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by John M. Volkman

Northwest Power Planning Council, Portland, Oregon

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I. Introduction

"[M]any opposites met in the same place . . . ."[1]

Sustainable development is premised on the idea that economic and environmental problems are inextricably linked. In one form, the idea focuses on the developing world: Economic growth, if left unchecked, threatens to exhaust the earth's resources. Yet, environmental protection is something that concerns people with full stomachs and warm homes. Without significant economic development, people in the developing world are likely to sacrifice important parts of their ecosystems because they will be driven to it. How can these economies develop sustainably, in ways that respond to the legitimate needs of people and avoid environmental problems?[2] Do we see this kind of economic development anywhere in the world, and if so, how do we nurture its tender shoots?

The Columbia River poses a variant of this question, one that is aimed more at the developed world. Over the course of the 20th century, the Columbia has become less a river and more a business and engineering enterprise. Its dams provide the Northwest with clean, inexpensive electric power, a valuable navigation corridor and plentiful irrigation water. It is a self-renewing enterprise in the sense that it depends only on water falling from clouds and running downhill. While this has helped make the Northwest prosperous, there is a question whether the Columbia River enterprise can sustain anything like the River's historic

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[1] Mark Helprin, *Memoir From Antproof Case* 148 (Harcourt Brace 1995).

[2] The idea was presented most visibly in a report of the United Nations Commission on Environment and Development, *Our Common Future* (Oxford University Press 1987).

ecosystem, and particularly its once-prodigious salmon runs. Alarmed by the sudden decline Columbia River of salmon 20 years ago, for the last fifteen years the Northwest has been working at rebuilding fish and wildlife populations while accommodating growing energy demands and other uses of the river. After fifteen years of this work, however, important salmon runs are not just in decline, but at the edge of extinction.

If the continuing decline of salmon poses a question about the region's ability to link development and ecosystem protection, it also suggests something about the difficulty of achieving sustainable development in more developed parts of the world. The Columbia River restoration effort has been large, well-financed, and comes with an considerable body of law to support it -- conditions that are not easily replicated elsewhere. Given that salmon runs continue to decline despite these advantages, does the Columbia experience suggest that sustainable development is not achievable in developed areas?

This paper suggests something less gloomy but more complicated: We are still debating what the idea of a sustainable Columbia River means; how we can move scientifically toward a more sustainable river; how we can pay for the effort; and how we can make judgments on issues that cross so many political, physical and biological boundaries. All of these questions interact with each other and cloud the more basic question over the value of a treasured natural heritage, the value of the river as an commercial enterprise and whether the two might complement each other. The Columbia is not yet an example of success or failure in this venture, but of the complex and shifting nature of the task.

This paper begins with background on the Columbia, the salmon runs, and their role in the region's energy system. I then discuss the Northwest's experience with four puzzles that arise in the Columbia River debate, which are likely to crop up in sustainable development initiatives more generally: the shifting debate over what we are trying to sustain; the role of

science in helping to answer this question; the influence of financing arrangements in deciding what can be sustained; and what kinds of institutions may facilitate intelligent judgments in these matters. Finally, I sketch some lessons from the Columbia River experience for the broader debate over sustainable development.

II. Background.

A. The Columbia River, salmon and energy.

The Columbia is a big river, the fourth largest in North American -- about 1,200 miles long, with average annual streamflow of 141 million acre-feet of water. The watershed runs through seven states and parts of Canada.[3] Before non-Indian settlement, native people numbering in the tens of thousands lived on the bounty of something like 10 to 16 million adult salmon that returned every year.[4] By most estimates, this was the world's greatest salmon river,[5] the kind of place where fishing could be done by pitch fork.

Salmon were at the center of life for the Columbia River Indian tribes. As an early 20th century Supreme Court opinion put it, "The right to resort to the fishing places . . . was . . . not much less necessary than the atmosphere they breathed."[6] When Issac Stevens negotiated for treaties to clear title to land for a northern railway route, the tribes took care to

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[3] *See* K. Lee, *Compass and Gyroscope: Integrating Science and Politics for the Environment* 19 (Island Press, 1993). About 30 percent of the River's streamflow originates in Canada and another third originates in the Snake River drainage in Idaho and Wyoming. Public Power Council, *Public Power Fundamentals* 23-25 (1995).

[4] *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).

[5] *See* National Marine Fisheries Service, *Proposed Recovery Plan for Snake River Salmon*at ES-1 (March 1995).

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

protect their right to fish at "all usual and accustomed places" outside reservation boundaries "in common with citizens of the territories."[7]

Non-Indian settlement began to nibble away at the river's productivity early on. A number of salmon runs were wiped out by overfishing in the 19th and early 20th centuries. The first big dam on the River was built in 1933 and over the next 25 years another four went in. From 1959 on, dams went in like gangbusters -- another 15 major dams on the mainstem of the Columbia and Snake rivers between 1959 and 1975, including the Hells Canyon complex on the Snake, which wiped out most of the prime spawning and rearing habitat for the Snake River fall chinook. The dams produce an abundant supply of relatively inexpensive electric energy. About 70 percent of the region's electricity comes from hydropower, and most of that is generated by the Columbia River dams.[8] More than half of the River's stored water is held in Canadian dams, managed in accordance with the Columbia River Treaty and other agreements.[9]

As the dams went in, fish and wildlife mitigation efforts were funded. Fish ladders were installed to let returning adults to climb over the dams. Congress funded salmon hatcheries to replace lost habitat. Hatcheries are comparable to the end-of-the-pipe pollution clean-up measures: an after-the-fact technological attempt to correct an environmental disturbance. The hatcheries exacerbated problems for the Columbia River Indian tribes. The tribes fish upriver, the hatcheries were located in the lower river, and so fish returning to the hatcheries would not pass the tribes' fishing sites.

Increasingly, the tribes saw this combination of dams and lower river hatcheries as lethal to their fishing rights, and in the late 1960s the tribes went to court. In a series of cases

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[7] *See, e.g.*, Treaty with the Yakamas, June 9, 1855, art. 3, 12 Stat. 951, 953.
[8] *See* Public Power Council, *Public Power Fundamentals* 23 (1995).
[9] Treaty with Canada Relating to the Cooperative Development of the Water Resources of the Columbia River Basin (January 17, 1961).

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.[10] They also asserted a right to have salmon habitat protected from degradation.[11] The latter principle has not been entirely resolved, but it bears directly on all activities that affect salmon habitat, including the operations of the Columbia River dams.[12]

If healthy wild salmon were the indicator of sustainability, by the late 1970s the Columbia had the earmarks of what we now call an unsustainable river system. Salmon stocks that once returned to tributaries in large numbers now were at such low levels that their survival was in question. There were too many dams, degraded fish habitat, chaotic harvest management, and salmon management increasingly was in the federal courts.

B. Remedial legislation.

In the late 1970s and 1980s, a battery of statutes was enacted to remedy the problems of salmon.[13] The Magnuson Fishery Conservation and Management Act[14] was passed in 1976 to regulate fish harvest in the ocean. The chaotic system of fish and wildlife agency salmon management was addressed by the Salmon and Steelhead Conservation Act,[15] which also promised federal funding for habitat restoration.

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[10] 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* Wilkinson, *Crossing the Next Meridian, supra* note 5; and F. Cohen, *Treaties on Trial: The Continuing Controversy over Northwest Indian Fishing Rights* (Univ. of Wash. 1986).

[11] *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). *See also* M. Blumm, "Why Study Pacific Salmon Law?" 22 *Idaho L. Rev.* 629, 636-37 (1985-86).

[12] *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).

[13] 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).

[14] Pub. L. No. 94-265, 90 Stat. 331, codified at 16 U.S.C. §§ 1801-1882.

[15] Pub. L. No. 96-561, 90 Stat. 331, codified at 16 U.S.C. §§ 3301-3345.

At the same time, the region's energy demands had outrun the Columbia River'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.[16] Congress responded with the Northwest Power Act.[17] The Act declared that the region's energy future should be planned in a public process that would consider the full environmental and economic cost of energy alternatives, emphasize energy conservation, renewable energy development and high efficiency generation, and include a program to offset the effects of the dams on salmon and other fish and wildlife populations.[18] The planning process would be developed in a public process, guided by a 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, whose activities the Council's plan must complement.[19] The program would be implemented by hydropower revenues and the federal agencies that control the hydropower dams.

Following passage of the Northwest Power Act, the United States and Canada negotiated a treaty designed to protect each country's ocean salmon populations from the other country's fishermen.[20] In 1986, the Northwest states and the region's Indian tribes negotiated a settlement of harvest issues in the Columbia River itself.[21] With the signing of

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[16] 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).

[17] Pub. L. 96-501, Dec. 5, 1980, 94 Stat. 2697, codified at 16 U.S.C. §§ 839-839h.

[18] *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).

[19] 16 U.S.C. § 839b(h)(6)(A).

[20] Treaty Between the Government of the United States of American 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).

[21] The Columbia River Fish Management Plan, approved by the federal district court in *U.S. v. State of Or.*, 699 F. Supp. 1456 (D. Ore. 1988), and affirmed on appeal in *U.S. v. State of Or.*, 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).

this settlement, salmon appeared to be the beneficiaries of an unprecedented body of protective law.

