Salmon are important not merely for those who harvest them, but also are the ultimate barometer of the health of aquatic ecosystems. Salmon also have deep cultural, historic, and religious significance, particularly to Northwest Indian tribes. For these reasons it is not an exaggeration to suggest that salmon are the spiritual soul of the Pacific Northwest.

MICHAEL BLUMM (1997, 655)
in planning and decision making, and conflicts over the proper role of the federal government in water development, protection, and management (Derthick 1974; Allee et al. 1981). Nevertheless, urgent calls for comprehensive, integrated watershed management continue to be made (Reisler 1981; Stakhiv 2003).

Derthick (1974) labels regional governments (including the Title II river basin commissions and the Delaware River Compact Commission, discussed in Chapter 6) political accidents. For Derthick (1974, 226), political accidents occur “only in very special circumstances, when there is a fortuitous coming together of opportunity, leadership, and political backing, so that it becomes possible to go against the institutional grain and create a genuinely new form.” The term “political accidents” suggests two points: (1) comprehensive, integrated management is rare; and (2) if the political stars align properly, it is possible. In this chapter, we explore the second point. Assuming a highly favorable political environment, is it possible to devise a strong form of comprehensive integrated watershed management?

This question is important to ask and answer because it strikes at the thesis of this book—politics matters. Politics matters because as people cooperate, bargain, negotiate, make trade-offs, and fight over how to govern a watershed, they devise many overlapping institutional arrangements. Suppose, however, that a “political accident” occurs, where people agree on watershed goals and how to accomplish them. Would comprehensive integrated watershed management emerge then?

Admittedly, this is a difficult question to answer, because such positive political settings do not exist. Consequently, to explore it requires an experiment—a thought experiment. We engage in a thought experiment for two reasons. One, there are no watersheds in the United States that are free of institutions. Thus, to examine whether it is possible to construct integrated, comprehensive watershed management that will not be undermined by existing institutional arrangements, it is necessary to begin with a thought experiment that allows for a clean institutional slate. Two, a clean institutional slate provides every advantage to the designers of an integrated comprehensive system. If it is possible to design such a system from scratch, then comprehensive, integrated watershed management remains a promising policy alternative. If, however, it is impossible to design such a system, even in a highly supportive environment, then comprehensive, integrated management must be set aside for more feasible options.
We rest our analysis on the cornerstones of bounded rationality and transaction costs. They capture two essential and unavoidable aspects of social settings: human decision making has well-known and well-understood limitations, and the creation and operation of institutional arrangements is costly. It may seem unusual to emphasize two such elemental features, but often people advocate policies without regard for the cognitive demands of such policies or the costs of their creation and operation (Jones 2001). If we are interested in understanding what institutional designs are possible, we must make reasonable assumptions about how people make choices, including choices about designing institutions, and the costs they must bear in so doing.

We proceed in this chapter by first introducing the key theoretical concepts of bounded rationality, the different forms of transaction costs, and how transaction costs are linked. Second, we develop a thought experiment in which we assume a watershed that is free of politics, at least initially, where we can explore the challenges of developing a comprehensive integrated management system in a world of transaction costs. In the final section of the chapter, we examine the effort to realize a more comprehensive and integrated form of watershed governance in the Columbia River Basin. Congress created an overarching organization to bring together the different governments, interest groups, and citizens to protect and enhance salmon stocks while maintaining dynamic economies founded on inexpensive hydropower. The Northwest Power Planning Council is statutorily created with specific mandates and authorities. It has a dedicated source of funding and its own staff to support plan development, technical analyses, and monitoring. At least on paper it appears to come close to comprehensive integrated management under a watershed-wide authority, and, in fact, it can boast of many positive accomplishments, such as closer working relations between state and tribal fish and wildlife agencies, the development of many watershed collaboratives and watershed plans, and a greater understanding of adaptive management in practice, among others. But the two most sought-after goals—salmon recovery and comprehensive integrated management—have remained terribly elusive. Those goals remain elusive not simply because of politics but because of boundedly rational people struggling to achieve collective goals in the face of transaction costs.
Bounded rationality is best understood in relation to perfect rationality, which is the neoclassical microeconomics model of the individual. The perfectly rational person makes choices so as to maximize his or her utility. Individuals are quite capable of maximizing their utility because they exhibit perfect and boundless computational abilities and possess perfect and complete information. For analytical purposes, such individuals possess well-defined utility functions, complete and well-defined sets of alternatives from which to choose, and probability distributions over all possible states of the world. Armed with such information and computational power, individuals, when confronted with a choice, select the alternative that maximizes utility. As Simon (1983, 34) suggests, the model better describes the mind of God than of man.

A boundedly rational individual possesses limited cognitive processing capabilities and information. Such an individual is intentionally rational in the pursuit of instrumental goals but is limited in that pursuit by her cognitive and information resources (Simon 1957). Boundedly rational people systematically and predictably violate the tenets of perfect rationality. For instance, people are influenced by how a decision is framed. If a decision is framed in terms of the gains that a person may realize, people make choices as if they are risk seeking. If the same decision is framed in terms of the losses a person may experience, people make choices as if they are risk averse—same decision, differently framed, leads to different choices (Markman and Medin 2002). A perfectly rational individual would not be affected by framing. That individual would always choose the alternative that maximizes utility, no matter how the alternatives are framed. Furthermore, people are satisficers and not optimizers. They select alternatives that are good enough rather than expending inordinate amounts of time gathering information and making careful and systematic comparisons among alternatives. Finally, how people process information and make choices is influenced by goals, motivations, beliefs, and emotions. People who are more cooperative and altruistic tend to be more concerned with collective outcomes than are people who are more individualistic and competitive (Kopelman et al. 2002, 119). Both cooperators and competitors, however, tend to attribute greater intelligence to their more preferred strategy than to the opposite strategy. That is, cooperators view other coop-
erators as more intelligent than competitors and vice versa (Kopelman et al. 2002, 121).²

None of this should be read to imply that instead of being perfectly rational, people are perfectly irrational. People are goal-oriented and purposive, but limited in their cognitive competence (Simon 1957). Boundedly rational individuals can learn and adapt to their immediate environment and, over time, learn and adapt to changing environments; however, learning and adaptation will be episodic and disjointed because of the structure and operation of their cognitive architecture (Jones and Baumgartner 2005).

At this point, supporters of comprehensive, integrated watershed management may object and claim that they do not expect individuals to make comprehensive, integrated decisions; rather, they expect institutional arrangements to support and guide people’s choices so that choices are more nearly comprehensive and integrated. Although institutional arrangements allow people to collectively accomplish what they could not as individuals, institutions are created by boundedly rational people and they must be understood in terms of the goals and capabilities of their designers (Williamson 1985). As Jones (2001, 14) notes, “the institutions that exist as a product of human culture seem to work best when the limits and potentialities of human nature are taken into consideration.” Assuming decision makers are boundedly rational is critical for understanding institutional design and performance.

**TRANSACTION COSTS**

Boundedly rational people act in a costly world. They must expend resources—time, money, expertise, social capital, and so forth—in developing, implementing, monitoring, enforcing, and revising institutional arrangements. Those costs shape and constrain the types of institutional arrangements that people devise (Williamson 1985).

