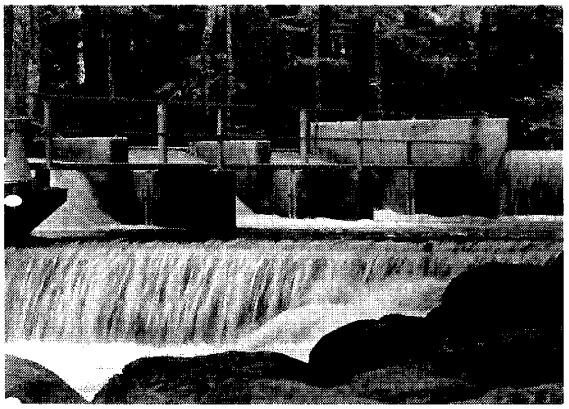
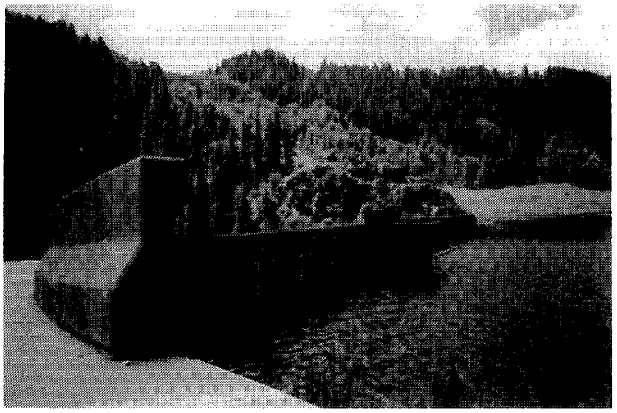
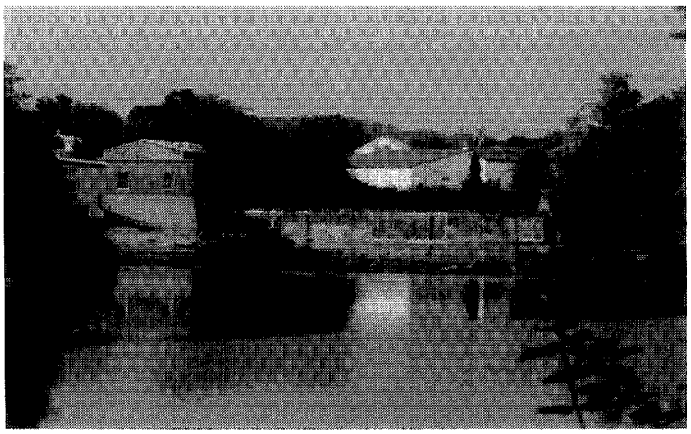
CERTIFYING HYDROPOWER FOR "GREEN" ENERGY MARKETS:

THE DEVELOPMENT, IMPLEMENTATION, AND FUTURE OF THE LOW IMPACT HYDROPOWER CERTIFICATION PROGRAM







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EXECUTIVE SUMMARY

Consumers in the United States increasingly have the option to choose "green" power sources of electricity—energy produced from renewable sources such as wind, water, and the sun, with fewer environmental impacts than traditional fossil fueled generation. With choice, however, consumers have questions about the environmental qualities of the generation sources they are supporting, especially hydropower. While hydropower generation does not require the burning of fossil fuels, hydropower dams can cause significant environmental harm. Because of this, consumers, power marketers, and other green power stakeholders need some means of ensuring that the hydropower they select comes from an environmentally acceptable facility.

The Low Impact Hydropower Institute (LIHI) aims to meet that need through its Low Impact Hydropower Certification program, a voluntary, impact-based certification system for hydropower facilities based on objective standards in eight criteria areas: river flows, water quality, fish passage, watersheds, threatened and endangered species, cultural resources, recreation use and access, and whether the facility has been recommended for removal. The program utilizes the expertise of state and federal natural resource agencies that evaluate hydropower facilities as a part of the licensing process before the Federal Energy Regulatory Commission (FERC).

The purpose of the program is to help reduce the impacts of hydropower generation by providing consumers with a credible and accepted standard for evaluating hydropower. The program was developed by the river conservation organization American Rivers and the Green Mountain Energy Company, with the assistance of the Center for Resource Solutions and an Implementation Task Force comprised of representatives of the hydropower industry, environmental organizations, power marketers, and others.

This report provides the first comprehensive description of the Low Impact Certification Program, including its development, its first years of operations, and an assessment of its future in the context of the green power markets in the United States. Although the Institute certified only two projects in 2000-2001, three more projects have already applied, fourteen more are considering applying, and an analysis of over 100 additional projects suggests that more than half are good candidates for certification. In addition, the certification program has been adopted by key green power stakeholders in this country, as well as by key stakeholders developing international "green tag" trading systems. Despite these successes, the program still faces obstacles, including the slow pace of green market development generally (especially following the collapse of the California energy market), and continued skepticism from some in the hydropower industry about the certification program specifically. As this report details, however, if hydropower is to meaningfully participate in green power markets, the certification program will play a role.

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INTRODUCTION

With the restructuring of the U.S. electricity industry, energy consumers increasingly have the ability to choose "green" power. Although there is no common definition, "green" power usually means electricity generated from renewable resources, without the use of fossil fuels, and generated with few significant adverse environmental impacts. Typical green power sources are wind and solar power, and sometimes biomass, geothermal, and hydropower.

Hydropower presents a dilemma for green power consumers. On the one hand, hydropower uses water instead of fossil fuels to generate electricity. The burning of fossil fuels in the electricity industry creates significant air pollution, and reducing that pollution is of tremendous importance for public health and the environment.[1] On the other hand, hydropower generation typically requires a dam to impound or divert a river or stream into turbines. Individually and cumulatively, hydropower dams can cause significant adverse impacts to aquatic ecosystems, including the fish, wildlife, and human communities that depend on them. Not all hydropower dams create these impacts, but how can concerned consumers be sure that the hydropower they are buying in a green power market does not result in significant adverse environmental impacts?

In the late 1990s, the river conservation organization American Rivers began to explore ways to identify environmentally acceptable hydropower for the emerging green power markets. Establishing a credible standard, especially one that avoided the problems of the commonly used, capacity-based "small hydro" standard, could help consumers make informed choices about hydropower. A credible standard could help prevent hydropower dams with significant adverse impacts from gaining an unearned market advantage as a green power source. A credible standard could also give positive recognition—and economic reinforcement—to hydropower dam owners who had taken steps to improve their facilities and invest in improvements in their local environment.

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[1] The National Resources Defense Council (NRDC) established that U.S. electric generators are responsible for 28% of NOx, 67% of SO2, 36% of CO2 and 33% of mercury emitted annually nationwide ("Benchmarking Air Emissions" 1998).

American Rivers' work to identify a credible standard for hydropower attracted considerable interest. The power marketer Green Mountain Energy Company and the non-profit Center for Resource Solutions joined the effort, which evolved into a proposal for an independent certification program for environmentally preferable "low impact" hydropower. After several years of toil, and with the help of a task force comprised of representatives from the hydropower industry, power marketers, consumer, and environmental organizations, the Low Impact Hydropower Certification Program was born.

The program was launched in January of 2000, shortly before the beginning of the end of the green power market in California. Through the turbulence of the past two years, the program has processed several applications, expanded its coverage to include "new" hydropower, and been embraced by a large number of important green power stakeholders, including the Green-e Renewable Electricity Certification Program. The opportunities and the challenges faced by the Low Impact certification program provide a lens through which to view hydropower's current and potential role in the emerging green power markets.

This report provides a detailed description of the development, implementation, and future of the Low Impact Hydropower Certification Program in the context of the green energy markets in the United States. Part I of this report describes the origins and development of the certification program from an endorsement system to be used by American Rivers, to a fully independent certification program backed by a range of organizations.

Part II describes the implementation of the program since its launch in January of 2000, including the certification of three projects and the lessons learned from those certifications, as well as information about two projects for which certification is pending. Part II also includes an analysis of fourteen projects that are considering applying for certification, and an analysis of over 100 additional projects as to their potential for certification. Although informal, these analyses provide some interesting data about the numbers and types of projects that are likely to be certified.

In Part III, the current status of green power markets are assessed, as is the role of hydropower in these markets to date. Part III also addresses the obstacles and stimulants to the further growth of Low Impact certification as the credible and accepted voluntary standard for evaluating hydropower for green energy markets, including a look at activities at the state, federal, and international level that may influence hydropower's participation.

PART I DEVELOPMENT OF LOW IMPACT CERTIFICATION

A. Electricity Industry Restructuring and Hydropower

Until recently, most of the U.S. electricity industry was comprised of vertically integrated utilities that functioned as regulated monopolies, controlling all aspects of energy supply, from generation to distribution. Utilities were required to provide reliable service to everyone within their designated territory, and electricity rates were controlled at the retail level by the individual states, and at the wholesale level by the Federal Energy Regulatory Commission (FERC).

By the mid 1990s, however, efforts to restructure the U.S. electricity industry were well underway. At the federal level, Congress had passed the Energy Policy Act of 1992, Pub. L. 102-486 (October 24, 1992), which encouraged FERC to take steps to facilitate competition. In 1996, FERC issued Order 888, the first in a series of orders addressing open access to interstate transmission lines. At the state level, dozens of states were considering or had passed restructuring legislation to break up the existing utility structures and open retail energy markets to competition. By the end of 1999, California, Pennsylvania, New Jersey, New York, Massachusetts, Michigan, New York, Arizona and Rhode Island allowed either partial or complete access for retail competition (Energy Information Administration 2002).

The primary impetus behind energy restructuring was a desire by large energy consumers (manufacturers, institutions, etc) to reduce energy prices, but competition also meant consumer choice. Renewable energy advocates and other environmental organizations believed that restructuring could provide a significant push in encouraging the use and development of environmentally preferable or green energy sources.

As interest in the development and sale of green power rose, so did the concerns about the potential for abuse. How should "green" energy be defined, and how could consumers be sure they were actually paying for environmentally preferable power? In an early pilot program for open competition, there were some attempts to market traditional fossil-fuel and nuclear sources as "green" or environmentally preferable power, leading to cries of "green washing"—the equivalent of a "white wash" in the environmental arena (see, e.g., Entine 1998). The National Association of Attorneys General (NAAG) was sufficiently concerned about the potential for abuse that they developed Environmental Marketing Guidelines for Electricity (1999).[2] The NAAG guidelines at 3(b) address the problem of the use of the term "green" for electricity products:

> It is deceptive to misrepresent, directly or by implication, that any product or company is "green." "Green" is a term of general environmental benefit, and as such, every implied representation of significant environmental benefit or lack of significant environmental harm that the general assertion conveys to customers must be substantiated. Accordingly, use of "green" should be accompanied by clear and prominent disclosure of the sense in

[2] The Federal Trade Commission also has environmental marketing guidelines, see 16 C.F.R. Part 260.

which the term is being used; and even where qualified, "green" may have some other, contextual meaning to consumers that must be substantiated.

In this context, hydropower poses an especially difficult dilemma for the emerging energy markets. Hydropower is often classified as a renewable resource because of its use of water, rather than fossil fuels, for electricity generation. Because of this, many advocates of hydropower urge that it be entitled to the same consideration as other renewable generation sources, such as wind and solar power. However, depending on where they are sited, how they are operated, and their size, hydropower dams can have devastating impacts on watersheds and river ecosystems and the fish, wildlife, and people that rely on them. As the World Commission on Dams found (2000), large dams, defined as those of 15 meters or more in height, can lead to:

- the loss of forests and wildlife habitat, the loss of species populations and the degradation of upstream catchment areas due to inundation of the reservoir area
- the loss of aquatic biodiversity, of upstream and downstream fisheries, and of the services of downstream floodplains, wetlands, and riverine, estuarine and adjacent marine ecosystems; and
- cumulative impacts on water quality, natural flooding and species composition where a number of dams are sited on the same river

Smaller scale hydropower dams can cause similar impacts both individually and cumulatively. A power source that causes the extirpation of species, degrades water quality, inundates wetlands and other critical habitats, and disrupts entire river ecosystems is not consistent with the concept of an "environmentally preferable" power source, no matter how few impacts to the air.

Not every dam creates such impacts. It is possible to provide hydropower generation with minimal effects to the environment through careful siting and operation, and site-specific mitigation measures. The challenge for the hydropower industry, green power marketers, environmental organizations, and consumers is to agree on a system or a standard that will help consumers credibly differentiate between the acceptable and the unacceptable hydropower dams when green power choices are available.

B. The Problem with the "Small Hydro" Standard

The idea to differentiate between types of hydropower facilities in developing incentive programs is not new. As early as 1978, Congress did so in the Public Utilities Regulatory Policy Act (PURPA). In PURPA, Congress encouraged the development of "small hydroelectric facilities," so long as they were sited in connection with existing dams that were not already being used to generate power. PURPA specifically defined "small hydroelectric facilities" to be those that had no more than 30,000 kilowatts (or 30 megawatts) of installed capacity. 16 U.S.C.

§ 2708(a)(1). Unfortunately, this so called "small hydro" standard has since become ubiquitous in the United States as a means of identifying environmentally preferable hydropower.[3]

The underlying assumption that a "small" project is necessarily less damaging than a "large" project is not accurate. A small dam on a tributary stream that prevents migratory fish from accessing miles of spawning habitat can be more damaging than a large dam on a stream without migratory fish. A small dam may be operated in "run of river" mode where inflow to the project equals the outflow on an instantaneous basis, but "run of river" also generally means the water from the river is either partly or entirely diverted into a penstock, and little to no water may be left in the natural river channel for hundreds of yards, or even multiple miles (i.e., the "bypassed reach"). This can be more damaging to the ecosystem than a large dam that operates in run of river mode, but which does not divert any water from its natural course.

