

**The Contribution of Nonmarket Valuation to Policy: The Case of Nonfederal Hydropower
Relicensing**

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Kurt Stephenson
Dept of Ag & Applied Economics
Virginia Tech
Blacksburg, VA 24061
Email: Kurts@vt.edu
Phone: 540-231-5381

Leonard Shabman
Resources for the Future
1616 P Street St., NW
Washington, D.C. 20036-1400
email: Shabman@rff.org
Phone: 202-328-5139

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Abstract: The contribution of nonmarket valuation studies to decisions about the operation of nonfederal hydroelectric facilities is examined. Hydropower licensing reforms by the Federal Energy Regulatory Commission to better weigh market and nonmarket tradeoffs did not require or use nonmarket valuation. License negotiation processes are interpreted as a substitute for valuation.

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I. INTRODUCTION

Many environmental economists advocate calculating and then including money-equivalent measurement of peoples' preferences for nonmarket environmental amenities in a comprehensive benefit-cost analysis. These benefit-cost results have long been proposed as a guide for public investment and regulatory decisions (Arrow et al 1996). Supporters of these efforts assert that such monetization will be welcomed and used by decision-participants who seek to understand peoples' preferences for important environmental services. This assertion provides part of the motivation for a major research program to develop procedures and data bases for "nonmarket valuation" (Cropper 2000). Some economists question the conceptual and philosophic validity of a benefit-cost criterion for policy evaluation (Bromley 2006, 2003; Sagoff 2004; Shabman and Stephenson 2000). Less systematic attention has been given to the question: "is nonmarket valuation demanded or used for decision-making?" We address this question in the specific context of hydropower dam licensing by the Federal Energy Regulatory Commission (FERC).

The Federal Energy Regulatory Commission (FERC) is responsible for issuing licenses to operate all nonfederal hydropower projects in the United States. FERC licenses these facilities for 30 to 50 years and also "relicenses" the same facilities when the initial license expires. License conditions typically include downstream flow release requirements (timing, magnitude, and duration of flow) that will constrain electric power production potential and influence downstream riverine conditions, but can also include fish passage requirements,

recreational enhancements (recreational facilities, public access to water, etc), and resource enhancements (ex. fish stocking programs) that can increase the costs of dam modifications and operations. In setting license conditions, Congress instructs FERC to balance competing uses for the water resources (Federal Power Act, Section 10a). This “balancing” directive requires FERC to recognize the tradeoffs between the marketed service of hydro-electric power and the nonmarket services of recreation and aquatic life support (fish population). In fact, the Federal Power Act’s hydropower licensing process represents one of the few instances in U.S. environmental law where a public agency is explicitly directed to do make such tradeoffs that involve environmental services. Most environmental statutes, such as Clean Water Act, Clean Air Act, and Endangered Species Act, explicitly prohibit an explicit economic weighing of costs and benefits when deciding levels of environmental services to be provided. As a result this process offers one of the few clear opportunities for nonmarket valuation estimates to be developed and used in making choices in environmental decision making.

Until recently, the FERC relicensing decision-process was highly centralized and FERC commissioners assumed primary responsibility for deciding tradeoffs between the value of hydropower production and environmental services (Spence 1999). Furthermore, FERC rarely if ever, asked for money-equivalent estimates of public preferences (non-market valuation) for recreational or environmental outcomes. Instead, FERC compared estimates of hydropower costs and revenues with a variety of qualitative and quantitative measures of the physical and biological changes of different license alternatives (Moore et al 2001; Stephenson and Shabman 2001).

However, beginning in the mid-1980s and gathering momentum in the 1990s, this FERC licensing process came under public criticism for perceived inadequacies when considering

alterations to biological resources and recreational uses in rivers affected by hydropower operations (Stephenson 2000; Spence 1999). This criticism manifested itself in increasingly lengthy and contentious licensing process, leading to calls for reform from nearly every interested party. Some economists argued that increased use of nonmarket valuation could guide FERC decision making when making tradeoffs and in so doing reduce the increasing tension and delay that had become endemic to the relicensing process (Moore et al. 2001; Loomis and Feldman 1995).