The most common types of transaction costs are decision making, agency, and commitment (Moe 1989; Horn 1995). Making a collective decision involves information costs in identifying the problem or opportunity, identifying and developing alternative courses of action, and bargaining and negotiating over selecting a single course of action. Furthermore, in many instances the process of decision making will not occur in such a rational sequence (Kingdon 1995). Some people will prefer a particular
policy alternative no matter the problem. Also, problems may be poorly defined and their underlying causes unidentified, but policy decisions are made anyway, even if they may not address the problem.

Decision-making costs are partly a function of characteristics of decision makers and partly a function of context. Decision makers with diverse values, preferences, and goals are much more likely to experience higher decision-making costs than decision makers with similar values, preferences, and goals. Diverse decision makers will have to spend more time discussing, bargaining, and negotiating in order to reach a decision. Of course, the ability to reach a collective decision is also a function of decision rules. A unanimity rule imposes very high decision-making costs, as each person must agree to a course of action, compared to simple majority rules. Finally, the larger social and physical context affects decision-making costs. Well-defined problems with clear causal mechanisms are likely to present clearer courses of action and consequently lower decision-making costs.

Most decision makers do not implement their decisions. Rather, policies are turned over to others to carry out. Agency costs involve ensuring that policy implementers, the agents of the policy makers, put the policies into place in ways intended by decision makers. Some slippage always occurs between what policy makers intended and what implementers of the policies do. Agency costs arise from a variety of sources. Agents may not have the expertise or experience to competently carry out the tasks. Or they may pursue courses of action that are more aligned with their own values or interests and not those of policy makers or key constituents. In a number of instances, detecting agency problems is difficult. Government programs often bear multiple and conflicting mandates (the residue of high decision-making costs), providing implementers with considerable discretion in carrying out their duties. Thus, it may be difficult to distinguish between purposeful undermining of policies and the legitimate exercise of discretion.

Finally, commitment problems arise because sometimes people are tempted to act in ways that run counter to what they promised. Commitments support cooperative endeavors as parties to a project are assured that at some later date they will not be taken advantage of. For instance, a common rule used to allocate resources among miners, ranchers, and irrigators during the nineteenth century in the western United States was “first in time, first in right.” Those first to exploit a resource were granted rights protect-
ing their uses from newcomers who sought access to the resources. Secure rights encouraged people to invest in economically productive activities. With rights in water, farmers could make long-term investments in irrigation systems, knowing that their systems would not be rendered useless by others taking their water.

Commitments are made credible through mechanisms that limit the opportunities and the value of breaking an agreement. For instance, water-use rights based on first in time, first in right are recognized and protected in the constitutions of most western states. For a state government to change to different rules of water allocation and use, the state’s constitution would have to be amended as opposed to simply passing a piece of legislation. Constitutional amendments are difficult and costly, so writing a property right into a constitution limits the opportunities for dismantling the right and therefore strengthens the credibility of commitments by individuals based on those assignments of rights.

The commitment coin has two sides. Credible commitments allow citizens, organizations, and communities to cooperate to solve shared problems or realize common goals, but at the same time, it is difficult to change or transform credible commitments. That is, after all, what makes them credible. Over time, as circumstances change and new interests seek to participate in policy making and have their goals credibly committed to, existing institutional arrangements representing commitments to different interests act as barriers to change. For instance, urban and environmental interests are frustrated that agriculture controls significant portions of water in most western states, even though agriculture no longer dominates western states’ economies. Urban and environmental interests want to draw water out of agriculture but find it very difficult to overcome the credible commitments made to agriculture in an earlier time.

These different types of transaction costs are not independent of one another—they are interactive. One type of transaction cost may be reduced, but often at the expense of increasing another type of transaction cost. People have to attend to these trade-offs among transaction costs to develop institutional arrangements. One approach to reduce decision-making costs is to adopt relatively vague directives. Instead of spending time and resources agreeing on all details of a policy, decision makers may leave portions of the policy vague, with the expectation that policy implementers will imbue them with greater content and specificity. Vague directives grant-
ing implementers more discretion, however, increase agency costs. Agency costs may be reduced, but usually through increased decision-making costs as policy makers design more specific policies to limit the discretion of implementers.

Commitment problems and agency costs also interact. Credible commitments are costly to undo, opening the possibility of higher agency costs. For instance, decision makers could commit to pursuing environmental goals by hiring a group of professional experts with impeccable environmental credentials and granting them civil service protection, making it very difficult and costly to fire them. Such a credible commitment raises agency costs. Policy makers will find it difficult to hold implementers protected by civil service accountable. Policy makers could anticipate these agency problems and insert a sunset clause into the environmental policy requiring policy makers to reconsider and review the policy and either renew it or let it expire. Reopening the policy to address agency problems, however, allows commitment problems to reemerge. In revising the policy, policy makers can just as easily undo their commitments to various aspects of the policy as they can address agency problems. Trade-offs among transaction costs are as ubiquitous as transaction costs themselves.

Transaction costs influence and condition the institutional choices people make. People are not free to design any type of institution or policy they desire: they must settle on a tolerable mix of transaction costs. Different types of institutional arrangements represent different mixes of transaction costs and trade-offs among them. Are decision makers willing to bear greater agency costs in order to avoid commitment problems? Are they willing to take on greater decision-making costs in order to reduce agency costs? Answers to these questions are heavily influenced by the values and goals of the decision makers as well as the types of problems they are attempting to address.

**A THOUGHT EXPERIMENT**

We begin our thought experiment with an ideal situation for an advocate of watershed-level integrated and comprehensive management. A like-minded group of boundedly rational people are committed to the broad goal of integrated watershed management and possess comprehensive authority to make governing decisions on all aspects of a watershed. These watershed
decision makers are faced with two types of choices. First, they will have to choose policies for governing the watershed. Second, they will have to choose how to best organize and direct the people implementing the policies.

**Choosing Policies**

Decision costs of like-minded policy makers may be lower because they will mostly agree on what constitutes good policy. Comprehensive integrated decisions, however, present special challenges to boundedly rational people. Comprehensiveness requires consideration of the multiple components and dimensions of a watershed, not just one or two. Integration requires that the policies are ordered and sensible, working together, not at cross-purposes, to realize a shared vision of the watershed. Making comprehensive, integrated decisions about a complex adaptive system requires a considerable level of information about the structure and functioning of the watershed and mechanisms to continuously update the information. Thus, information costs to support comprehensive, integrated decision making will be high.

Even more challenging for decision makers is choosing among incommensurate alternatives. Incommensurate alternatives are things, people, or policies that possess multiple attributes in different combinations and degrees. They do not correspond in degree or extent in their attributes and consequences and no common metric exists to ease the choices among them. The epigraph for this chapter notes such a choice involving watersheds—water development versus fish, and not just fish but aquatic life, riparian habitat, and, in the case of the Pacific Northwest, human cultures.

Almost by definition, comprehensive, integrated watershed decision making means that policy makers will confront choices among incommensurate alternatives. As Jones (2001) notes, boundedly rational individuals struggle mightily with incommensurate choices. Are there mechanisms or decision-making processes that would ease the burden?

One approach is to identify each attribute of each alternative, assign a weight to each attribute, use the weighted attributes to develop an overall score for each alternative, and then compare the scores of the alternatives and select the one with the best score. The decision-making costs of such a process for each decision that policy makers must make would be quite high, even for a like-minded group of policy makers. Other ways of addressing
the high decision-making costs associated with choosing among incommensurate alternatives involve simplifying the alternatives and their attributes so the burden of comprehensive integration is reduced (Jones 2001).