Worse, the "small hydro" standard is based on a facility's *capacity* rather than the actual size of the dam, the size of any impoundment, the length of any bypassed reach, or how the facility is operated. Small generation capacity may mean a small dam, but it's not necessarily the case. Consider the Stagecoach Dam evaluated by LIHI and addressed in section II; it has a *generation capacity* of 0.8 megawatts (MW), but the Stagecoach dam is 140 feet high and impounds a reservoir of some 33,738 acre-feet. This is a "large scale" project by almost any measure, and it should not *automatically* be categorized as environmentally preferable. It should only be eligible after careful consideration of its relative impacts, as was done by LIHI.

Similarly, small capacity hydropower generation facilities are sometimes added after the fact to large or very large pre-existing dams. While the hydropower addition may have little additional environmental impact, the impacts of the large dam are not taken into account in the "small hydro" standard. A consumer could be purchasing "small hydro" which is developed at a very large dam with significant environmental impacts.

Thus, small capacity does not guarantee minimal impacts on the environment. There are numerous examples of hydropower dams with an installed capacity of 30 MW or under that nonetheless have significant adverse environmental impacts.[4] This is not to say that small capacity projects cannot be environmentally preferable, they certainly can; the point is that the small capacity standard doesn't provide any information about environmental preferability.

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[3] Among other things, the "small hydro" standard is used in a variety of green pricing programs and state renewable portfolio standards (see section III.B, *infra*); it is used by some green power certification systems to define acceptable hydropower products (e.g., Green-e)(see section III.D.2, *infra*); and it is touted by renewable energy organizations as a "green" power source, see e.g., Global Green USA, http://www.globalgreen.org/programs/green_power.html.

[4] Some examples of small capacity projects which have raised concerns among natural resource agencies and others about continuing significant adverse environmental impacts: the Milford project in Maine, 8 MW; Lytle Creek in California, 0.450 MW; Potter Valley, California, 10 MW; Glines Canyon, Washington, 1.2 MW; and Leaburg, Oregon, 23 MW.

Moreover, the vast majority of individual hydropower dams in the United States are "small hydro" facilities of 30 MW or under, but even so, they account for less than 10 percent of the total available hydropower capacity in this country—the bulk of which comes from large hydro facilities of over 30 MW.[5] This means that the "small hydro" standard is automatically "passing" as green most of the hydropower *dams* in this country, while simultaneously excluding most of the hydropower *capacity* from evaluation and participation in the green markets. A green standard should be used both to assure consumers that the facility is environmentally acceptable, and as a means to evaluate and even encourage better standards for the power generation source altogether. The "small hydro" standard fails on both counts.

C. The Problem With FERC Licensing as a "Green" Standard

FERC is the licensing authority for all non-federal hydroelectric projects (with few exceptions).[6] All FERC licenses are issued for 30-50 years after which the project owner must seek a new license from the FERC if the project is to continue operations. These "relicensing" proceedings include an evaluation of the current operations under modern-day needs and demands. FERC must evaluate the project's on-going impacts, and identify what protection, mitigation, and enhancements measures are needed to ensure the project continues to be in the public interest.

These relicensing proceedings can be comprehensive and include an extensive evaluation of environmental conditions and impacts at the dam, and can result in many new environmental mitigation measures at a project. A hydropower project that has undergone relicensing is generally better in terms of impacts to the environment than it was prior to relicensing. As a result, some believe that if a hydropower project has been relicensed recently by FERC, it should be automatically considered an environmentally preferable or "green" project, and that FERC relicensing after a certain date can be considered a credible "green" standard.[7]

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[5] Eighty-seven percent of the individual non-federal hydroelectric projects in this country have an installed capacity of less than or equal to 30 MW, but the bulk of the hydropower capacity in this country (91 percent) is produced from facilities with installed capacities of greater than 30 MW. This is based on the February 2001 lists of non-federal projects licensed or exempted by FERC (available at http://www.ferc.gov/hydro/hydro2.htm). There are 1605 individual projects licensed or exempted by FERC, which have an installed capacity of nearly 60,000 MW. Of those individual projects, 1402 of them, or 87 percent, have installed capacities of less than or equal to 30 MW. The remaining 203 projects have an installed capacity of some 54,935 MW, or 91 percent of the total.

[6] FERC's authority for hydroelectric project licensing is the Federal Power Act of 1920, 16 U.S.C. § 791 *et seq.* Federal hydropower projects, i.e., hydropower dams operated by the Army Corps of Engineers, the U.S. Bureau of Reclamation, and the Tennessee Valley Authority are governed by the agencies' statutory authority and regulations, and by project-specific statutory authorizations.

[7] For example, one of the standards for use for Green-e certification in the New England area is whether or not a hydropower project has been relicensed since 1986—if it has, it is currently eligible for certification as part of the renewable portion of the product.

However, FERC's mandate regarding hydropower licensing is to provide "equal consideration" to power and non-power benefits. In other words, FERC must balance between maintaining power production and providing protection, mitigation, or enhancement measures for the environment. FERC is not required to select the environmentally preferable alternative for the new operating license, even if natural resource protection agencies and the interested public recommend that alternative.

As a result, a "relicensing" standard does not assure the concerned consumer that the project is operating with the most stringent environmental measures. Also, since the standard is what the dam owner/operator must already do to comply with the law, a "relicensing" certification would provide no incentive for improvements. For these reasons, "relicensing" is not considered a credible standard on which to build a voluntary certification program. However, as is discussed in the following section, the relicensing process does contain information and analyses on which a certification program can rely.

D. The Early Origins of the Low Impact Hydropower Certification Program

1. American Rivers

With the rise in interest in green power nationwide, a number of environmental organizations were looking into developing appropriate standards for defining "green."[8] A green hydropower standard posed unique difficulties because of the extreme variability of projects and impacts, and the complex regulatory universe of hydropower licensing, so the non-profit river conservation group American Rivers took the lead. American Rivers was familiar with the impacts of hydropower generation, the complex regulatory arena, and had experience in river issues nationwide. In early 1997, Margaret Bowman, then Director of Hydropower Programs, and Lorraine Bodi, then Co-Director of American Rivers' Northwest Office, began to develop criteria that would enable hydropower projects to earn an endorsement as green or environmentally preferable power sources.

Aware of the flaws of the "small hydro" standard and concerned about the inadequacy of relicensing alone to identify "green" projects, American Rivers sought to develop impact-based standards that would be tough, but also achievable. It would be easy enough to establish environmentally credible standards that only the smallest of dams could meet. American Rivers was interested in finding a way to encourage improvements at all dams, large and small, using market incentives. In October of 1997, American Rivers circulated for comment a draft of a "Hydroelectric Project Certification Program" to members of the Hydropower Reform Coalition, an aggregation of river, watershed, and whitewater recreation groups interested in obtaining

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[8] In 1996, and early 1997, for example, representatives of a number of the largest environmental organizations formed a committee to work on green certification issues. This effort eventually lead to the development of the Power Scorecard ™ rating system, see discussion in section III.D.2, *infra*.

environmental improvements at hydropower facilities. The draft program used a rating system, with three possible ratings:

1. the dam has low environmental impacts
2. the dam has substantial environmental impacts
3. the dam has high environmental impacts.

The rating would be based on questions addressing three resources commonly affected by dams: fisheries (anadromous, or ocean-going, and resident species), wildlife, and water quality. The questions asked would be objective, but American Rivers would make the subjective evaluation of what rating a project would receive. American Rivers revised the program again in late October in response to comments, and then began to circulate the revised draft to utilities, marketers, and others who had expressed an interest in their effort.

By December of 1997, American Rivers' "Criteria for Low Impact Hydropower" had expanded to address several more resource areas, including river flows, and inundated lands, and all the criteria had to be met by each project:

1. Successful Fish Passage—if native migratory fish species were present when the project was constructed, is the project equipped with fish passage facilities (upstream and downstream) that result in less than 50 percent direct and indirect mortality to those species?
2. Healthy Fish Populations—Are more than half of the native fish populations in the areas above and below the project healthy (stable or increasing)?
3. Adequate River Flows—Does the flow regime in affected stream reaches satisfy current state and federal resource agency standards for all fish life stages and for water quality?
4. Controlled Flow Changes—If the project fluctuates flows for power production (i.e., load following or peaking), does the project have peaking limitations and ramping rates that meet current state and federal fish and wildlife agency standards?
5. Good Water Quality—Does the water in the project reservoir and in the downstream reach meet state water quality standards at all times of the year? If not, is the quality of water entering the project reservoir better or no worse than the water leaving the downstream reach?
6. Protection For Flooded Lands—Is an equivalent of 50 percent or more of the land that was inundated or occupied by project facilities permanently dedicated as fish, wildlife or wetlands mitigation?

It is very easy to a identify a criterion goal—that a project won't harm fish, for example. It is exceedingly difficult to identify an objective standard applicable nationwide to identify compliance with the standard—how to determine whether the project is harming fish. As a result, the above criteria introduce for the first time the use of "state and federal resource agency standards" as a basis for making that determination, recognizing that these agencies often have the expertise and on-the-ground knowledge to establish such standards.

2. Green Mountain Energy and the Center for Resource Solutions

American Rivers' efforts attracted the attention of a number of entities involved in the emerging green power markets, including the Green Mountain Energy Company (Green Mountain), and the non-profit Center for Resource Solutions (CRS). Green Mountain was trying to establish a presence for renewable and clean power sources for residential consumers, and also to position itself as the largest marketer of environmentally preferable power. Green Mountain looked for guidance from environmental organizations regarding the specific resources, including hydropower, that they were contracting for, so American Rivers' effort was of interest. Similarly, CRS had recently launched its green power product certification program, the Green-e Renewable Electricity program, to certify green power products containing certain minimum amounts of renewable energy. Green-e adopted the California regulatory definition of renewables as a starting point, and that renewable definition included the 30 MW "small hydro" standard. CRS recognized the limitations of this standard for hydropower, and so was also interested in what American Rivers was developing.

As an outgrowth of the Green-e process, Green Mountain agreed to collaborate with American Rivers on a certification system. To assist with its work, Green Mountain engaged a national, experienced hydropower consulting group. As an alternative to the American Rivers approach, they developed a percentage scoring system that did not require a dam owner to meet all criteria in order to be certified. Under this system, a high score for one criterion could, in effect, compensate for a lower score under another criterion. Green Mountain and American Rivers agreed to field-test both of their approaches to determine which was preferable. The results of this field-testing led those involved to conclude that the American Rivers approach was the basic structure that should be used. The other approach was more subjective, and allowed almost all facilities tested to be certified, including projects that American Rivers and others involved agreed were not appropriate for certification.

Having selected the basic American Rivers approach as preferable, American Rivers and Green Mountain (with the assistance of their consultants) proceeded to negotiate the details of the certification criteria. Mutual goals of the negotiation were to develop a certification system that was both environmentally defensible and certified sufficient power to develop the green market. During much of 1998, the original draft criteria were further refined, and circulated for review and comment amongst environmental organizations knowledgeable about hydropower.

At the same time, the drafters were trying to establish the basic structure and operation of the certification program itself. The primary issue was whether the system should be a self-certification process, in which dam owners could review and confirm their compliance with the standards and announce their certification, or a third party certification system in which an independent body would administer the standards and confirm whether or not a facility complied, or something in between. Eventually, the drafters gravitated to a third party audit model with an independent non-profit organization overseeing the process. The drafters believed that the credibility of the program was its most important asset, and credibility demanded independent oversight, even if this added to the complexity and cost of certification. The result of the negotiations was the September 2, 1998, draft criteria discussed below.

E. The First Public Release of the Proposed Low Impact Certification Criteria

By late summer 1998, the criteria and the outlines of the certification program had been fully incubated. The program was ready for its first public review by interested stakeholders, including the hydropower industry, power marketers, consumer groups, scientists, and others. On September 2, 1998, American Rivers and Green Mountain Energy jointly issued a letter announcing the proposed Low Impact Hydropower Certification program, and sought public comments.

The letter stated that the goal of the program was to "create a system to identify hydropower plants with low environmental impacts." The system was designed to be:

- Credible with consumers
- Transparent and understandable
- Based on objective criteria
- Easy to use

American Rivers and Green Mountain believed the program would meet these objectives, but they also took pains to clarify what the program would not do:

> . . .Some environmental activists are sure to find facilities that gain certification which have adverse environmental impacts. Some hydropower generators are sure to identify facilities which do not pass but are doing a good job on environmental issues. The criteria are not designed to make a perfect in-depth assessment of every hydropower facility across the country. Rather, they are designed to provide a simple, objective and transparent method of making a distinction between hydropower with low and high impacts.
>
> The Low Impact Hydropower criteria also do not compare hydropower with other electricity sources because that judgment, we believe, is best left to consumers. They instead provide a method of comparing differing hydropower facilities.
>
> The goal of the Low Impact Hydropower criteria is to establish a standard for environmentally preferable hydropower . . .

The September 1998 draft criteria addressed six resource areas—fish, river flows, water quality, land protection, cultural resources protection, and recreation. The goals for each were clear—fish would be protected, river flows would be satisfactory, water quality preserved, flooded or inundated habitat would be mitigated, cultural resources protected, and recreational opportunities made available.

For some resource areas (fish, river flows, and mitigation for inundated lands) the criteria standards would look to expert resource agencies and their recommendations for appropriate mitigation, even if those recommendations were not ultimately adopted by FERC. As background, although FERC determines most license conditions, the license must also contain certain "mandatory" conditions submitted by other agencies with statutory authority to protect

certain resources. For example, states can issue mandatory conditions for water quality protection under authority of section 401 of the Clean Water Act; certain federal fishery agencies (the National Marine Fisheries Service and the U.S. Fish and Wildlife Service) have the authority to issue prescriptions requiring fish passage facilities; and other federal agencies may require conditions for the protection of affected federal lands (e.g., the U.S.D.A Forest Service can impose conditions for the protection of a National Forest should a project be located there).

All other measures that federal, state, and tribal resource agencies may recommend for mitigating the operations of the project are not mandatory. FERC must give deference to resource agency recommendations, but FERC can, and does, reject agency recommendations, particularly if FERC deems them too expensive for the licensee. Due to statutory amendments in 1986, FERC must give "equal consideration" to power and non-power values when it issues operating licenses, but it is not required to adopt the most environmentally protective conditions identified for a particular project by a resource agency. While this may be appropriate given that FERC's mandate is to find what it considers the appropriate balance between environmental protection and continued operation of the hydropower facility, it was not considered appropriate by the drafters for a certification system that was aiming to assure consumers that the subject facility was environmentally preferable.

