

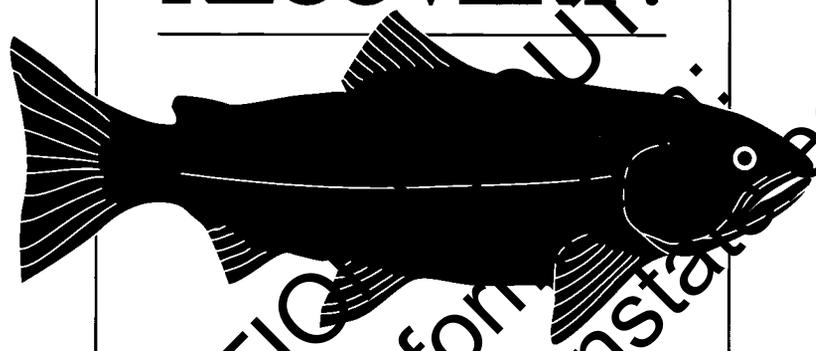
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WHO SHOULD PAY  
[ ] FOR [ ]  
**SALMON  
RECOVERY?**

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A Pacific Northwest Extension Publication  
Oregon • Washington • Idaho  
PNW 470 • April 1994

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**The University  
Task Force on  
Salmon and  
the Columbia  
River System**

The Task Force is a group of faculty from the University of Idaho, Oregon State University, Washington State University, and the University of Washington with interest and expertise relating to the Columbia River system. They were appointed by the Agricultural Experiment Stations and Extension Service directors of Idaho, Oregon, and Washington and given the following charges:

- Identify research and educational issues that the universities can address within the framework of their missions, capabilities, and resource bases;
- Identify resources and create working networks in each state to address identified issues relating to the Columbia River system salmon and steelhead runs;
- Develop a working plan to organize research and public education programs:

Document the current knowledge base;  
Prepare educational materials;  
Plan and conduct workshops with interested agencies, organizations, and interest groups; and  
Conduct research and education programs.

The Land Grant and Sea Grant universities of Oregon, Idaho, and Washington are repositories for a substantial amount of information relating to the resources of the Columbia River system. They are also home for many highly trained scientists with relevant expertise. These scientists and the knowledge available to them could have considerable bearing on improving solutions to the problems arising from reduced populations of native salmon.

Although the issues will, in the end, be decided by the public through a variety of political processes, the quality of these decisions will depend on the quality of information on which the decisions are based.

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# Who Should Pay for Salmon Recovery?

*Compensating for Economic Losses Caused by Recovery of Columbia River Salmon*

H. Berry and R.B. Rettig

The resources of the Columbia River Basin fueled the development of the Pacific Northwest. However, while agriculture, forest products, mining, and other industries boomed, the natural environment underwent fundamental changes. Many species of fish, wildlife, and vegetation (some native, some cultured from native species, and some introduced from other areas) are more abundant, while other, native species declined sharply in variety and abundance. Perhaps the best known trend is the dwindling of Columbia River salmon to a fraction of their former numbers.

Measures intended to address threats to salmon survival span four broad areas known as the four "H's": habitat, hydropower, hatcheries, and harvest. The Northwest Power Planning Council and associated state and federal agencies are taking measures to improve the spawning and early life habitat for salmon. These groups, as well as private dam operators, are introducing approved devices such as fish screens to decrease mortalities during downstream migration. Water management agencies also are considering ways to reduce mortality in migration through altering the flow of water. Hatchery operations are being carefully scrutinized and modified. Fishery management agencies are becoming increasingly restrictive in harvest management to avoid harming threatened and endangered salmon stocks in both the ocean and the river.

Mitigation programs are expensive. According to 1992 General Accounting Office figures, federal expenditures between 1981 and 1991 increased by \$1.4 billion over what they would have been without the mitigation thrust. Costs are expected to increase significantly as recovery plans for threatened and endangered species are implemented. However, these expenditures are a small portion of the total costs. Lost opportunities also are costs. Commercial fishing fleets, recreational anglers, and related businesses such as fish processors, boat builders, and fishing guides are unable to continue their businesses at historic levels. Energy-intensive industries, such as aluminum refining must adapt to higher costs. Agricultural and forest products industries that ship by barge may pay more to use alternative transportation modes or ship their products at different times. Marinas and other tourism-based businesses along the Snake River will face increasing costs and decreasing revenues if river and reservoir levels drop in the spring and summer.

Some of these private sector losses are offset by gains. Railroads and trucking companies will expand their operations. Because leisure time will stay roughly constant, lost sales to some firms selling goods and services to recreators will be redirected to other firms. Once salmon stocks recover, new economic

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Helen Berry, graduate student, marine resource management, and R. Bruce Rettig, professor, agricultural and resource economics, Oregon State University.

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opportunities should emerge. One of the political realities is that people who think they might lose are identifiable and have incentives to participate in public discussions while those who may gain are not as easy to define. Indeed, major economic change may imply that some businesses and people may choose to leave the region while the new opportunities may attract different people and businesses.

The question of who will pay for salmon recovery raises many related considerations. Recovery actions will affect the regional economy, especially fishing communities close to the Pacific coast and communities near the lower Snake River that ship and receive many commodities by barge. People in the Pacific Northwest must consider the consequences of alternative actions to save salmon. As economists say, there is no such thing as a free lunch; someone must pay. Recovery actions can be structured to reduce the effect on many groups. For other groups compensation may be warranted. Since saving species requires change and change creates costs, who should bear the costs?