Derthick (1974), in examining the decision-making processes of the TVA, noted the struggle of the three commissioners in choosing among incommensurate alternatives. They handled sharp differences among themselves over how the major activities of the organization should be integrated and coordinated by specialization (Derthick 1974, 205). Each commissioner took control of a major activity, with little attempt to engage in close coordination. Eventually, the board hired an executive director to handle the day-to-day operations and decisions, but the divisions among functions remained (Derthick 1974, 205). As Derthick (1974, 206) argues: “There was nothing here to suggest the incomparable superiority of the autonomous regional corporation as an integrative instrument. Eventually, electric power operations came to predominate overwhelmingly, although an ideal of coordination would probably have called for harmonization of a wide range of related activities.”

Besides simplifying decisions, policy makers could turn to professional experts to develop more comprehensive analyses of alternatives and score them. Doing so would lower their decision-making costs but increase agency costs. Policy makers would have to take steps to ensure that the professionals who developed and evaluated the alternatives did so in a way that was responsive to their values.

Decision-making tools may relieve decision makers of developing copious amounts of information, but they are only useful to the extent decision makers rely on them. Invariably, decision makers will confront situations in which they prefer an alternative different from the one the decision tool suggests is best. Such situations occur for a variety of reasons—an alternative may impose costs on a well-defined group of citizens that can least afford to bear them, for instance, or an alternative may require that a particular habitat or species receive greater protection than people’s livelihoods. The reasons are likely to be innumerable.

In order to commit to a decision-making tool, policy makers must in some way tie their hands so that they cannot discard the tool when it serves their purposes to do so. This may be accomplished in different ways. Decision makers may write into legislation that the tool must be used in making decisions or can be disregarded only if an extraordinary majority
agrees to use a different process. That is, they can avoid their commitment only through increased decision-making costs.

Decision makers may instead direct professional experts to use the decision-making tool and only forward to them the alternatives with the best scores. This, however, invites agency costs. If the experts have a stake in the options selected or strong preferences for particular alternatives, they may manipulate the decision tool to realize their preferences. A classic case of decision makers and professional experts grappling with decision-making tools concerns the relationship between Congress and the Army Corps of Engineers. Since at least 1936, with the passage of the Flood Control Act, Congress has required the Corps of Engineers to use cost-benefit analyses to select viable projects (Committee to Assess 1999). Over time, Congress has required the Corps of Engineers to engage in more sophisticated analyses and consider additional dimensions of projects, but cost-benefit analyses remain as the foundational decision tool. Congress and the Corps have struggled with such analyses. The budget, prestige, and political support of the Corps hinge on building projects, even projects with marginal or poor cost-benefit ratios. Members of Congress benefit from having a project in their districts or states, even if the project cannot be justified in cost-benefit terms, since the benefits are concentrated in specific districts and states and at least a portion of the costs is spread across all U.S. taxpayers. Consequently, the Army Corps of Engineers has exercised its discretion in ways that have made some projects more attractive, and members of Congress have not objected.

Over the past two decades, increasing pressure has been brought to bear from a variety of sources—reform-minded members of Congress, environmental groups, taxpayer groups, National Academy of Sciences committees, to name a few—to revise the process by which the Corps recommends projects to Congress (Committee to Assess 1999; Coordinating Committee 2004; New York Times 2006). The reform that has been repeatedly pursued, but that has not yet received congressional approval, is independent review of any project costing more than $40 million (New York Times 2006). Such independent oversight is intended to encourage Congress and the Corps to renew their commitment to selecting and funding projects in a more objective fashion.

Advocates of integrated watershed management rarely assume that integrating and coordinating various complex and difficult aspects of human uses of watersheds will be easy, but they do assume that it can be
done reasonably well. With sufficient information, resources, and authority, difficult comparisons and trade-offs can be made and comprehensive, integrated choices can be achieved. The above analysis suggests, however, that comprehensive, integrated decision making will rapidly overwhelm people’s cognitive capabilities. Boundedly rational people will seek to cope with such complexity by using a variety of simplifying mechanisms that they hope will reduce their decision-making costs. As transaction cost theory suggests, reducing decision-making costs inevitably creates opportunities for agency problems and/or commitment problems to emerge. People confront cognitive and cost limitations in developing and selecting policies, limitations that push them away from comprehensive integrated decisions.

Implementing Policies

Agency costs accrue as boundedly rational policy makers try to ensure that the policies they have selected are implemented appropriately. Policy makers usually do not implement policies but turn the policies over to others to implement. How do decision makers ensure that their agents implement policies as the decision makers would want? Once again, we return to the now-familiar transaction costs trade-off story, but we add a time dimension.

Agency problems may be anticipated and addressed in a number of ways, none of them costless. One approach is to select implementers from a profession whose values, norms, and preferences are most closely aligned with those of the policy makers. Policy makers may then rest assured that as implementers make choices, even in uncertain or unique situations unanticipated by policy makers, they will do so in ways that the policy makers would themselves have done (Moe 1990). Another approach is for policy makers to define specifically and concretely the actions they want the implementers to follow. Providing specific instructions, guidelines, and even time lines limits the discretion of implementers and lowers agency costs.11

Relying on appropriate professionals or detailed instructions and guidelines will work as long as the values, norms, and preferences of policy makers do not change. Inevitably they will. At the very least, current policy makers can readily anticipate that they will be replaced and that their replacements may have different values, norms, and preferences. Current policy makers are then confronted with another set of choices: how to ensure the policies
they adopt, which they believe are best for the watershed, remain in place even after they are no longer in positions of authority and no longer able to protect their programs. In other words, how can current policy makers commit future policy makers to particular courses of action?

One answer is to use mechanisms to insulate agencies, programs, and their employees from the reach of policy makers. Civil service systems, preventing policy makers from removing employees at will, are widely viewed as a means of insulating public employees from politics (Frant 1993; Horn 1995). Other examples include commission forms of agencies, in which commissioner terms are staggered and are for longer periods than elected officials; making it difficult for any particular coalition of decision makers to remove commissioners. Another mechanism is to adopt long periods between reauthorization dates, allowing a policy or program to become firmly established before policy makers have the opportunity to substantially revise or eliminate it (Moe 1990; Horn 1995). Or policy makers may provide individuals with property rights in the benefits of a program. If such property rights are recognized and protected in the larger legal system, they will be very difficult to substantially alter or eliminate.

Committing to an agency or program by insulating it from future policy change raises the probability of higher agency costs. Programs and employees may be more difficult to terminate, not just for future policy makers but for current ones. The ability of policy makers, present and future, to adjust programs to better fit changing circumstances, or to hold employees readily accountable, becomes increasingly constrained.

Consequently, future policy makers come into office confronting policies, organizations, and employees, put in place by their predecessors, that reflect values, norms, and preferences not of their own choosing. Even if these new policy makers are like-minded so that they may make decisions readily, they are now making decisions in a context with a history, and that history is difficult to back out of, just as their predecessors intended. They must attempt to realize their preferences in a context that will make it costly to do so. They may proceed along several avenues, none of which are mutually exclusive. They may attempt to roll back or eliminate programs and agencies created by their predecessors, which is the most costly and difficult approach to take. Employees will attempt to save their programs and their jobs, as will citizens who benefit from the programs. Policy makers will have to spend some of their limited time and resources overcoming such
opposition. Although they may eliminate undesirable programs, they will still face the task of creating new ones better suited to their preferences.

