second reason has so far attracted little attention. Under the North American Free Trade Agreement (NAFTA), Canada and the United States committed to cooperate in the conservation, protection and enhancement of

[594] *See* Majority Staff Report, Subcommittee on Oversight and Investigations, House Committee on Natural Resources, *Taking from the Taxpayer: Public Subsidies for Natural Resource Development* (August 1994).

transboundary resources.[595] The Commission on Environmental Cooperation, which the two nations organized to carry out this commitment, has already begun to survey the prospects for bi-national water management of the Columbia. That survey is likely to provoke debate regarding resource-subsidy issues, of the kind currently brewing in Canada over whether the Columbia River Treaty favored American agriculture at the expense of Canadian agriculture.[596] It is hard to imagine that this and other subsidy issues will not emerge in negotiations between the two countries. United States interests might be in a stronger negotiating position if they have analyzed such questions domestically. Their position might be stronger yet if they had adjusted benefits in favor of a recovery program for a transboundary species covered by another treaty between the two nations, the Pacific Salmon Treaty.

3. Establishing a New Economic Formula

The politics of reestablishing an *entente* between hydropower and salmon recovery, much less those of reexamining a fuller range of the river's benefits, are daunting. But the degree of uncertainty in current financial relationships is a problem that will be solved either in the region or by default. A new regional balance will likely have to address at least three considerations: Clearly, hydropower's financial contribution to ecosystem recovery needs to be put on more stable footing. It is equally clear that improved accountability in ecosystem recovery programs is needed. In view of the broad areas of uncertainty in ecosystem science, establishing systems of accountability is likely to be slow and frustrating, but the mounting investment in salmon recovery is already requiring it. Finally, it is likely that some broadening in the financial basis for ecosystem recovery will be needed. If the limits of this last point are primarily political, they are no less real. It is possible that squeezing a contribution out of navigation, irrigation and other water users will prove too politically unappealing. But if so, federal budget deficits mean that the financial responsibility for ecosystem recovery is likely to remain squarely on the shoulders of the hydropower industry in the Columbia Basin.

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[595] Canada, Mexico and the United States of America, *North American Free Trade Agreement: Draft Side Accord on Environment* (http://iisdl.ca/trade/cec.htm, September 1993).

[596] Compare W. R. Holm, *Evaluation of the Effect of Downstream Benefits to Washington Agriculture Under the Columbia River Treaty on the Competitive Positioning of British Columbia Producers: Summary*, vol. I at 10 (Burnaby, British Columbia: Submitted to the Provincial Agricultural Land Commission, 1994), with Briefing Note from Denise Mullen-Dalmer to Kirk Miller, Chair and General Manager of the Province of British Columbia Agricultural Land Commission, dated January 16, 1995.

D. Ecosystem Recovery, Water Policy and Governance [597]

1. The Uneasy Transition

All of these themes raise issues of governance. Adaptive management requires an extraordinary degree of collaboration among diverse interests, and has been slowed by the absence of any single entity with power to implement systematic research, monitoring and evaluation programs. Tributary water issues and watershed initiatives are difficult to negotiate absent a level of inter-governmental and public-private coordination that verges on the super-human. The management of the federal hydropower system is inextricably linked to decisions made in salmon recovery, and *vice versa*, and yet energy policy is increasingly drive by market forces and decreasingly by environmental considerations (See Attachment A for a snapshot of current arrangements for managing key parts of the salmon ecosystem.) All of these points underscore the need for better-integrated government institutions that can mandate collaboration, establish consistent government policy, and manage dams and recovery efforts in ways that complement each other.

The Columbia has joined this debate more than once. Up to this time, the course of the river governance debate has gone through three phases.

Early proposals for comprehensive authority, and the reality of ad hoc management. The early debates over river governance, the Columbia Valley Authority debate and the Columbia River Compact negotiations, were focused on controlling river development, and both ended in stalemate. In place of integrated river government, the river was simply developed. Management was shaped by the nature of this development and the *ad hoc* agreements that attended it.