However, the relicensing process and the agency recommendations made in that process were considered useful. Reliance on resource agency recommendations for some of the Low Impact criteria provides two advantages. First, it is a way to utilize the existing efforts made by expert agencies and local land managers in evaluating the site-specific impacts of projects as a part of the FERC relicensing process. This means that the certification program does not require an applicant to "reinvent the wheel" or require applicants to conduct additional studies or analyses in order to obtain certification. Second, reliance on the most stringent of recommendations, even if those recommendations were not ultimately adopted by FERC, provides assurance to the consumer that environmental considerations were at the heart of the certification. This is believed to be critical to the acceptance by the public of a green hydropower certification, particularly one that could include large-scale (but relatively low impact) facilities.

The September 1998 draft also included the initial outlines of the certification process, including the establishment of an independent non-profit organization to administer the process, the opportunity for public review and comment on applications, and the opportunity to appeal certification decisions. The system would exclude new hydropower construction (anything not built and operating as of August of 1998) and would exclude pumped storage facilities (which typically utilize fossil fuels to pump water between reservoirs). The drafters left open the question as to whether or not the program would apply to hydropower facilities outside of the U.S.

Two standards were identified for future implementation. The first would require the project owner to implement a water quality monitoring program and to make the results of monitoring available to the public. The second would require, as mitigation for inundated lands, that the project owner provide a 200-foot buffer zone around the entire impoundment, dedicated to conservation purposes, or provide equivalent acreage in wetlands or wildlife habitat acreage, or an equivalent value in an enhancement fund for watershed conservation activities. Both of these

enhancements would require some additional development, but were expected to be implemented starting in 2002. One of the reasons for the delayed implementation date was to give some time for the market to develop. The drafters expected that when these enhanced criteria were implemented, there would be real market value for the certification that would justify the additional investment that these enhancements might require.

The drafters did not set a target for the number or percentage of projects that were expected to be certified. However, Green Mountain's hydropower consultants had informally tested the draft criteria against existing projects. With the cooperation of facility owners, the consultants evaluated over fifty projects in various regions of the country. Although not a statistical sample, and no guarantee of the actual result in individual cases, these early beta testing results suggested that approximately 69% of the projects evaluated would pass the criteria. That figure was expected to be lower (41%) when the requirement to provide a 200-foot buffer zone requirement went into effect, but it provided some assurance to the drafters that there could be sufficient certified facilities to create a market push.

Table 1 Summary of Beta Testing Survey Results, 1998

	# of Projects Surveyed	Total MW Surveyed	# Projects Pass Without Considering Lands Criteria (D.2)	# Projects Pass All Criteria	# of MWs Pass Without Considering Lands Criteria (D.2)	# OF MW PASS ALL CRITERIA
Pacific NW, CA	10	2141	6 (60%)	6 (60%)	897 (42%)	897 (42%)
New England	24	835	15 (63%)	7 (29%)	657 (79%)	570 (68%)
New York	21	730	16 (76%)	9 (43%)	561 (77%)	392 (54%)
Mid Atlantic	2	524	2 (100%)	0 (0%)	524 (100%)	0 (0%)
Midwest	4	133	3 (75%)	3 (75%)	110 (83%)	110 (83%)
TOTAL	**61**	**4363**	**42 (69%)**	**25 (41%)**	**2749 (63%)**	**1969 (45%)**

Source: American Rivers and Green Mountain 1998 (internal notes omitted).

The September 2, 1998 letter also indicated the drafters would be finalizing the procedures for the criteria with the help of an Implementation Task Force that had yet to be established. Nominations for task force members were encouraged.

Comments on the draft program were received from twenty-five organizations and individuals, including dam owners, marketers, consumer groups, environmental organizations, federal agencies, and others. The comments were generally supportive of the effort in concept, albeit with dozens of recommendations for improvements or changes on a diverse range of issues.

Dam owners commented on a full range of issues, but the reliance on resource agency recommendations and the proposed buffer zone requirement as mitigation for inundated lands

garnered the most criticism. Using resource agency recommendations, particularly when they were not adopted for the license by FERC, was seen as too unreliable and unscientific—dam owners expressed concern for what they perceived to be the arbitrariness of some agency recommendations. As to the buffer zone proposal, some questioned why mitigation was needed for inundated lands, when the inundation may have provided other public benefits, such as flood control and recreation. Others believed that the buffer zone requirement would preclude many otherwise desirable projects located in developed watersheds, where the costs of acquiring lakeside buffer zones would be prohibitive. Dam owners also questioned the "all or nothing" aspects of the program, requiring compliance with all the criteria to obtain certification. Some thought that it was unfair not to provide some flexibility so that extraordinary efforts in one category could overcome some deficiencies in another.

Some environmental organizations were concerned that the criteria might not be difficult enough, particularly because there was no criterion specifically addressing the cumulative impacts of multiple dams in a watershed. Other environmental organizations believed that hydropower should never be considered eligible to participate in renewable or green energy markets.

F. The Implementation Task Force Convenes

American Rivers and Green Mountain selected the members of the Implementation Task Force, which met for the first time in October of 1998, at CRS' offices in San Francisco. As expected, the program had attracted considerable interest, and this was reflected in the breadth of the task force: members included hydropower dam owners (municipal owners, utilities, and independent power producers); power wholesalers; power marketers; hydropower consultants; environmental organizations involved in electric utility restructuring in California, Pennsylvania, and New England; environmental organizations developing green labeling systems; and environmental organizations involved in hydropower dam relicensing.

Implementation Task Force Members:

Margaret Bowman, American Rivers (Washington, D.C.)
Bill Bradbury, For the Sake of the Salmon (Oregon)
Kirk Brown, Center for Resource Solutions (California)
Sheryl Carter, Natural Resources Defense Council (California)
Mark Crowdis, Green Mountain Energy (Maryland)
John Devine, Duke Engineering (Maine)(also, President of the National Hydropower Assoc).
Angus Duncan, Bonneville Environmental Foundation (Oregon)
Alec Giffen, Land and Water Associates (Maine)
Gabriella Goldfarb, For the Sake of the Salmon (Oregon)
Corinne Grande, Seattle City Light (Washington)
Jan Hamrin, Center for Resource Solutions (California)
Rita Hayen, Wisconsin Electric (Wisconsin)
Nancy Hirsh, Northwest Energy Coalition (Washington)
Cleve Kapala, U.S Generating (New Hampshire)
Debra Malin, Bonneville Power Administration (Oregon)

Steve Malloch, Consultant to American Rivers (Washington, D.C.)
Jan Mulder, Seattle City Light (Washington)
Tom Rawls, Green Mountain Energy (Vermont)
Richard Roos-Collins, Natural Heritage Institute (California)
Mike Sale, Oak Ridge National Laboratory (Tennessee)
Frank Shrier, PacifiCorp (Washington)
Johanna Thomas, Environmental Defense Fund (California)

At its initial meeting, the task force addressed the organizational structure of the proposed Low Impact Hydropower Institute, and the details of the certification process. The task force agreed that there must be a Low Impact Governing Board to oversee the program and policies, but there was considerable debate over whether or not the Board should include members of the hydropower industry. Some felt that dam owners should be on the Board because the industry needed to be invested in the certification process. Others thought the Board had to be limited to environmental and consumer interests to maintain credibility of the certification process as an environmental standard, not one that could be perceived as being controlled by dam owners. Others were concerned that if a dam owner were on the Board and had obtained certification for a facility, that owner would have an incentive to keep the amount of certified power low to increase its value. Others suggested that so long as the industry had a clear line of communication and input, a voting role (particularly if it was not going to be able to overrule environmental votes) was not critical.[9]

The task force agreed that a Hydropower Industry Advisory Panel would be helpful to provide some hydropower industry representation and input into the organization without the risks associated with dam owners being voting Board members. The task force also believed it was important to have another panel that would address the impacts of the certification program on other renewables. Task force members were concerned that if too much hydropower became certified, it could threaten support for solar and wind power. Several subcommittees were established to complete remaining aspects of the program. The subcommittees met independently, developed drafts, and circulated them to the other task force members before finalizing.

The other issue the task force addressed was the certification process, as distinct from the criteria. Ultimately they settled on a very open and transparent process, with significant comment periods for interested parties and an opportunity for appeals. While this made the certification process more lengthy and complex than originally envisioned, the task force

[9] Interestingly, the Internal Revenue Service (IRS) weighed in fairly heavily on this issue later, when the Institute applied for tax-exempt status as a public benefit organization under section 501(c)(3) of the Internal Revenue Code. The IRS reviewer was concerned that the Institute and the certification program were actually designed to benefit only the hydropower industry and not the general public. The reviewer indicated that the lack of dam owner representation on the Governing Board was one of the key factors in his conclusion that the program was for public benefit rather than just industry benefit. (Conversation with IRS reviewer David Aguilera, of Dallas, Texas, May 10, 2001).

concluded that credibility was key, and credibility demanded thoroughness and participation by the public.

The task force met again on November 18, 1998, in Washington D.C., and on February 22-23, 1999, in Portland, Oregon to refine their efforts. On February 26, 1999, American Rivers and Green Mountain solicited nominations and statements of interest for the Governing Board and Advisory Panel positions in the new Institute.

G. Final Draft of the Certification Program Circulated to the Public

By March of 1999, the certification program had been much advanced, thanks to the efforts to the task force. On March 10, American Rivers and Green Mountain issued a revised draft of the certification program based on the activities to date, and sought public comments again. Included within the March package was a summary of the revisions to the program since the original draft had been circulated in September of 1998, as well as a response to comments. Major revisions to the program included the addition of two new criteria, one to address impacts to threatened and endangered species, the other to address whether the dam had been recommended for removal.

In June, the Low Impact Hydropower Institute (LIHI) was incorporated as a non-profit public benefit corporation in the State of California. The purposes of the Institute were described to include: [10]

- Setting criteria for characterizing hydropower facilities as low impact
- Conducting a program to certify dams that meet these criteria with a goal of (1) reducing the environmental impacts of hydropower generation by (2) creating a credible and accepted standard for consumers to use in evaluating hydropower; and
- Making information about the environmental effects of power generation available to the public.

CRS agreed to serve as the initial Certification Administrator for the program, and to manage administration and fundraising matters until the Institute could obtain a determination that it was a tax-exempt organization.[11]

After reviewing the nominations and statements of interest, American Rivers and Green Mountain selected the representatives of the Governing Board and the Advisory Panels. Individuals and organizations that supported the goals and objectives of the program were asked to publicly confirm their support for the program, and a list of supporters was established.

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[10] Articles of Incorporation, Low Impact Hydropower Institute, filed with the Secretary of State, California, June 17, 1999.

[11] CRS provided a LIHI Program Manager who served until the launch of the program. The Governing Board hired the author as Executive Director in September of 2000. The Institute was determined to qualify for 501(c)(3) tax-exempt status in May of 2001.

Low Impact Hydropower Institute: Governing Board (November 1999):[12]

Governing Board Chair:
Richard Roos-Collins, Natural Heritage Institute (CA)

Governing Board Members:
Margaret Bowman, American Rivers (DC)
Bill Bradbury, For the Sake of the Salmon (OR)
Stephen Crow, Northwest Power Planning Council (OR)
John Gangemi, American Whitewater (MT)
Ashok Gupta, Natural Resources Defense Council (NY)
Kenneth Kimball, Appalachian Mountain Club (NH)
Dan Kirshner, Environmental Defense Fund (CA)
Stephen Malloch, Trout Unlimited (VA)
Edward R. Osann, Potomac Resources, Inc. (DC)
Jaime Pinkham, Nez Perce Tribe (ID)
Katherine Ransel, American Rivers (WA)
Michael Sale, Oak Ridge National Laboratory (TN)
Sam Swanson, Renewable Energy Technology Analysis Project (VT)

Non-Voting Board Members:
Sheryl Carter, Natural Resources Defense Council (CA), Chair, Renewables Advisory Panel
Corinne Grande, Seattle City Light (WA), Co-Chair, Hydropower Industry Advisory Panel
George K Lagassa, Mainstream Asst's (NH), Co-Chair, Hydropower Industry Advisory Panel

Natural Resource Technical Advisor:
Alex Hoar, U.S. Fish & Wildlife Service (MA)

On October 4, 1999, American Rivers and Green Mountain issued a summary of the comments received on the program and criteria since the March 1999 draft and addressed the revisions made in response. On October 21, 1999, the final draft of the program was released. On November 8, 1999, the Governing Board met for the first time in Washington, D.C., and finalized the program. After nearly three years of intensive efforts by a broad range of interested participants, the Low Impact Hydropower Certification Program was formally launched in January 2000.

H. Summary of the Low Impact Certification Program, January 2000

1. Final criteria

The final Low Impact Hydropower criteria address eight resource issues: river flows, water quality, fish passage and protection, watershed protection, threatened and endangered species protection, cultural resources protection, recreation use and access, and dam removal

[12] A list of the current Board Members, Advisory Panel members, and supporters is available at http://www.lowimpacthydro.org/LIHI.html.

recommendations. The criteria were designed to be environmentally rigorous, yet achievable. The drafters recognized that if the level of environmental protection were set too high, an insufficient amount of power would be eligible for certification, and the program would be unable to attract participants. Without participants, the program could not be effective in its ultimate goal of encouraging reductions in the impacts of hydropower generation. They also recognized that if they were set too low, the program would lose environmental credibility, and thus lose the public and market value of the certification. The following summarizes the goal of each criterion, and its applicable standard.

River flows:

Goal: The certified project should provide river flows that are healthy for fish, wildlife, and water quality, including seasonal flow fluctuations where appropriate.