More broadly, a link had been forged between regional energy development and fish and wildlife recovery in the Columbia River Basin. The Northwest Power Act would aim for a power system that meets growing energy demands through measures that impose the least economic and environmental cost on the region, particularly energy conservation, while simultaneously 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 power system. One would not proceed without the other.

C. Wild fish and the Endangered Species Act.

After the passage of this legislation, salmon runs began to increase. The runs that were the subject of bitter fights between Indians and non-Indians in the early 1980s increased impressively. In the early 1980s, one upriver fall chinook salmon run had declined to about 100,000 fish from a 1940s level of about 600,000[22]. The early 1980s decline was low enough to prompt the state fish agencies to try to shut down tribal harvest on the run.[23] Four years later, the same population of fish had increased to more than 400,000 mature adults.[24] Increases in other stocks were not so remarkable, but still promising.

Not everyone was enthusiastic about this apparent upswing in the salmon populations. By the mid-1980s the replacement of wild fish by hatchery fish was far advanced -- the runs

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[22]Oregon Department of Fish and Wildlife, Washington Department of Fisheries *Status Report, Columbia River Fish Runs and Fisheries, 1938-92* 50, figure 24 (1993).

[23]The attempted closure was litigated in *U.S. v. Oregon*, 718 F.2d 299 (9th Cir. 1983).

[24] Oregon Department of Fish and Wildlife, Washington Department of Fisheries, *supra* note 23 at 50, figure 25.

were only about 25% wild.[25] Hatchery runs are prized by fish managers because they can sustain heavier harvests; only enough adults need to be saved to provide eggs to seed the hatcheries. Wild fish have to return in much bigger numbers if they are to remain viable. However, wild fish are subject to natural selection pressures and tend to be much hardier and better adapted to life in the wild. 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, and more prone to disease. As hatchery production increased, the Basin was trading vigorous wild fish populations for less hardy hatchery fish.[26]

It was therefore a source of concern when in the late 1980s wild populations seemed to be careening downhill as aggregate salmon numbers grew. An article in *Fisheries*, the Journal of the American Fisheries Society showed that wild salmon populations up and down the Pacific coast were at critically low numbers.[27] The message was not entirely surprising; conservationists like Bill Bakke of Oregon Trout had been making such claims for years, but the *Fisheries* article documented the trend in a peer-reviewed journal and made it impossible to ignore. This realization was soon followed by the beginning of what has been a seven year drought and persistently poor (for salmon) ocean conditions. Since 1988, the data show 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 were much worse.

Swings in salmon abundance are not themselves a concern. Salmon are subject to natural cycles. Changes of thousands of percent over a two or three year period have

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[25] *See* Northwest Power Planning Council, *supra* note 5 at 212; Wilkinson and Conner, *supra* note 14 at 81-84; Northwest Power Planning Council, *Columbia River Basin Fish and Wildlife Program*, at 7-13 (Dec. 1994).
[26] *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,"
[27] *See* W. Nehlsen, et al. "Pacific Salmon at the Crossroads: Stocks at Risk From California, Oregon, Idaho and Washington," *Fisheries* 4 (Mar./Apr. 1991).

occurred.[28] These swings may reflect the effects of drought, poor ocean feeding conditions and other natural factors. Robust salmon runs can survive these fluctuating natural conditions. Extremely weak runs -- like many of the wild Columbia and Snake River runs -- cannot.

This pervasive weakness in the wild runs led to the listing of Snake River chinook salmon populations under the Endangered Species Act in 1992.[29] When the ESA petitions were first filed, 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 Endangered Species Act listings, a more encompassing discussion was thought to be essential. A "Salmon Summit" was organized: a 6-month, mediated process in 1991 and 92, that familiarized a broad range of players with the complexity of salmon issues. And it had the desired effect. 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.[30] At the same time, however, the breadth of the process made it unlikely that consensus could be achieved on the most difficult salmon issues.

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[28] *See* Oregon Department of Fish and Wildlife, Washington Department of Fisheries *supra* note 23 at 56, figure 29 (estimated numbers of sockeye entering the Columbia River and escapement).

[29] 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).

[30] *See* J. Volkman, "Making Room in the Ark: The Endangered Species Act and the Columbia River Basin," 34 *Environment* 18, 42 (May 1992).

In 1991, the region's governors asked the Council to address issues that could not be resolved at the Salmon Summit. The Council began an 18-month process that produced what the Council called the *Strategy for Salmon.* The *Strategy* put emphasis on the protection of weak, wild salmon populations, establishing a standard calling for "no appreciable risk to biological diversity" among salmon and other fish populations[31] and a more cautious approach to hatchery-related programs.[32] The *Strategy* expanded the Council's salmon flow augmentation program by more than half, adding 3 million acre-feet of water to a 5.65 million acre feet "water budget" at a power system cost of $100 million in lost revenues annually. The Council doubled a $40-50 million spending program to address habitat, hatchery and other areas. However, the Council also found that although these efforts were all that could be made in the near term, they were probably not enough to allow weak wild populations to recover. The problems they address appear to be broader and deeper, and the immediate remedies appeared inadequate. Accordingly, the Council called for fast-track evaluations of new mitigation measures -- additional sources of water for salmon flow augmentation, strategies for reducing reservoir levels to increase water velocities, and other measures.

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 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 resident fish and wildlife interests. Upriver storage reservoirs had been hit hard by power drafting over the years, but power generation was a benefit to the local area, at least in part, and so to some

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[31] *See* Northwest Power Planning Council, *Strategy for Salmon* 18 (1993).

[32] *See id.*, 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).

upriver interests these drafts were easier to understand. Salmon flow releases have no immediate benefit for upriver areas; they only raise concerns. Storage reservoirs are habitat for resident fish and wildlife species and there is concern that flow releases will hurt these species. Big "bath tub rings" exposed by reservoir releases have grown and become persistent over seven years of drought and have hurt reservoir recreation. Salmon flow releases can contribute to these problems.

In 1993, shortly after publication of the *Strategy for Salmon,* the National Marine Fisheries Service issued its biological opinion on the operation of the Columbia River dams.[33] The biological opinion added another two million acre-feet of stored water to the the *Strategy for Salmon*'s Columbia River flow operations, and concluded that the dams' operations would not jeopardize the continued survival of the species.

Both the biological opinion and the *Strategy for Salmon* attracted legal challenges. In *Idaho Department of Fish and Game v. National Marine Fisheries Service, et al.,*[34] the court faulted the Fisheries Service's analysis and sent it back for further work. While the holding of the case was narrow, the court had far-reaching observations on the underlying substantive issues:

> [The biological opinion was] 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 minimial disruption.[35]

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[33] 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 is required to issue a biological opinion detailing how the proposed action affects 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).

[34] ___F. Supp. ___ (D. Ore. 1994). The case is currently on appeal.

[35] Slip opinion at 36.

In addition, the court 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."[36] 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 next shoe to drop was in the litigation over the *Strategy for Salmon.* In *Northwest Resource Information Center v. Northwest Power Planning Council,*[37] the Ninth Circuit found that the Council's program too was procedurally flawed. Again, the procedural holding was accompanied by expansive *dicta*, including a theory of the Northwest Power Act that could strip the Power Planning Council of large areas of discretion in fish and wildlife policy. The court observed that the Council should give "a high degree of deference" to the fish and wildlife agencies' and tribes' judgments on fish and wildlife mitigation.[38] 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."[39]

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[36] *Id.*, at 36-37.

[37] 35 F.3d 1371 (9th Cir. 1994).

[38] The Northwest Power Act directs the Council to develop a fish and wildlife program on the basis of "recommendations" submitted by fish and wildlife agencies, tribes and others. The Council must evaluate the recommendations in light of several criteria including, for example that the program must "complement the existing and future activities" of the agencies and tribes (16 U.S.C. § 839b(h)(6)(A)) and be consistent with the legal rights of Indian tribes (16 U.S.C. § 839b(h)(6)(D)), and determine which of the recommendations to adopt. In saying that the Council must accord a high degree of deference to the fish and wildlife agencies and tribes, the *Northwest Resource Information Center* opinion emphasized a statement made by the chairman of one of the two house committees that reported on the Northwest Power bill regarding a provision in the bill that was not adopted. The court expanded on one part of this legislative statement ("the Council should rely heavily on the fish and wildlife agencies . . . and not try to become a superfish and wildlife entity.", Cong. Rec. at H10683 (daily ed. No.v 17, 1980)), and discounted another (that the Act's fish and wildlife criteria were not intended to "provide a legal basis for challenging the program," Id.). By this route, the court concluded not only that the Council must accord "a high degree of deference" to the agencies' and tribes' judgments, but that the agencies' and tribes' interpretations of the Northwest Power Act's fish and wildlife provisions were entitled to deference.

[39] 35 F.3d at ___.