Remedial legislation and ad hoc management in fishery policy. After the late 1970s, salmon and their advocates played a growing role in the river's development and management: the Columbia River Indian tribes became

[597] For further reading on institutional issues surrounding the Columbia river and salmon, *see* Naiman, Magnuson, McKnight and Stanford, eds., *The Freshwater Imperative: A Research Agenda at* chapter 5 (Island Press 1995); National Research Council, *Upstream*; Nez Perce Tribe, et al., *Wy-Kan-Ush-Mi-Wa-Kish-Wit*, vol. I, sections 4 and 5; National Marine Fisheries Service, Proposed Recovery Plan for Snake River Salmon, chapter III; *Illahee*, vol. 10 (Winter, 1994, discussing proposals for governance of the Columbia River and its watersheds); Bonneville Power Administration, et al., *Columbia River System Operation Review, Appendix Q, Columbia River Forum* (July 1994). One of the most thoughtful discussions of river basin governance issues generally is G. Weatherford, *From Basin to "Hydrocommons": Integrated Water Management Without Regional Governance* (University of Colorado Natural Resource Law Center Occasional Paper No. 5, January, 1990).

significant influences in salmon management and river operations. Federal and state salmon recovery efforts, managed largely by fish and wildlife agencies, burgeoned. The states acting together became an important force in energy and fish and wildlife policy for the hydropower system, acting through the Northwest Power Planning Council. No formal or explicit mechanism was provided for integrating ecosystem-wide activities under one roof. Rather, parties with interests in particular issues coalesced to work out coordinating mechanisms.

Endangered Species Act listings and energy competition. In the 1990s, the Endangered Species Act listings and competition in the hydropower industry eclipsed or called into question important parts of the region's role in managing the river. The Endangered Species Act listings integrated federal activities to a degree, but it is at best an open question whether the ESA process can integrate state and tribal salmon management jurisdictions, or pull other constituencies into a broad salmon recovery effort.

If restoring ecological functions is the point of departure for the next phase in the river management debate, then the question is: how can human activities (including government) be organized to allow the rivers and their watersheds to reestablish important ecological functions? This question has direct implications for mainstem river operations, tributary water usage, land use, and fish and wildlife management. It raises a legion of issues bristling with controversy, and all of it goes by the name "river governance." It is worth surveying the current debate not because the Basin has arrived at any answers, but because the questions recur in water policy.

2. Proposals for Institutional Reform

The debate over river governance, dormant in the 1980s, was renewed in 1994 by former Senator Mark Hatfield in an article commenting on the "Long's Peak" national water-policy proposals.[598] Senator Hatfield urged that river basin management should encompass "all natural resources, air, fish and wildlife, land and, most important of all, water."[599] However, the federal government's deficit problem means the river basin initiatives will have to rely more on non-federal funding. Accordingly, the Senator proposed a series of trusts organized by river basin boundaries. Government funds would be used to leverage corporate and private financial contributions; the trusts would be governed by "community- and regionally-based citizen/government

[598] M. Hatfield, "The Long's Peak Working Group and River Basin Trusts," 24 *Env't'l L.*145 (1994).
[599] Hatfield, "The Long's Peak Working Group," 24 *Env't'l L.* at 151.

groups" and guided by "general river basin management and conservation goals" established by the federal government, with water and resource conservation as the central investment theme.[600] He used the Northwest Power Planning Council as a model, and urged that further pilot projects be launched at the watershed level. The Deschutes Conservancy discussed earlier in this paper was successfully sponsored by Senator Hatfield in 1996, with many elements of his 1994 proposal.

These ideas were taken up by Angus Duncan, then a member of the Northwest Power Planning Council, in another 1994 journal article. Mr. Duncan reiterated Senator Hatfield's ideas and added to them. He proposed that the Northwest Power Planning Council (possibly expanded with tribal representation) be charged with "setting forth a general plan for the conservation and efficient use of the waters, and lands affecting those waters, of the Columbia-Snake River Basin." The plan would include regional standards that "describe the threshold ecosystem needs of species for survival as healthy populations and for conservation of the species' gene pools." The plan would incorporate individual subbasins plans, filtered through regional standards. In developing the plan, the Council would analyze costs, economic consequences, the cost-effectiveness of investments given "the complexity of biological systems," and propose an allocation of costs among communities and industries.[601] The plan would be implemented with hydropower revenues and financial contributions from state and federal agencies.