A more attractive alternative than eliminating programs is creating additional programs that better suit their preferences and assign their implementation to existing organizations. Or create new organizations to implement the new programs and hire individuals whose professional values are aligned with those of the policy makers. In the former case, organizations evolve whose goals, missions, and programs may conflict. In the latter case, multiple organizations work in the same issue or problem area but with different authorities, activities, and missions. No matter which approach is selected, overall watershed management will begin to appear fragmented, piecemeal, limited, and myopic. Such appearances are amplified as boundedly rational policy makers struggle with incommensurate choices by simplifying decisions and pursuing less comprehensive and less integrated alternatives.

**ADDITIONAL COMPLICATING FACTORS**

Thus far, we have explored the choices made by like-minded, boundedly rational policy makers. Let us now assume that the policy makers are no longer like-minded. Instead, they hold different values, norms, and preferences. The most immediate effect is on decision-making costs. Policy makers with diverse preferences will experience increased levels of conflict and disagreement, leading to higher bargaining and negotiation costs as they search for common ground. Furthermore, incommensurate choices become that much more difficult and thus that much more important to minimize as policy makers contest over which attributes of a given policy are vital and which can be safely ignored, and which weights should be given to important attributes.

Policy makers with diverse preferences can attempt to lower decision-making costs in a variety of ways so that choices can be made and actions taken. One approach is logrolling, which should not be confused with comprehensive, integrated policies. Logrolling gives each policy maker some of what he or she wants, but the policies do not fit together in a comprehensive meaningful fashion. Another approach is to adopt vague policy, allowing each decision maker to interpret the policy as he or she prefers. The implementers bear the decision-making costs and the conflict of turning the
vague policy into a better-defined and specified policy that could be implemented. Vague policies may lower decision-making costs but at the expense of increased agency problems. Also, commitment problems become more acute among policy makers with diverse preferences. Policy makers want to protect their hard-won policies not just from future policy makers with different preferences but from current policy makers as well. Addressing commitment problems by insulating them from politics ensures their durability, but at the price of agency problems. Agency problems could be reduced, but at the expense of commitment.

Another complicating factor is that watersheds are complex adaptive systems, as discussed in Chapter 1. It is just such an environment that has led to the call for comprehensive, integrated management. However, such an environment works against comprehensive, integrated management. Appropriate types of flood control, water quality, habitat protection or restoration, stream flows, and so forth are a function of time and place information. Water quality, threats to it, and approaches to recovering and/or maintaining it depend on a variety of factors, such as the type and location of the water sources and the types and locations of human activities that are impacting the sources. The transaction costs of making and implementing comprehensive, integrated policies that appropriately account for the wide variety of circumstances within a watershed simply explode. Decision-making costs escalate as policy makers struggle to obtain critical time and place information and address the distributional consequences of the policies under consideration. Commitment problems become more acute, as locking in one policy for one set of interests adversely affects other interests or limits policy makers’ ability to act in other areas. Agency costs escalate as implementers struggle to apply uniform policies across a diverse and highly differentiated watershed.

As boundedly rational policy makers struggle to make choices among incommensurate alternatives in a world characterized by complexity and transaction costs, the choices they make and the means by which those choices are implemented are likely to appear fragmented, duplicative, and narrow. We do not end up in a world of watersheds advocated by proponents of comprehensive, integrated watershed management, even though that was our point of departure. Comprehensive, integrated management at the watershed level taxes the cognitive abilities of people and generates burdensome levels of transaction costs.
Should we abandon the goal of comprehensive, integrated watershed management? The previous analysis suggests that there are hard limits to accomplishing such a goal. Instead of ignoring those hard limits and continuing to press for such a goal, it may be more appropriate to design watershed governance systems that take bounded rationality and transaction costs into account. Paraphrasing Jones (2001), watershed management is more likely to be successful if it accounts for the limits and potentialities of human nature.

Our discussion of bounded rationality and transaction costs has been relatively abstract to this point, so we now turn to a specific watershed—the Columbia River Basin. It provides a rich setting for exploring the effects of bounded rationality and transaction costs. In 1980, Congress engaged in an experiment by superimposing the Northwest Power Planning Council on the many governments within the watershed. The council was to integrate fish and wildlife goals with power goals across the basin. The council has experienced limited success for a variety of reasons, including bounded rationality and transaction costs.

**THE COLUMBIA RIVER BASIN**

The human uses of the Columbia River Basin are diverse, stretching across the entire basin and at multiple scales. Thousands of acres have been transformed into irrigated agriculture. Irrigation districts and companies, large and small, divert millions of acre-feet of water from the river and its tributaries each year. Compared with the volume of water that passes through the river annually, such diversions appear modest. Compared with the water diverted for municipal and industrial use, they are significant, and not merely because of their magnitude. Irrigated agriculture absorbs much of its water roughly at the same times that anadromous fish need it, in the spring for smolt to traverse to the ocean and in the late summer for adults to travel upstream to spawn.

Mining and timber harvesting have also sustained generations of people in the Columbia River Basin. The impacts of both activities have reverberated throughout the basin. Extensive cutting of old-growth forests has imperiled several species of wildlife. Mining and timber harvesting together have polluted the region’s streams and rivers with silt and toxic chemicals.
Agriculture, mining, and timber harvesting dot the landscape, but what has led to the most extensive and tightly intertwined human use in the basin is harnessing the power of the Columbia River and its largest tributary, the Snake River, for electricity generation. Over fifty major dams and twelve major storage projects, built by the Army Corps of Engineers and the Bureau of Reclamation, capture and control the flow of the Columbia (Wandschneider 1984). Furthermore, under the Treaty Related to the
Cooperative Development of the Water Resources of the Columbia River Basin, signed by Canada and the United States in 1961, Canada built a series of dams and reservoirs, capturing much of the spring runoff that had, until that point, served to propel smolt to the ocean (Wandschneider 1984; Blumm and Simrin 1991). The system of dams and powerhouses in an average water year generates 16,000 average megawatts of power, fueling a large and robust economy (Northwest Power and Conservation Planning Council 2005). The dams have also had a profound effect on what many consider the touchstone species of the Columbia River Basin—salmon and steelhead trout. In recent years, about 1 million adult fish return to the basin each year to spawn. Prior to dam and hydroelectric power development, spawning fish numbered 10 to 16 million annually (Northwest Power Planning Council 2000).

These many uses of the Columbia River Basin are governed by many different and overlapping institutional arrangements. Water allocation and use are governed by each of the states within the basin. Although all use the prior appropriation doctrine to govern water allocation and use, each state has its own distinct system of administration and rules. Furthermore, states do not coordinate or consult with each other concerning overall water allocations, nor do they have a mechanism, such as an interstate river compact, that provides a means of coordinating off-channel water uses. In addition to the states, the federal water agencies, especially the Bureau of Reclamation, are notable water allocation actors. Although federal projects, in developing water, must abide by state water laws, once the water is captured, it is governed by a different set of rules. Federal project water is typically not governed by prior appropriation; rather its allocation and use are governed by a series of contracts that the federal water agency enters into with water users, particularly irrigation districts.