Standard: For instream flows, a certified facility must comply with recent resource agency recommendations for flows. If there are no qualifying resource agency recommendations, the applicant can meet one of two alternative standards. First, the applicant can demonstrate the flows meet the Aquatic Base Flow standard, or the "good" habitat flow standards calculated using the Montana-Tennant methodology. Second, in the alternative, the applicant can submit a letter prepared for the application by a relevant resource agency, confirming that the flow conditions at the project are appropriately protective of fish, wildlife, and water quality. (This last option was a temporary one, available for the first year of the certification program, though it could be extended, canceled, or made permanent; the LIHI Board has since extended it through 2003.)

"Recent resource agency recommendations" are defined to be final recommendations made by state, federal, or tribal resource agencies issued pursuant to a proceeding. The agencies are limited to those whose mission includes protecting fish and wildlife, water quality and/or administering reservations held in the public trust. Thus, agencies such as a state department of fish and game, or the U.S. Fish and Wildlife Service are considered a "resource agency" but FERC, with its balancing responsibilities, is not. The recommendations must be recent, which is defined as after 1986 (after enactment of the Electric Consumers Protection Act, which amended the Federal Power Act to increase the profile of recommendations from fish and wildlife agencies in the FERC licensing process). If there are a number of resource agency recommendations, then the most stringent (most environmentally protective) is selected. In all cases, the recommendation must be the final recommendation adopted by the agency, not an initial or draft recommendation. In the case of a comprehensive settlement agreement for licensing, the terms of the settlement serve as the "recommendations."

The drafters recognized that there were continuing concerns about relying on resource agency recommendations, but were unable to identify a satisfactory alternative. No objective standards were identified that would allow projects to be evaluated appropriately without also requiring new or additional studies. For example, there is no uniform agreed-upon methodology for determining the appropriate minimum instream flow at every project. In the absence of such a universal standard, the Institute could evaluate it on a case-by-case basis, but this could end up being a subjective evaluation based on the interests and perspectives of the individual Board

members at the time. While not perfect, using the recommendations made by natural resource agency that knows the area and has evaluated the facility in context was considered the best approach under the circumstances.

Water quality:

Goal: The water quality in the river is protected.

Standard: The water quality criterion has two parts. First, a facility must demonstrate that it is in compliance with state water quality standards, either through producing a recent (after 1986) Clean Water Act Section 401 certification from the state, or providing other demonstration of compliance, such as a letter from the state confirming current compliance with water quality standards. Second, a facility must demonstrate that it has not contributed to a state finding that the river has impaired water quality under Clean Water Act Section 303(d).

Future Enhancement: For applications in 2002 and beyond, a limited program of regular water quality monitoring and reporting would be required, after the Institute developed the specific parameters of the monitoring program. (As discussed in section II.D.2, the future enhancement was deferred until 2004 for further development).

Fish passage and protection:

Goal: Where necessary, the facility provides effective fish passage for riverine, anadromous and catadromous fish, and protects fish from entrainment.

Standard: For riverine, anadromous and catadromous fish, a facility must be in compliance with both recent (after 1986) mandatory prescriptions regarding fish passage, and recent resource agency recommendations regarding fish protection (e.g., tailrace barriers). If anadromous or catadromous fish historically passed through the facility area but are no longer present, the facility will pass if the applicant can show that the fish are not extirpated or extinct in the area because of the facility, and that the facility has made a legally binding commitment to provide any future fish passage recommended by a resource agency.

When no recent fish passage prescription exists for anadromous and catadromous fish, and the fish are still present in the area, the facility must demonstrate either that there is a recent decision that fish passage is not necessary for a valid environmental reason, or that existing fish passage survival rates at the facility are greater than 95% over 80% of the run. As another alternative, an applicant can submit a letter by the National Marine Fisheries Service or the Fish and Wildlife Service prepared for the application indicating that the agency is satisfied with the existing passage and that it is adequately protective. (This alternative was considered a temporary option, and could be extended, canceled, or made permanent by the Board after the first year; it has been extended through 2003).

Watershed protection:

Goal: Sufficient action has been taken to protect, mitigate and enhance environmental conditions in the watershed.

Standard: A certified facility must be in compliance with resource agency recommendations and FERC license terms regarding watershed protection, mitigation or enhancement.

Future Enhancement: As previously discussed, beginning in 2002 the Institute planned to require that facilities meet one of four enhanced watershed protection requirements: facilities would have to: (1) set aside a 200 foot buffer zone around the impoundment; (2) dedicate an equivalent number of acres of habitat for conservation purposes in the watershed; (3) establish an enhancement fund to be spent on a series of acceptable watershed protection activities (a formula for determining the required amount of funding would be determined later); or (4) combine partial efforts under the other three options. These watershed protection requirements were designed as a one-time obligation. (As discussed in section II.D.2, this enhancement was deferred to 2003 or later for further development).

Threatened and endangered species protection:

Goal: The facility does not negatively impact state or federal threatened or endangered species.

Standard: For threatened and endangered species present in the facility area, the facility owner/operator must either demonstrate that the facility does not negatively affect the species, or demonstrate compliance with the species recovery plan and any relevant authority for a "take" of the species under federal or state laws.

Cultural resource protection:

Goal: The facility does not inappropriately impact cultural resources.

Standard: Cultural resources must be protected either through compliance with FERC license provisions, or, if the project is not FERC regulated, through development of a plan approved by the relevant state, federal, or tribal agency.

Recreation:

Goal: The facility provides access to the water and accommodates recreational activities on the public's river.

Standard: A certified facility must be in compliance with terms of its FERC license or exemption related to recreational access, accommodation and facilities. If not FERC regulated, a facility must be in compliance with similar requirements as recommended by

resource agencies. A certified facility must also provide access to water without fee or charge.

Facilities recommended for removal:

Goal: A natural resource agency has not concluded the facility should be removed.

Standard: If a resource agency has recommended removal of a dam associated with the facility, certification is not allowed.

If a facility meets the requirements under all eight of the criteria, the facility will be certified as Low Impact. A facility failing on one or more of the criteria will not be certified. The reason for the "all or nothing" approach was to help avoid subjectivity. The drafters considered and tested systems that would not require compliance with all the standards, but such an approach was imbued with subjectivity and lead to unpredictable results. The "all or nothing" approach also retains a level playing field for all potential applicants.

2. Certification process

Transparency in the certification process and certification decision-making is considered crucial for the credibility of the program. The dam owner's application, the technical review and verification, and any other relevant information relied upon in issuing a certification decision should be accessible to the public. Similarly, the public should have an opportunity to participate in the certification process, including an opportunity for appeal. As a result, the certification process includes the following key stages:

Submission of an application package
The applicant submits a certification questionnaire package, including supporting documentation and the required fee to the Certification Administrator (LIHI staff). The Certification Administrator reviews the application and checks to make sure it is complete. (In 2001, the Institute also codified its practice of offering free pre-application consultation services for potential applicants, see section II.D.3).

Public comment period
If the application is complete, LIHI posts it to the website for a sixty-day public comment period. LIHI sends out a notice to the contacts listed in the application, and to its general notice list. Any public comments are posted to the website, as are any responses the applicant provides.

Application Reviewer analysis and recommendation
LIHI hires an independent consultant as the Application Reviewer. The Application Reviewer will investigate and verify the information in the application and provide a report and recommendation as to whether or not the facility meets the certification criteria. The Application Reviewer will also address any public comments on the application.

Preliminary certification decision by the Governing Board
Once the public comment period has closed, the Application Reviewer's report is completed, and LIHI staff has issued any additional report and recommendation regarding the application, the LIHI Governing Board will meet to deliberate. Deliberations on contested or controversial applications are open to the public. The Board may decide to issue a preliminary certification decision, or may request additional information or analysis. Certification decisions require a two-thirds majority vote.

Appeal period

If the preliminary certification decision is to certify, that decision plus the Application Reviewer's report and any staff report are posted to the website. Any person who commented on the application has 30 days to appeal the decision. If the decision is not to certify the facility, the applicant is notified and given the reasons for the rejection. The applicant may either mitigate the reasons for rejection and submit a letter in explanation, or may submit an appeal request. If the preliminary decision is to certify, and there are no appeals, then the Certification Administrator will issue the certification.

If appeals, then to Appeals Panel
If there is an appeal, the Application Reviewer reviews the appeal and submits a report. An Appeals Panel is convened. The Appeals Panel is comprised of three independent individuals selected by the Governing Board from a pool of qualified candidates. They are selected on the basis of their expertise with hydropower and natural resource issues, and their ability to objectively evaluate cases concerning the certification program. The Appeals Panel reviews the record and makes any needed inquiries, and makes its own independent decision as to whether the facility should be certified.

Final certification decision, based on Appeals Panel decision or Governing Board special review
If the Governing Board takes no action on the appeal decision, it becomes final. The Board may review the appeal decision if a Board member requests it, or if LIHI staff, the applicant, or a commenter requests it and the Board agrees a special review is warranted. The Board reviews the appeal decision to ensure it is consistent with the Board's interpretation of the criteria and other policy matters, but defers to the Appeals Panel on factual matters.

Given the extensive opportunities for public comment, it takes approximately four months to complete the certification process, if there are no appeals. Once a project is certified as Low Impact, the owner may market it as such directly. In addition, as a certified facility, the power produced will also qualify for other green power certification programs for retail markets, green pricing programs, and green tag programs, as described in section III.D.2. The term of certification was originally set at two years, but has recently been extended to five years, see discussion under section II.D.1.

3. Summary of the key attributes of the certification program

The LIHI program is not the only certification program available to hydropower project owners in the United States—there are at least two others, the Environmentally Preferable Electricity Sources ™ certification offered by the for-profit Scientific Certification Systems (SCS), and the EcoLogo certification for Low Impact Renewable Electricity, a certification administered by TerraChoice for Environment Canada. However, the Low Impact Hydropower Certification program has several attributes that together make it unique among energy certification programs in North America, if not the world.

First, it focuses solely on one power generation source, hydropower. Second, it certifies the generation facility, not the power produced (thereby focusing on the source of the generation's environmental impacts). Third, the certification is based on the actual, site-specific impacts of the hydropower facility, rather than its size or capacity. Fourth, the program addresses a comprehensive range of resource issues—eight in all—rather than just one or two. Fifth, the certification program does not generally require new studies or new analyses, but instead utilizes the existing information already developed for U.S. regulatory processes. This helps to avoid repeating efforts already done, but it also increases the objectivity of the program, since the regulatory processes generally provide measures for public comments and opportunities for appeal themselves.

Last but not least, the LIHI process is uniquely transparent. No other certification or rating scheme invites public comments on the certification decision, displays the application and information relied upon in making a certification decision, and offers the public an opportunity to appeal a certification decision. [13]

[13] SCS' approach does not address the range of resources that LIHI addresses and it may require additional studies for the certification (while not necessarily utilizing the information developed in the FERC relicensing process). SCS' approach is an evaluation of hydropower compared with other generation sources, rather than a comparison within the hydropower sector alone. In addition, the SCS process is not open to public review and participation. The EcoLogo program is more similar to LIHI's, but it does not provide for public review and participation. Raphals (2001) has critiqued these and other existing certification and rating systems operating in North America. There are also a number of certification systems for "green" power in Europe that address hydropower; the one that is most similar to LIHI's is that of "Naturemade Star" in Switzerland, which also provides a site-specific, impact-based analysis across a matrix of resources. For details of the Swiss program, see Bratrich & Truffer (2001).

PART II IMPLEMENTATION OF LOW IMPACT CERTIFICATION

Since its launch in January of 2000, the Low Impact Certification program has received five applications for certification. The reasons for this tepid response are discussed in more detail in part III. Nonetheless, the processing of the applications provides considerable information about the functioning of the certification program, and its strengths and weaknesses, which are discussed in this part. Part II also includes a discussion of fourteen additional potential applications for certification that have undergone some level of pre-application consultation, but have not filed for certification as yet. This part also includes a detailed analysis of the potential for certification of over 100 projects that have been surveyed, including the reasons why they may, or may not be good candidates for certification. Lastly, the steps the LIHI Governing Board has taken to expand and improve the program are detailed, including the critical decision to expand the program to address "new" hydropower.

A. Projects That Have Applied for Certification

To date, five projects have applied for Low Impact Hydropower certification: the Island Park Facility on the Henry's Fork of the Snake River, in Idaho (the initial application was received in May 2000, and the amended application was submitted in January 2001); the Stagecoach Project on the Yampa River, in Colorado (October 2000); the Putnam Hydropower project on the Quinebaug River, in Connecticut (December 2001); the Falls Creek Project on Falls Creek in Oregon (February 2002), and the Deerfield No. 5 facility on the Deerfield River in Massachusetts (April 2002). Stagecoach, Island Park, and Putnam have been certified. The certification processes for the Falls Creek and Deerfield No. 5 projects are still on going, though it appears both are likely to be certified.

1. Island Park

The Island Park project was the first to apply, in May of 2000. The facility is a 4.8 MW hydroelectric project located at the base of the Island Park Dam and Reservoir. The dam and reservoir are operated by the U.S. Bureau of Reclamation for irrigation and storage as part of the larger Minadoka project. The hydroelectric facility is owned and operated by the Fall River Rural Electric Cooperative, Inc., a member-owned cooperative the serves Idaho, Montana, and Wyoming. The facility is located on the Henry's Fork of the Snake River, in Idaho, within the Targhee National Forest, about fifteen miles west of Yellowstone National Park. Fall River's application for certification of its hydroelectric project raised a host of difficult issues for the Institute.

Addressing the complexity of a shared facility

The Island Park Facility is a shared facility—the dam and reservoir are owned and operated by the federal government for irrigation and storage, but the hydroelectric project is owned and operated by Fall River. Because the dam and reservoir are federally owned and operated, there is no FERC license for the dam and reservoir. Because the hydroelectric project is non-federally owned and operated, it does require a FERC license.

When it initially applied for certification, Fall River did not address whether Reclamation's Island Park Dam and Reservoir met the LIHI criteria because Fall River has no jurisdiction or control over Reclamation's operations. Fall River utilizes whatever irrigation releases Reclamation makes. The Institute accepted the application, and contracted with Stillwater Sciences of Berkeley, California, to be the Application Reviewer. Stillwater concluded that the Island Park Hydroelectric Project met the certification criteria, but this was without addressing whether or not the Island Park Dam and Reservoir met the criteria.