The differences between the Hatfield and Duncan proposals are worth noting. Senator Hatfield's proposal made no presuppositions about ecological constraints in river basin management. His proposal was concerned with the appropriate geographic scope of management (river basin), range of resources (water, land, air, fish and wildlife), level of government (regional, not federal), and management tools (money and water conservation). These features would serve regardless of the mix of conservation and development objectives. The absence of any reference to ecological limitations reflects a common assumption about the shifting nature of water management policy:

> *Today's prevailing water-related values, however impressive and apparently well-grounded, will survive only through processes of adaptation that will leave them changed in relevance and, to some extent, form. Basin-oriented management schemes that do not anticipate and*

[600] Hatfield, "The Long's Peak Working Group," 24 *Env't'l L.* at 153, quoting from the *Long's Peak Report*, 24 *Env't'l L.* at 128.
[601] A. Duncan, "Proposal for a Columbia Basin Watershed Planning Council," 10 *Illahee* 287, 299 (Winter, 1994).

> *accommodate change are doomed to short or ineffective institutional lives.*[602]

Senator Hatfield assumed that multiple use is the enduring reality of the Basin's water use and that interest in ecological thresholds is likely to wax and wane with changing values. The Duncan proposal included many of the same considerations, but added "ecosystem health" and the "threshold ecosystem needs of species" as foundational elements. Duncan argued that a basin that fails to meet threshold biological needs for its species is not a viable basin, and not the basin Northwesterners want. Diverse species are baseline resources that will sustain us over time, goes the argument; we should make a value judgment that government should be organized to protect these resources.

The Hatfield and Duncan proposals both reflected ambivalence about allocating government authority in these matters. There is a pervasive sense that too many entities have authority in salmon policy. Because salmon and other resources are managed separately, power is dispersed and no one can truly be "in charge" of salmon recovery. However, few people want anyone else to have full authority over all of the natural resource decisions that affect salmon. Reflecting this ambivalence, neither Hatfield nor Duncan proposed a super-agency. Both proposed hybrid organizations with broad scope but ambiguous power.

The depth of this ambiguity came out in the reception that met a series of other institutional proposals in 1995. First, the National Marine Fisheries Service proposed a recovery plan that would centralize management of salmon recovery in the Fisheries Service itself.[603] In part, the proposal responded to the strong opinion of the Snake River Recovery Team (on whose recommendations the proposed recovery plan was partly based), that a single entity needed to be "in charge" of salmon recovery. Next, the lower Columbia River treaty tribes' offered a set of institutional proposals. Their proposals were less concerned with centralizing power in a single place. Instead, they called for increasing emphasis on watershed efforts, more management control to tribes, transferring Bonneville's fish and wildlife fund to a fish and wildlife entity, and establishing a dispute resolution process for salmon management issues.[604] Finally, in 1995 Congress directed the Power Planning to report within 180 days "regarding the most appropriate governance structure to allow more effective regional control over efforts to

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[602] Weatherford, *From Basin to "Hydrocommons* at 4.
[603] National Marine Fisheries Service, Proposed Recovery Plan for Snake River Salmon, chapter III.
[604] Nez Perce Tribe, et al., *Wy-Kan-Ush-Mi-Wa-Kish-Wit*, vol. I, sections 4 and 5.

conserve and enhance anadromous and resident fish and wildlife within the Federal Columbia River Power System."[605] In response, the Council initiated a compressed public process to consider alternatives. The Council explicitly set out a range of alternative governance structures, starting with a model of the *status quo,* progressing through several intermediate options, and ending with one that took in virtually the full geographic range of salmon, with sweeping powers. The Council's 1996 report, however, recorded resounding ambivalence in the region: everyone agreed that someone needs to be in charge, and no one wants it to be anyone other than themselves. Ultimately, the Council urged a limited shift: an executive order committing federal agencies to implement the Council's program if permitted by statute, and enactment of legislation if the executive order were ineffective.[606]