Motivations for providing compensation to different parties stem from legal, economic, political, and ethical reasoning. Each of these perspectives also raises points of concern about unwanted and unintended consequences from some compensation and mitigation programs. This publication addresses the need to carefully consider these arguments in choosing among public policy alternatives. The objective is to provide a framework for evaluating the many cases for potential compensation or mitigation that are anticipated to develop with the release of a recovery plan for threatened and endangered Columbia River salmon. This publication reviews compensation and mitigation, including the role of the Bonneville Power Administration—one of the major factors in Columbia River developments. It then offers guidelines for evaluating future claims.

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### Compensation and Mitigation Defined

Mitigation and compensation are alternative tools for responding to changes in resource usage. Mitigation refers to measures taken during planning, construction, operation, or implementation of a policy in order to avoid or reduce adverse effects. In contrast, compensation refers to payments made to offset losses that occur despite mitigation efforts. As defined by the Province of British Columbia, mitigation is aimed at preventing harm while compensation is aimed at redress.

Mitigation can occur at the outset by designing projects to minimize harmful effects. For example, dams can include fish passage facilities such as fish ladders as part of their original design. In the case of the large federal hydroelectric projects on the Columbia and Snake Rivers that threaten the survival of several salmon stocks, mitigation is taking the form of “retrofitting” dams—spending large sums of money so that the dams can operate with less harm to the fish stocks.

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When mitigation is impossible or excessively costly, some equivalent outcome is needed. Fishery biologists commonly associate compensation with artificial propagation programs. In the Oregon Administrative Rules, the Oregon Department of Fish and Wildlife says that compensation means “activities that replace fish, stocks, and/or their habitat through development or other activities.”

Just as environmental policies may require mitigation to reduce losses of fish and wildlife, social policies may require mitigation of another type: the reduction of economic losses and amelioration of social disruption that results from measures to recover threatened and endangered fish and wildlife. Similarly, compensation is meaningful both as ways to provide alternate fish and wildlife habitat when damaged habitat cannot be recovered and as ways to provide either cash or in-kind replacement of lost resources when people are economically or socially disturbed. In the past, the focus has been on minimizing the effect of human development on salmon stocks. In the future, the debate will increasingly focus on minimizing the impact on people and on identifying which parties, if any, should be compensated for their losses.

Some of the costs of recovery are explicitly assigned in the Northwest Power Act. Section 4.(h)(8)(B) directs that “Consumers of electric power shall bear the cost of measures designed to deal with adverse impacts caused by the development and operation of electric power facilities and programs only.” For this reason, one of the first tasks undertaken by the Northwest Power Planning Council was to determine how much of the decline in fish and wildlife in the Columbia River Basin was caused by the development of federal power and how those losses took place. The costs of modifying federal dams to reduce passage mortality, changing water flows to return to flow regimes more amenable to salmon before dam construction, and similar measures were assigned to those people who benefited most from the hydroelectric dams—buyers of federally produced power. Congress charged the Northwest Power Planning Council with developing a broad strategy, including and going beyond repair of the damage caused to salmon by federal power projects. Although federal power interests would be billed their fair share, the Act also charged the Power Council to be a leader and to negotiate “agreements among the appropriate parties providing for the administration and funding of such additional measures.”

The single largest source of money for salmon recovery is the Bonneville Power Administration (BPA), which is also the largest, but not the only hydroelectric producer. Congress expressly avoided placing a similar burden on non-federal, private utilities in the Columbia River Basin. Whether BPA should be bearing such a large share of the costs is a topic of regional discussion.

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## Charging Energy Consumers

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Section 4.(h)(11)(A)(ii) of the Northwest Power Act states that non-federal electric power projects only are required to bear the costs of the fish and wildlife measures directly attributable to their own development and operation. The Bonneville Power Administration's policy of compensating for other costs imposed on the non-federal utilities by actions taken at federal projects, which has received qualified support from the U.S. Court of Appeals, Ninth Circuit, provides detailed guidance. BPA first tries to mitigate any effects to the affected parties. When mitigation does not eliminate all negative effects to the utility's operations, BPA tries to compensate in kind by supplying electric power to substitute for the power lost by the utility. When this is not possible, BPA has a process for reviewing and providing some cash compensation.

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### When Should Compensation Be Awarded?

The Bonneville Power Administration's current strategy for distributing increased energy costs is one example of the complexity of the compensation question. For each industry, one can ask: Is their share of the costs equitable? Is there a sound economic rationale for providing relief to those who suffer economic damages? Should this relief be temporary or permanent?

There is no defined policy concerning the role economics should play in decision-making or how economic issues should be addressed. Should barge companies, river ports, and shippers of bulk commodities be compensated? Should navigators be compensated?