Not surprisingly, the application raised considerable debate amongst the Board members and Advisory Panel members during the first deliberations on the application in October of 2000. The primary concern was for the lack of evaluation of the dam and reservoir. Despite Fall River's lack of jurisdiction or control, the dam and reservoir were being utilized to generate power. Was the program designed to encourage changes in behavior? If so, how could this occur if the hydropower producer was unable to adjust operations to meet the criteria? But would certification of a hydroelectric facility, without consideration of the associated dam, be credible with the public?

In the end, the Board determined that the application was incomplete because of the failure to apply the criteria to the Island Park Dam and Reservoir. The certification program was designed to address a "facility" which is defined to include both a dam and a powerhouse. So, in its first major policy decision, the LIHI Board confirmed that the entire facility must be evaluated, even if segments were separately owned and operated. Fall River was encouraged to resubmit its application once it could evaluate whether or not the Island Park Dam and Reservoir would meet the Low Impact criteria as well.

Re-application, and the Montana-Tennant standard

Fall River did submit an amended application in January of 2001 addressing the entire facility. The most difficult issue upon re-application was whether or not the facility, including the Island Park Dam, complied with the river flows criterion. Fall River did not submit any additional technical information, but said that the flows released from the dam were appropriately protective of fish, wildlife, and water quality, citing a letter submitted in the original application by the Idaho Department of Fish and Game in support of the hydroelectric facility as low impact.

The certification question for flows first asks whether or not there are any resource agency recommendations issued after December 31, 1986, regarding the appropriate flow releases for the Island Park Project (see question A.1 of the certification questionnaire, Appendix A). The hydroelectric project was licensed by FERC in 1988, and construction was completed in 1994, but there were no applicable post-1986 flow recommendations. The flow recommendations were either (a) too old to be considered; (b) withdrawn by the agency initially making them; or (c) provided by entities that do not qualify as a "resource agency" under the certification program definition (e.g., FERC, and the Idaho Department of Parks and Recreation). Moreover, the flow recommendations were "informational" only in that FERC had no jurisdiction to order releases by Reclamation.

The certification program provides alternative methods for meeting the flow criteria in the absence of qualifying resource agency recommendations, under question A.2 and A.3 of the certification questionnaire. These "fall back" methods require that an applicant demonstrate that the flows released meet either the "good" habitat flow standards calculated using the Montana-Tennant method or the flow meets the Aquatic Base Flow (ABF) standard. If those standards can't be met, then a letter from a relevant resource agency written for the application stating the flows are appropriately protective of fish, wildlife, and water quality is acceptable. Fall River was utilizing the latter alternative, relying on the letter from the Idaho Department of Fish and Game. However, subsequent conversations with that agency suggested the letter was written to address releases from the hydroelectric project only, and was not intended as an evaluation of flow releases out of the entire Island Park facility including the Reclamation dam.

As a result, the Institute requested its Application Reviewer to analyze compliance with the flow standards under the Montana-Tennant methodology. (The ABF method was developed in New England based primarily on New England streams, so the Montana-Tennant method was considered more appropriate for Island Park).

Donald L. Tennant of the Fish and Wildlife Service in Billings developed the "Montana" method in the 1970s as a "quick, easy methodology for determining flows to protect the aquatic resources in both warmwater and coldwater streams based on their average flow" (Tennant 1976). The method is based on surveys of a number of streams and rivers, from "small, precipitous brooks high in the Rocky Mountains to large, low-gradient rivers and streams out on the prairies of mid-America or along the coastal plains." Tennant found that percentages of the average annual flow were consistent in their impacts for fish, regardless of the stream or location. Thus, as depicted in Table 2, the "Montana-Tennant" method describes a series of possible base flow regimes, based on a percentage of annual flow by season and predicted effect on fish habitat:

Table 2 Montana-Tennant Standards

"Montana Method" for prescribing Instream Flow Regimes for Fish, Wildlife Recreation and Related Environmental Resources		
Narrative Description Of Flows	Recommended Base Flow Regimes	
	Oct-Mar	Apr-Sept
Flushing or Max.	200% of the average flow	
Optimum Range	60%-100% of the average flow	
Outstanding	40%	60%
Excellent	30%	50%
Good	20%	40%
Fair or Degrading	10%	30%
Poor or Minimum	10%	10%
Severe Degradation	10% of average flow to 0 flow	

Source: Tennant 1976 (internal footnotes omitted).

Tennant recommended that the flows be instantaneous, and developed based on the *unimpaired* average annual flow of the stream.

The first problem for the LIHI Application Reviewer in applying the standard to Island Park was to define the average annual unimpaired base flow for the Henry's Fork at the project location. United States Geological Survey data were available just downstream of the dam, but only for the post-reservoir construction era, from 1933-2000. Any flow calculations based on that flow regime would include the dam and reservoir in the baseline. The LIHI Governing Board determined Stillwater should evaluate, on whatever data were available, the average annual flow prior to the construction of the Island Park Dam and Reservoir. Stillwater did identify five years of flow data prior to dam construction, although that period also coincided with one of the most severe droughts on record.

Thus, Stillwater did two different calculations, one based on post-dam flows, and one on estimated pre-dam unimpaired flows; the required "good" habitat flow levels for certification would then be:

Post-dam average annual flow:		631 cfs
Montana-Tennant "Good" flows:		
October-March (20 %)	126 cfs	
April-September (40 %)	252 cfs	
Pre-dam estimated unimpaired average annual flow		731 cfs
Montana-Tennant "Good" flows:		
October-March (20%)	146 cfs	
April-September (40%)	292 cfs	

Based on available data, the regulated flows released from the Island Park Facility were determined to be:

October-March:	monthly means from 218 to 862 cfs
April-September:	monthly means from 484 to 1974 cfs

The monthly means were sufficient to meet the criterion, but the flows could have fluctuated outside of the standards on a daily basis. Since the certification program requires compliance with the criterion at the time the application is filed and in the year preceding, Stillwater also checked daily flow records for the prior year. There was one day when the flows dropped below the required level: on April 4, 2000, the flows were 270 cfs, when they should have been 292 cfs. Stillwater concluded that the reduced flow on that day, which was on the cusp of the change in seasons, was not significant, and should not preclude passage on the flows criterion. The Governing Board agreed.

The combined Island Park Dam, Reservoir, and Hydroelectric Facility met the remaining criteria with little difficulty. Indeed, the hydroelectric project helps to mix water from the reservoir for better water quality downstream, helping to sustain a highly regarded rainbow trout fishery. As a result, the entire facility was finally certified on June 7, 2001. There were no appeals. Fall River

initiated a green pricing program shortly thereafter, offering its customers the opportunity to purchase specific blocks of power from the certified project, for a slight premium.

Costs involved

Fall River estimates that it spent about $5,000 on the application, plus the $2,500 application fee. Most of the additional cost was for hiring a consultant to prepare the application and interact with the Institute. The Institute spent $14,825 in direct costs for the Application Reviewer for review of the initial and amended applications, including the calculations to determine the Montana-Tennant standards; this does not include the indirect costs of staff and Board time in reviewing the application.

Post-script: suspension due to flow violations

In November of 2001, Fall River notified the Institute that the required flows were not being maintained due to the severe drought in the Pacific Northwest. As a result of the consecutive low water years, the Island Park Reservoir had been drawn very low. Reclamation needed to refill the reservoir by April 1, 2002 for the irrigation season and to aid in endangered salmon flow augmentation requirements well downstream in the basin. In order to refill the reservoir in time, the flow releases had to be reduced over the winter. They were reduced in mid-September to 150 cfs. In October they were reduced again to 80 cfs and were expected to stay there until April. The hydroelectric facility had not been operating since August due to the low reservoir levels.

The compliance provisions of the certification program require the Institute to determine whether the reduction in flows was a "significant" violation of the criteria. If a "significant" violation is found, the Institute must revoke the certification, bar the holder from re-applying for five years, and prohibit marketing based on the certification, among other things. Institute staff evaluated the situation, and found that the low flows were a cause for concern because of potential impacts to trout and also endangered Trumpeter swans that over winter in an area downstream of the facility.

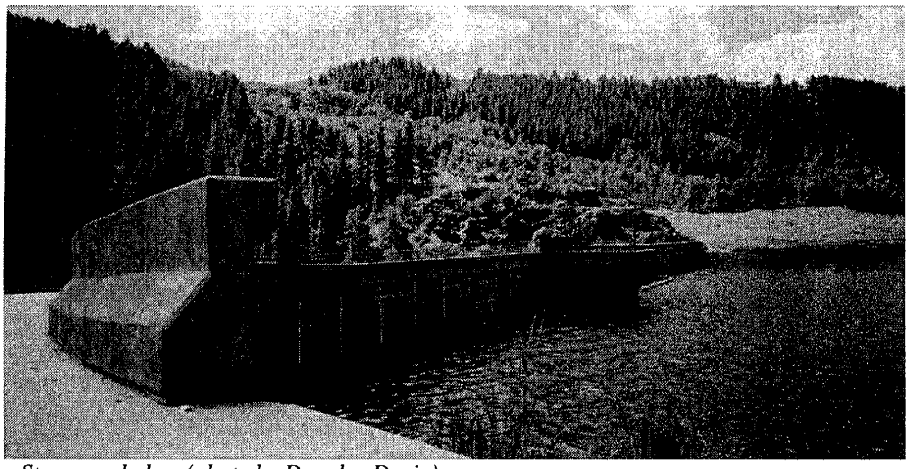
The Governing Board concluded that the reduction from the required flows to 80 cfs over the winter was a "significant" violation because it represented nearly a 50 percent drop in the flow levels, and the low flows could harm both fish and wildlife, although the actual impacts were uncertain. However, the Board did not feel that revocation was appropriate: the cause of the flow reduction was partly due to natural conditions; the flows had not been reduced simply to take advantage of a power generation opportunity; and the resource agencies, though not happy about the reductions, were also not opposing them. As a result, the Governing Board decided to suspend, rather than revoke the certification pending resumption of the certified flows. The Board also amended the certification program to provide it the flexibility to revoke, or take other actions it deemed appropriate, in response to a significant violation. Fall River was required to notify its customers, and to work out the language of the notice in cooperation with the Institute.

In sum, because of the different control and jurisdictional issues, applicants from shared facilities may run a higher risk of having the certification suspended or revoked due to circumstances

beyond the control of the hydropower operator. On the other hand, certification may provide a factor to be considered when making decisions about the operation of the shared facility. For example, participants indicated that Reclamation did try to maintain higher flow levels during the fall in order for Fall River to maintain the certified flows, until circumstances made it impossible to continue. This suggests that the certification can potentially help improve environmental conditions at shared facilities by providing an additional incentive for environmentally preferable operations.

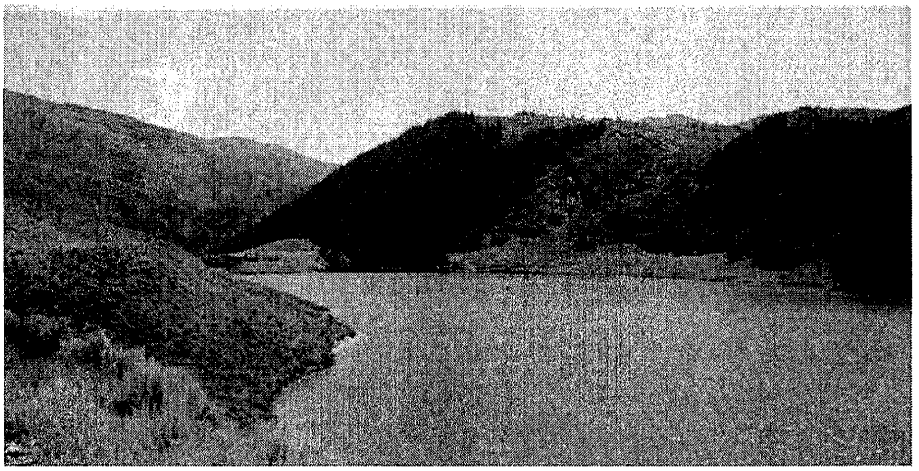
2. Stagecoach Dam and Reservoir

The second application received by the Institute (in October of 2000) was for the Stagecoach Dam and Reservoir, located 16 miles south of Steamboat Springs, Colorado, on the Yampa River. The 140-foot dam was completed in late 1988:



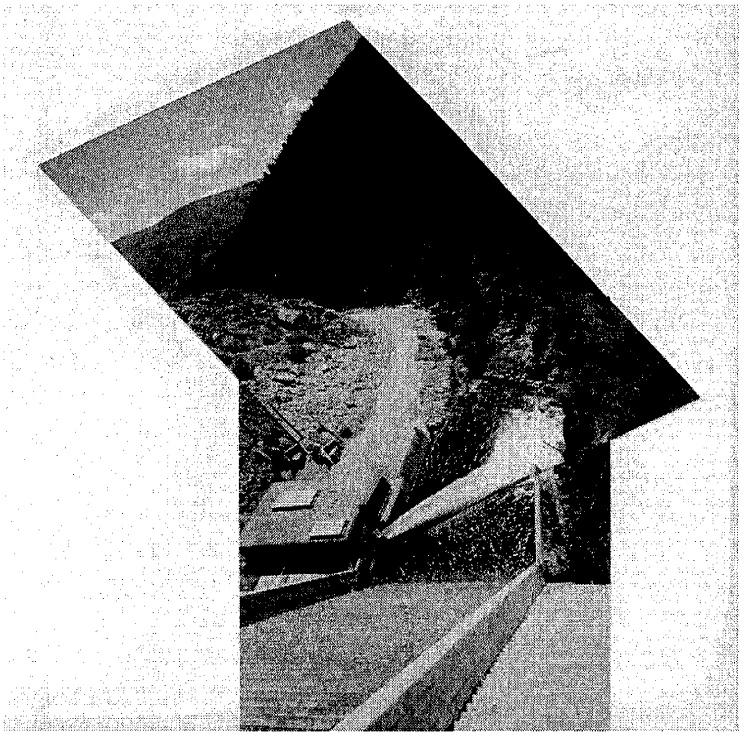
Stagecoach dam (photo by Douglas Denio)

The reservoir (777 surface acres, and 33,738 acre-feet) was filled in 1990:



Stagecoach reservoir (photo by Douglas Denio)

The hydro project has an installed capacity of 800 kilowatts (the Stagecoach Project was primarily designed as a small reclamation project). The facility is owned and operated by the Upper Yampa Water Conservancy District.