Before the ruling was handed down, the Council had completed the further evaluations the *Strategy for Salmon* had called for and was poised to make decisions on reservoir drawdowns and other measures. In December 1994, three months after the *Northwest Resource Information Center* ruling, the Council adopted amendments to its fish and wildlife program that attempted to respond simultaneously to the needs of salmon and of resident fish and wildlife in upriver areas.[40] One of the primary departures in the new salmon program is a commitment to embark on an ambitious and costly program to lower the level of various reservoirs to increase rates of river flow, especially in the Snake River, and a willingness to cut back on barge transportation of juvenile fish in the Snake River by the Army Corps of Engineers. All of these measures were put in an experimental context: each measure would be part of a head-to-head evaluation of the survival of fish that are transported by barge and fish that are left in the river. The Council also added another 1.3 million acre-feet of water to the salmon flow program for the Columbia River and authorized a number of new mitigation and enhancement measures. The Council adopted operating rules that would limit fluctuations in upriver storage reservoirs to respond to concerns regarding resident fish and wildlife in upriver reservoirs. The Council program received measured support from Indian tribes and environmental groups, and an industry lawsuit was abandoned.[41]

In March 1995, the National Marine Fisheries Service completed the consultation process it had initiated in response to the *Idaho Department of Fish and Game v. National Marine Fisheries Service* opinion regarding the operation of the hydropower dams. For the first time, the Service's new biological opinion found that dam operations were likely to

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

[41] The amendments intially 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.

jeopardize salmon survival and outlined a "reasonable and prudent alternative"[42] that the Service said would avoid jeopardy.

While the biological opinion and the Council program have much in common, they differ in key respects, reflecting the difference between the Northwest Power Act's broad concern for power production and fish and wildlife throughout the basin, and the Endangered Species Act's focus on listed species. The biological opinion focuses on the needs of salmon, and affords no protection for resident fish and wildlife, except insofar as these species are themselves listed under the Endangered Species Act and protected in their own right.[43] The biological opinion puts more emphasis on barging juvenile fish and less emphasis on improving migrating conditions in the Snake River. The opinion avoids calling for the acquisition of significant amounts of water from the Snake River Basin, and reserves judgment on the strategy of drawing down the Lower Snake River reservoirs. Instead of calling for improvements in the Snake River system, the biological opinion draws more heavily on storage projects in the Upper Columbia arm of the system (Grand Coulee in north-central Washington and Libby and Hungry Horse in Montana), so that Snake River fish will find a faster Columbia River when they emerge from the Snake. However, this strategy raises concerns about impacts to upriver resident fish and wildlife populations which the opinion does not purport to address. Moreover, without further changes in the river, which depend on measures on which the biological opinion reserves judgment, the opinion predicts a low likelihood of recovery for the listed salmon stocks. The biological opinion has been challenged from almost all sides: industry and environmental groups, Indian tribes and the States of Alaska and Montana.

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[42] *See* note 34, *supra.*

[43] 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 other priorities.

A few weeks after the biological opinion was issued, the Fisheries Service proposed a recovery plan that incorporated the biological opinion's dam operations into a program that addresses a broad range of federal activities, including land and water management, regulation of fish harvest and hatchery management.[44] The recovery plan will be the subject of hearings later this year.

The Endangered Species Act has had effects beyond the river and the dams. In *Pacific Northwest Generating Cooperative v. Brown,*[45] the Ninth Circuit held that utility and industrial groups have 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,*[46] and *Pacific Rivers Council v. Intermountain Forest Industry Association,*[47] the courts upheld challenges by environmental groups, finding that the U. S. Forest Service must consult under the Endangered Species Act regarding land resource management plans. Until consultations occurred, 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 United States was unsuccessful in obtaining review by the U. S. Supreme Court.[48] In recent months, fishery interests have filed a variety of challenges to power system transactions that affect river operations and the indications are that more litigation is coming.

Thus, what had been a relatively serious debate over salmon recovery during the 1980s became significantly more intense with the salmon declines that brought Endangered

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[44] National Marine Fisheries Service, *Proposed Recovery Plan for Snake River Salmon*(March 1995).
[45] 38 F.3d 1058 (9th Cir. 1994), reversing 822 F.Supp. 1479 (D. Ore.)
[46] 30 F.3d 1050 (9th Cir. 1994).
[47] Civ. No. 94-0159-S-HLR (D. Idaho 1994).
[48] 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.

Species Act listings. Ensuing Endangered Species Act, Northwest Power Act and other litigation has raised the stakes and deepened the discussion. As explained in the next section this occurs at a time when the hydropower system, which is expected to pay much of the cost of salmon recovery, is facing unprecedented challenges.

D. The emergence of a competitive electric power industry.

When the Power Planning Council developed its first power plan in 1983, it became apparent that the energy deficit the utilities had foreseen in the 1970s had disappeared. The region had an energy surplus, not a deficit. During its first five years, the Council's challenge was to find ways to build the region's ability to develop conservation and renewable energy at a time when neither was needed. The surplus began to fade after 1986, when energy demand again began to surge. Between 1986 and 1991, the region's energy surplus went from about 2,500 megawatts to none.[49] During that time, much of the new energy demand was absorbed by energy conservation initiatives financed in part by federal power revenues, which saved the region $1.4 billion, compared to the cost of building large generating plants.[50] New building codes and energy efficiency standards saved the region even greater amounts of energy.[51] The region's public utility commissions helped to bring private utilities into a similar approach to energy development. While there were still obstacles to implementation of energy conservation and development of renewable energy projects, the region had made significant progress.

The electric industry was fundamentally transformed in the early 1990s. Beginning in the early 1990s, technological advances made it possible for highly efficient power generators to be built at costs that are well within the finanical capability of many utilities.

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[49] *See* Northwest Power Planning Council, II *Northwest Conservation and Electric Power Plan*, part I at 42 (1991).
[50] *See ibid.*
[51] *See ibid*, 42-43.

Proven supplies of natural gas to fuel these generators have grown beyond expectations, and natural gas prices have done nothing but fall. At the same time, much of the regulatory structure that traditionally constrained electric utilities was rearranged, supplanted or marginalized by the Energy Policy Act of 1992.[52] That statute authorized new species of energy producers and brokers to supply energy at the wholesale level, which had previously been the exclusive domain of utility companies.

The combination of new technology, cheap natural gas and new suppliers has turned many of the assumptions underlying the Northwest Power Act on their heads. One of the Northwest Power Act's premises was that the federal hydropower system would remain the principal financier of the region's energy development, that centralized thermal plants would be too costly and risky for any other utility to provide financing and Bonneville would be the primary power developer. With the technological developments of the 1990s, large thermal power plants are no longer part of any utility's thinking. The federal hydropower system may not be the dominant financier of future energy development in the region. Rather, burdened with bad nuclear power investments and growing fish and wildlife obligations, there is genuine concern about the ability of the federal hydropower system to compete in the market, at least in the short term. Assuming that natural gas will not always be as cheap as it is now, federal hydropower can be expected to regain a significant competitive advantage around 2005.[53] For the near term, however, because the Northwest Power Act conceives of the federal system as the principal financier of energy conservation, renewable energy development and fish and wildlife mitigation in the Columbia, these developments raise questions about the region's energy future and the federal system's ability to finance salmon recovery.

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[52] Pub. L. 102-486, 106 Stat. 2776 (Oct. 24, 1992).

[53] *See* Northwest Power Planning Council, "Assuring an Adequate, Efficient, Economical and Reliable Power Supply and the Ability to Carry Out Other Purposes of the Power Act," C-25, Appendix C to the *Columbia River Basin Fish and Wildlife Program* (December, 1994).

III. Is a Sustainable Columbia River Emerging?

Several themes underlie the Columbia River experience: The idea of a "sustainable river" shifts with changing laws, new understandings of biology and evolving public values. What we sought to sustain ten years ago is different from what we seek to sustain now. These shifts are influenced by scientific information, but slowly and incrementally; science is less likely to answer questions than to sharpen them. Our ability to work toward sustainability is affected by economic considerations, especially financing, and these arrangements too are shifting. Finally, the institutions we ask to address these questions often can influence them only in pieces; non-governmental forces are likely to be at least as significant in shaping the debate. This section surveys these themes.

A. What kind of river are we trying to sustain?

We have seen at least two different ideas of the Columbia River over the past twenty years. In the mid-1970s, the river's keepers saw the river as a valuable resource, a supply of water to be allocated for commercial uses and fish and wildlife. Under the Northwest Power Act, fish and wildlife would be protected, but only as long as the region was assured an "adequate, efficient, economical and reliable power supply."[54] If management of the river and habitat conservation efforts could not accommodate fish and wildlife needs, we could compensate with technology. The Northwest Power Act and other remedial legislation created a process in which decisions regarding allocation of the river and use of technological surrogates could be made. The Act reflected hope that ecological conditions for salmon could be improved enough to rebuild the runs. But there was also skepticism, a strong belief among fisheries managers that rebuilding could only be accomplished with hatchery

[54] 16 USC § 839b(h)(5).

supplementation, that wild runs were less important than large, harvestable populations, and a conviction among river managers that changes in the hydropower system could make only a limited contribution to species recovery.