Compensation regularly is awarded in the United States to address economic and social change. The debate over when to compensate spans many disciplines. On a political level, compensation for a well organized group that would be adversely affected can be justified as the most effective and cheapest way to enable new policy adoption. Legal guidelines consider compensation in the context of property rights—this is an area of intense activity where definitions of compensation and the taking of rights are changing. The economic perspective commonly is framed in terms of economic efficiency, cost-effectiveness, and long term effects. Economists understand equity to be important, but often argue that they have no special ability to evaluate it and choose to display the distribution of gains and losses among groups of people and to allow someone else to judge the value of changes. For most people, moral judgments are of equal or greater concern. Ultimately, these are the most difficult to address. Each of these debates can illuminate compensation decisions and can be applied to the Columbia River situation.

Although definitive answers are hard to come by, some guidance is available. To begin with, we'll use Calabresi and Melamed for a legal determination of property rights: What rights correspond to legal entitlements and which are

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only politically protected? Have private property rights been taken, or is this a case in which the bundle of legal relations that involve certain interests have been rearranged without any taking?

Lawyers use the metaphor of bundle of sticks to explain what they mean by property rights. Munzer bases his description of property on two seminal writers—Hohfeld and Honoré. Hohfeld identified four elements: claim-right, privilege, power, and immunity. For each element there is a correlative and an opposite. If one party has a claim-right, then someone else has a duty to respect that right, and the opposite of a claim-right is no-right. If one party has a privilege, then someone else has no-right to interfere with the exercise of that privilege, and the opposite of privilege is duty. If one party has a power, someone else is liable, and the opposite of power is disability. Finally, if someone has an immunity, someone else has a disability of taking action, and the opposite of disability is liability. Munzer says that Hohfeld's fundamental concepts apply to many facets of law. To apply them to property, he adds Honoré's incidents:

...slightly modified, include the claim-rights to possess, use, manage, and receive income; the powers to transfer, waive, exclude, and abandon; the liberties to consume or destroy; immunity from expropriation; the duty not to use harmfully; and liability for execution to satisfy a court judgment.

Munzer stresses the point that property, in the bundle of relations metaphor, is more than property rights. Instead, he argues that "Property rights involve only advantageous incidents. Property involves disadvantageous incidents as well." These issues are important and relevant for considering compensation for costs arising from implementation of the Endangered Species Act (ESA). Restricting commercial and recreational harvests, altering stream flow, reducing generation of hydropower, and restricting the use of public lands by timber harvesters and cattle ranchers illustrate complex ways that property is affected. Many relations exist and many will be changed. To think of these changes solely as reductions in private property rights is to ignore the changes in liabilities, powers, immunities, and duties of property owners.

If no legal obligations are at stake, is it in the interest of society to help financially particular groups who bear large and immediate costs in the interest of more widely distributed benefits? Before exploring this key issue, a short review of the question of legal issues may be helpful.

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## Legal Protection

Private property rights are fundamental to the United States legal system. The Fifth Amendment to the U.S. Constitution states that “no person shall be deprived of property, without due process of law; nor shall private property be taken for public use, without just compensation.” This protection is further guaranteed at the state level through the due-process clause of the Fourteenth Amendment.

The government is permitted to take private property for public use in return for just compensation. According to Rolston, an acceptable public use is one in which “the benefit to the public outweighs the disadvantage to the unwilling landowner.” Accordingly, the government is justified in taking property to secure a public benefit, such as a highway, in return for just compensation. Similarly, compensation should be provided if any legally defined takings occur related to Columbia River salmon recovery. However, determining whether an action constitutes a taking is based on the complex definition of property rights and their relation to environmental resources.

There are several scenarios for which compensation clearly is not legally required. These exceptions potentially apply to the Columbia River situation. The nuisance theory holds that if the government acts to prevent a landowner from creating a detriment to the public, this act is not considered a taking. For example, prohibiting businesses from producing noxious gases in order to protect public health does not require compensation. As Large states in legal shorthand, “there is no property right to a nuisance.”

Physical invasion of private property is the legal grounds for taking with the longest history. This definition expanded in 1922 when Justice Oliver Wendell Holmes found that if a regulatory act diminishes the value of property significantly, it becomes a taking. However, Justice Holmes did not prescribe how to determine when this occurs. Currently, the question is put to the courts on a case-by-case basis to determine if a particular action has crossed the fuzzy line of foregone value and become a taking.

Since expanding the takings definition, the courts have had difficulty deciding when regulations cross the line and become regulatory takings. To date, the U.S. Supreme Court has not been able to articulate a test that would clarify the role of compensation in all takings cases. Most recently, the case of *Lucas v. South Carolina Coastal Management Council* brought the issue of regulatory takings back to the U.S. Supreme Court. The *Lucas* case was widely regarded as a major test case for regulatory law, and it has implications for Columbia River actions. At issue was the effect of South Carolina’s Beachfront Management Act on two lots that Mr. Lucas purchased for \$975,000 and where he planned to build single family homes. After the purchase, South Carolina prohibited construction of homes on lots such as Mr. Lucas’ by enacting the Beachfront Management Act. Immediately following passage, Lucas filed suit alleging that his property had been taken without compensation.

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The South Carolina trial court agreed that a taking had occurred and awarded Mr. Lucas \$1,232,388. Following the decision, the Coastal Council appealed to the State Supreme court, which supported the state's position that the Beachfront Management Act was a valid attempt to prevent a public harm. Lucas then applied to the U.S. Supreme Court to overturn the decision and reinstate the trial court verdict.