In response to the widespread criticism and dissatisfaction with the process, FERC instituted a series of licensing reforms starting in 1997 and through 2005 period FERC made significant institutional changes to address the perceived inadequacies in the way it met its statutory balancing requirement. We first provide a historical review to set the stage for the debate over the possible role for nonmarket valuation in a revised licensing process. During this time FERC had the opportunity to revise licensing procedures or guidelines that would encourage or require the use of nonmarket valuation as an aid to its deliberations. However, it did not make such changes. Then we report on the role nonmarket valuation now plays in deciding the balance between hydropower and environmental services under the new licensing rules. While nonmarket valuation is permissible, there is little empirical evidence that decision participants on individual relicensing cases either demanded or used nonmarket valuation when making licensing decisions. We conclude that the new FERC licensing process stressing negotiation between various interests is a workable, and perhaps, preferable, substitute for nonmarket valuation as a way to meet FERC's statutory balancing requirement.

II. NONMARKET VALUATION IN FERC HYDROPOWER RELICENSING

The Traditional Process

FERC was formed with the passage of the Federal Power Act in 1920 as an independent commission.¹ The Commissioners were appointed by the President on staggered terms and were served by a staff of experts from the disciplines required for the commissioners to execute their responsibilities. As an independent commission, the FERC was to determine the public interest in dam licensing decisions based on the results from necessary technical studies. Even by standards of the day, the FERC was designed to be better insulated from public pressure than most water resource agencies.² With a few exceptions, Congress granted the FERC broad authority to decide whether a dam would be constructed and the conditions under which the dam should operate. According to one observer, “for more than 60 years the FPA (i.e. FERC) has been the prototypical example of the unconstrained delegation of power to unelected bureaucrats” (Spence 1999a, 420).

FERC required license applicants to follow a formal licensing process that would provide the FERC commissioners with the information they deemed necessary for making a decision that would serve the public interest. Prior to the recent reforms, FERC’s “traditional” licensing process could be described as applicant driven and sequential. In general the licensing process is divided into two parts: pre-filing and post-filing (license) phase. In the pre-filing phase, the licensee notifies interested parties on an intent to file for a license (or relicense) and take comments on study needs. The applicant selects and funds analytical studies. Based on another set of comments from state and federal resource agencies, the applicant submits a draft license

¹ Originally, FERC was called the Federal Power Commission (FPA).

² This statutory delegation of authority to the FERC was consistent with the progressive-era ideal delegating resource allocation and decisions to expert agencies.

application to FERC. The draft application includes the license conditions recommended by the licensee. The post-filing phase begins when FERC accepts the application for review. Initially, FERC judges whether the application is complete. If not, FERC will require that additional studies be conducted (funded by the applicant). When the applicant is judged to be complete, FERC officially accepts the application and begins the formal evaluation process. The process, conducted under the National Environmental Policy Act (NEPA) guidelines, formally recognizes all participants (federal and state agencies, environmental groups, Native American Tribes, etc) who wish to review and comment on the application. FERC accepts and reviews license proposals from these groups and may issue request for additional studies. FERC may also develop license alternatives of its own.

Based on this process, FERC would evaluate and select among a number of license alternatives, including the preferred alternative of the applicant. FERC is not required to, and would not, compare license alternatives based on formal social benefit cost analysis. In evaluating a typical relicensing case, the analytical baseline is the operations and resulting levels of services under the existing license. FERC then typically calculates the financial costs (capital and annual operating and maintenance costs) to the license applicant of alternatives to the existing license. Costs also include foregone power benefits of any required change in operations from the existing license (typically measured as the cost for replacing lost hydropower production with the next best available alternative).

In most relicensing cases, the majority of analytical attention and resources were directed toward the means, costs, and consequences of mitigating environmental conditions from operating the facility. Such measures might include establishing downstream flow releases, reservoir levels, fish screen/entrainment, fish passage facilities, recreational enhancements, and

environmental enhancements (riparian buffers, wetlands). The FERC staff calculated the reduction in the net financial position of the licensee (e.g. increased costs from the construction costs of a fish passage facility or reduced power revenues due to increasing minimum instream flows) for different mitigation options.