The idea that hatcheries and other technologies could be surrogates for improvements in the river gave the region flexibility in the allocation of the River between salmon, hydropower and other uses, but it also may have fed a willingness to see wild fish disappear. For example, in 1987, the wild Snake River coho salmon appeared headed for extinction. When the Power Planning Council made this prospect public, fish managers said this was simply a case where a small wild population had to be sacrificed to allow bigger populations to be freely harvested. Because the bigger, bread-and-butter runs of hatchery salmon, mainstays of the fish harvest, were rising, the loss of a small wild stock was of little moment. It didn't reflect an unsustainable river, it was just a side effect of the river many people wanted to sustain: one that put power production and big fish harvests ahead of the biological value of diverse, wild salmon runs.

With the Endangered Species Act listings, the debate shifted on its axis. Under the Endangered Species Act the question is how to rebuild wild fish runs,[55] not to protect hydropower, harvest or other human activities. The river is not seen as a scarce resource to be allocated, but as indivisible wild fish habitat. This vision of the river emerges from the *Idaho Fish and Game v. National Marine Fisheries Service* and *Northwest Resource Information Center v. Northwest Power Planning Council* cases: significant changes in dam operations will produce a river that supports healthy wild fish. Moreover, because hatchery programs can affect endangered wild stocks adversely, they become part of the problem.[56] This river

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[55] Waples, "Definition of 'Species' Under the Endangered Species Act: Application to Pacific Salmon," *NOAA Technical Memorandum NMFS F/NWC-194* p. 9 (March 1991).

[56] Hard, Jones, Delarm and Waples, "Pacific Salmon and Artificial Propagation Under the Endangered Species Act," National Marine Fisheries Service Technical Memorandum NMFS-NWFSC-2 (1992).

looks more like the one that salmon evolved in, and it eschews political compromise and economic considerations.

If salmon and power generation are coequal, the wild river of the Endangered Species Act and the allocable river of the 1980s are unreal rivers, "virtual rivers" at best. The allocable river was always limited by salmon biology. Even the most aggressive advocates of hatcheries and other technological fixes had to admit that the complete loss of wild fish stocks and the genetic material they represent would threaten the long term sustainability of the runs. Even the most aggressive protectors of the power system had to admit that a political allocation of the river that didn't allow for the continued survival of the salmon runs was unlikely to be politcally and legally sustainable. And even at the rosiest moments, one can see a wild river only by squinting hard, and even then it is hard not to see the dams. The dams are, simply, *there*.

The federal and regional recovery programs are headed toward something more like a wild river than the river has been: a faster river with less reliance on technological surrogates such as barge transportation and hatcheries. With regard to changes in river operations, the differences between the two plans are important, and some think they are crucial.[57] The federal plan uses stored water to increase flows, but this strategy is constrained in three ways. One constraint is the Basin's limited water storage capacity. There are especially significant problems with this approach in an arid area like the Snake River Basin, where the weakest wild salmon stocks originate. There is a second, related constraint: in the Snake Basin, storage is not only limited, but much of it is tied to irrigation water rights. Securing irrigation water for salmon flows raises a welter of political and legal issues. Finally, a flow

[57] "The [Northwest Power Planning Council] plan invites the region to debate whether saving salmon is worth the increased costs. The vast majority of Northwest residents probably will conclude that saving salmon is a wise investment, one that the region can afford. . . . On the other hand, the [Endangered Species Act] plan, if pursued, would lead to a very different scenario. While [the National Marine Fisheries Service] bills it as a recovery plan, the environmental and fishing communities are convinced that it is an extinction plan." J. Poisner, "Salmon at the Crossroads," 1 *Big River News* 1, 9 (Spring 1995).

augmentation strategy is constrained by the hydraulics of mainstem reservoirs. One commentator characterized the problem this way:

> Partially draining key upstream storage reservoirs in Idaho and Montana would put more water through the system, but it would take a massive volume of water to create small velocity increases. Indeed, it is not clear whether the dry Snake River system contains enough storage water to create a sufficient increase in velocity.[58]

In view of these constraints, the Council program takes a different approach. While the Council program also relies on flow augmentation,[59] the primary strategy in the Snake is to lower the level of key reservoirs, creating a narrower and faster migration channel for juvenile fish. This would create faster flows without using as much stored water. The Council approach would gamble that a faster river is key to salmon survival, and that benefits of somewhat larger flows from the Columbia arm of the system are less significant. Both the Council and the federal strategy gamble on the idea that flows and velocities are important to salmon survival.[60]

The National Marine Fisheries Service's recovery plan and the Council's salmon program both call for a more limited and careful reliance on hatchery supplementation, with the Council willing to proceed more aggressively. Both plans also call for reductions in harvest.

The shifts reflected in these two programs raise new questions about the priority of traditional uses of the river under the Endangered Species Act. One question has to do with the Basin's Indian tribes. Changes in the river are important to the tribes. They view flow augmentation and particularly the Council's reservoir drawdown initiative as positive.

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[58] *Ibid.*

[59] The Council program has a major flow augmentation program for the Columbia River, and calls for 1.425 million acre feet of water to be secured from the upper Snake River for instream flows, which is one million acre-feet more than the Endangered Species Act biological opinion calls for.

[60] J. Poisner, *supra* note 60 at 9.

However, reductions in harvest and hatchery production are particularly painful for the tribes. As the runs have declined over the past decades, the tribes have given up harvesting one population after another. At this point, there is only one population that they harvest in significant numbers and that is the population for which harvest reductions now are expected. When these harvest reductions are coupled with reduced hatchery supplementation that they believe would otherwise allow bigger harvests, they see that a great deal is being asked of them. One of the principles that were established in the treaty fishing cases is that the burden of conserving salmon populations must be borne equitably by Indians and non-Indians alike.[61] To ensure that this occurs, the courts have said that non-Indians, whose ocean and lower river fisheries occur before salmon reach the tribes' fishing sites, must reduce their harvest before the tribes are required to reduce their harvest.[62] The tribes contend that the same principle applies to sharing the burden of conservation between the hydropower system and tribal harvest: before tribal harvest is reduced further, the government should establish that the federal dams' "harvest" of salmon is reduced comparably. They are strongly skeptical of the claim that the National Marine Fisheries Service recovery plan calls for equitable reductions.

Apart from the legal merits of these claims, they raise a question for the idea of a sustainable river. Is meeting the harvest needs of the river's Indian tribes an essential function of a sustainable river, more important than the production of a certain increment of power? Is it more important than any threat to wild salmon that might be posed by additional hatchery production? Under the Endangered Species Act we might give one answer to these questions, under the Northwest Power Act we might give another, and five or ten years from now we might come to yet another conclusion, and the idea of sustainability will evolve once again.

The point of this extended discussion is relatively simple. We are not sure what we want the Columbia River to sustain or at what price. What we want to sustain depends on

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[61] *See Sohappy v. Smith,* _____(D. Ore. 196__).
[62] *See* _____.

what it costs, whether we have a way of paying the cost, what the incidental environmental effects may be, and whether protecting one set of values brings us into conflict with others. The Endangered Species Act is pushing the region in one direction, but the ambiguity of these questions and the difficulty of the choices are unlikely to be driven by the Endangered Species Act alone.

B. Do we know how to sustain the river?

Assuming we can iron out differences between the federal and regional recovery strategies and shore up financing for salmon recovery, do we have a strategy that will work? Perhaps we do. There is a body of opinion among fish and wildlife managers that we know how to conserve salmon, that the Power Planning Council's program is a reasonable way to proceed, and the only question is whether we have the will. However, money and politics aside, one of the awkward realities of Columbia River salmon recovery is that we cannot be sure we have made the right choices. We do not entirely understand the effects of human activities on the Columbia River ecosystem, or how likely it is that our recovery strategies will work. We do not understand what we *need* to sustain if we are going to have a reasonably productive and resilient ecosystem and so we cannot be sure that we are putting our efforts in the right place. These uncertainties make the debate over sustainability that much more difficult.

When these uncertainties first became apparent to the Council in the early 1980s, it adopted a strategy called "adaptive management" advocated by Kai Lee, then a member of the Council. Adaptive management suggests that we have to recognize that we understand too little to be confident of success, anticipate that our initiatives may fail, and be prepared to

learn from them. If recovery measures are structured as experimental probes, we can learn from them.[63]

The proposition is simple to state and difficult to implement. By hypothesis, the health of salmon depends on the health of the salmon ecosystem -- the watersheds, tributary streams, rivers and ocean in which Pacific salmon exist. The riverine ecosystem runs from high Rocky Mountain headwaters, through what used to be deserts before we drained the rivers to irrigate them, and down through heavily logged forests to the sea. We know something about what happens to salmon in some parts of the ecosystem, and something about how salmon are affected by human activities along the way, but it is little enough. Conditions in the Pacific Ocean have a much bigger impact on salmon than conditions in the river and we know much less about what happens to salmon there. The scientific task of understanding how these ecosystems work, and how human activities affect these ecosystems to influence salmon, is huge.

Indeed, it is all to easy to underestimate just how difficult the scientific problem is. There is a common misconception about the workings of scientific inquiry, and in particular about the nature of ecological science. "[Man] has been taught that science is a large collection of facts," said Jacob Bronowski,

> and if this is true, then the only seeing which scientists need do is, he supposes, seeing the facts. He pictures them, the colorless professionals of science, going off to work in the morning into the universe in a neutral, unexposed state. They then expose themselves like a photographic plate. And then in the darkroom or laboratory they develop the image, so that suddenly and startlingly it appears, printed in capital letters, as a new formula for atomic energy.[64]

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[63] *See* K. Lee, *supra* note 4; C. S. Holling, ed., *Adaptive Environmental Assessment and Management* (Wiley, 1987); C. Walters, *Adaptive Management of Renewable Resources* (Macmillan 1986); Volkman and McConnaha, "Through a Glass, Darkly: Columbia River Salmon, the Endangered Species Act, and Adaptive Management," 23 *Env't'l Law* 1249 (1993).