In 1996, the Comprehensive Review of the Energy System (discussed above) served as a barometer of the persuasiveness of these proposals. Parties involved in the Review concluded that the governance issues had not been convincingly addressed, and then, following a grand tradition, left the issue to the Northwest states' governors.[607]

3. The Continuing Debate

It is probably true that a more integrated approach to salmon recovery would solve some of the problems that plague us. There are too many plans and too many chefs in the kitchen. It is hard to implement a coherent, scientifically-based strategy; individual parties can stop the action too easily. Local communities are forced to sort through a bewildering array of messages from government agencies. Mounting a long-term, well-focused monitoring and evaluation program sometimes seems virtually impossible. The question, however, is whether a new institution could solve these problems.

The National Research Council put these ideas in broader context in its report, *Upstream*. *Upstream* suggested that government for ecosystem problems focuses on three ideas: bioregionalism (government should follow natural rather than political boundaries, taking in the mainstem, tributaries and the ocean), cooperative management (a broad range of interests at basin-wide and watershed-specific levels must be engaged in debate and implementation), and adaptive management (systematic learning). However,

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[605] Fiscal Year 1996 Energy and Water Appropriations bill.
[606] Northwest Power Planning Council, *Report to Congress: Fish and Wildlife Governance and the Columbia River Hydropower System* (May 15, 1996).
[607] *Comprehensive Review of the Northwest Energy System, Final Report: Toward a Competitive Electric Power Industry for the 21st Century* at 5-6 (December 12, 1996).

in exploring these ideas for the Columbia, the Research Council saw real tensions between different uses and areas of the ecosystem, and concluded that these were tensions that could only be worked out politically, not academically. Resolving them would take a political consensus that the Research Council did not see.[608]

The Research Council's three-part formula is plainly right. Ecosystems have natural boundaries, and governance systems that encompass them are likely to be more effective than those that don't. Because these boundaries take in so many different jurisdictions and interests, government cannot dictate, but must be geared to maximize cooperation. Because we are relatively unfamiliar with ecosystem processes and even less familiar with the idea of managing for them, governance systems that can learn and adapt will be better than those that can't.

However, while integrating governance along these lines might help with ecosystem problems, there would be a price. We might find that emerging problems have different ecosystem boundaries than we had assumed. Perhaps we think of the problem as a river-related salmon problem now, but later we find it has more to do with ocean conditions. Our institutional design, in other words, is likely to be hampered by our ignorance of ecosystems. Another part of the price would be in concentrating government authority. Integrating resource agencies in support of ecosystem protection would create a degree of government authority that we may or may not be willing to accept. In fact, in the American tradition of government, it is not clear that fragmentation in salmon recovery is something we should dislike.

If history is a guide, fragmentation in government will continue, and river basin governance will take shape piecemeal as it has in the past. Policy will emerge in many decisions involving salmon, hydropower, irrigation, and navigation, influenced by economics, the Endangered Species Act, Indian treaties, water rights, international relations, and organizational and political maneuvering. As we make these decisions, we will know more about whether we should collapse boxes together on organization charts or rewrite laws to establish an ecosystem algorithm for existing jurisdictions.

If we are concerned with ecosystem integrity, perhaps we should be less concerned with fragmentation *per se* than with whether our institutions help us adapt to the changing ecosystems that are, ultimately, our support. If government institutions do not help us sense important ecological changes and respond to them, they fail us in important ways. The difficulty that

[608] National Research Council, *Upstream* at 292-93.

current institutions are experiencing making adaptive management work suggests that change is needed. The precise nature of the change is, however, not yet apparent.

VIII. Conclusion

It is fair to ask if the Columbia Basin offers models that could be of use to other western river basins as they take on conflicts between traditional water uses and environmental needs, and it is just as fair to answer this question yes, no and maybe.

The answer is yes in several respects. The Basin offers many innovations that merit attention in other parts of the west:

Tribal involvement. Indian tribes, backed up by federal treaties and more than twenty-five years of litigation, are playing an active role in developing policy for the river. In this sense, decision making in the Columbia Basin has been opened to a broader set of interests and values than in some other basins. While the genesis of the Columbia Basin tribes' involvement in the river is not something other states should consider duplicating, the outcome—a broader set of values within which to evaluate tradeoffs—is important for other basins to consider.