Stagecoach dam and tailrace (photo by Douglas Denio)

Although the Stagecoach project did not present the same complexity as Island Park, there were some questions as to whether the project met the flow and water quality criteria. In terms of flows, once again the issue was whether or not the project met "fall back" certification standards. Although the project license was issued in 1987, the agency recommendations regarding flows (a 20 cfs instream flow) were made previously, in 1986. As a result, the flow recommendation was too old to meet the first LIHI flow standard. The project had to either meet the Montana-Tennant standard for flows, or obtain a letter from resource agencies confirming the project was releasing flows that were appropriately protective of fish, wildlife, and water quality.
The Application Reviewer concluded the required flows under the Montana-Tennant method should be:

October-March:	15.7 cfs
April-September:	31.5 cfs

The Stagecoach project was found to meet or exceed these flow releases. However, the Application Reviewer also noted that the resource agencies would be seeking to increase the required flow releases to 40 cfs year round as a part of a water rights proceeding. The Application Reviewer recommended that LIHI make the certification contingent upon the applicant releasing the 40 cfs. The Board rejected that approach, noting that it could not require

a facility to meet a flow level that had not been formally recommended as yet. However, under the compliance and reporting sections of the certification, Stagecoach would have to report a new recommendation. The Board would decide whether or not to require compliance at that time, or whether to wait until the project sought re-certification.

There was also a history of water quality problems at the facility involving non-compliance with dissolved oxygen standards. This had lead to fish kills in the past. The state believed the problem was due to the poor water quality of the reservoir; similarly, the U.S. Environmental Protection Agency thought it was because the reservoir had been poorly located in a basin with extensive cattle grazing. The water quality problems prompted a FERC investigation, and eventually FERC issued a compliance order.

Although there had been no water quality problems in the year preceding the application, and the project was currently in compliance with water quality standards and the LIHI criteria, the Application Reviewer nonetheless recommended that the applicant be required to meet the enhanced water quality monitoring requirements of the certification program that were to be implemented in 2002. The Board did not accept this recommendation because the enhanced water quality monitoring program requirements had not yet been developed. However, in certifying the project, the Board did require the Certification Administrator to conduct follow up checks on the compliance of the Stagecoach Facility, rather than rely on just the self-reporting of the applicant.

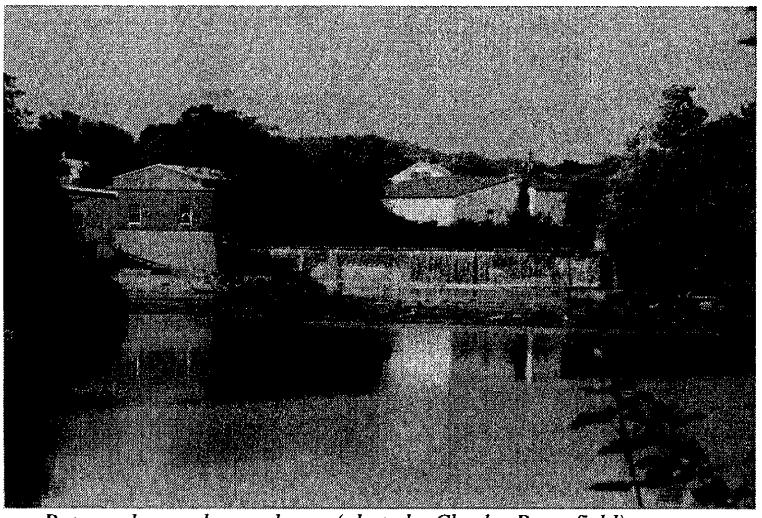
The Stagecoach project was certified on March 27, 2001, and was the first to be certified by the Institute. The applicant's representative, Mr. John Fetcher of the Upper Yampa Water Conservancy District sought certification because he believes hydropower should be given the same consideration as wind or solar power. His attempts to attract a premium payment from the Public Service Company of Colorado, which purchases the output of the facility (and which offers a wind power option to customers), have so far been unsuccessful.

Costs involved

Mr. Fetcher estimates that the District's effort to obtain certification cost about $500 in addition to the $2,500 application fee. The Institute spent $4,300 for the Application Reviewer in this case.

3. Putnam Hydropower Project

The Putnam Hydropower Project is a small mill site dam located on the Quinebaug River in northeastern Connecticut.



Putnam dam and powerhouse (photo by Charles Rosenfield)

The project received an exemption from FERC in 1982. The project has an installed capacity of 0.575 MW, and is operated in a run-of-river fashion (inflow equals outflow on an instantaneous basis) with no bypassed reach. The project is owned and operated by Putnam Hydropower Inc. The application was filed on December 28, 2001, the public comment period began on January 2, 2002, and concluded on March 4, 2002, and the project was certified effective April 10, 2002.

The Putnam project was the first from the New England area, and was also the first to undergo extensive pre-application consultation offered by the Institute. The pre-application consultation helped ensure that the application was as thorough and complete as possible before it is was posted for processing. In addition, this small facility had few potential issues in meeting the certification criteria, and both the Application Reviewer and the Staff reports recommended certification. The Board's decision to certify the project was unanimous. The only public commenter on the application was the Rivers Alliance of Connecticut, and they had commented favorably.

In addition to being the first certified project from the New England area, Putnam was also the first certified facility to attract a third-party marketer. The Connecticut Energy Cooperative is purchasing the output of Putnam to help supply its "EcoWatt"™ and "EcoWattPLUS"™ renewable energy products, which are offered throughout New England.

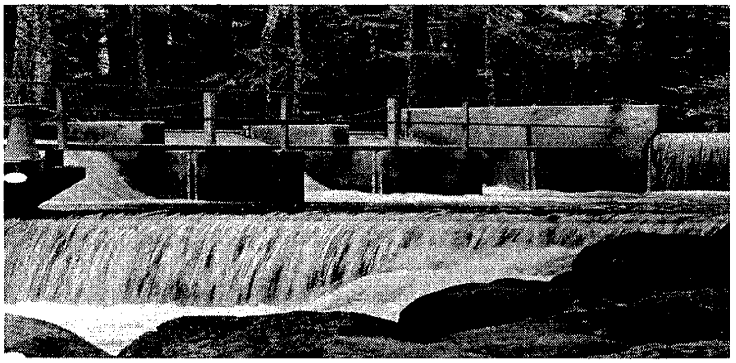
Costs Involved

Mr. Rosenfield, the Secretary-Treasurer of Putnam Hydropower, Inc., indicated that other than the application fee of $2,500, the direct costs for developing and submitting the application were negligible. In addition, Putnam is receiving a premium from the Cooperative since it has been certified, but the parties have declined to identify the amount of the premium.

As for costs to the Institute, with the pre-application consultation work the need for extensive involvement by the Application Reviewer in investigating the application was significantly reduced over prior applications. As a result, the Institute's direct non-salary costs on the Putnam application totaled $1,570.

4. Falls Creek Project

The Falls Creek project is a 4.3 MW high head run-of-river project located in the Willamette National Forest about 20 miles east of Sweet Home, Oregon. The project consists of a small diversion structure (5 feet high, 25 feet in length) that diverts about 26 cubic feet per second (cfs) of water from Falls Creek:



Falls Creek diversion dam (photo by Frontier Technology, Inc.)

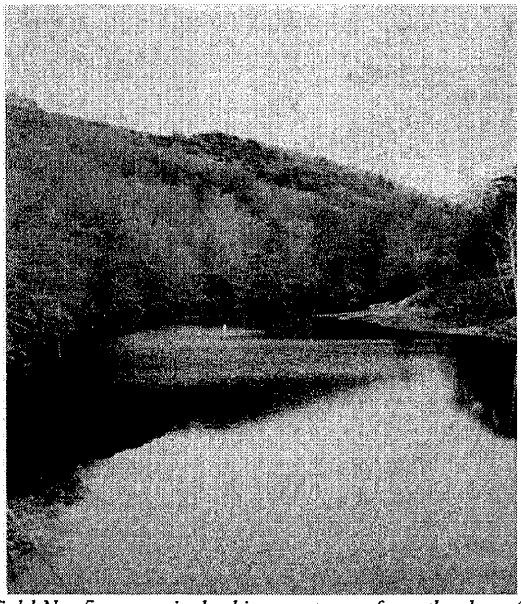
The water is diverted to a buried penstock that is 7,380 feet long, and drops about 2,381 feet to the powerhouse:

Falls Creek Powerhouse (photo by Frontier Technology, Inc.)

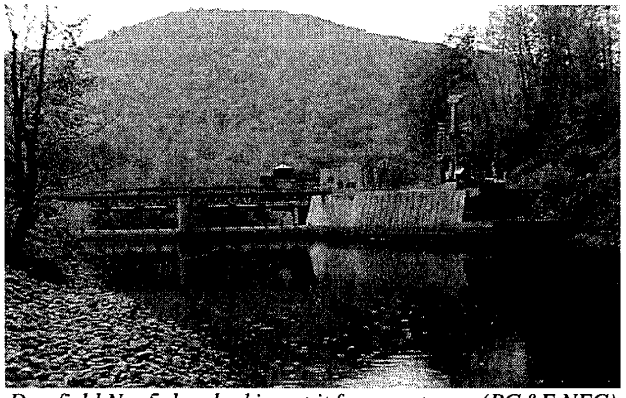
The diverted water is discharged into Falls Creek near the confluence with the South Santiam River. A minimum instream flow of 1 cfs is released in the bypassed reach to maintain habitat for trout in the bypassed reach (which is comprised primarily of falls and pools). The project was issued an exemption by FERC in 1983. The project was also issued a Governor's Energy Award in 1986, in recognition of its environmental attributes. The application for certification was filed on February 11, 2002, and the public comment period closed April 12, 2002. A preliminary certification decision is expected in late May 2002.

5. Deerfield No. 5 Facility

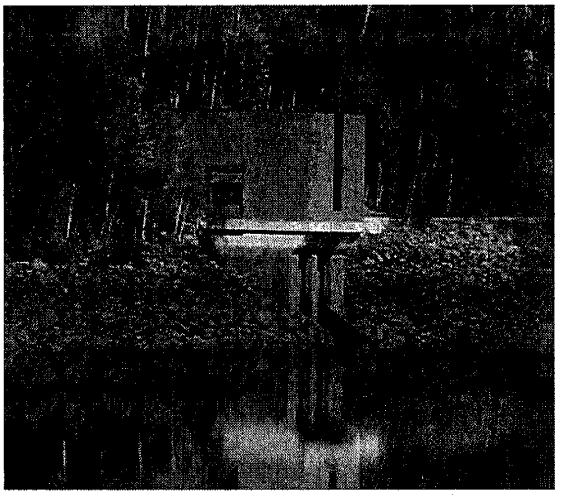
Deerfield No. 5 is the fifth facility to seek certification, the second from New England. Deerfield No. 5 is a 17.55 MW unit of development of the larger multiple development Deerfield Hydroelectric Project, FERC No. 2323, owned and operated by the PG&E National Energy Group. Deerfield No. 5 is comprises of a small reservoir (3/4 mile long, 38 surface acres, 118 acre feet in storage), a dam (40 feet high and 151 feet long), and a powerhouse with a single Francis type turbine.



Deerfield No. 5 reservoir, looking upstream from the dam. (LIHI)



Deerfield No. 5 dam looking at it from upstream (PG&E NEG)



Deerfield No. 5 powerhouse at the Fife Brook Impoundment (PG&E NEG)

Deerfield No. 5 is operated in a daily peaking mode, meaning that water is stored and released throughout the day for power production. Water from the reservoir is diverted at the dam into a tunnel, conduit, and canal system creating a 2.6-mile bypass reach between the dam and the powerhouse. Water is discharged from the powerhouse into the Fife Brook Impoundment, which is part of a separately licensed pumped storage facility.

The entire Deerfield Hydroelectric project was relicensed in 1997 based on a comprehensive settlement agreement approved by the FERC. The agreement was between the project owner/operator, environmental organizations, and state and federal natural resource agencies. The agreement addresses various license conditions for operation and mitigation over the next license term. For example, as a part of the license agreement, there is a minimum instream flow released into the bypassed reach below he Deerfield No. 5 dam. In addition, seasonal whitewater boating flows of up to 1100 cubic feet per second are released below the dam, supporting a popular "Adventure Class" whitewater stretch.

The Deerfield application was filed in April, the public comment period closes in June, and a certification decision is expected in July. Because the Deerfield No. 5 was recently relicensed via the collaborative settlement that was agreed to by all the relevant natural resource agencies, the facility is expected to have little difficulty meeting the certification criteria.

Thus, the total experience of the program to date can be summarized as follows:[14]

[14] For this analysis (including subsequent tables), the United States was divided into geographic regions as follows: the Pacific Northwest is WA, OR, ID, and AK; the Pacific Southwest is CA, NV, AZ, and HI; the Inter-Mountain region is MT, WY, UT, CO, and NM; the Prairie/Texas region is ND, SD, NE, KS, OK, and TX; the Great Lakes Basin is MN, WI, MI, IA, MO, IL, IN, and OH; New England is ME, VT, NH, MA, NY, RI, and CT; the Mid-Atlantic is PA, NJ, DE, MD, VA, and WV; and the Southeast is KY, TN, NC, SC, AR, LA, MS, AL GA, and FL.