The cost to the licensee of different mitigation options was then compared to different measures of environmental change. Specifically, the cost of replacement power and project modification costs are compared against typically a suite of indicators that measure the changes to the natural environment. These indicators might include changes in fish populations, acres of usable aquatic habitat, and increased number of recreational user days. These trade-offs were sometimes analyzed using incremental (knee-of-the curve) analyses. For example, such analyses might compare the incremental gains in usable fish habitat with the changes in the sum of the financial and power replacement costs as different minimum instream flows were required (Fargo 1991).

Some environmental indicators might be expressed in monetary terms, for example as the replacement cost through hatchery production of juvenile fish lost to entrainment. Research on FERC decision-making, however, consistently reports an almost complete absence of willingness to pay estimates for establishing environmental mitigation measures (Moore et al 2001; Loomis and Feldman 1995; Stephenson and Shabman 2001). Moore et al (2001, 424) state:

One result is clear from examination of the record: FERC does not explicitly weigh the social benefits and costs of relicensing decisions. It regularly considers only private hydropower revenues and costs in its decisions. The opportunity

costs of hydropower operations – in terms of the benefits of whitewater recreation and sport fishing – are rarely quantified in the sample of licenses studied here.

While Moore et al. consider that explicit weighing means only monetized estimates of all changes in environmental and economic services, this does not also imply that FERC did not weigh tradeoffs or consider the opportunity cost of hydropower operations. FERC commissioners (and the staff that make recommendations) do weigh tradeoffs, but historically it was based on FERC's collective judgment of whether the mitigation option is "worth" the financial cost to the licensee and was not based on an analytical calculation.

Pressures for Reform

Almost since its inception, environmental and recreational interests have charged that FERC placed too much weight on hydropower interests in licensing and relicensing decisions (Spence 1999b). This criticism began to more vocal and persistent beginning in the 1960s and gathered further momentum as the river restoration movement emerged two decades later. Partly in response to this mounting criticism, the FERC has seen gradual erosion in its authority to determine licensing conditions (Sensiba 1999a). First, Congress and the courts have required modified procedural requirements to assure greater attention to environmental consequences of licensing decisions (Spence 1999a; Sensiba 1999). For instance, the 1986 Electric Consumers Protection Act required the FERC give equal consideration to wildlife and recreational outcomes and to accept resource agencies' recommendations or to explain in writing why it was rejecting the recommendations. The authority of state and federal agencies to insert conditions into a license over the objections of FERC was also strengthened (called "mandatory conditioning authorities"). The courts, for example, expanded state water quality agencies' authority to

specify downstream flow conditions under section 401 of the Clean Water Act as well as expanding authority of the U.S Department of Interior to proscribe fish passage facilities on existing facilities (Sensiba 1999). Unlike FERC, state and federal agencies exercising their mandatory conditioning authority face no statutory obligation to balance environmental gains against hydropower. Instead, these agencies advocate for a single objective (ex. aquatic habitat) and performance measure (ex. Dissolved oxygen at X concentration).

The changes facilitated the ability of other interests to assert their conditioning authority in the relicensing process. The number of mitigation alternatives offered by agencies for each license increased over time (Moore et al 2001; USGAO 1992). Not surprisingly, the license process became more costly and conflict-ridden (Giovando 2000; Powell 1997). Consequently, the time to process a relicense request increased considerably, from a little less than a year in the early 1980s to over 4 years by the mid 1990s (Hunt and Hunt 1997).

By the mid 1990s, FERC's traditional licensing process was becoming increasingly unacceptable to the FERC itself, as well as to the applicants and the resource agencies (Stephenson 2000). Even while they were increasing their influence in the licensing process, federal and state resource agencies and environmental groups remained critical of licensing conditions that reflected FERC's balancing of interests, as opposed to serving the more narrow objectives of the resource agencies. As federal/state agencies and nongovernmental groups kept resisting FERC, and as court challenges increased in number, the hydropower industry became increasingly concerned about time and cost required to secure a license renewal.

FERC Hydro Licensing Reform, 1997-2004.