Power Act model. The Basin states exercise substantial influence over the hydropower system and in the use of hydropower revenues to mitigate the system's fish and wildlife impacts under the Northwest Power Act. The infusion of hydropower funds alone makes the Northwest Power Act model one that has to be considered in other western basins, particularly as the federal belt is cinched tighter.[609] But in addition, the Northwest Power Act provides a way for a collection of states to begin to transcend jurisdictional boundaries, and to bring government more in line with natural ridgetops.

Adaptive management. The adaptive management model, while not yet fully functioning in the Columbia, is a model that must be made to work if we are to achieve clarity about the ecological implications of the choices that face us.

Management of investments. The innovative systems that have been created to manage the Bonneville Power Administration's fish and wildlife budget, the independent scientific review, and the budget memorandum of agreement, provide important foundations for managing ecosystem recovery investments (see Attachment A for detail).

Local initiatives. Finally, a large number of site-specific initiatives deserve attention: watershed initiatives in the Deschutes, the Clark Fork, the Wallowa and Methow valleys, and elsewhere; the Bureau of Reclamation's water conservation pilot projects; the federal/tribal/WaterWatch work on water spreading in the Umatilla Basin; and many others.

[1609] *See* J. Volkman and K. Lee, "Within the Hundredth Meridian: The Western States and Their River Basins in a Time of Transition," 59 *U. Colo. L. Rev.* 551 (1988).

If the test of a model is an enterprise that holds promise for addressing water conflicts, each of these efforts offers lessons for emerging water policy.

On the other hand, if the test is whether these initiatives have solved the broader problem, the salmon declines and the ecological problems that surround them, the answer is no. Neither the treaty fishing litigation, nor the states' involvement through the Northwest Power Act, nor the infusion of a sizeable stream of hydropower funds, nor the Endangered Species Act listings has solved this problem. Nor, frankly, have many of the individual water initiatives described in the study put a great deal of water back in dried-up salmon tributaries. In this sense, the Basin offers limited victories, two steps forward and one step back (and sometimes *vice versa*), and no models of ultimate success.

In other respects, the answer is maybe. The overlapping Northwest Power Act and Endangered Species Act programs may prove to be a model if they can succeed in establishing a scientifically credible working collaboration that gains significant popular and political support. The collaboration has been touchy, and it is by no means clear that the two programs will learn to complement each other, that either will be able to establish a meaningful ecological framework for itself, or, if they do, that they will be implemented. But they represent a level of legal and financial muscle for environmental recovery that is rare in natural resource policy.

In truth, there is no simple formula for judging success in ecologically-based resource management. To a certain extent, natural resource management has always involved managing dilemmas: the Basin's residents want salmon, but they also want inexpensive electric power, flood control protection, timber harvest, grazing, and a clear navigation channel to Lewiston, Idaho. While resource management requires choices, either/or choices is not something at which American government excels. Even when policy favors species protection to the degree the Endangered Species Act does, the results are likely to be ambiguous.

There is no question that there is room for improvement in all the Columbia Basin's mechanisms of government. Yet, even if we had a free hand to redesign them, our innovations would still reflect the limits of human perception of ecosystems and of the role of government in American culture. We would still face problems for which we would find no good answers in existing science. And if we found scientific answers, we would still face the values and constituencies that underlie government. Notwithstanding the Basin's deeply-felt alarm over the salmon declines, for a long time people have been choosing dams, timber harvest, ranching, irrigated agriculture and other features of modern life that undermine salmon ecosystems. However

much we may think that new statutes, court rulings, or evolutions in policy can reverse these choices, these are not things that can be reversed with the stroke of a pen. The choices we have made have altered ecosystems and cultures. And these are the cultures to which government ultimately must look for consent.

From this perspective, the task that faces an ecologically-based water policy is a humbling one. We cannot expect sweeping power or ultimate answers, and we should probably stop evaluating resource programs in such grandiose terms. Rather, we should look for policy and institutions that help us retain a sense of our connectedness to nature even as we are tossed around by larger forces. And so, when we re-think water policy, we should look for those devices and tools of governance that clarify ecological linkages and consequences, and reward human instincts that contribute to the long-term viability of natural systems.