[64] J. Bronowski, *Science and Human Values* 10 (Harper & Row Perennial Library 1972).

The reality is otherwise. If we sat down with notebooks and dutifully spent the next forty years recording everything we could observe about the Columbia River ecosystem, forty years from now we would have an immense collection of meaningless facts: temperature, wind, daylight, descriptions of flora and fauna, reservoir levels, etc.. Scientists do not just the record such facts, but use their imaginations to try to find meaning in facts -- by looking for coincidence and similarity in different phenomena, imagining how and why such similarities exist, and then using experimental techniques to try to prove themselves wrong.

The science of large ecosystems has a particularly difficult time applying these experimental methods.[65] The problem is not in imagining connections between disparate phenomena, but in testing the imagined relationships. As two ecological researchers recently described the problem:

> [E]xperiments take longer, replication, control, and randomization are harder to achieve, and ecological systems have the nasty habit of changing over time. We don't think that the problem with ecology is the inherent complexity of the systems under study. A human body or a single cell are very complex systems too, and yet progress in medical research has been made at an astounding pace.
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> Our contention is that the rate of progress in a field of science will be largely governed by how quickly hypotheses can be tested, how many replicates can be performed, how good the controls can be, and whether experimental treatments can be randomized. All other things being equal, a field that can perform an experiment in a week will make progress 52 times faster than a field where an experiment takes a year.[66]

At an ecosystem level, time is slow.

The problem is not just one of time, moreover. It is much easier to control experiments that are conducted in a test tube than in a large ecosystem. One cannot easily

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[65] *See generally* W. Lewis, "The Ecological Sciences and the Public Domain," 65 *U. Colo. L. Rev.* 279 (1994).
[66] R. Hilborn and D. Ludwig, "The Limits of Applied Ecological Research," 3 *Ecological Applications* 550 (1993).

manipulate the Columbia River to test the effects on fish. The river is too big and the impacts on human activity too important for the River to be run by scientists. Learning, accordingly, is almost bound to be opportunistic: observing conditions in the river and the ecosystem, forming hypotheses, and seeing whether further observations tend to bear them out. Learning of this kind is likely to be slow, episodic and difficult to sustain.

The problem is in part political and institutional. No single entity is in charge of any large ecosystem. Organizing contending parties to address uncertainties requires political cooperation. The Columbia River experience shows just how difficult this can be. Throughout the 1980s, the Power Planning Council and others worked with warring factions to focus evaluation efforts on the relationship between river flows and salmon survival, for example. As with so other salmon recovery measures, there were many parties interested in the question, many different ideas of what the real issue was, many different approaches to addressing the issue, and no single entity able to make a decision and enforce compliance. By the turn of the decade, a consensus began to emerge on a research strategy and new information is being generated, but it is a fragile consensus, years in the making.

The Council pushed consensus further in a 1994 policy exercise aimed at identifying clearly the key uncertainties underlying mainstem issues, how the uncertainties relate to each other, and a process for systematically generating research to evaluate these relationships and the merits of one mitigation strategy versus another. With the help of an *ad hoc* group of scientists, the Council documented what is known and what is disputed about ecological relationships and mitigation measures in the river's mainstem. Based on a clear statement of these matters, the Council developed a research process to identify experiments to address key uncertainties.[67] The initial experiment identified in this process -- a head-to-head evaluation of the survival of fish that are transported by barge and fish that are left in the river -- became

[67] *See* Northwest Power Planning Council, *supra* note 41, sections 5.0B-E.

the focal point for the Council's later debate over mainstem mitigation measures generally. Indeed, the head-to-head experiment is central to the mainstem strategy that the Council adopted in December 1994.[68]

As the first few years of data from these experiments begin to come in, the region is beginning to learn that the contribution science can make to decisions about large ecosystems is surprisingly limited, at least in the short term. "Rely on scientists to recognize problems, but not to remedy them" is the sobering advice of two ecosystem scientists.[69] Scientists tend to serve more as voices of caution and equivocation and less as providers of "facts" that justify the investment of large sums of public money. After years of work to build consensus for research on the flow-survival relationship, the Northwest is becoming acquainted with this phenomenon. The data are preliminary, they concern a limited part of the ecosystem, and they may or may not improve the basis for policy decisions in the short term. Left to their own devices, scientists would probably take several decades to begin to refine their understanding of the problem, and a good deal longer to draw conclusions. Questions of this kind don't seem to go away as more is learned, they multiply.[70]

One answer in such circumstances is to avoid making decisions. In the face of uncertainty, why not stand stock-still to avoid a misstep? In some situations, this may be consistent with science, politics and common sense. But it is not always an answer. A lack of certainty suggests the need to learn, and standing still may preclude learning. Moreover, there are too many large forces at work in the world to be able to count on doing nothing. *Something* must be done for Snake River salmon. Decisions have to be made, and the

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[68] *Ibid,* section 5.0.

[69] D. Ludwig, R. Hilborn and C. Walters, "Uncertainty, Resource Exploitation, and Conservation: Lessons from History," 260 *Science* 17, 36 (1993).

[70] *See, e.g.,* C. Collette, "Pandora's Basin," *Energy News* for the Power Planning Council's experience with the Yakima Production Project, an experimental facility intended to answer basic questions about the ability of hatcheries to supplement wild and natural salmon populations. The title of the article refers to the participants' experience that planning for such experiments can all too easily be paralyzing, as new questions spring from each round of planning.

question is whether they will be based on the best possible science and structured to provide the best possible feedback.

Because decisions often cannot wait for definitive science, the question for scientists is whether they can reconcile themselves to the fact that decision makers are going to make decisions. Instead of resisting decisions, scientists can help policy makers to understand the limitations of the data and suggest how policy initiatives can be framed as effective tests. The challenge for policy makers is to resist the impulse to count on success, remember that there are good reasons for scientists' caution, and insist that decisions be monitored and evaluated. The difficulty should not be minimized, however. In effect, policy makers have to recognize that ecosystem policy questions can only be answered on biological time-scales, and these involve long, slow oscillations. When the Endangered Species Act and the next elections demand solutions today, the long-term benefits of good science may be cold comfort. But the alternative is to proceed with recovery initiatives from which we cannot learn, and leave the next generation with environmental problems that are just as uncertain as they are today.

Both the Northwest Power Act and the Endangered Species Act processes emphasize the need to evaluate the effectiveness of higher and faster river flows versus barge transportation of juvenile fish, which remains one of the most basic and divisive scientific disagreements in the recovery debate. Both recovery programs call for independent scientists to advise decision makers on critical uncertainties facing recovery efforts, evaluation strategies and ways of measuring progress. The Power Planning Council has, in fact, organized and begun working with such a group. Whether either process can manage the ambiguity and difficulty of the learning enterprise remains to be seen.

Whatever the institutional model, it is essential that species recovery efforts have a sharper, more realistic basis in science than they have in the past. Science-oriented policy

needs its own peculiar tools and techniques. The difficulty the Northwest has experienced in learning suggests that the ability to force reluctant parties to learn may be a crucial power for any institution that hopes to deal with the Columbia River ecosystem.[71] It may be that the combined force of the Endangered Species Act and the Northwest Power Act provides this power. But power alone is not enough. Ecosystem learning is a long-term prospect, while policy makers tend to live in a short-term world. Institutions that insist on learning must recognize that it may do them little good in the near term. Decisions will continue to be based more on inference than proof, and advocates will continue to try to shape science to self-interest. And yet, if every effort is not made to learn from policy initiatives, the long term success of the effort will be compromised.

C. Who pays?

For decades, hydropower dams have been viewed as "cash registers:" dams that generate electricity for commercial sale, bringing in revenues with which to subsidize other activities that could not pay for themselves.[72] This stream of revenues from hydropower can make it the dominant factor in project operations, even for projects that were built primarily for other purposes.[73] The relationship between hydropower and other project purposes can also be symbiotic, however, as the dams' revenues are spread to other purposes. Irrigation is the most prominent beneficiary,[74] but there are others. In the Northwest, the dams provide not only irrigation assistance, but they finance big investments in nuclear plants that currently eat up more than $500 million in hydropower revenues annually. Various customer groups -- aluminum companies, irrigators and others -- have advantageous electric rates. Since passage

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

[72] M. Reisner, *Cadillac Desert: The American West and Its Disappearing Water* 140 (Penguin 1986).

[73] *See* 2 Clark, *Water and Water Rights* § 121.1 at 244 (1967).

[74] *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).

of the Northwest Power Act, hydropower revenues also finance a range of energy conservation, energy development initiatives and fish and wildlife recovery.