A similar institutional description holds for many other uses of the Columbia River Basin's resources. State and federal laws and agencies govern forests on state and federal land, respectively. Fishing, even for salmon, is governed by states, Indian tribes, the federal government, and a treaty between the U.S. and Canadian governments. Compared with water and forestry, fishing is more closely coordinated, with a variety of governing bodies at different scales allocating fish and devising harvesting rules (Wandschneider 1984, 1049).

The institutional arrangements that govern hydropower are striking for their limited diversity and high degree of coordination, unlike the institu-
tional arrangements governing the other resources of the Columbia River Basin. Even though there are many dams and reservoirs and many electric utilities, the hydropower system is dominated by several large agencies and a coordinating agreement that tightly ties the utilities and agencies together. The Army Corps of Engineers and the Bureau of Reclamation by far generate the most power. The Bonneville Power Administration (BPA), a regional organization created by Congress, markets the power of the two federal water agencies. The Federal Energy Regulatory Commission licenses and monitors private hydropower plants.

The Pacific Northwest Coordination Agreement of 1964 established detailed operating criteria and power exchange principles. It also established an annual system-wide planning process to maximize power production (Blumm and Simrin 1991, 705–707). Wandschneider (1984, 1051) argues that the coordination agreement acts to manage hydropower as if there were a single, centralized utility. The physical effect of operating the river for hydropower production is to shift peak streamflow from spring to winter when demand for electricity is greatest (Wandschneider 1984, 1050).

Human uses and institutional arrangements governing those uses have had a profound effect on the ecosystems of the Columbia River Basin, but by far the most direct and negative effect has been on salmon. Concern over the fate of salmon has been expressed repeatedly over the past century, but not until Congress adopted the Fish and Wildlife Coordination Act in 1976 was there a concerted effort to coax the federal water and power agencies to address the effects of their actions on salmon. Although the act was well intentioned, it failed to accomplish its goal of providing equal consideration for fish and wildlife in project planning and development. The act created a consultation process between federal and state fisheries agencies and federal water and power agencies. In the consulting process, projects could be altered to reduce their effects on fish and wildlife, mitigation measures could be adopted to compensate for negative effects, and studies of project impacts on fish and wildlife could be conducted. However, the federal water and power agencies were given implicit veto power. They could reject project alterations or mitigation efforts if they deemed them to be unjustifiable in maximizing overall project benefits. Even if alterations or mitigation efforts were adopted, they often were inadequate because it was difficult to estimate the impact of the project on fish and wildlife. Attempting to incorporate additional alterations and mitigation measures after project completion...
was challenging, especially with regard to developing additional financing (Blumm 1982, 110–112).

The Northwest Power Act

Treating fish and wildlife as an afterthought in water projects changed dramatically within four years of the adoption of the Fish and Wildlife Coordination Act. During the 1970s, a series of events set the stage for congressional adoption of the Pacific Northwest Electric Power Planning and Conservation Act of 1980. Tribes successfully sued to have their treaty fishing rights recognized and enforced. The U.S. National Marine Fisheries Service and U.S. Fish and Wildlife Service initiated a review to determine whether various salmon stocks should be listed as threatened or endangered (Blumm and Simrin 1991, 690). The recognition of tribal treaty rights and the listing process coincided with a national energy crisis and the fear of a regional crisis in the Northwest. Congress’s attention turned to energy policy, including the expansion of electric generation capacity in the Northwest. Congress adopted the Pacific Northwest Electric Power Planning and Conservation Act of 1980 (often referred to as the Northwest Power Act), addressing both hydropower and fish and wildlife issues. As a result, the National Marine Fisheries Service and the Fish and Wildlife Service suspended the endangered species listing process in lieu of the development and implementation of what appeared to be an innovative and comprehensive approach to protecting and restoring salmon stocks (Blumm 1986).

The Northwest Power Act, in its structure and directives, signaled that its congressional creators understood that placing fish and wildlife on an equal footing with hydropower would be challenging. The act moved well beyond what was required of federal water and power agencies under the Fish and Wildlife Coordination Act, which largely required the agencies to take into account anadromous fish on a project-by-project basis. In contrast, the Northwest Power Act encompassed the entire Columbia River Basin, and planning and implementation activities were to be undertaken with the entire basin in mind (Blumm 1984).

The also act created a regional council consisting of two representatives from each of the basin states (Washington, Oregon, Idaho, and Montana). The Northwest Power Planning Council was charged with developing a basin-wide power plan and a basin-wide fish and wildlife recovery plan. The plans
would guide the actions of the various federal, state, and local governments and public and private power producers. Council decision rules required a high level of agreement among members to adopt and amend the plans. Plan adoption and revision required a majority of members appointed to the council, including a member from each state or, alternatively, six members of the council. The former rule required only five affirmative votes, although each state had to vote in the affirmative; whereas the latter rule required any state combination that yielded six affirmative votes. No single state exercised veto power, but states’ interests had to be adequately addressed for plan approval. In contrast, non-plan decisions simply required a majority vote of a quorum of members. A quorum consisted of five representatives; thus, only three votes were necessary to conduct day-to-day business.

Congress granted the council greater discretion in devising the power plan, which was to coordinate the development of additional power supplies among producers, than in devising the fish and wildlife plan. Congress constrained the council’s discretion in a variety of ways. First, the council was given strict time lines for developing and adopting a fish and wildlife plan. The council was to adopt a fish and wildlife plan within a year of receiving recommendations from the region’s fish and wildlife agencies, whereas the council was given two years to develop a power plan. Furthermore, the council was directed to develop a power plan that was fully consistent with the fish and wildlife plan (Public Law 96-501, section [h][9]).

Second, Congress directed the council to rely heavily on the expertise of the federal, state, and tribal fish and wildlife agencies in developing and revising a plan. The council was required to solicit in writing recommendations from these agencies for measures that would recover and protect fish and wildlife. Federal and state water and power agencies could also submit recommendations; however, the council was not required to solicit recommendations from them and the recommendations from the fish and wildlife agencies were to be given greater consideration. This was to be accomplished in several ways. If recommendations were inconsistent with each other, the council was directed to resolve the inconsistency, giving due weight to the expertise of the fish and wildlife agencies. Moreover, if the council declined to adopt recommendations from fish and wildlife agencies, it had to justify its action in writing by explaining how the recommendation violated the purposes of the act or how the council chose to adopt a measure that provided greater protection than the recommendation that was rejected (Public Law
Third, Congress directed the council to use several criteria in developing and revising the fish and wildlife plan. The plan should (1) complement existing and future activities of federal, state, and tribal fish and wildlife agencies; (2) be based on best available scientific knowledge; (3) use the alternative that is least costly among equally effective measures for achieving biological objectives; (4) be consistent with tribal rights; and (5) in the case of anadromous fish, provide improved survival at hydroelectric facilities and provide flows of sufficient quantity and quality between such facilities to improve production, migration, and survival of such fish (Public Law 96-501, section [h][7]).

Fourth, Congress created a dedicated funding source for developing and implementing the plan. Consumers of electricity were to pay for the effects of the hydropower system on fish and wildlife through the creation of a Bonneville Power Administration fund. Fifth, BPA and the federal water and power agencies were directed to abide by the plan. In particular, they were to exercise their responsibilities “in a manner that provides equitable treatment for such fish and wildlife with the other purposes for which such system and facilities are managed and operated” (Public Law 96-501, section [h][11]).