The widespread dissatisfaction with the relicensing process led to reform proposals ranging from calls for different analytical methods to legislative changes to the balancing

language of the Federal Power Act itself (Stephenson 2000). In 1997 FERC made an initial effort to address these criticism by developing and experimenting with an “alternative” licensing process (referred to as the ALP process) (18 C.F.R. § 4.24(i) 2000). The alternative relicensing process retains the same two stage pre-filing and post-filing licensing process as the traditional process, but front loads the pre-filing process with early negotiation and collaboration between the license applicant and involved stakeholders (Powers 2004; Hill and Murphy 2003; Swant 2001; Bonham 1999; Groves and Liimatainen 1999; National Hydropower Association 1999).

Under the ALP, the licensee must file a request to use the alternative process and before granting the request, the licensee must demonstrate to the FERC that the relevant stakeholders have been contacted, will participate in the process and the must have an acceptable communications protocol (National Hydropower Association 1999). If approved, the licensee then establishes a collaborative process to investigate and discuss licensing alternatives. The licensee works with the stakeholders to decide what studies will be conducted. In addition, NEPA document preparation is moved into the pre-application phase where the applicant and stakeholders, not FERC, are largely responsible for preparing a draft NEPA document and a license application (National Hydropower Association 1999). FERC staff are actively engaged in facilitating, not directing, the pre-filing discussions (Hill and Murphy 2003).

At the time the license renewal application is filed, FERC staff also receive a draft NEPA document and license application jointly submitted by the license applicant, resource agencies, Tribes, environmental groups, and other interested stakeholders. FERC then produces a final EIS and license recommendations. The presumption is that if all interested parties to the negotiation can agree on a mutually satisfactory license conditions and such conditions are within FERCs authority to confer, the FERC will translate these conditions into a new license.

As a practical matter, the alternative process decentralizes decision making by downplaying the role of the FERC staff and commissioners in judging whether the cost imposed by a license condition is “worth” the environmental/recreational enhancements (Stephenson 2000). The ALP process places more responsibility on the licensee and involved decision participants to negotiate license alternatives and decide what alternative is mutually acceptable.

As the alternative licensing process was being tested, FERC and a number of federal agencies (Departments of Commerce, Interior, Energy, and Agriculture, Environmental Protection Agency, and Council of Environmental Quality) voluntarily formed an interagency task force (ITF) in the late 1990s to investigate ways to improve the licensing process (DeWitt and Ebrahim 2001). A steering committee initially divided into four workgroups: Coordination of federal and state statutory and regulatory mandates; Review of ex parte regulations; Collaborative Process Issues; and Economic Analysis: Methods and Procedures.

The economic analysis work group was tasked with reviewing FERC’s economic analyses to assure that the licensing process fostered analyses that reflected federal resource agencies missions and the concerns of nongovernmental environmental groups. The U.S. Fish and Wildlife Service commissioned a study to advise the agency on how economic analysis could improve FERC decision-making (Industrial Economics 1999; Loomis 2000). More than half of the report was devoted to explaining and advocating the use of nonmarket valuation techniques in relicensing. A few years earlier, a coalition of environmental groups (called the Hydropower Reform Coalition) commissioned another study to review and critique FERC’s economic analysis (Marcus 1997). This report was also critical of elements of FERC’s analyses and advocated for the need to conduct more nonmarket valuation as a way to minimize FERC’s “subjective” valuations as it made tradeoffs.

Three years after forming, the Interagency task Force released seven final reports (DeWitt and Ebrahim 2001).³ The seven reports dealt almost exclusively with government agency coordination and licensing procedural issues. Notable by their absence were reports or recommendations on the use or role of economic analysis in relicensing. In fact the economics workgroup was not mentioned at all in the final reports. Although no reports were issued, the economics workgroup did meet and develop initial work tasks. The group divided their efforts into two phases (Heinz 2000). A Phase 1 report was descriptive in nature, cataloguing the type of economic analyses conducted by the different agencies and the types of methods that could be used to monetize the various market and nonmarket services that might be involved hydropower relicensing. Drafts of this report were produced, but not released. Phase II report was intended to be a consensus on what type of analyses *ought* to be done. No consensus could be reached on the Phase II report (Heinz 2000).