The decision handed down by the U.S. Supreme Court came from a deeply divided court in sharply worded opinions. Justice Scalia's majority opinion, which was joined by Justices Rehnquist, White, O'Connor, and Thomas, remanded the case to the South Carolina Supreme Court with the following standard: "When the owner of real property has been called upon to sacrifice all economically beneficial uses in the name of common good, that is to leave his property idle, he has suffered a taking." The only exception Scalia recognized to this definition was the common law of nuisance. Although concurring with the majority, Justice Kennedy argued that in addition to the nuisance law, the state has authority to impose restrictions to protect environmental concerns: "Coastal property may present such unique concerns for a fragile land system that the state can go further in regulating its development and use than might otherwise permit." Dissenting opinions were issued by Justices Blackmun and Stevens. Justice Blackmun held that the decision of whether development is harmful is not a separate consideration, but is already a part of nuisance law. Justice Souter wrote a separate opinion, arguing that the case should never have come before the Supreme Court because "an unreviewable assumption on which this case comes to us is both questionable as a conclusion of Fifth Amendment law and sufficient to frustrate the Court's ability to render certain the legal premises on which its holds rests."

The Lucas decision does not provide conclusive guidelines, but it brings into question the degree of environmental regulation that can be supported by statutory assertions of public harm. What environmental protection efforts are covered by nuisance laws? There is no consensus in the Supreme Court on this issue, which is relevant to some compensation considerations on the Columbia River.

Whether the Columbia River salmon recovery plan creates any takings is further muddled by the particular characteristics of water law. Water law in western coastal states is a blend of riparian rights (rights awarded to land-owners immediately adjacent to the water) and rights awarded under the prior appropriation doctrine (the first party to file for the rights and showing a beneficial use becomes the owner). However, these rights are reduced as noted by the legal scholar Joseph Sax:

Both the federal navigation servitude and the equitable apportionment doctrine may operate to reduce or displace pre-existing private rights in order to meet public obligations, and there are statutes of long standing requiring minimum

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instream flows to sustain fish populations downstream of dams. The same is true of state determinations of navigation for recreational use. In some states the people of the area of origin have a servitude on many of the West's rivers, and even before the reserved rights doctrine was enunciated it was recognized that the federal government as a riparian had a prior claim on the flows of the rivers which no state law creating private rights could impair. The scope of private rights in water has always been sharply limited.

(This citation was brought to our attention by Richard Hildreth, professor of law at the University of Oregon. With Oregon Sea Grant support Professor Hildreth and research assistants Mara Brown and Missy Thompson are researching the legal aspects of salmon recovery plan implementation. They anticipate circulating a draft report for comment within the coming year. If you would like a copy, write or phone the Ocean and Coastal Law Center, University of Oregon School of Law, Eugene, OR 97403 (503) 345-3845, FAX (503) 346-1564.)

Environmental policies that diminish the bundle of property rights on private land have been litigated extensively, yet what constitutes a taking in a new case—one that has not been through the courts—is uncertain. If the salmon recovery plan diminishes the value of private land and resource users' incomes without compensating the losers, litigation is likely. Both parties—the government and the parties whose property values and incomes have declined—should be highly uncertain about the outcome of this litigation. Perhaps the only definitive observation is that the litigation will be expensive and will be tied up in courts for several years before a conclusive answer emerges. Even then, the conclusive answer for one case may prove inconclusive for other cases.

For example, consider the loss of value on irrigated land where the cost of pumping water from the river increases because the streamflow is lower and farther from the cropland. Any settlement in such a case may shed little light on the prospect for recovering damages on lands planned for irrigation, but when irrigation withdrawals have not yet begun.

In summary, the constitutional case for requiring compensation to parties suffering losses from the salmon recovery plan is weak. After criticizing all branches of government, but especially the U.S. Supreme Court, for muddying the legal grounds, Rose-Ackerman argued that the case for compensation should be made on grounds of economic efficiency, then modified to reflect legislatively mandated principles of justice. If one accepts this line of reasoning, the next step is to consider the economic and moral arguments for and against compensation, independent of what is required under constitutional law.

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**Other Reasons  
to Compensate**

The potential for destroying the incentive to make socially valuable investments, perhaps the most important reason to compensate losers, is also the most complex and arises from uncertainty about the future. Property owners invest with some level of expectation that their current sacrifices will reap future rewards. Timber owners defer harvest expecting to get a better return on their investments by waiting. Irrigators place pumps and other equipment on their property expecting to grow more productive or valuable crops. Fishers buy vessels and fishing equipment expecting future harvests. Yet, each is aware that nature is an uncertain mistress. Their plans, based on incomplete information, may encounter snags. The demands of consumers, technology, and the forces of competition constantly change. The laws and regulations governing them could change.

Many of the parties affected by the salmon recovery plan have relatively small investment portfolios. Thus, the risk to their farms, fishing enterprises, wood products firms, and grazing operations cannot be spread easily. Some sources of risk can be averted through the purchase of insurance, with one major exception: the uncertainty that the laws and regulations affecting them will change. Risk-averse people may avoid investments that would make a positive contribution to the economy for fear they will not reap the rewards of that investment. For example, the Oregon Forest Practices Act places many restrictions on timber harvesting including a requirement that harvest not take place within a specified distance of certain streams, and specified requirements about logging roads. The possibility that the Oregon legislature could amend the Forest Practices Act to further reduce the timber harvest provides an incentive to cut trees now rather than investing in additional years growth to maturity.