For its time, the 1980 Pacific Northwest Electric Power Planning and Conservation Act was innovative and creative. It was greeted warmly by organizations, agencies, and individuals who were actively attempting to protect the salmon of the Columbia River Basin. Viewed as the “most ambitious salmon recovery plan ever undertaken” (Blumm 1986, 464), the act broke with previous protection efforts in its scope, authority, diversity of recovery measures, and funding. By creating a single entity whose jurisdiction spanned the basin, a more holistic and coordinated approach to the recovery and protection of fish and wildlife could be realized. No longer would mitigation efforts occur on a piecemeal, project-by-project basis. Instead, a variety of critical measures could be adopted that worked together to recover salmon, such as simultaneously improving river flows, dam passage, and habitat restoration. True, the act did not address the myriad assaults on salmon, such as water diversions and fishing, but it did focus on a dimension over which the federal government held considerable leverage, the federal hydropower system. Furthermore, the act was more proactive than previous attempts at saving salmon. Best available science, not certainty in science, was to be the foundation of the measures and projects undertaken (Blumm
The act envisioned changes in the operation of hydropower projects in order to improve production, migration, and survival of fish. Finally, recovery efforts would not compete for funding with hundreds of other programs in the annual congressional budget process, because funding for the recovery program was ensured by the consumers of electricity.

The Northwest Power Act’s congressional authors paid careful attention to transaction costs, providing it with independence from other well-established organizations and programs that it challenged, while imposing structure and direction to try to ensure that it achieved congressional goals. The balance was delicate, and it was at the trade-off points among transaction costs that the act was most vulnerable. Rather than relying only on existing organizations to carry out innovative programs, Congress created an independent organization that afforded each basin state equal representation. A new and independent organization holds the promise of more faithfully realizing its creators’ goals and intentions than does housing new and possibly threatening programs in existing agencies with their well-developed operating procedures and well-organized supporters. In terms of electric power, the new organization provided states with a much greater role in regional planning and development, a role that they actively sought, rather than being marginalized in the BPA power planning process (Blumm 1983, 229). In terms of fish and wildlife, avoiding the ESA listing process required housing recovery efforts in an organization independent of the federal water and power agencies, which had demonstrated little interest in protecting fish and wildlife.

So that the council could move forward in a relatively timely manner and avoid becoming bogged down in making immediate and direct trade-offs between fish and wildlife and electricity generation, Congress directed it to develop two plans—plans that took account of each other, but two plans nonetheless. Congress steered the council clear of some very difficult choices among incommensurate alternatives. Furthermore, in developing each plan separately, the council was to rely on two very different sets of experts and professionals. The power plan required the council to work closely with state regulatory agencies and utilities. The fish and wildlife plan required the council to work closely with tribal, state, and federal fish and wildlife agencies. In both cases, Congress attempted to address potential agency problems by selecting experts whose professional values and skills were most closely aligned with the goals of Congress to actively engage in plan development.
Finally, as noted, Congress demonstrated its commitment to fish and wildlife recovery by creating a dedicated source of funding for plan development and implementation.

As discussed earlier, resolving commitment problems often comes at the risk of agency problems. The Northwest Power Act anticipated some of the agency problems that could arise. In the legislation, Congress took steps to ensure that the council acted in intended ways by constraining its discretion. For instance, the fish and wildlife plan was to mitigate only the hydropower system’s effects on fish stocks, not other human activities that harm fish. In addition, the plan was to be consistent with other criteria important to Congress, such as protecting tribal rights and not working at cross-purposes with existing recovery efforts. Finally, to ensure that the dedicated source of funding (which was beyond annual congressional control) was used appropriately, the act directed the administrator of the BPA, who controlled the source of dedicated funding, to use the revenues to protect, mitigate, and enhance fish and wildlife to the extent affected by hydroelectric projects on the Columbia. Furthermore, the administrator was specifically advised that the expenditures are in addition to, not in lieu of, expenditures required of other entities; the administrator was not to undercut funding by paying for other recovery efforts out of the fund or by reducing fund expenditures by counting other recovery efforts against it (Public Law 96-501, section [h][10][A]).

Limiting agency costs is often accomplished at the expense of decision-making costs. Certainly, Congress expended additional effort devising the various criteria that the council was to realize in developing a fish and wildlife plan, but the increase in decision-making costs was largely borne by the council rather than by Congress. To limit the council’s ability to evade congressional intent, Congress increased its decision-making costs by requiring the council to put in writing its reasons for rejecting measures proposed by the fish and wildlife agencies. Congress placed the burden of proof on the council to publicly justify its decisions. Limiting agency problems was further addressed through extensive public participation requirements. Rather than Congress expending decision-making resources to closely monitor the activities of the council, Congress invited the public to take on those costs by providing for a variety of participation mechanisms—submitting comments, attending public meetings, and participating in hearings.

Congress demonstrated a credible commitment to the recovery of fish
and wildlife by creating an independent organization and charging it to rely heavily on fish and wildlife experts in devising a recovery plan. It further demonstrated its commitment by imposing a strict time line on the adoption of a plan to discourage the process from becoming bogged down. However, it also imposed decision rules that required a high level of agreement among council members in order for a plan to be adopted, but once adopted, a plan would be hard to unravel or water down. The other notable commitment mechanism was a dedicated source of funding.

The Northwest Power Planning Council

Somewhat surprisingly, given tight deadlines, super-majority decision rules, and hundreds of submissions of measures to be included in the fish and wildlife plan, the council did adopt a plan on schedule that largely followed the directives of Congress. The plan reflected the major substantive measures proposed by the fish and wildlife agencies. The centerpiece was a water budget, controlled not by the federal water agencies that operated the dams but by two water budget managers who were fisheries experts. The more than 4.6 million acre-feet of water was to be used during the spring and early summer to support the migration of juvenile salmon downriver (Blumm and Simrin 1991, 696). The water budget managers could call for the water from federal water agencies at times and in places that they judged would be most beneficial.

The council, perhaps anticipating agency problems, placed constraints on both federal water agencies and the water budget managers. The water budget could easily be undercut by federal water agencies as they released water to generate power. For instance, they might release less “power” water in order to compensate for “fish” water. In an attempt to avoid that possibility, the council adopted a fixed schedule of “firm power flows” that provided for at least a certain level of spring flows to which the water budget would be added (Blumm 1984, 314–315). The council also recommended that the water budget take priority over reservoir fill and secondary power generation. That is, the federal water agencies were not granted the discretion to trade the water budget for goals that they found more desirable. The water budget managers, in turn, were not allowed to release water that would have the effect of increasing river flows above a recommended maximum.

The second major component of the plan addressed dam bypass mea-
sures for migrating juveniles. Not only is it important to speed the passage of juveniles down the river, but it is also important to protect them from passing through the power turbines. The plan adopted spill requirements on the middle section of the Columbia and ordered studies and eventual incorporation of mechanical bypass devices on dams throughout the basin. Both requirements were controversial, with fish and wildlife managers arguing that the measures were inadequate and dam operators arguing that less expensive alternatives, such as barging and trucking of juvenile salmon around the dams, should be used more widely (Blumm 1984).