After the ITC reports were issued, investigations into the licensing improvement continued. Two major efforts, the Interagency Hydropower Committee (IHC) and the National Review Group (NRG) ran in parallel. The IHC was comprised of the same agencies that formed the Interagency Hydropower Committee (IHC). Formed in July 2001, the goal of the IHC was to two fold. First, the IHC would monitor the use of the ITF recommendations. Second, the IHC would investigate and make as necessary further recommendations for improving the licensing process (Hill and Murphy 2003, 40). The National Review Group (NRG) was lead by the Energy Policy Research Institute. Made up of representatives from the hydro industry and conservation

³ The seven reports were: Guidelines to Consider for Participating in the Alternative License Process Agency Recommendations; Conditions, Prescriptions under FPA; NEPA procedures in FERC relicensing; FERC Noticing Procedures; Improving the Studies Process in FERC Licensing; Improving Coordination of Endangered Species Act Section 7; Tracking and Enforcing License Conditions

organizations they aimed to investigate and report on voluntary practices that might improve the relicensing process (Hill and Murphy 2003; DeWitt and Ebrahim 2001).

Both the IHG and the NRG published reform proposals in 2002 (Hill and Murphy 2003, 40). The type and use of economic analysis in the licensing process was not a substantial part of these efforts and did not appear in the recommendations. The recommendations from each group were similar and tended toward procedural recommendations and modifications that built on the ITC recommendations (Hill and Murphy 2003; Swiger and Hill 2003). The reasons why analytical guidelines or recommendations, especially as related to the use of nonmarket valuation, were not included in these reforms is not part of the official record. However, during interviews with FERC staff, the following reasons for the failure to endorse non market valuation were offered. Comprehensive benefit-cost analysis as it was advocated would purport to identify through computational analysis the single best alternative. Requiring FERC staff to conduct such analysis was viewed as usurping the Congressionally delegated authority of the Commissioners to decide among alternatives. Supporting this concern was the perception that nonmarket valuation studies yield highly variable measurements of people's preferences and that different study techniques or methods of the same environmental service will not yield consistent or reliable estimates. In that case, extended debate over methods would further extend the time to decision by creating an additional controversy among the various parties affected by the license (EPRI 2000). In effect, the studies were not viewed as a practical or acceptable substitute for the statutory requirement that the Commissioners exercise their judgment to establish what decisions served the public interest.

The ongoing deliberations between the ITF, IHG, and NRG contributed to the development of a third licensing process in 2003, called the Integrated Licensing Process (FERC

Order No. 2002, July 2003). Conceptually, the integrated licensing process is an elaboration of the alternative process (Swiger and Grant 2004). Like the alternative process, the integrated process stresses and supports collaboration early in the relicensing process (re-filing stage), but adds a number of schedules/timelines and dispute resolution provisions (for example a close ended process to settle any pre-application study disputes). In 2005 the ILP process became the default licensing process, officially replacing the traditional process.

In sum, FERC's efforts to respond to the challenges and criticisms to the lack of attention to environmental outcomes in licensing choices was one of revising agency level rules governing the process of making licensing decisions. The overwhelming focus and attention of the extensive revision of the licensing rules was on how to design processes that placed more responsibility on the involved decision participants to more effectively negotiate a mutually acceptable license alternative. Despite initial efforts to examine the possibility, the new licensing process did not include any guidelines or preferences for what type of analysis decision participants would have use in order to develop a license. As with other forms of analysis, nonmarket valuation was not endorsed or encouraged. Instead, the kind of analyses used in any specific case was to be at the discretion of the negotiating parties. In the new licensing processes, the responsibility to decide what analyses to conduct is made collaboratively between the dam owner, resource agencies, and involved stakeholders. The question then becomes, "Do decision participants use limited analytical resources to conduct nonmarket valuation studies to illuminate and aid their deliberations and choices of license conditions?"

Use of Nonmarket Valuation under the New Relicensing Processes

To examine what type of analyses are being produced and then used in the collaborative relicensing process, a list of all cases settled under the alternative and integrated licensing processes through 2005 was obtained from FERC. It is important to note that these were settled cases, meaning that all parties, including resource agencies and nongovernmental groups, were able to agree to the terms of the license based on the analyses that were completed. The list contains 35 cases, representing 46 different individual hydropower projects (or test cases prior to formal adoption of the rules) (see Table 1).⁴ The Environmental Impact Statement/Environmental Assessment (EIS/EA) and license order for each case were obtained from FERC records. Since the EIS/EA documents are the statement of record for each case, the EIS/EA provides a reliable catalogue of the types of studies produced during a licensing case.