The timber example leads immediately to a solution to this dilemma. If a tightening of forest practice regulations governing private landowners was offset by at least some compensation, landowners would be more inclined to take a longer view. Blume and Rubinfeld say this principle holds generally: Compensation can act like insurance against whatever uncertain changes trigger it.

On a related note, compensation may force government to consider more carefully the opportunity costs of their actions. The reality that imposing a cost on someone in the private sector requires compensation and that people in government agencies are accountable makes the concept of cost more tangible and real. Officials at the Bonneville Power Administration must go to their customers and announce a price hike to pay for the Fish and Wildlife Program (the activities identified by the Northwest Power Planning Council to offset the loss of fish and wildlife caused by the power system). Anticipating strong challenges from their customers, BPA staff carefully analyze fish and wildlife expenditures. They are under great pressure to select actions that generate the greatest benefit for fish and wildlife for the money spent.

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Another reason to provide compensation is that it can reduce the cost of changing legal rules. Displaced fishers, farmers facing reduced incomes, and others facing losses place high demands on management agencies to be strictly accountable for every action taken. Even when the agency complies with all required procedures, adversely affected parties may litigate or bring political power to bear on the agency. Opposition from members of the Alaska congressional delegation is thought to have played a key role in the slow development of fleet rationalization policies developed by the North Pacific Fishery Management Council. All these activities cost both private parties and public agencies dearly. Efforts to mitigate the economic losses or provide partial or full compensation reduce opposition and, consequently, the need to spend large amounts of time and money negotiating an outcome.

A widely held perception is that the greater the uncertainty about new public policies or changes in implementation of policies, the wealthier the lawyers become. All interest groups, including state and federal agencies, are spending large sums of money on legal research, which might be less necessary if more people accepted the validity of recovery actions. An associated problem is that people spend time and effort evading rules, which means agencies must respond with more time and effort to enforce relevant rules. Both Jentoft and Pinkerton say one of the lessons of the natural resource co-management literature is that people who “buy in” on a policy reduce the costs of negotiating and administering regulations and improve effectiveness of management. Similar benefits may flow if receipt of compensation or endorsement of mitigative measures implies that the parties most directly affected have “bought in” to the emerging policies.

Compensation is consistent with widely held social norms. For example, although ignorance is not an acceptable defense for violating the law, many people believe they should not be punished for operating under incorrect assumptions when what was “right” and “wrong” were unclear.

Perhaps of even greater importance is an assumption of an entitlement to the use of a natural resource. That is, many believe that when their actions were condoned and perhaps supported in the past, government implicitly awarded them legally protected entitlements. On the other hand, other parties who were left out historically may challenge the validity of those assumptions. The resolution of the conflict between those who feel entitled to what they received in the past and those who feel unjustly left out must also embrace the conflict between those who have acquired power and those who are using the Endangered Species Act and other environmental laws to acquire power.

The development of natural resources in the Columbia River Basin was supported by political interests; now attempts to reverse the effects of the development are supported by another set of political interests. The ambiguity about legal protections suggests that a balancing of interests will be required in a political process, and this will demand serious examination of public perceptions and discussion of social norms.

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## Concerns About Compensation

There are major problems with using compensation as a tool to encourage investments by providing the equivalent of insurance. First, society does not always wish to encourage certain risks. Burtraw and Frederick point out that irrigation in the Pacific Northwest was developed with subsidies from the federal government and that some subsidies remain. An investment that appears profitable to a farmer may not increase net national product. (Irrigated agriculture is used here only as an example. Virtually all commercial interests in the Pacific Northwest have received direct or indirect support from the government at some time.)

Second, provision of compensation and insurance may create a moral hazard problem; the insured person or the person expecting compensation could alter their behavior in a way more likely to encounter risk. Too much insurance (compensation) for parts of the risk of enterprises may lead to excessively risky decisions from a social perspective. Expectations of compensation could cause people to enter into investments that they would not otherwise make.

The problem of incorrect signals about appropriate investment behavior is not the only concern. Another is that compensation may lead people to lose the incentive to anticipate changes and act early. Friedman states that not only do the eminent domain and due process clauses of the Constitution encourage people to conform to existing institutions, they also discourage people from anticipating and adopting new institutions early. Compensating people who are disturbed by new environmental rules may encourage them to operate as they have in the past. If the signal society wishes to send is that the old practices were not consistent with sustainable development and that people should rapidly adopt sustainable practices, then people need incentives to adopt new approaches and disincentives to maintain old ways of doing business.

For example, programs to limit the licenses in a fishery commonly are adopted only after the excess capacity of the fishing fleet greatly exceeds the level that provides sustainable incomes to the fishers. One technique, which has been tried often in spite of difficulties with such programs, is to buy back fishing licenses. Because such programs are introduced during times of great economic stress in the fishing industry, these policies are approved for social equity reasons. Suppose fishers in overcapitalized fisheries always expected compensation for leaving a fishery, but only when the fishery enters its worst moment of crisis. Not only would fishers delay their exit, but those who left the depleted fishery would attempt to re-enter the industry at the worst possible time.