The third major substantive component of the plan focused on rebuilding fish stocks. In addition to funding a number of specific projects, the council created the Fish Propagation Panel to develop a coordinated, system-wide plan for recovering wild stocks, improving hatchery operations, and identifying potential hatchery sites and to coordinate the propagation plan with existing efforts (Blumm 1984, 314–315). Overall, the council adopted an initial plan that was comprehensive in scope, addressing the major hydroelectric impacts on fish and wildlife, from river flows to dam bypass systems to habitat restoration.

Separate and apart from substantive components, the council also addressed a number of issues involving coordination and funding in order to ensure that the federal agencies abided by the plan. The council anticipated agency problems by attempting to limit the discretion of federal agencies. In the plan, the council requested that the BPA expeditiously act to develop funding for the plan’s measures. Such funding would largely come through BPA’s rate-setting process. In addition, the council reminded the federal water and power agencies that according to the statute, they were to implement the plan to the fullest extent practicable. Consequently, the council directed the agencies to indicate in writing that they would implement the various measures or, if they were unable to implement the measures, to provide an explanation with supporting documentation (Blumm and Simrin 1991, 679–680). Finally, the council requested that FERC assess the cumulative impacts of hydroelectric proposals instead of assessing impacts on a project-by-project basis. The council also directed the BPA to ensure that all power sales and power scheduling were in accordance with the plan (Blumm 1986, 475).

The fish and wildlife agencies had suggested a more aggressive approach to implementation. They requested a series of studies to examine how federal water and power agencies engaged in decision making and to identify
appropriate mechanisms for inserting fish and wildlife considerations into the decision-making processes. In other words, the fish and wildlife agencies wanted the council to design and adopt mechanisms that would commit the federal water and power agencies to implementing the plan. The council viewed implementation as an agency problem; the fish and wildlife agencies viewed it as primarily a commitment problem. In 1987, frustrated with the slow progress made by federal water and power agencies, the fish and wildlife agencies once again pressed the council to address the issue. This time, the fish and wildlife agencies viewed the issue as an agency problem and requested that the council adopt a conflict resolution mechanism whereby the council would investigate and make a written report in response to any allegation that a program item was not being implemented. The council refused to adopt the conflict resolution mechanism, claiming that existing procedures were adequate (Blumm and Simrin 1991, 692–693).

Federal Water and Power Agencies’ Responses

The council and the fish and wildlife agencies were disappointed in the implementation response of the federal water and power agencies. The substantive portions of the plan became embroiled immediately in a variety of agency problems. First, the water budget was inadequately implemented. The firm power flows were often not provided, and the water and power agencies gave priority to reservoir fill and to the sale of electricity on the secondary power market. These activities acted to undermine the value of the water budget (Blumm and Simrin 1991, 676–677). Second, federal agencies were also slow to request funding for dam bypass mechanisms, delaying their implementation. Dam bypass mechanisms competed with funding for other projects that the agencies valued more highly. Third, hatchery and habitat restoration projects and a variety of studies became entangled in funding disputes between the council and the BPA. For instance, the BPA refused to fund a study requested by the council to measure the effects of the hydropower system on fish and wildlife so that overall program goals could be established. After all, consumers of electricity were to pay only for the effects of the hydropower system and no more. The BPA stated that the study plan developed by the fish and wildlife agencies was unacceptable to BPA management and in violation of ratepayers’ interests (Blumm and Simrin 1991, 675). Much the same occurred with hatchery and habitat res-
toration projects in the Umatilla Basin, a tributary of the Columbia River (Chaney 1986). Conversely, the council feared that the BPA would use program monies to fund studies that the council had not requested. Eventually, the council and the BPA came to an understanding over the studies that would be funded.

The Council’s Response to the Federal Agencies

Given the earlier discussion of transaction costs and trade-offs, the council’s response to the agency problems encountered was predictable. The primary response was to increase the decision-making costs of the council and of the federal water and power agencies. The council’s decision-making costs increased as the council engaged in almost annual amendments to the plan. Although some amendments were substantive in nature, such as declaring hundreds of miles of streams off limits to hydropower development and adopting spill requirements for the Snake River dams to allow smolt to bypass power turbines, many of the amendments were directed at implementation problems. The agencies’ decision-making costs were increased as the council subjected them to stricter time lines and directed them to follow more detailed and transparent decision-making processes.

In 1984, the council adopted a series of deadlines for various projects and activities. For instance, deadlines were established for the installation of bypass systems at several main-stem dams (Blumm and Simrin 1991, 681). In addition, time lines were established for a variety of habitat improvement and fish propagation projects (Blumm and Simrin 1991, 683). Also, the council adopted a five-year action plan that set priorities for various program measures. As part of the action plan, federal water and power agencies were to develop work plans and budgets for program measures and to make annual progress reports (Blumm 1986, 477–478).

Over the course of the 1980s, the council spent a considerable portion of its time attempting to cajole the federal water and power agencies into implementing the fish and wildlife plan. Although progress was not as rapid as desired, the council, nevertheless, could point to a number of accomplishments, from developing a solid foundation of research on a variety of dimensions of the Columbia River Basin, to protecting hundreds of miles of streams from hydropower development, to adopting a water budget, to funding dozens of habitat restoration projects, to adopting spill programs at
dams on the Columbia and the Snake, to placing the term “adaptive management” into the popular lexicon through its insistence on study designs that maximized learning opportunities, and so on. By the end of the 1980s, the council could point to a number of substantive changes. These accomplishments, however, were overshadowed by one disturbing fact: salmon stocks continued to dramatically decline.

The Rest of the Story

Beginning in the 1990s, the Northwest Power Planning Council was slowly displaced as the central actor in recovering salmon stocks. By 1990, Indian tribes and fish and wildlife agencies were increasingly restless and dissatisfied with the limited progress of the council and its fish and wildlife plan. The Columbia Fish and Wildlife Authority, a coalition of state and tribal fish and wildlife agencies, released a report calling for specified flows on the Columbia and Snake Rivers. The council’s water budget did not provide sufficient flows to mitigate the effects of the hydroelectric system on fish runs. Consequently, the authority wanted river flows established (Blumm et al. 1997). At roughly the same time, tribes and environmental groups petitioned to have various Snake River salmon runs listed as endangered under the Endangered Species Act. In 1991, the National Marine Fishery Service (NMFS) listed some Snake River salmon runs as either endangered or threatened. In response, the council amended the fish and wildlife plan by establishing specified flows on the Snake River. NMFS relied on the amended plan to issue a “no jeopardy” ruling, which specified that the operation of hydroelectric projects was not to jeopardize the continued survival of the salmon in light of the revised fish and wildlife plan. Both the council plan and the NMFS biological opinion were challenged in court, with environmental and state fish and wildlife agencies charging that the plans were inadequate and industry groups charging that they were too aggressive and costly. The courts largely ruled in favor of the environmental groups and chided the council and the NMFS for adherence to an incremental approach that favored the status quo (Blumm 1995).