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 dams' operations,[75] because mitigating fish and wildlife impacts can be legitimately counted as a cost of producing power[76] and because we don't know how to fully offset the impacts of the dams, it is fair to look to the hydropower system to fund the biggest share of the mitigation. Some argue, however, that hydropower revenues have borne a disproportionate share of the funding burden. Programs such as those promised by the Salmon and Steelhead Conservation and Enhancement Act were never funded.[77] 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. By default, hydropower revenues became the primary financier for fish and wildlife measures on the Columbia River.

A similar phenomenon has occurred in the way the Columbia River fish and wildlife issues have come to be characterized. Although some of the federal dams were built

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[75] *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 L.* 673, 678-79 (1983).

[76] 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, "The Northwest's Hydroelectric Heritage: Prologue to the Pacific Northwest Electric Power Planning and Conservation Act," 58 *Wash. L. Rev.* 175, 234 (1983).

[77] 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.

primarily for non-hydropower purposes,[78] the Northwest Power Act refers to the projects generically as "hydroelectric facilities" or "hydroelectric projects."[79] The Columbia River debate is characterized as "hydropower versus salmon."[80] There is some justice in this way of looking at things, but it tends to mask other issues. Even at dams that are largely hydropower, the dams serve other purposes, both directly and through subsidies. In the Snake River Basin, dam operations are driven far more by irrigation than hydropower.[81] And the dams are not the only source of salmon problems -- habitat conditions, harvest and hatchery operations contribute. Thus, there are reasons to spread the cost of fish and wildlife mitigation beyond hydropower revenues.

The idea of spreading fish and wildlife costs takes on more importance as salmon recovery costs grow. Under the Power Planning Council's fish and wildlife program at the beginning of the 1990s, salmon recovery expenses ran at around $150 million per year, including about $55 million in lost power revenues due to salmon flows and spills. When the Council adopted the *Strategy for Salmon* in 1992, it increased these costs to about $250 million per year on average. The Fish and Wildlife Program amendments adopted in late 1994 would add another $25 million in mitigation project costs, $95 million in capital costs associated with reservoir drawdowns, and another $130 million in lower power revenues. The cost of the Endangered Species Act program is in the same ball park, with much more of its expense in foregone power revenues and less in capital expense. While these costs add a relatively small increment to a home owner's power bill, no one contends that $500 million per year is insignificant, even in relation to the federal hydropower system's $3.5 billion in

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[78] *See* T. Price and A. Radin, *Federal Water Project Costs* (1990).
[79] *See* 16 U.S.C. §§ 839b(h)(1)(A), (2)(A), (4), (6)(E)(i), (8)(A), (10), (11).
[80] *See* M. Blumm, "Hydropower vs. Salmon: Thge 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).
[81] *See* Hydrosphere, *Water Supplies to Promote Juvenile Anadromous Fish Migration in the Snake River Basin, A Report to the National Marine Fisheries Service* 2-8 (1991).

annual revenues.[82] The maximum volume of water devoted to salmon flows in a low water year under the Power Planning Council's program, 11.9 million acre-feet, is about 46% of the water available in U. S. storage facilities[83] and 27% of water in the entire system including Canadian reservoirs.[84] The biological opinion commits a maximum of about 51% of the water available in U. S. facilities and 30% of water in the system including Canadian reservoirs. More troubling to the power industry is the prospect that fish and wildlife costs will continue to rise. What was once characterized as the largest biological restoration program on the planet has become significantly larger.

The competitive energy market has had a direct effect on the link between the energy system and fish and wildlife costs under the Northwest Power Act. Under the Northwest Power Act, the primary limit on fish and wildlife costs is the requirement that the fish and wildlife program assure the region "an adequate, reliable and affordable power supply."[85] In other words, fish and wildlife investments are fully recoverable costs of producing hydropower as long as they do not create "unreasonable power shortages" or constitute "a burden on power consumers."[86] If the competitive power market ensures the region adequate and affordable power, then competition may have freed salmon restoration efforts from this set of economic fetters. In theory, if a competitive industry makes other sources of low-cost power available to consumers, the region might tear out all the dams and still have "an adequate, efficient, economical and reliable power supply." In this sense, a competitive market could snip the connection between salmon recovery and affordable hydropower that was central to the Northwest Power Act. But if so, the old fetters have been replaced with

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[82] Department of Energy Fiscal Year 1996 Congressional Budget Submittal, Bonneville Power Administration, Current Services at 2. Bonneville's revenues can be characterized in various ways. About one billion of the $3.5 billion in total revenues is a bookkeeping entry in which Bonneville passes through benefits to investor-owned utilities. Looking at Bonneville's revenues net of this factor yields a figure of two-plus billion dollars.

[83] Counting projects above Bonneville Dam, including all Upper Snake River Basin projects.

[84] Personal communication with James Ruff, April 28, 1995.

[85] The Power Planning Council's fish and wildlife program must assure the region "an adequate, efficient, economical and reliable power supply," 16 U.S.C. § 839b(h)(5).

[86] H.R. Rep. No. 96-976, Part I, 96th Cong., 2d Sess. 57 (1980).

new, market-driven restraints. Hydropower revenues remain the cash registers for salmon recovery efforts, not to mention energy conservation initiatives, irrigation assistance, development of renewable energy sources and other regional energy priorities. If the dams were gone, or if hydropower were priced out of the market, the cash register would be empty.

Keeping hydropower affordable is likely to require new arrangements to ensure that all beneficiaries of the dams pay their share of fish and wildlife mitigation. Since 1980, the hydropower system has paid some or all of the fish and wildlife costs attributable to the non-hydropower features of the dams, primarily flood control, navigation, and irrigation. One way to spread these costs more broadly, and it is by no means the only possibility, is suggested in the Northwest Power Act itself., which provides a mechanism for shifting these fish and wildlife costs to the federal Treasury. The Act allows the Bonneville Power Administration to allocate the cost of fish and wildlife measures among the dams' purposes according to accounting formulas.[87] One of the Act's committee reports explains that if Bonneville pays for more than just the hydropower share, it may treat the excess "as being payments for other project costs for which BPA is responsible under existing law."[88] Repayment to the U. S. Treasury of the capital cost of the power features of the dams is one such cost.[89] In other words, using hydropower revenues to pay for salmon recovery can reduce the hydropower system's debt to the federal Treasury. In fact, the Clinton

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[87] 16 U.S.C. § 839b(h)(10)(C).

[88] *See* H.R. Rep. No. 96-976, Part II, 96th Cong. 2d Sess. 45 (1980) ([P]ower, irrigation, navigation, recreation and other project purposes will continue to bear only their established shared of the total costs attributable to protection and mitigation measures. All 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.").

[89] *See* H. R. Rep. No. 96-976 pt. 2, 96th Cong. 2d Sess. 45 (1980) (expenditures in excess of the power share may be treated as payments "required by or pursuant to law to be charged and returned to the general fund of the Treasury for the repayment of the Federal investment in the Federal Columbia River Power System from electric power marketed by the Administrator."); S. Brown, "Breathing Life Back Into a Drowned Resource: Mitigating Wildlife Losses in the Columbia Basin Under the Northwest Power Act, 18 *Env't'l* L. 571 (1988).

Administration used this mechanism to absorb some $60-70 million in costs for the 1995 salmon program.[90]

If one subscribes to the theory that all subsidies should be closely scrutinized, shifting non-power mitigation costs to the Treasury may be a good result. As long as these costs are borne by the hydropower system, Congress has little incentive to weigh them carefully and the hydropower system has no power to question them on its own. Once shifted to the Treasury, deficit pressures are more likely to ensure that these subsidies are subject to a careful evaluation.

The advent of the competitive power industry also is likely to require reconsideration of financing arrangements within the power industry itself. Regional utilities and other customers of the hydropower system have a variety of benefits from the system -- prefential claims to power, a subsidy that helps equalize residential power rates for private customers and other benefits. As customer utilities become competitors of the federal hydropower system, these benefits are bound to be called into question. And as these arrangements change, there will be direct implications for the hydropower system's ability to finance fish and wildlife costs, energy conservation and other matters.

Further issues are raised as customers leave the hydropower system to deal with other energy producers. The Columbia River hydropower system has taken on a variety of financial burdens for the benefit of its customers: part of the cost of the dams themselves, nuclear power plants, energy conservation investments, etc. All of these investments were made at a time when returns on these investments seemed assured by the prevailing system of utility regulation. Now that the utility system is deregulated, can some customers jump ship and avoid any responsibility for these investments? If so, the hydropower system's costs per

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[90] *See* B. Walth, "U.S. Vows to Bear Salmon Costs," Portland *Oregonian* (March 15, 1995).

kilowatt hour will be driven up, the system becomes less competitive, and the burden of old investments is stranded on the customers that are unable to leave the old system.[91] These "stranded costs" have implications for Columbia River fish and wildlife mitigation. The competitive market establishes the upper limit on the Columbia River dams' ability to finance fish and wildlife mitigation. The market allows customers to leave the federal system to deal with power suppliers that are not burdened with nuclear debt, irrigation assistance and fish and wildlife obligations and other expenses borne by cash register dams. As its customers leave, the federal system's rates go up and the system's ability to pay fish and wildlife costs goes down. Remedies, such as "exit fees" for departing customers, are being discussed. Currently, the Federal Energy Regulatory Commission has a proposal rulemaking that explores ways to ensure that if utility customers choose other power suppliers, they keep a share of the old investments.[92] While the direct application of these principles to the Columbia River system is unclear, these issues will have an important effect on the emerging Columbia River.