Many environmental policies are adopted to improve public health and safety. Elimination of actions prohibited under the law of nuisance do not warrant compensation on either economic or moral grounds. Public agencies seek to protect the rights of parties who cannot afford to secure their interests

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through market transactions; in economic jargon, public actions are intended to “internalize the externalities” imposed on third parties. In the Columbia River Basin, this issue turns out to be quite complex. One of the measures being proposed is flow augmentation: acquisition of additional water in the upper Snake River basin that would be flushed down the river at a time that approximates historic flows. To acquire the additional water requires negotiations with irrigators in the upper Snake River basin. One of the complexities now recognized about water markets arises from concern for third parties. In Idaho, some irrigation water is lost through evaporation and plant transpiration, but much re-enters groundwater aquifers and returns as an available resource downstream. Because the nature of externalities among the various water users is complex, the perception that externalities have been widespread is a subject of careful examination at this time.

All of us face risk. To the extent that modification of natural resource policies in the Columbia River Basin is simply an extension of previous actions, the risk is analogous to the “normal risks of economic life,” and compensation is not warranted. On the other hand, the fortunes of many groups affected by salmon recovery, including farmers and fishers, varies widely with natural elements from short term shifts in the weather and from longer changes in climate such as extended periods of drought. Nonetheless, the question of the level of risk is one of several parts to an argument that the salmon recovery plan should be introduced gradually, with substantial opportunity for adjustment. Fishers, farmers, and other natural resource users understand that change is inevitable; what is less well accepted is the cost driven by rapid change.

If costs of compensation exceed the damages done, compensation programs cannot be justified on economic efficiency grounds. Earlier, vessel reduction programs (buybacks) in salmon fisheries were portrayed more as responses to social concerns than as effective economic remedies. The same issues drive similar programs throughout the world. Norway’s fishing vessel scrapping program is an especially vivid illustration of this principle.

The Norwegian program of buying vessels that operated in the offshore fisheries and scrapping them (in some cases simply sinking them at sea), while the inshore fisheries allowed new entry made little sense in economic efficiency and can be explained only by the political influence of the fishing industry and the history of Norwegian fisheries going back to World War II; Brochmann reports it can be justified only by appealing to other social objectives. Drawing on experiences of vessel reduction programs in the 1960’s and 1970’s, most recent programs do not buy back vessels. Instead, as both Rettig and Wesley report, they buy only the licenses, as was the case in Oregon’s buyback in the Columbia River gillnet fishery; or they follow other procedures thought to be less costly, as was the case in Australia.

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Deciding whether to compensate is complex. Determining how to compensate is equally difficult. The form and source of compensation can have wide distributional effects. These effects, together with the costs of negotiating and administering a program, are essential to determining the total cost of a program. Total cost is central to evaluating a program's efficiency from an economic perspective.

## Determining How to Compensate

One can compensate in cash or in kind. A classic economic principle illustrates differences between the two forms. Suppose you are trying to decide whether to buy a cup of coffee for someone. A nearby coffee shop sells coffee for 50¢ per cup. You could either give someone the cup of coffee or give that person fifty cents. Which creates more satisfaction? An economist would reason that a gift of 50¢ (cash) always makes the person better off. If the recipient wanted coffee, a cup of coffee would be purchased, and the outcome is the same as if coffee had been given. If the recipient preferred something else, perhaps a cup of tea, a different purchase could lead to a better outcome. In this ideal situation cash is preferred due to its flexibility.

Cash compensation can potentially provide great flexibility to affected parties. Awarding cash in the event of changed water flows gives an irrigator the option to relocate the pumps, purchase alternative technology, or invest in something else more beneficial. The difficulty of awarding cash compensation comes with determining the monetary value of the good or privilege. How do you measure the monetary value of a non-monetary item?

A common measure of change in economic welfare is compensating variation. Layard and Walters say "The compensating variation (CV) is the amount of money we can take away from an individual after an economic change, while leaving him as well off as he was before it. For a welfare gain, it is the amount he would be willing to pay for the change. For a welfare loss, it is minus the amount he would need to receive as compensation for the change. However, it is not clear how to determine what amount of money leaves a person as well off as before.

Estimating the amount of compensation that is fair when a group's harvest of fish or use of water is restricted is difficult. Two different answers are given to questions regarding how much they would be willing to pay and how much they would be willing to accept for the resource. Assuming complete and honest answers, we expect the amount of money they would be willing to accept would be much larger than they would be willing to pay, perhaps much larger. Why?

Both economists and psychologists have worked on the answer to this last question. Economists offer several reasons, but highlight the income effect. They use the concept of "full income" to reflect that consumers make their

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decisions from a starting base which includes not only money but other things they do not have to buy. The cattle rancher who eats beef and the salmon gillnetter who eats part of the daily catch make different food consumption decisions than does the urban resident with the same income and endowed wealth. Holding a right is to be endowed with more wealth than not holding that right. People who feel deeply about preserving primitive natural habitat may provide very little money to environmental groups interested in land acquisition, but freely donate land they already own with the restriction that the land not be developed.

Psychologists agree that willingness to sell is usually higher than willingness to pay, but they provide their own theories. One explanation is loss aversion. People place a higher value on losses than on gains of the same magnitude. Kahneman and others give an account of laboratory experiments that document this reasoning.