Each EIS/EA and license order was reviewed. Studies listed in each EIS/EA were classified into 5 general categories: hydropower analysis, incremental flow/aquatic habitat analysis, entrainment/fish passage analysis, recreational user day studies, and nonmarket valuation studies. In relicensing cases, hydropower analysis typically is the estimated cost in terms of value of the electric power forgone from the existing license baseline for environmental or recreational improvements. Incremental flow and aquatic habitat analysis constituted a broad category of analytical efforts to estimate the change in aquatic habitat or biological functioning that would occur due to changes in the timing, duration, or magnitude of different flow releases. Fish passage analysis includes any attempts to evaluate fish mortality through the dam (e.g. fish loss due to entrainment/impingement) and technical studies to evaluate success of passing fish around the dam. Studies falling under the recreational user day classification were confined to efforts to either estimate the current or future use of recreational amenities at the project site or

⁴ Some cases involved more than one hydropower projects. In these cases, FERC processed these hydropower projects in the same watershed and operated by the same owner as a group.

the estimate the cost to provide or enhance an amenity. For purposes here, recreational user studies do not include any attempts to monetize the value of that use. Nonmarket valuation includes any monetization of preferences for recreational or aquatic service enhancements.

A summary of the types of studies produced in the 35 settled cases are shown in Table 1. The types of analysis listed in the NEPA documents and license order were broadly similar to the types of analyses produced under the traditional analysis. Every alternative licensing contained some type of financial cost analysis of foregone power, but in many cases the estimates of foregone power benefits seemed perfunctory. Many cases contained cost/use estimates of various recreational enhancements or the cost of fish passage alternatives. Participants in the collaborative negotiation processes devoted the majority of analytical resources to estimating the physical and behavioral outcomes of different mitigation alternatives. Incremental stream flow and fish response studies were the most common type of analyses used by participants in these negotiations (30 out of 35 cases). Although these studies differed dramatically in levels of sophistication, many relicensing cases seemed to be focused on identifying possible physical and biological responses to different licensing alternatives. Half of all the cases reported estimates of current recreational use or predicted changes in recreational use from different licensing alternatives. These behavioral changes were reported as user days or subjective assessments of the quality of recreational experiences.

Of the 35 cases settled under the new licensing rules, not one EIS, EA, or licensing order reported an environmental valuation study or estimate. There were no instances of any of the relicensing cases using formal benefit-cost analyses to decide between different licensing alternatives. This evidence suggests that participants in the new FERC relicensing process did not require the use of environmental benefit estimates in their collaborative decision-making.

Participants did not elect to spend limited analytical resources to quantify the affected benefits and

costs on a comparable monetary basis in order to decide between levels of instream flows and power generation.

While FERC and license participants have failed to move toward more comprehensive benefit-cost analysis, the more collaborative decision processes have appeared to improve the processes. Public statements of support for the new licensing processes come from a diverse set of groups, including the hydropower industry, environmental groups, and resource agencies (Groves and Liimatainen 1999, Swant 2001; Keil 2002, Wilson 2000, Richter et al. 2003; Richter et al 2005; Pearsall et al. 2005). FERCs own assessment of the process also confirms that the time, cost, and level of conflict has diminished under the alternative licensing process (FERC 2001).

III. REFLECTIONS FOR POLICY ECONOMISTS

Many environmental economists argue that money-equivalent measures of peoples' preferences for environmental services are essential for comprehensive benefit cost analysis. In turn, they argue that only by aspiring to such a comprehensive analysis can decision makers be assured that all preferences are counted and socially appropriate tradeoffs made. In the case of FERC licensing process for example, Loomis and Feldman (1995, 97) state that "FERC is faced with trying to balance 'apples and oranges.' Benefit cost analysis provides a framework where all the relevant power and environmental values can be put in equivalent terms." A recent National Research Council report (2004, 32) on valuation reflects the same sentiment: "if an environmental policy decision involves a trade-off in the choice between providing one ecosystem service (such as a particular habitat or ecological service) and providing another good or service (such as agricultural output), then information about the relative values of these

alternative goods and services (*through nonmarket valuation*) can lead to better-informed and more defensible choices (NRC, 32).”