Even at their most coherent, law and policy alone cannot succeed in anything as broad as shifting an ecological template. Success in such an enterprise may have as much to do with cultural evolution as law, and here is a possibility. One of the romances of the American west is the image of the drifter. We see it in the boom-and-bust pattern of western economies, and the idea that we can mine each resource until it plays out and then move on:

> *Cattle ranchers, conducting their business on the hoof, on 1,300-mile drives from Texas to Montana and the Dakotas, set the tone for the loggers, miners and railroad construction gangs who followed them. People got what they needed from the land, and moved on, like grazing cows. . . . [W]hen the forest is logged or the seam mined to the point of diminishing returns, you move on to a new job. When, eventually, you reach the coast, you go trawling for salmon in Alaska.*[610]

There is a variation of this romance in a sense of technological optimism, endlessly ingenious and boundlessly promising, which will allow us to engineer our way through the landscape and reach new frontiers. This romance has played a central role in the Columbia River Basin and the decline of salmon. Increasingly, however, it is tinged with the sense that at the end of the day, the ingenious drifter may settle down in a diminished world.

Perhaps we are moving to another idea of settlement that is less romance, more difficult, and more consistent with the way some westerners like to

[610] J. Raban, *Bad Land* at 230 (Pantheon, 1996).

think of themselves. It is represented by the people who didn't move on, who put down roots and made a life with the land they found. It is a peculiar irony of modern life that this idea of settlement, if it is the one we are choosing, may now repudiate some of the solutions of the recent past in an attempt to save an older resource. And the further irony is that these new choices can only be made in common, in an urban region whose rivers are shared with rural communities.

The closing of Columbia Basin rivers to new diversions may or may not be a sign that the drifter image of the frontier is behind us. Western communities have often been more divided by water than united by it, and we may not be headed for a future that includes a healthy salmon river. But one way or another, one of the important tasks of water policy in the coming decades will be to help communities make these choices, and look for new ways to make rivers work.

Attachment A

A Snapshot of Current Salmon, River, and Watershed Management

A Snapshot of Current Salmon, River, and Watershed Management

The plethora of salmon recovery initiatives required new management and coordination systems. They have emerged over the last seventeen years in pieces, and they are still emerging. The following is a 1997 snapshot:

1. Hydropower Operations and Dams

After the Northwest Power Act, the pre-1980 arrangements for industrial river operations were still in force. The Corps, the Bureau of Reclamation and Bonneville still managed the system consistent with project authorizing statutes and the Columbia River Treaty, for flood control, power production and navigation. Reclamation facilities were still managed for reclamation and, with the exception of Grand Coulee, were factored out of hydropower operations. The three federal agencies coordinated their management with non-federal project operators through interagency memoranda of understanding, and coordinated system operations for power through the Pacific Northwest Coordination Agreement.

The Northwest Power Act established new obligations with respect to fish and wildlife. Under the Council's fish and wildlife program, the primary river-related measures in the Council program were the water budget (flow augmentation water that still could pass through turbines and generate power), spill operations (water that spilled over the dams, bypassing turbines) and dam modifications (bypass screens) to improve passage survival. The Council created a Fish Passage Center to give fish and wildlife agencies and tribes the capacity to make recommendations for managing the water budget, but ultimate management decisions were made by the Corps of Engineers in consultation with Bonneville and others. Later, the Council created the Fish Operations Executive Committee to plan for the water budget, spill, and transportation; to broaden input into river operations; and to resolve disputes among the federal agencies, fish managers and others.