Table 3 Applications for Certification Through April 30, 2002

	Total Projects Applied	Total Projects Certified	Passage Rate	Installed Capacity	Pre or Post ECPA
Pacific Northwest	2	1 (1 Pending)	100% so far	9.1 MW	1 Pre, 1 Post
Pacific Southwest	0	0			
Inter-Mountain Region	1	1	100%	0.8 MW	Pre
Prairie/Texas	0	0			
Great Lakes Basin	0	0			
New England	2	1/1 Pending	100% so far	18.1 MW	1 Pre, 1 Post
Mid-Atlantic	0	0			
Southeast	0	0			
TOTALS	**5**	**3 to date**	**100 % to date**	**28 MW applied for**	**3 Pre, 2 Post**

The Institute assumed that initial applications to the program would be from facilities over 30 MW in installed capacity, that the facilities would be located in states with active retail markets, and that the facility would have been licensed after 1986, after the passage of the Electric Consumers Protection Act or ECPA.[15] Albeit limited, experience to date runs counter to those predictions: all five projects are under 30 MW (although the size of the dams vary significantly); three out of the five are from states without retail competition (Colorado, Idaho, and Oregon); and three of the five were licensed (or exempted) prior to 1986.

B. Anticipated Applications

LIHI has fielded dozens of inquiries from a range of interested project applicants around the country. Fourteen projects have undergone some level of preliminary, pre-application evaluation and consultation to determine their likely chances for certification, with varying results. Some projects that were previously on this list have since applied for certification. Other projects have some additional analysis or information to gather before deciding to proceed, or have decided not to proceed because of potential problems meeting the criteria or because of poor market conditions. It is unclear at this point how many of these projects may eventually apply. The following table summarizes the fourteen projects:

[15] With the ECPA, Pub. L. 99-485, Congress amended the Federal Power Act to require FERC to give "equal consideration" to purposes of "energy conservation, the protection, mitigation of damage to, and enhancement of, fish and wildlife, the protection of recreational opportunities, and the preservation of environmental quality" when issuing hydropower licenses. See 16 U.S.C. 797(e). The ECPA amendments also raised the profile of state and federal fish and wildlife recommendations in the licensing process by requiring FERC to adopt those recommendations unless it could make findings that the recommendations were inconsistent with the Federal Power Act or other applicable law, 16 U.S.C. 803(j). Projects licensed after 1986 are often presumed to be better environmentally than projects licensed or relicensed prior to 1986.

Table 4 Applications Known to be Actively Contemplated

	Total Applications Known to Be Actively Contemplated	Installed Capacity 30 MW or less	Installed Capacity Over 30 MW	Licensed Pre-ECPA (1986 or earlier)	Licensed Post-ECPA (1987 or later)
Pacific Northwest	5	2	3	2	3
Pacific Southwest	1	0	1	0	1
Inter-Mountain Region	1	1	0	1	0
Prairie/Texas	0	0	0	0	0
Great Lakes Basin	2	0	2	1	1
New England	1	1	0	1	0
Mid-Atlantic	1	0	1	1	0
Southeast	3	1	2	1	2
TOTALS	**14**	**5**	**9**	**7**	**7**

C. Identifying Potentially Eligible Projects

Given the slow pace of applications, the Institute is now seeking to recruit applicants to the program. The first step is to identify a pool of projects that are good candidates for certification. Over 100 projects have been evaluated to date, in one of two ways. About half were evaluated in the beta testing phase of the program by consultants to Green Mountain, before the criteria were finalized. This evaluation included contacts with dam owners who were willing to discuss the application of the criteria to their facilities, on the condition of anonymity. The other half of the projects was evaluated by LIHI staff through research of public files (especially the FERC Records Information Management System, or RIMS), with some contact with dam owners. The results of the two survey strategies have been combined here, and are explored in detail in the tables and graphs that follow.

These surveys do not provide a scientific sampling of dams across the country. Also, given the inherent variation and complexity of hydropower projects and the comprehensive range of questions asked as a part of the certification process, it is not always easy to discern a project's compliance with the criteria, at least at the survey level. This is particularly true of projects that have not been relicensed recently, or which have not been exempted recently, since on-line information is difficult to come by.

Lastly, because the beta testing survey utilized the 1998 draft criteria that did not include the endangered species criterion or the dam removal criterion, some of the projects that were found to pass at that time may not meet the final criteria. Some, but not all, of the beta tested projects have been re-evaluated, and the additional criteria would not have made a difference, but not all of those beta tested projects have been re-evaluated with the final criteria.

Even if not definitive, the survey results are interesting. First, the average percentage of projects deemed good candidates for passage—54 percent—is relatively high for what is expected to be

system identifying those projects able to earn "premium" price rates, although it reflects that at least some of the projects were selected based on expectations that they would pass. Actual passage rates, particularly of the entire universe of eligible projects, must be assumed to be lower, although how much lower is difficult to determine. Second, of the two "hydro rich" regions of the country, the Northwest and the Northeast, more facilities in the Northeast are expected to pass than in the Northwest, perhaps because of the larger scale of the projects in the Northwest and because of the presence (or absence, as the case may be) of endangered salmon species. Another factor may be that many projects in the Northwest are either in relicensing or are scheduled to be relicensed soon, whereas many projects in the Northeast have already been relicensed. Projects that have not yet been relicensed are unlikely to have the requisite resource agency evaluations necessary to address many of the LIHI criteria.

Project selection during the beta testing phase was done to obtain a broad cross section of large and small capacity, and of projects licensed prior to 1986 and those after. Project selection by LIHI staff was slightly different. First, a list of projects known or expected to be good candidates for certification was generated based on input from LIHI Board members, Panel members, and others (the beta testing survey had addressed a number of these already). Then, other projects were generally chosen according to the following ranking scheme, with projects with higher scores considered more likely to pass the criteria than those with lower scores:

i. Capacity: less than 30 MW= 1 point; 30-50 MW= 2pts; over 50 MW =1pt
ii. Date licensed/relicensed:
    Between 1986-1990, 1 pt
    Between 1991-1995, 2 pts
    Between 1996-present, 3 pts
iii. Relicensed via settlement agreement, 3 pts
iv. Located in a Green-e state (CA, NJ, PA, CT, OH) 2 pts
v. Located in the Pacific NW (OR, WA, ID, MT)(Renew 2000, Salmon Friendly Power), 2pts
vi. Located in a state restructured now or by 2002 (w/o Green-e)(NY, ME, DE, MA, NH, RI, DC, MD, VA, IL, MI. TX), 1 pt

The ranking scheme was developed to target those projects that were believed to have the highest probability of being able to meet current certification criteria, as well those most likely to be interested in certification due to market conditions. Thus, projects with an installed capacity of 30-50 MW were given a higher score than those that are under 30 MW because it was assumed that the smaller capacity projects would simply use the "small hydro" standard instead of seeking the more difficult Low Impact certification. Higher points were given to projects more recently licensed or relicensed, on the assumption that the more recent the licensing, the more modern and up to date the project, and therefore the increased likelihood of meeting the certification standards. Projects licensed via a collaborative settlement were given a high point total, since a settlement with resource agencies establishes the standard under many of the certification criteria, and again, increases the likelihood of passing. Additional points were given for projects located in states that had existing market structures for green power, particularly if they used LIHI certification (e.g., Green-e in restructured states, or the Pacific Northwest with other systems that utilize LIHI certification). Then, in some cases, due to requests for information by

green power stakeholders, LIHI has attempted to survey all of the projects in the state (e.g., Connecticut and North Carolina). Only those projects for which there was sufficient information to make a survey determination are included in these tables.

Both the beta testing and the LIHI staff evaluation grouped projects into two main categories, roughly "good candidates" and "not good candidates at this time." Projects were not considered good candidates if they appeared to fail one or more of the criteria. "New" projects—projects that were not in operation as of August of 1998 were not eligible for the program, so they were "not good candidates." (However, with the December 2001 decision by LIHI to consider "new" hydropower, discussed in section II.D.4, some of those projects may now be good candidates). Projects just entering relicensing were not considered to be good candidates because, as described above, the criteria often rely on resource agency recommendations submitted during relicensing, so the project would have a difficult time passing until those recommendations are established. The additional caveat of "at this time" was added to acknowledge that projects might be eligible in the future depending on project modifications.

Table 5 and Figure 1 summarize the survey results according to geographic region, and Table 6 provides the reasons why a project as not considered a good candidate; these and the following tables include results from the initial beta testing, the LIHI staff surveys, and the fourteen projects that have actively considered applying (see table 4, above):

Table 5 Survey Results, by Geographic Region

Region	Total Projects Surveyed	Good Candidate for Certification	Not A Good Candidate At This Time	Passage Rate	Total Installed Capacity of "Good" Candidates (in MW)
Pacific Northwest	16	4	12	25%	796
Pacific Southwest	6	3	3	50%	255
Inter-Mountain Region	3	3	0	100%	31
Prairie/Texas	N/A	N/A	N/A	N/A	N/A
Great Lakes Basin	10	4	6	40%	53
New England	64	41	23	64%	1036
Mid-Atlantic	5	3	2	60%	1144
Southeast	18	8	10	44%	83
TOTALS	**122**	**66**	**56**	**54%**	**3398**

Figure 1 Survey Results, by Geographic Region

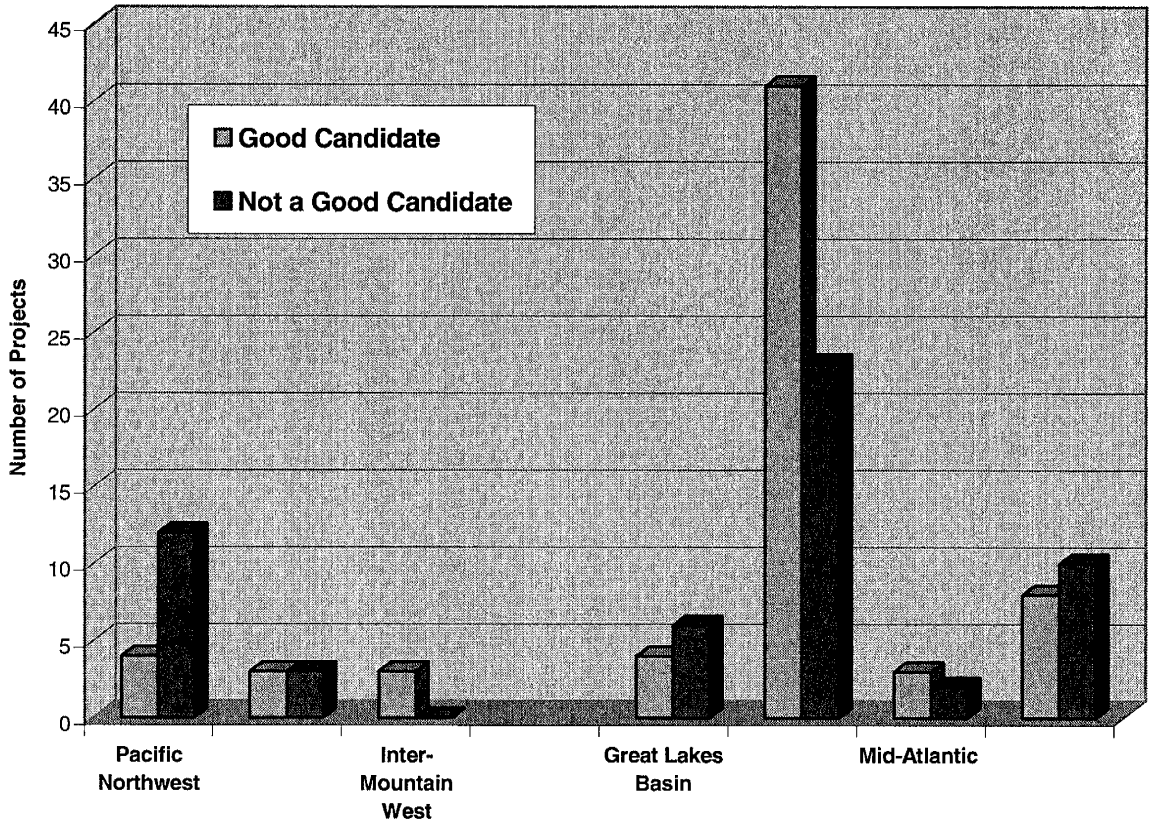
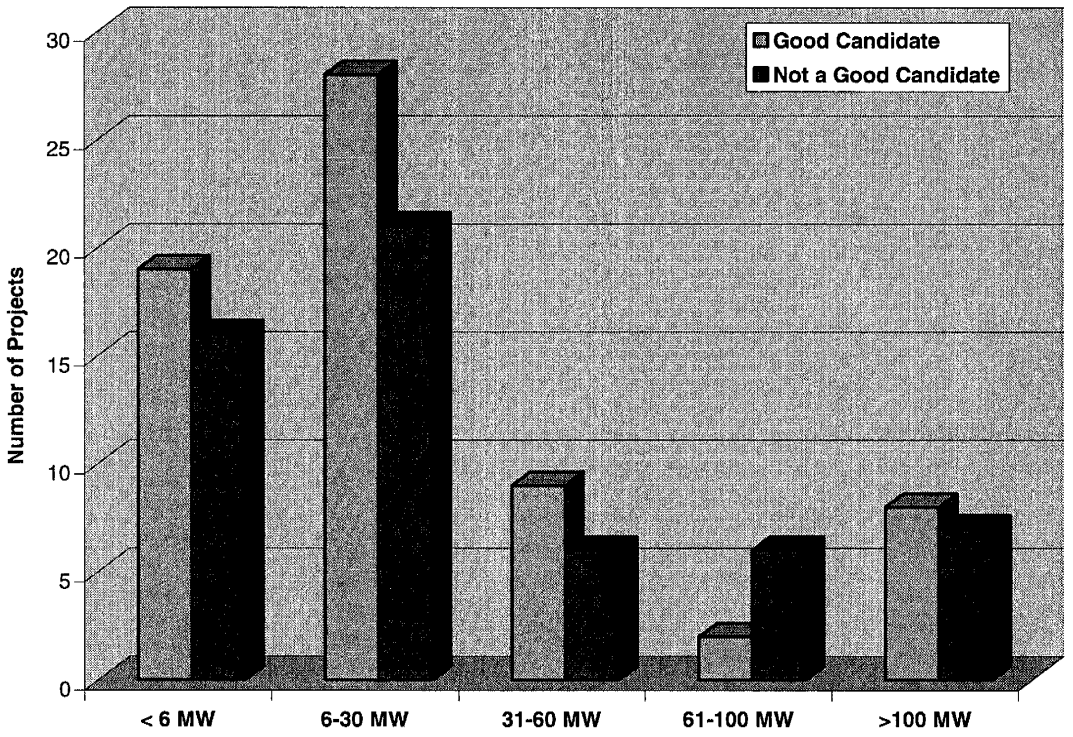


Table 6 Reasons for "Not Good Candidate" Status

Region	Inadequate Flows	Fish Passage Problems	Water Quality Problems	"New" Hydro	Just Entering Relicensing	Other
Pacific Northwest	4	6	3	1	6	0
Pacific Southwest	3	1	0	0	0	0
Inter-Mtn West	0	0	0	0	0	0
Prairie/Texas	N/A	N/A	N/A	N/A	N/A	N/A
Great Lakes Basin	2	3	1	2	1	Recreation, compliance issues
New England	11	14	1	2	6	Recreation impacts
Mid-Atlantic	1	0	1	0	0	0
Southeast	3	0	2	4	5	0
TOTALS*	**24**	**24**	**8**	**9**	**18**	
* The totals exceed the total number of projects, as some projects were found not to be good candidates for multiple reasons.						