Most economists also recognize that not all values can be monetized. Nonetheless, the NRC report argues that the “use of the (imperfect) information about these values is preferable to not incorporating any information about ecosystem values into decision-making (i.e. ignoring them), since the latter effectively assigns a value of zero to all ecosystem services” (NRC p. 242). An unstated assumption behind this quotation is that decision participants can only make trade-offs if the outcomes of different alternatives are expressed in a single denominator of dollars. The explicit assertion is that failure to monetize preferences for environmental services will result in ignoring these preferences when decisions are made (Costanza et al. 1996; Loomis et al. 2000; NRC 2004).

However, the FERC hydropower licensing experience shows that even where there was an opportunity to use non market valuation in decision making, there was no demand for such valuation by decision participants. More importantly, the FERC experience denies the assertion that environmental values are ignored unless they are monetized. Instead of mandating new computational requirements so the commissioners could make difficult tradeoff decisions, FERC instituted institutional changes encouraging dam owners, government resource agencies, and nongovernmental groups to negotiate mutually satisfactory license conditions, that the commissioners would in turn endorse. This process is a substitute for valuation and for benefit cost analysis.

To reflect all relevant values the FREC required that resource agencies, as well as nongovernmental groups such as property owner associations around a reservoir, whitewater boating groups, and environmental groups have access to the process equal to that of the dam

owner. To assure that all values were considered FERC required that these groups bear a relatively low cost of participating in the process. To support the negotiations FERC required the dam owner to sponsor analyses of how different alternatives would affect metrics as diverse as power production, salmon numbers, recreational river use, and river flow regimes. The analyses allow decision participants to recognize the effects of a choice on financial outlays by the dam owner and the environmental and power production opportunities realized or forgone by all participants. With this multi-metric information, decision participants in dozens of cases have been able to consider different environmental changes in consideration of costs and agree on a license condition. That agreement was then reflected in new license conditions by the FERC commissioners, as long as the participation requirements of the non-traditional procedure were met.

Securing agreement is compelling evidence that all values have been considered and acceptable tradeoffs made because no participant will agree to license conditions that would result in an outcome that would worsen their position.⁵ And of note for this paper, we found no evidence that reaching agreement in the numerous cases reviewed required monetary expressions of preferences for all outcomes. Instead the revised licensing process assures that the positive value of environmental services is recognized and that trade-offs are considered.

⁵ In neoclassical terms, the new licensing processes establish a process for multiple decision participants to negotiating toward a contract curve.

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Table 1: Analysis Produced under FERC Alternative and Integrated Licensing Processes*

FERC Docket Number	Hydro Power Analysis	Incremental Flow Studies/Habitat Analysis	Recreational User Day Data, Studies	Entrainment/ Fish Passage Analysis	Nonmarket Valuation
P-1951	X	X	X		
P-11243	X				
P-11393	X	X			
P-2375 & 8277	X	X	X		
P-1218	X		X		
P-2058	X	X	X	X	
P-2609	X	X	X	X	
P-420	X	X			
P-11561	X	X	X		
P-1980 et al	X	X			
P-2035	X	X			
P-2901 & 2902	X	X			
P-2016	X	X			
P-2077	X		X	X	
P-11834	X	X	X		
P-271	X	X	X		
P-346	X			X	
P- 2364 & 2365	X	X	X		
P- 2000	X	X	X		
P-1354	X	X		X	
P-201	X	X		X	
P-11588	X	X			
P-2009	X	X	X	X	
P-2852	X	X			
P-469	X	X			
P-309	X	X			
P-11659	X	X	X		
P-12379	X	X			
P-477	X	X	X	X	
P-2177	X	X	X	X	
P-487	X	X	X		
P-2169	X	X	X		
P-632	X				
P-2586	X	X			
P-2233	X	X	X	X	
Summary	<i>35/35</i>	<i>30/35</i>	<i>18/35</i>	<i>10/35</i>	<i>0/35</i>

*Analysis reported in EIS/EA case documents.