Financing arrangements affect what uses of the river we can sustain and how far we can sustain them. If we are looking for a sustainable river, the question is whether financial responsibility will broaden to respond to the values we want to sustain, or whether we will narrow our vision of sustainability to match our ability to finance it.

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[91] *See* U. S. Federal Energy Regulatory Commission, "Promoting Wholesale Competition Through Open Access Non-discriminatory Transmission Services by Public Utilities," (docket no. RM95-8-000) and "Recovery of Stranded Costs by Public Utilities and Transmitting Utilities," (docket no. RM94-7-001), 70 FERC ¶ 61,357 (Mar. 29, 1995), 60 *Fed. Reg.* 17662 at 17689-17710 (April 7, 1995).

[92] The Federal Energy Regulatory Commission suggests that utilities using the federal energy transmission lines could be required to pay for such costs through transmission fees. *See ibid.*

D. Who decides?

The Northwest's experience with adaptive management and financing recovery efforts underscores some of the key limitations in the region's array of institutions, but the list of limitations is longer. One of the premises of the Northwest Power Act was that fish and wildlife mitigation is an electric power development issue. Only if there were a viable strategy for new electric energy development could there be an effective strategy for restoring environmental conditions for Columbia River fish and wildlife. Only if there were a realistic strategy for fish and wildlife recovery could energy development proceed at all smoothly. Fish and wildlife recovery would constrain development, to be sure, but as part of a broader strategy for energy development. By coupling energy and fish and wildlife planning, the Act might bridge the chasm between development and environmental protection into which so many environmental initiatives seem to fall.

The limitations of this premise are increasingly obvious. The Columbia is not just part of an energy system, it is part of an ecosystem. Salmon are not affected only by dams, they are affected by fishing, timber harvest, grazing, irrigation, ocean currents, hatcheries and any number of human activities. Energy policy involves not just electric power, but oil and natural gas, new technology and regulatory policy, as the region is now witnessing. A statute designed to deal only with the electric energy aspects of the river and its salmon leaves a great deal out of the picture.

These limitations raise the question whether the Northwest Power Act should be broadened to take in a bigger part of the energy system and aspects of land and water management,[93] and this is one direction sustainable development can take. Government institutions can be expanded to encompass the ecosystems and interests they must

[93] *See* A. Duncan, "Proposal for a Columbia Basin Watershed Planning Council," 10 *Illahee* 287 (Winter 1994).

accommodate, and we are beginning to see experiments along these lines. One of the most dramatic is New Zealand's Sustainable Management Act. By the late 1980s, New Zealand had developed a stew of local and national bureaucracies. Native forest depletion, erosion, pollution and other problems were attributed in part to this fragmentation in natural resource policy and administration. Many people became convinced of the need to manage New Zealand's resources in a way that was integrated and consistent.[94] In 1989, the country reorganized local government boundaries to correspond to the boundaries of "catchment basins," i.e., watersheds.[95] Building on this realignment of jurisdictional boundaries, two years later the Resource Management Act of 1991 supplanted more than 20 major statutes and created a system of resource management that explicitly adopted principles of sustainability -- including protection of ecosystems and compliance with Maori treaties -- as objectives of all natural resource management, including zoning and other local management.[96] There are other examples. British Columbia's Commission on Resources and Environment has proposed a "Sustainability Act" that would lead to a provincial land use strategy based on principles of sustainability.[97] The Act would not supplant existing jurisdictions, but would require them to develop land use plans responsive to sustainabilty objectives established at the provincial level. Because more than 93% of the province is publicly owned, it would be a relatively encompassing approach.

These are interesting ideas and they are worth exploring. But it is also important to remember not to forget the reasons for the Northwest Power Act's narrower scope, which may say something about the prospects for organizing American political institutions around the idea of sustainability. First, as with any developed area, the Columbia had its own family

[94] New Zealand Ministry for the Environment, "The Resource Management Act," Resource Management Information Sheet number two (August 1991).
[95] R. Salter, "Role and Function of Regional Councils as Catchment Based Environmental Resource Agencies in New Zealand."
[96] *See* L. Gow, "National Policy and Sustainable Development: Fact or Fantasy?", opening presentation for the Theme Semester Program, State University of New York and Binghamton, (Sept. 16, 1992).
[97] British Columbia Commission on Resources and Environment, "A Sustainability Act for British Columbia," volume 1 *The Provincial Land Use Strategy* p. 5 (November 1994).

of bureaucracies before the Act was passed, each with its own piece of turf. Columbia River salmon contend with as many as seventeen jealously-guarded salmon management jurisdictions in the course of their migration.[98] There are four state and two federal fish and wildlife agencies and more than a dozen Indian tribes. The dams are operated by the Army Corps of Engineers and the U. S. Bureau of Reclamation under multipurpose statutes. The Bonneville Power Administration markets power from the dams and represents the energy demands of a large number of utilities and industrial customers. Nonfederal energy dams are regulated by the Federal Energy Regulatory Commission. Federal salmon habitat is managed by the U. S. Forest Service and Bureau of Land Management. State and local entities enact land use controls, issue water diversion permits and administer instream flow programs. A new entity created to develop sustainable resource policies must either complement or supplant this existing web of bureaucracies. Because many of these bureaucracies and their constituencies can influence legislative initiatives, it is a good bet that sustainability enterprises will do more complementing and less supplanting. This is not invariably the rule, as the experience in New Zealand shows, but it was certainly at play when the Northwest Power Act was drafted.

The point may be even more basic in the United States. Ecosystem-scale institutions may involve more power than Americans are willing to cede to government. The Northwest experienced this lesson in the 1940s and 50s, when proposals were made for a federal Columbia Valley Authority with broad jurisdiction over federal dams, river management, and "the unified development of the Columbia Valley region."[99] "A perfect set-up for autocracy," was the assessment of one Northwesterner at the time.[100] Similar concerns arose when the U. S. General Accounting Office had the ill grace to suggest an integrated process in which to

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[98] *See* Wilkinson and Conner, *supra* note 14.

[99] C. McKinley, *Uncle Sam in the Pacific Northwest* 543 (1952). *See also* G. Tollefson, *BPA and the Struggle for Power at Cost* 127-28, 248 (1987); Greenleaf, "What Kind of a 'Valley Authority?'", 32 Iowa L. Rev. 339 (1947).

[100] McKinley, *supra*, at 558.

plan and administer the waters of the Colorado River.[101] It is possible that integrated river management proposals in the American West are fated to collapse under the weight of public mistrust of government, turf protection by existing agencies and their constituencies, and the jealously with which western states and traditional water users guard their jurisdiction over water.

Moreover, even where it is politically feasible to create broader, ecosystem-scale institutions with sustainability objectives, as in New Zealand, at this point we can only speculate about how such institutions will work. Sustainable development is a relatively diffuse concept. Perhaps it will be unifying and lead to creative new arrangements that could not otherwise have been achieved. But it is also possible that the breadth of the concept will pull any central implementing agency in so many different directions that it will ultimately be paralyzed.

At this point, institutional relationships on the Columbia River are headed in a direction all their own. The Endangered Species Act increasingly is driving salmon issues, with its own set of advantages and disadvantages. The Act brings a sharp focus on listed species and powerful authorities to protect species from federal activities -- dam operations, timber and fish harvest, road building, hatchery operations and other federal activities that affect salmon.[102] The Act has the potential to focus salmon recovery efforts. The federal recovery plan, for example, proposes a federal-state-tribal implementation team to "ensure a unified approach to recovery of ESA-listed stocks."[103] However, critics of the Act contend that it diverts attention and money from the more crucial task of preserving biological

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[101] *See* Report to Congress by the Comptroller General of the United States, *Federal-Interstate Compact Commissions: Useful Mechanisms for Planning and Managing River Basin Operations*, report no. CED-81-34 (February 20, 1981).

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[103] National Marine Fisheries Service, *Proposed Recovery Plan for Snake River Salmon* at III-5.

diversity more broadly.[104] That the Endangered Species Act is aimed at species -- and a few species at that -- seems to be borne out by its funding history.[105] The Columbia River's experience with the Endangered Species Act's concern for effects on unlisted fish and wildlife teaches a similar lesson. Moreover, as powerful as the Act may be, it does not have an encouraging recovery record. In 1988, the General Accounting Office of Congress reported that of 493 species that had been listed under the Endangered Species Act, five had recovered -- one percent.[106] To this point, the Act has not done well in addressing the genetic conservation issues that underlie much of the wild fish debate.[107] Nor has the Act tended to generate the political support that will be needed for species recovery actually to occur. It can raise the profile of weak species, but it also can generate opposition. Some of the lack of political support for Endangered Species Act programs can be traced to processes that have traditionally been closed.[108] None of these criticisms is unanswerable and efforts are being made to answer them. But clearly there is room for improvement in the Act's administration.