Without exploring the reasons for the differences between willingness to buy and willingness to sell, implications can be drawn from an example. Consider an irrigated farm that will be bankrupted by loss of irrigation water supply, or a gillnetter who will go out of business with reduced fishing opportunities. One technique for determining the appropriate compensation level is based on historical operating records for the firm; one can estimate the changes in the "fair market value" of the firm. Typically, the amount of money the firm would have required to voluntarily leave (the willingness to sell out) is higher than what it would pay to be able to remain. These differences were evident during the last buyback program for gillnet licenses in the Columbia River. Among the explanations for these differences are the intangible values associated with this life-style, optimism about the future of the industry that cannot be documented from past trends, and fears about social and economic costs in changing occupations or in relocating the existing operation.

In summary, how much to spend on compensation or mitigation depends on the status of the damaged parties. If compensation is needed to "make a damaged party whole" (as well off as if no change in public action had taken place) the amount of compensation paid should be based on the willingness to sell. In-kind compensation that makes a damaged party as well off as if nothing had happened will cost at least as much, and could cost much more than cash compensation. If the action were determined to be an unconstitutional taking and the damaged parties had to be compensated at the level at which they would voluntarily surrender their property interests, damage assessments would reach their highest level. Parties expecting to suffer damage as a result of the Endangered Species Act (ESA) behave rationally by providing estimates at this level.

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At the other extreme, if parties who suffer from ESA actions are liable for the damages to the endangered species, the economic magnitudes should be framed in terms of willingness to pay to keep water rights. These sums should be much lower than in the previous rights assignment. Since both willingness to pay and willingness to sell will be difficult to determine objectively, court settlements are more likely to be based on fair market value. Due to the high costs and uncertainty about the outcome of court cases, all parties may wish to negotiate agreements even if their liability is uncertain. Standard practice in U.S. courts is to award fair market value as compensation.

Another difficulty related to cash compensation is selecting a baseline condition. Economic costs are measured as departures from a baseline condition. In determining compensation for physical damage to property resulting from a test drawdown of the Little Goose and Lower Granite reservoirs, the Corps of Engineers selected as the baseline the value of property immediately before the drawdown. They compensated for the change in value immediately after the drawdown due to physical damages. In this case, values were based on estimates to repair or salvage damaged property. This method of measuring is appropriate because the drawdown was a single act with measurable results over a short time and clear geographic bounds. Also, only physical damages were compensated, losses such as diverted recreational activity and foregone income from changes in port activity were of great concern locally, but would have required more detailed and careful determination for reasons discussed earlier in this publication.

In most cases involving a potential compensation, both the period and the extent of damage are hard to measure. The baseline condition from which the change occurred is usually unclear. The Columbia River Basin is influenced strongly by annual and cyclical variations in temperature, the amount of precipitation and its distribution over the year, and other factors that affect the water entering and moving through the basin. Add to this the ever-changing ways that human actions influence the basin. For example, irrigation projects grow and change; manipulation of water movement through dams varies from year to year and over time; land use varies throughout the watershed, and so on. There also are evolutionary changes in both climate and human intervention. How can one compare the evolving system with changes in salmon protection to what the system would have been like without those changes?

Even without these changes occurring in the basin, analysis would have to account for the actions toward increasing salmon populations that have been taking place for a decade. Substantial direct expenditures and opportunity costs have paid for countless actions, including modifications to dams,

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barging of smolts, spill of water, and screening to divert smolts. These ongoing changes, and the changing value of the resources over time, make it difficult to estimate a baseline value prior to recovery.

Due to the difficulty of calculating rights to cash compensation, in-kind compensation is often preferable. In-kind compensation is more likely to be accepted because it is easier for people to make subjective comparisons between similar objects than dissimilar objects. Compensating in kind avoids the quandary of assigning monetary value to things.

One particular method of providing in-kind compensation without addressing the thorny issue of valuation is to link the type of compensation directly to the type of harm. Burtraw and Frederiek give the example of farmers shipping grain to market and others moving bulk commodities by barge into and out of the lower Snake River area. Many of these people are deeply concerned about their loss of current transportation opportunities. In this case, compensation could provide funding for road improvements in response to problems caused by increased truck traffic.

In-kind compensation also solves the problem of adverse selection. Adverse selection can occur in situations of cash compensation when funds are awarded to someone who misrepresents rights to the resource. Since in-kind compensation provides an equivalent for the damaged item as opposed to a supposed owner, misrepresentation is more difficult.

Despite its clear advantages in certain cases, in-kind compensation should not be preferred to cash compensation across the board. The ultimate cost differential of the program needs to be considered. Researching and negotiating the terms of in-kind compensation can be quite high. In-kind compensation programs may also be more complex and expensive to administer than cash programs. In such cases, parties needing compensation may be "made whole" at less cost to society.

Another consideration in determining forms of compensation is whether the goods or services can be transferred or exchanged. If they can, an incentive-based approach can provide an effective policy solution. Just as a horse may be tawn forward more easily by dangling a carrot in front of its nose than when it is beaten by a stick, the incentive-based approach may be more effective than the command and control approach. Rather than narrowly defined actions that people in the Columbia River Basin must comply with to achieve ESA policy goals, incentive-based programs allow parties with

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differing stakes to engage in voluntary trades. In a personal communication, Daniel Huppert noted that to save a single Snake River chinook salmon, Alaska trollers must forego much larger harvests than those of Columbia River gillnet fisheries; he asks what the result would be if Alaska trollers were allowed to pay non-Indian gillnet fishers to stop their chinook fisheries in return for a larger Alaska harvest.