The results of the court cases were three plans by three different organizations for the recovery of salmon (Blumm et al. 1997). In 1994, the council adopted a new fish and wildlife plan that established specified river flows, largely through reservoir drawdowns. It also established spill requirements
for dams throughout the basin and it relied less heavily on trucking and barge of smolt. Furthermore, to supplement flows in the Snake River it called for the leasing of up to 1 million acre-feet of water. The plan was largely ignored by federal water and power agencies, which focused more on the NMFS plan. The NMFS adopted an approach heavier on studies and lighter on changes in system operations than the council plan. It too established flow targets, albeit lower than those established by the council; it deferred reservoir drawdown and instead called for drawdown studies; it adopted a much more limited spill program; and it relied heavily on trucking and barge of smolt (Blumm et al. 1997). A third plan, which was unenforceable against federal water and power agencies, was proposed by a coalition of tribes. It was closer in content to the council plan, although it contained more rigorous drawdown, spill, and hatchery components (Blumm et al. 1997). The council recognized the confusion engendered by three plans and called for the reconciliation of the plans, ideally under the stewardship of the council. Little progress was made toward plan reconciliation, and over time, the NMFS, under its ESA authority, became the principal leader in salmon restoration efforts (Blumm et al. 1997).

In the meantime, the council has added a layer of complexity to its planning approach. Historically, its fish and wildlife program focused on the basin level. The water budget was devised at the basin level as was the dam bypass and passage plan. Only the rehabilitation of salmon habitat was concentrated in promising sub-basin areas. Initially, the council refused to engage in sub-basin planning. By the close of the 1980s, however, the council realized that the sub-basins of the Columbia Basin were diverse, with different habitats, different salmon species, different economies, and different threats and challenges to salmon recovery (Blumm and Simrin 1991, 688). It instituted a sub-basin planning process that it recently completed. Using community participation processes, sub-basin plans were developed that conformed to the council’s basin-wide framework but addressed the unique problems and community goals of each area. The plans will continue to guide the council’s funding decisions as it seeks to recover, enhance, and protect salmon habitat.

Prospects remain rather discouraging. In 2002, Oregon State University and the Environmental Protection Agency formed Salmon 2100. The coalition drew together thirty-three fisheries scientists and policy analysts to determine the likely future of wild salmon in 2100. The consensus was that
under current policies only remnant populations of salmon would be present throughout the Pacific Northwest and California.

CONCLUSION

The shape and form of fish and wildlife recovery efforts in the Columbia River Basin have changed dramatically over the last three decades. In the 1970s, the federal water and power agencies were required to consult with fish and wildlife agencies only on a project-by-project basis. In the 1980s, a new basin-wide organization, the Northwest Power Planning Council, developed and administered a basin-wide fish and wildlife recovery plan. The 1990s saw three basin-wide plans: one by the council, one by NMFS in response to the listing of salmon as endangered, and one by a coalition of tribes frustrated with the other two organizations’ plans. By the end of the 1990s, the council was actively overseeing the development of sub-basin plans as a primary mechanism for implementing its basin-wide plan.

Comprehensive, integrated watershed management remains elusive in the Columbia River Basin for a variety of reasons, including bounded rationality and transaction costs. The many choices among incommensurate alternatives, diverse agencies with missions that conflict with the overall goal of recovering fish and wildlife, and the complexity of the watershed all work against comprehensive management. Bounded rationality and transaction costs, however, are not the only reasons why multiple, overlapping governments and organizations are likely to emerge in a watershed. They are also likely to emerge because of the different values and uses people pursue in a watershed, as we will discuss in the next chapter.

NOTES

1. As Derthick (1974, 4) colorfully summarizes the politics of river basin management, “Regional organizations are excrescences on the constitutional system, unusual things that must be superimposed on the universe of functionally specialized federal and state agencies. The odds are against their being formed and, if formed, against their flourishing.”

2. See Markman and Medin (2002) for an excellent survey of the psychology and social psychology literature on decision making. See Kopelman et al. (2002) for an excellent survey of the psychology literature that applies decision making to environmental settings.
3. For instance, it has become increasingly common for elected officials or key constituencies to complain that government employees are not using the best available science in carrying out their duties. For elected officials who desire less regulation, there is often the assumption that government employees are pursuing extreme environmental values that scientific evidence simply fails to support. For elected officials who desire more regulation, there is the assumption that government employees are purposely failing to act as they await more certain scientific results.

4. North and Weingast (1989) used this concept to explore the relations between the Stuart kings and the British parliament during the seventeenth century. Kings increasingly turned to manipulating and seizing private property to acquire sufficient resources to fight wars. In response, parliament refused to provide kings with a regular source of revenue. Both sides would have been better off if kings had committed to protect private property and parliament had made a reliable stream of revenue available to the king. However, a simple promise by the king to stop seizing private property hardly would have constituted a credible commitment, since he easily could, and had, gone back on his word. Only after several decades of conflict did the king and parliament devise institutional arrangements, such as a judiciary and a parliament independent of the crown, that acted as checks against the crown, making such a commitment on the part of the king credible. See David Weimer (1997) for numerous case studies that apply to the concept of credible commitment to explain the economic reforms occurring in Russia, the Czech and Slovak republics, Poland, Hungary, and East Germany. Also see Gary Miller (1992) as he explores the problems managers experience in making credible commitments to share the gains realized from efficiency-enhancing activities adopted by employees.

5. Williamson (1985) calls such mechanisms “hostages.”

6. On the other hand, the security of senior water rights, which in western states are held mostly by agricultural users, is what makes those rights especially valuable, and those rights tend to command high prices in locations where transfers of water rights are feasible.

7. For instance, regulatory agencies make choices among incommensurate alternatives in devising and adopting rules. An ozone standard set by the EPA affects not only businesses and industries but also citizens who have chronic and severe respiratory ailments. Regulatory agencies are regularly criticized for the incommensurate choices each makes, and for the differences in choices across agencies. Some agencies impose quite strict rules that limit human exposures to risk; others adopt less strict rules, exposing people to greater risks, but there is little consistency among agencies. Not all choices among incommensurate alternatives involve human life-and-death matters, but they are difficult to make nevertheless.

8. As Jones (2001, 47) notes, “Of all the limitations cited in people’s ability to put rational choice theory into practice, the most important is probably the difficul-
ties people have in handling incommensurate attributes.”

9. For instance, if decision makers wanted to establish a surface water quality standard, they would first identify the different attributes of each standard they were considering, such as the effects on different types of aquatic plants and animals, the functioning of wetlands, the different uses of water and wetlands made by humans, groundwater quality, economic development, and so forth. They would then place a weight on each of the attributes—they may give functioning wetlands greater weight than groundwater quality, for instance. Once they have assigned weights to each of the attributes, they would then develop a score for each water quality standard and they would select the one with the best score.

10. The Water Resources Council attempted to develop a multi-objective planning process to be used by each of the river basin commissions that would allow the commissions to prioritize different projects and programs with the goal of optimal use of the watershed (Holmes 1979).

11. Both approaches for limiting agency costs come at the expense of other types of transaction costs. For instance, providing specific instructions increases decision-making costs. Decision makers must expend additional time and resources attempting to anticipate the variety of circumstances implementers are likely to encounter and then devise appropriate decision rules. Such actions may ultimately work against the larger goals of decision makers. Weighing down implementers with a multitude of rules and time lines may promote policy failure and not policy success (Moe 1990).


13. The BPA attempted to convince the council to adopt a smaller water budget and to adopt alternatives to a water budget (Blumm 1984).

14. As Blumm (1986, 495) noted, “the program’s clear elevation of Water Budget flows over reservoir refill and secondary power sale considerations has been frequently ignored or evaded by the federal operating agencies.”

15. The BPA also refused to fund projects that it anticipated Congress would appropriate funding for (Blumm 1984, 347).