As the competitive market moves toward center stage in Northwest energy development, it will create its own benefits and impose its own costs. Markets may develop energy supplies at the cheapest short-term cost, and they may move quickly than government-developed projects. But markets are not known for their ability to account for environmental

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[104]Winckler, "Stopgap Measures," *Atlantic Monthly* pp. 74, 78 (Jan. 1992). See also Knickerbocker, "Biodiversity: Top Concern in Saving Species," *The Christian Science Monitor* p. 8 (December 23, 1991); Doremus, "Patching the Ark: Improving Legal Protection of Biological Diversity," 18 *Ecol. L. Q.* 265, 304 (1991); Goodman, "Preserving the Genetic Diversity of Salmonid Stocks: A Call For Federal Regulation of Hatchery Programs," 20 *Envtl L.* 111, 148-155 (1990).

[105]Winckler, *supra,* at 77.

[106] General Accounting Office, "Endangered Species: Management Improvements Could Enhance Recovery Program," Report no. GAO/RCED-88-185, 1988.

[107] *See* M. Goodman, *supra* note 103 at 165.

[108] Even state and tribal fish managers who have been significantly involved in the expanded examination of hydropower operations in *Idaho Department of Fish and Game v. National Marine Fisheries Service* are dissatisfied with their level of participation: "Since the salmon were listed, . . . there has been a disturbing trend toward placing decisionmaking on hydropower operations exclusively in federal hands. . . . Increasingly, state and tribal biologists find themselves as invited 'guests' to federal committees rather than as members of collegial bodies attempting to reach consensus." Idaho Department of Fish and Game's Response to Federal Defendants' Report of Compliance at 5, *Idaho Department of Fish and Game v. National Marine Fisheries Service,* No. 92-973-MA (D. Ore. April 20, 1995). Others, including the general public, are at a much farther remove from the process.

values and long-term societal interests.[109] If it were not for the Northwest Power Act, the region's long-term interests would be accounted for only under other environmental statutes -- the Clean Air Act, the Clean Water Act and the Endangered Species Act, for example. Unconstrained markets provide little assurance that when natural gas becomes more expensive, there will still be a viable energy conservation industry, an active renewable energy industry, or that the other energy initiatives that have been central to the Northwest Power Act program will still be healthy.[110]

It is possible that an Endangered Species Act-plus-market approach will move the Columbia toward sustainability. The Endangered Species Act could set biological limits and targets, while markets could internalize the cost of meeting biological requirements. But if unmitigated by other influences, this approach also could give us the worst of all worlds: a power system that delivers cheap power only in the short term, more expensive power and deeper environmental problems in the long term; a Columbia River that is periodically whipsawed by newly-endangered species whose interests could have been anticipated and provided for; and a deteriorating fishery that finally forces the Columbia River tribes back into court. It also could leave the most critical decisions about management of the Columbia River in the hands of the federal government, the market and the courts, far from the communities that have the most at stake.

Sustainable development should be a bridge between the rigors of the Endangered Species Act, the economic dynamism of the market and the need for a viable fishery. Where the Endangered Species Act provides hard-edged focus, the idea of sustainability would encourage consideration of a broader range of species, look for ways to mitigate draconian impacts, and help build public support for species conservation. Where the competitive market can efficiently find short-term sources of energy supply, a sustainable energy strategy

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[109] *See* W. and J. Stead, *Management for a Small Planet* 74-86 (Sage 1992).

[110] *See* A. Salpukas, "Renewable Energy: 70s Dreams and 90s Realities," *The New York Times* (April 11, 1995).

should identify energy sources that make long-term economic and environmental sense. These are the purposes of the Northwest Power Act, and pursuing them aggressively may be more important now than ever.

This complex set of Endangered Species Act/competitive market/Northwest Power Act/Indian treaty relationships is distinctly less tidy than New Zealand's all-encompassing sustainable management approach, but the clutter may be unavoidable. In the short term, the future of the Columbia River is likely to be determined more by national politics, economic pressures, litigation and weather than by government processes in the Northwest. The Endangered Species Act may or may not survive in anything like its current form. No one is predicting how the Northwest Power Act might fare if Congress takes a hand. If natural gas prices rise or gas turbines hit their own environmental potholes, the federal hydropower system may be more than competitive and the Northwest Power Act's priorites will have more muscle in regional energy matters. If the region has good rainfall and ocean conditions, the salmon runs and the energy system's finances may start to improve and the region may conclude that it has salmon and energy policies tuned to a fine pitch. The Columbia River Indian tribes may or may not reassert treaty issues into the forefront of the debate. The region can control none of these developments, and in the near term the region is probably best advised to paddle through this rough water with the institutions it has.

In view of these uncertainties, no prediction should be taken too seriously, but I will make one. It is unlikely that Congress will eliminate the Endangered Species Act and the Northwest Power Act or, if it does, that this would obviate salmon issues on the Columbia River. Congress would have to sweep broadly, to reach the Columbia River Indian treaties, which turned fishery management on its head in the 1970s, and the National Environmental Policy Act, which effectively stymied the Northwest utilities' energy strategy in the same

period.[111] To address salmon-related problems in the national forests, the National Forest Management Act, the primary statute driving the Northwest spotted owl litigation, and other environmental laws that hold important parts of the Northwest's economy to environmental account would probably have to be amended. In addition to needing a large broom, Congress would have to contend with strong regional and national sentiment for salmon recovery. Almost any native Northwesterner of my age remembers salmon returning in abundance to local rivers. To these people, the idea of rivers without salmon is like Colorado without mountains or New England without trees. As one Idahoan said, looking at an empty salmon stream, "It makes you feel so empty you can't really describe it."[112] Any political development that fails to see the depth of this feeling will have shallow roots indeed.

V. Conclusion

Many apparent opposites are meeting in the Columbia River: hydropower and salmon, economics and ecosystems, the Endangered Species Act and human uses of the river. The thesis of sustainable development, however, is that these are not opposites; healthy salmon runs should not conflict with adequate energy, irrigation and navigation. The Northwest will be a healthier place if it can learn to accommodate all these things.

The Columbia is a legitimate test of this thesis. The ideal is reasonably clear in broad terms, the Northwest has legal and financial tools with which to pursue it, and the pursuit is deeply rooted in the region's historical and cultural attachment to the river and its salmon runs. Underlying all the arguments over objectives, scientific data, financing, and turf is the fact that the Columbia is a highly developed river basin, and changing it involves high stakes

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[111] *See* Blumm, *supra* note 17, at 222-228.

[112] J. Brinckman, "Salmon Advocates, industry, politicians remain at odds on how to preserve runs," *Idaho Statesman*, p. 1, April 2, 1995.

and predictable friction. All of these factors make the Columbia River a fair test of the sustainable development ideal.

To this point, the test has taught us a few things: What we need to sustain in the river, how we can sustain it, how we finance the cost and how we make decisions all are moving targets, and they are moving in part because they are connected. Our understanding of what we need to sustain evolves as we learn more about interactions with the river, as our ability to finance remedial efforts changes, and as courts and legislatures impose new and more intense legal requirements. When we decide what mitigation efforts to implement, we want assurance that it will be well spent, but we cannot have this assurance without good scientific information. Obtaining better data is slowed by institutional limitations. Institutional limitations are often dictated by law or politics, which change unpredictably. These are intricate and contentious questions of biology, economy, law and politics, and it should surprise no one that the questions are more plentiful than the answers. Nor does the lack of easy answers mean that the questions should not be asked.

While the Northwest is dealing with an extraordinarily difficult set of questions, there is an irony here that should not go unnoticed. The United Nations Commission on Environment and Development characterized sustainable development in large part as a dilemma that involves the developing world. Where people have too little to eat, too little fuel for cooking or comfort, how can they be asked not to cut down forests for fuel or to clear land for crops? If short term sacrifice means starvation, can we ask it? Without an environmentally benign development strategy that supplies adequate food, shelter and other basic needs, can catastrophic environmental destruction be avoided?

As difficult as the questions on the Columbia River may be, the Northwest is not gambling with starvation. No one should confuse the costs and risks on the Columbia with

those that face developing nations. Rather, the Northwest's stakes are part of a more comfortable calculus. Because it is developed, changing the Columbia River is costly, more so than if we were making changes in a less developed river. And the changes that are needed are not all win-win situations, at least in the short term. Significant change in developed areas involves a gamble with big money, growing market pressures, uncertain biological returns, and species whose survival is in doubt, all of which tend to feed debate, argument and litigation rather than action. But if the short-term expense and the uncertainty are too great, what does this say about the likelihood that poorer nations faced with more desperate choices can find sustainable approaches to development?

In the Northwest, we can expect to be closer to answers in the coming ten years, in part because wild salmon runs are so weak and because so many aspects of the Columbia River are up in the air. We can expect to see a broader extinction pattern if we are unable to implement effective recovery efforts. We can expect to see significant changes in the institutional arrangements surrounding the river if the hydropower system is not solvent. At this point, I can say only that giving up on the problem does not seem to be a choice. The concerns that underlie the idea of a sustainable river are unlikely to go away by themselves. If in the coming years we can begin to learn from our interactions with the river, look for ways in which human communities and the river can sustain each other, and carry on a coherent debate over the choices that face us, perhaps we will begin to see ecosystems and economies less as opposites, and the risks as more manageable.

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