Although the Alaska to Columbia River gillnet trade has not received serious public attention, Burtraw and Frederick, along with Peterson and others, have noted the incentive-based approach of voluntary water markets. One of the most difficult potential conflicts comes from the need to redirect some of the water used for irrigation in southern Idaho toward flow augmentation in the Snake River. Water markets are a way to provide revenues to the irrigators while moving the water downstream voluntarily. Water markets are not only fair in the sense that voluntary contracts reduce political resistance, they also are economically efficient because those who value the irrigation water least are likely to be the ones most eager to sell.

Burtraw and Frederick suggest that water markets would enhance economic efficiency in the Pacific Northwest. They offer as evidence the fact that the marginal value of the water resource varies greatly among its users. A water market could reassign water use to its highest value by allowing currently entitled users to transfer rights to higher valued uses through a system with low administrative costs.

Water markets, as well as other forms of compensation and mitigation, raise substantial differences of opinion about equity. As Burtraw and Frederick note, much of the irrigation was developed through federal subsidies and some of the crops grown continue to be supported through federal agricultural programs. Was this gain in value a “windfall”? If so, should a subsequent loss to comply with salmon recovery be viewed as a “wipeout” or as a delayed charge for the subsidy? Although this question is a legitimate one for public debate, we note that the only person who benefits from such a windfall gain is the person who owns the property at the time the program began. When the land is sold to a subsequent owner, that person pays both for the inherent value in the land and the value of the water rights. Because the original owner cannot be billed for windfall gains, the later loss in value will be seen as fair or unfair in different ways by different people.

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## Conclusion

Unavoidably some people will suffer economic losses so that Columbia River wild salmon stocks can recover. Since few of these losses will require compensation under constitutional principles, the issue of compensation will be resolved principally outside the judicial system. Several general guidelines should shape compensation and mitigation policy on the Columbia River.

If a policy represents a temporary change in resource management, compensation would be desirable for many industries in order to encourage long term economic stability and to preserve the viability of valuable, but economically marginal economic sectors. However, according to Kai Lee, the economy of the Columbia River Basin is changing in fundamental ways that do not permit a clear picture of stability and equilibrium. These changes reflect gradual, but fundamental, shifts in the way that environmental resources are managed in the United States. Kenneth Boulding characterized this shift as one from a cowboy economy in which achievement is measured in throughput, growth, and consumption to a spaceship economy in which the goal is to maximize efficiency and ensure sustainability. Because struggles over competing uses of water and related land resources in the Columbia River Basin reflect new approaches to management, compensation should be provided carefully—only when it does not distort the region's preferred path toward growth and change and only when it complies with widely accepted principles of justice.

Some argue that the federal government should compensate the region for ESA-related Columbia River salmon activities since the ESA is a reflection of values that are shared nationwide. As Burtraw and Frederick point out, two strong counterarguments are that federal subsidies that have paid for the dams do not require compensation and that, because energy users throughout the region benefit from the lowest electricity rates in the nation, rate increases should be the first source of funds.

Other considerations make limited compensation a reasonable solution in some cases. If goods or services can be transferred or exchanged, incentive-based programs such as water markets provide implicit compensation by enabling the new resource user to compensate the current user. This structure shifts some of the burden away from the taxpayer and the hydroelectric customer. As Lee observes, markets are valuable ways to deal with complex decisions in the face of limited information, and it is unclear whether other processes for conflict resolution provide adequate substitutes.

Programs that speed transition and increase political acceptance of changes through compensation or mitigation also should be encouraged. One example is President Clinton's support for funding to retrain workers as part of the Option 9 Forest Plan. The dual purposes of these programs—to manage natural resources sustainably with great care for environmental values and to mitigate or compensate for economic dislocations arising from actions needed to ensure sustainability—are equally important.

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When compensation is adopted, in-kind programs are usually preferable. These programs allow the thorny issue of valuation to be skirted, and they provide alternatives that often are more socially acceptable than cash transfers. However, there are important caveats to any compensation or mitigation program. First, all associated costs must be kept within bounds; for example, the costs of carrying out compensation programs must be limited and well below the value of the compensation program to the recipients. Second, and most important, long term objectives for the programs must be clearly defined. Ludwig and others, along with McGoodwin, note that temporary subsidies from the government, such as many fishing vessel loan programs, encourage unwise investments with resulting consequences, such as overfishing, which later will be criticized by the very parties the public attempted to help.

Ultimately, the Endangered Species Act and the Power Planning Act herald a significant, if small, step in a much larger process of change in resource use and management. Compensation and mitigation can help if used to encourage equitable resource allocation. What role they play will be decided largely within the legislative arena. People who clearly and explicitly identify their potential losses will play important roles in this debate, but they are not the only ones affected. The general public, especially those who pay taxes and hydroelectric utility bills, will pay for much of the compensation and mitigation programs on the Columbia. Although it is not unreasonable to expect electricity costs to increase throughout the Pacific Northwest, ratepayers and others who provide the funds for compensation also should be involved in order to have their interests represented.

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