With the Endangered Species Act listings in the early 1990s, the Council continued to include hydropower system operations and dam modifications in its program, but the Corps, the Bureau and Bonneville determined to operate the federal projects consistent with the National Marine Fisheries Service's biological opinion and a Kootenai sturgeon biological opinion produced by the U.S. Fish and Wildlife Service. Accordingly, the biological opinions are now regarded as setting the basic rules for system operations for salmon. The current biological opinion calls for water from federal headwater storage projects on the Columbia, with limited contributions from major tributaries such as the Snake. Non-federal project operators, such as the operators of

the Mid-Columbia dams and the Hells Canyon Complex on the Snake, are called upon or forced by circumstance to accommodate these operations. The federal system operators have also agreed to implement a few operations for fish and wildlife which not specified in the biological opinions but are in the Council's program, such as a winter operation to raise the level of Lake Pend Oreille to protect resident fish. In a 1996 budget agreement, Bonneville has consented to absorb the financial consequences of implementing the biological opinions and these other operations.

Within these rules, operating decisions must be made during the year depending on the size and shape of the run-off, amounts of water still in storage, and the size and timing of the fish migration. To make these decisions, the Fisheries Service, the Corps, Bonneville and the Bureau created a Technical Management Team, overseen by an Implementation Team and an Executive Committee. The state and tribal fish agencies and Council staff participate in these groups, although the federal agencies, especially the Fisheries Service, make the final decisions. The Council agreed to merge its Fish Operations Executive Committee into these processes. Currently, the Fisheries Service and others are working on rules and procedures for dispute resolution. In addition, various parties are seeking to establish a court-supervised process for disputes involved in implementing the biological opinion.

The Fisheries Service's biological opinion not only sets the basic rules for system operations, it also specifies dam modifications to improve fish survival: screens and bypass systems; gas abatement measures to ameliorate spill impacts; and barge transportation improvements. To help make these decisions, the federal agencies created a System Configuration Team, which is also overseen by the Implementation Team and Executive Committee mentioned above. Although the dam modifications are mostly paid for out of Congressional appropriations in the first instance, Bonneville reimburses the Treasury for a major part of the cost. The Bonneville fish and wildlife budget agreement also specifies how the federal agencies will share budget information with the Council, the tribes and others to help make regional decisions.

2. Tributary Water Management

The Columbia's major tributaries are mostly outside the federal hydropower system. For each, there is a separate set of rules or arrangements, described in sections 3 and 4, above; these include rules and institutions for water use, Federal Energy Regulatory Commission licenses and settlement agreements, and a body of state water law governing individual water rights, instream

flows and other matters. Idaho, Oregon, and Washington have limitations on new diversions to protect salmon in some streams. With limited exceptions, existing water rights are not regulated for fish and wildlife purposes.

3. Expenditures for Other Fish and Wildlife Activities

Hydropower system operations and modifications are one aspect of the fish and wildlife activities in the basin; expenditures for production, habitat, research and tributary passage and water projects are another. Most of these expenditures are guided by the Council's fish and wildlife program.

Council program/BPA funding. When the Council's fish and wildlife program was first adopted, there was no particular system for overseeing program implementation, so the Council first adopted an "action plan" into the program—a collection of measures to be implemented over the coming five-year period. When additional policy management proved to be needed, Bonneville and the fish and wildlife managers developed a process called the "implementation planning process" to guide implementation. However, that process proved cumbersome and it was later abandoned. Bonneville, the Council, and the fish and wildlife managers then developed a “prioritization process,” which is currently used to allocate Bonneville fish and wildlife funds. In this process, the Council reviews criteria with which to set priorities, the fish and wildlife managers review current and proposed projects, rank them according to the criteria, and make recommendations to the Council and Bonneville on funding allocations. After public review and comment, the Council makes recommendations to Bonneville based on the projects' consistency with the Council program, which the fish and wildlife managers respond to when they submit their final recommendations to Bonneville. Bonneville then makes funding decisions consistent with the program, tending to defer to the Council's recommendations.

In 1996, concerned that the fish and wildlife managers’ recommendations were too influential in the funding process, Congress called for a scientific review group to advise the Council in reviewing the managers’ recommendations and providing guidance for Bonneville’s funding decisions. With this new system, independent scientists review projects proposed for Bonneville funding, evaluate them for their consistency with the Council program and for scientific merit, and make recommendations to the Council. If the Council departs from the scientists' recommendations, it must explain why in writing.

Other expenditures and implementation. The Fisheries Service’s biological opinion on hydropower system operations calls for certain Bonneville direct

fund expenditures, especially for research. These expenditures are scrutinized during the prioritization process described above, but the Fisheries Service intends the Implementation Team and Executive Committee to be forums for implementation of the biological opinion and recovery plan. In 1996, the Council, the Fisheries Service and the fish and wildlife managers developed multi-year workplans to provide a longer-term context for implementation.

A few hatchery programs are included in the Council program, but most are Congressionally-authorized programs. One of these programs is funded by Congressional appropriations through the Lower Snake River Compensation Plan, reimbursed by Bonneville, and administered by the Fish and Wildlife Service, the Corps of Engineers and the states. The Fisheries Service has produced a separate Endangered Species Act biological opinion on these hatchery operations, which includes some provisions for hatchery reform. Once appropriated by Congress, Bonneville considers these reimbursable costs to be mandatory. These reimbursements include annual operation and maintenance expenses and annual Treasury repayments for capital construction projects. Their repayment takes precedence over implementation of the Council's program. Another set of hatchery programs and expenditures is administered by NMFS and the states and funded by Congressional appropriations through the Mitchell Act. These expenditures are not reimbursed by Bonneville.

Finally, the settlement agreement in the *U.S. v. Oregon* harvest litigation included commitments by the federal government to work with the tribal governments and the states to reform production policies and implementation. The parties to the litigation and the settlement set up an on-going Production Advisory Committee as a forum for reviewing and recommending production policies. The Production Advisory Committee's recommendations influence the production activities described above.

4. Harvest

Since the early part of the century, Oregon and Washington have jointly managed lower river harvest through the Columbia River Compact. The Compact committed the two states to adopt identical harvest regulations, which are implemented in annual harvest plans. The Indian treaty litigation of the 1970s established a *de facto* set of constraints on the Compact process. After a good deal of friction, Washington, Oregon and the tribes agreed in 1986 to manage harvest in a common process. Their agreement, called the

Columbia River Fish Management Plan, was approved by the *U. S. v. Oregon* court as a settlement agreement. The process remains under the jurisdiction of the federal court, which has the power to resolve disputes. Idaho and several other tribes are parties to *U. S. v. Oregon*, and therefore bound by the Columbia River Fish Management Plan, but they object to its terms. Idaho is not a party to the Columbia River Compact.

Much of the salmon harvest occurs in the ocean, off the coast of the continental U.S., Canada and Alaska. There are two forums for managing this harvest. For United States harvest, there are fishery management councils. The councils, comprised of representatives of fish and wildlife managers and harvesters, advise the National Marine Fisheries Service regarding harvest regulations. For Canadian harvest, the US-Canada Pacific Salmon Treaty of 1985 establishes harvest management procedures. The Pacific Salmon Commission makes harvest recommendations to the two national governments. The treaty benefits Columbia River fish by reducing harvest in Canadian and Alaskan waters. However, the negotiations with Canada are complicated by the need to make trade-offs in other U. S. fisheries. For example, further reductions in Canadian harvest of Columbia River salmon could require decreases in harvest of Canadian fish in Puget Sound and Alaska.

5. Habitat

A significant amount of the public land affecting the river is federally owned and managed by the Forest Service or the Bureau of Land Management. Both agencies must comply with federal land management laws, the Endangered Species Act and other federal authorities intended to protect fish and wildlife. In areas with listed salmon populations, the two agencies must consult with the Fisheries Service to determine if proposed land management activities will jeopardize listed species, and the Service must produce a biological opinion. Federal court decisions in the last few years have halted, at least temporarily, Forest Service activities because they failed to adequately consider endangered species issues. The Northwest Power Act does not apply to the land management agencies, although the managers may follow the program. Most land management activities are funded through agency budgets, although there is some Bonneville funding for Forest Service habitat projects.

For land owned by states, tribes and private parties, there are state, tribal and local land-use regulations, and local watershed groups (which may also include federal land). All these activities can be subject to the Endangered Species Act in the sense that no one can "take" a member of a listed species

without a permit, but this is an indirect form of control. Nonfederal parties have no duty to consult under the Endangered Species Act before taking action. Again, the Northwest Power Act does not apply to these lands, although land owners may choose to follow the program.