A founding principle for LIHI is that capacity size is not the definitive indicator of environmental impacts; therefore, LIHI reviewed projects with a variety of installed capacities. Figure 2, below, illustrates the likelihood of certification across five arbitrary capacity categories (less than 6 MW, 6-30 MW, 31-60 MW, 61-100 MW, and over 100 MW):

Figure 2 Survey Results, by Installed Capacity



Although installed capacity cannot be used as a measure of environmental impacts, it is generally fair to say that smaller *scale* projects (small dams, small or no impoundments, short bypass reaches, etc) are less likely to have significant impacts than large-scale projects. And it is fair to say that as a general matter, the smaller scale projects are also of small capacity. Thus, more "small hydro" appear to be likely to pass than projects over 30 MW.

However, note that even at very small installed capacities (less than 6 MW), the number of poor candidates is nearly as high as the good candidates. If "small" hydro were a reliable indicator of environmental preferability, then most of the small capacity projects, and especially the very small capacity projects, should have been good candidates for certification. That is not the case.

Since 1986 is often used as the demarcation line for the "modern" licensing process (after the passage of ECPA), projects licensed after 1986 should be more likely to meet the Low Impact criteria than projects issued licenses before 1986. Tables 7 and 8 depict the certification rates for projects licensed pre- and post-ECPA.

Table 7 Survey Results, Pre-ECPA Projects

Region	Good Candidate for Certification	Not a Good Candidate At This Time	Totals	Pre-ECPA Passage Rate
Pacific Northwest	1	6	7	14%
Pacific Southwest	0	0	0	N/A
Inter-Mountain West	1		1	100%
Prairie/Texas	N/A	N/A	N/A	N/A
Great Lakes Basin	1	1	2	50%
New England	12	4	16	75%
Mid-Atlantic	3	2	5	60%
Southeast	2		2	100%
TOTALS	**20**	**13**	**33**	**61%**

Table 8 Survey Results, Post-ECPA Projects

Region	Good Candidate for Certification	Not a Good Candidate At This Time	Totals	Post-ECPA Passage Rate
Pacific Northwest	3	6	9	33%
Pacific Southwest	3	3	6	50%
Inter-Mountain West	2	0	2	100%
Prairie/Texas	N/A	N/A	N/A	N/A
Great Lakes Basin	3	5	8	37%
New England	29	19	48	60%
Mid-Atlantic	0	0	0	N/A
Southeast	6	10	16	37%
TOTALS	**46**	**43**	**89**	**52%**

Somewhat surprisingly, these informal survey results show that projects licensed or relicensed after 1986 are not much more likely to be a good candidate for certification (61% to 52%). These results may be somewhat skewed since a project that is currently in relicensing and which may be a good candidate once that process is over would appear on this chart as a post-ECPA project that was not currently a good candidate. Looking at this another way, then, of the total number of "good candidates" identified, 70% were licensed after ECPA, as depicted in table 9.

Table 9 Survey Results, Good Candidates, % Post-ECPA

Region	Good Candidate for Certification	Good Candidate Licensed Post-ECPA	Post-ECPA Passage Rate
Pacific Northwest	4	3	75%
Pacific Southwest	3	3	100%
Inter-Mountain West	3	2	67%
Prairie/Texas	N/A	N/A	N/A
Great Lakes Basin	4	3	75%
New England	41	29	71%
Mid-Atlantic	3	0	0%
Southeast	8	6	75%
TOTALS	**66**	**46**	**70%**

D. Significant Changes to the Program Since Its Initial Launch

The LIHI Governing Board is committed to regular reviews of the program to ensure it is continuing to meet its goals and objectives. In late April and early May of 2001, the Governing Board met in Oakland, California for such a review. The Governing Board was concerned about the lack of applicants to the program. The general conclusion was that the overall slow pace of green market development, particularly with the energy crisis in California, had blunted incentives for obtaining Low Impact certification, as had the continued use of the "small hydro" standard for other certification programs. (This is discussed further in section III.C.1).

While LIHI cannot by itself address the market problems, the Governing Board was interested in removing obstacles for dam owners interested in applying. The Board recognized that without attracting applicants, there would be no means of utilizing the proposed market incentives to encourage improvements at hydropower dams. The Board asked its Hydropower Industry Advisory Panel to provide recommendations for how the Institute could remove obstacles for potential applicants.

The Hydropower Industry Advisory Panel submitted a list of suggested recommendations. Those recommendation include adding industry representatives as voting Governing Board members; increasing the term of certification; reducing application fees for the next few applicants; extending the criteria to address "new" hydropower and non-river hydropower; and other measures. Other options were developed by Board members, such as a recommendation to develop an environmental audit program for hydropower dams.

After a day and a half of deliberation, the Governing Board approved five specific proposed changes to the certification program for public comment. The proposals were designed to encourage additional applicants to the certification program without modifying its basic strengths.

The five proposals were:

1. Extend the term of certification from two to five years.

2. Delay changes to the water quality and watershed criteria until 2003 to allow for more development and possible revisions.
3. Codify the practice of providing a free, confidential pre-application consultation to help prospective applicants understand the potential for certification of the Facility; the pre-application consultation could include a referral to the Board for a policy or interpretation decision, while maintaining the anonymity of the applicant and project.
4. Extend the program to "new" hydropower—adding hydropower capacity to an existing hydropower structure, but with specific new parameters to ensure there wasn't a change in flow that would be detrimental to fish and wildlife.
5. Consider extending the program to address non-hydropower dams or other structures that added hydropower-generating facilities, with additional limitations designed to ensure that the existing dam had not been considered for removal prior to the addition.

In June of 2001, the Institute posted the proposals and explanatory information to the web site, and initiated a public comment period. Public comments were taken on the proposal for several months and posted on the website. Institute staff developed an analysis and summary of the public comments, and issued a report and recommendations for action by the Governing Board. That report and the recommendations were also made available on the website for public comment.

In December 2001, the Governing Board deliberated on the proposed changes. The Board agreed to extend the term of certification from two to five years, delay changes to the water quality and watershed criteria enhancements to allow for further development, codify a pre-application consultation process, and to expand the program to address some "new" hydropower generation. Details of the proposals, the public comments, and the Board's deliberations follow.

1. Extend the certification term from two to five years

The Hydropower Industry Advisory Panel recommended that the term of certification be extended from two to perhaps three or more years. The panel felt that with the uncertainty in the energy markets an extended term would provide applicants a longer period of time to recoup expenditures necessary to obtain certification.

The Governing Board was generally supportive of this approach and discussed a five-year extension. The Board recognized that a longer term would mean a delay in implementation of criteria enhancements since certified facilities would have a longer period until re-certification. However, the Board recognized that most certification systems provide some lead time for instituting program changes, and a five year window was not considered to be a significant problem given the 30-50 year license terms of most hydropower projects.

2. Defer water quality and watershed enhancements

As described previously, the drafters of the certification program planned that two additional criteria enhancements would go into effect starting in 2002. The first would add a water quality monitoring program requirement for all certified facilities. The second would implement a requirement for mitigating the impacts of inundated lands either by establishing a 200-foot buffer

zone around all impoundments, or the equivalent in acreage in the watershed dedication to conservation purposes, or the equivalent of the acreage in an enhancement fund to be used for improving watershed conditions, or some combination of the three.

One of the reasons that the drafters established the 2002 delayed implementation date was to give some time for the market to develop. The theory was that when these enhanced criteria were implemented, there would be real market value for the certification that would justify the additional investment that these enhancements might require.

Both proposed enhancements also required some additional work before they could be implemented. For the water quality monitoring program, the Institute had to develop the specific parameters to be monitored and the requirements as to frequency and scope of the monitoring. For the watershed criterion enhancement, a formula had to be developed to convert the number of acres inundated into the appropriate enhancement fund value for the enhancement fund option.

When the Board met it was apparent that the anticipated market value had not developed as expected. In addition, the underlying efforts to develop the parameters for the enhancements had lead to difficulties. In late 2000, two LIHI subcommittees, including members of the Hydropower Industry Advisory Panel were established to work on the details for both of these efforts. Despite considerable effort and discussion, the subcommittees were unable to accomplish their tasks. The water quality monitoring subcommittee found that it would be difficult to establish a universal monitoring program that would provide meaningful results without being prohibitively expensive. Similarly, for the enhanced watershed criterion, it was difficult to identify a realistic, universally applicable formula for converting the number of acres inundated into an appropriate monetary value for an enhancement fund. No valuation methodology appeared to be easy to apply, national in scope, and also provide a credible value for the complexities of habitat loss. As a result, the proposal was made to defer these enhancements to provide additional time for the subcommittees to develop the appropriate mechanisms, or to suggest revisions of the criteria enhancements.

Public comments in response to the deferral proposal were mixed. Some were concerned that this would unnecessarily delay needed improvements, and were an indication of weakening of the standards. Others thought that it was perfectly appropriate to defer them if there was additional effort to make them workable. Still others advocated for a complete removal of the proposed additions altogether.

The Governing Board agreed to defer the proposed enhancements until at least 2003. In the meantime, the subcommittees would continue their work and either complete the task of the underlying requirements or provide alternatives enhancements for public consideration in 2003.

3. Allow for free, confidential, pre-application consultation

Dams owners generally want to know whether or not their project is likely to be certified before they submit a non-refundable application fee and before they submit the project to additional public scrutiny. LIHI staff will help a dam owner walk through the certification criteria and help evaluate how the criteria might be applied before a dam owner commits to applying, although

there can be no guarantees of certification. This free, confidential pre-application consultation process was already part of the LIHI process.

However, sometimes the pre-application evaluation may raise a policy or interpretation question that cannot be determined by the Certification Administrator, and must be decided by the Board. Given the commitment to transparency, the Board cannot issue decisions regarding the program without making them public. As a compromise, a proposal was developed that would allow the Certification Administrator to refer a policy or interpretation question raised in a pre-application consultation to the Board for resolution, without providing the name of the facility or the potential applicant. The Board would address the question, and any resulting interpretation would be made public, even if the (potential) applicant and facility would not be. If and when the project applied for certification, the interpretation and the specific project would then be identified, and the public would have the opportunity to challenge the interpretation as applied to the specific project.

Public comment on this proposal was again mixed. Some felt that to set up a system where policy decisions would be identified but without the particulars of the project would mar the transparency of the system. Others believed that it would be helpful to gain a good understanding of the potential for certification of a particular facility before proceeding.

The Board adopted the proposal, but clarified that they were not required to issue a pre-application decision referred by the Certification Administrator. If they demurred, the potential applicant would have to decide whether to proceed without the interpretation. The Governing Board concluded that this approach did not undermine the fundamental transparency of the certification program, since all certification decisions and the basis for them would still be made public.

4. Expanding to cover "new" hydro

When the certification program was being developed, there was no intent to cover new hydropower, at least not in relation to new dam construction. New dam construction would require different, and stricter, criteria than the existing criteria, which were fundamentally designed to address existing dams. Thus, the certification program precluded consideration of hydropower facilities that were not generating electricity as of August of 1998 (about the time of the final draft of the program).

Nonetheless, the Board recognized a distinction between new hydropower dam construction, and the addition of hydropower capacity to existing dams. Adding hydropower to existing dams could potentially be done with little additional environmental impact, and more importantly, could be done in ways that might actually improve environmental conditions. For example, increased generation at existing facilities accomplished through efficiency upgrades might actually reduce the amount of water needed for power production. Adding hydropower to existing dams might also create conditions for additional benefits, such as installation of fish passage to a dam that did not have any passage prior to the addition of hydropower capacity.

On the other hand, the addition of hydropower to existing dams could also require changes that would appreciably worsen existing conditions for fish and wildlife, or could lead to the retention of marginal dams that might otherwise have been good candidates for removal. The Governing Board was willing to consider a proposal to certify some "new" hydropower facilities, but there would be limits placed on what would be eligible for the program.

As originally proposed, "new" hydro was bifurcated into two categories, where hydropower capacity was added to existing hydropower facilities, and where hydropower capacity was added to existing non-hydropower dams. The bifurcation was tied to the jurisdictional distinctions between the two. Existing hydropower dams seeking certification were assumed to be primarily non-federal facilities licensed by FERC. There would therefore be some record of analysis from which to evaluate the addition of any hydropower capacity, in addition to any evaluations FERC would conduct for the additional capacity. The existing certification criteria were believed adequate to address "new" hydropower capacity at such facilities.

Adding hydropower to a non-hydropower dam, however, did not necessarily mean there would be a complete record to work with, especially if the capacity were added to an existing federal dam as in the case with the Island Park project. Island Park demonstrated how complex such hybrid situations could be. There, although FERC licensed the hydroelectric facility, it did not evaluate the impact of the operations of the federal dam, and neither did the resource agencies involved. As a result, the LIHI Board wanted to provide some additional threshold limits on eligibility for "new" hydropower at existing dams when the existing dam was not already used for hydropower.

Thus, the proposal for evaluating new hydropower at non-hydropower dams read as follows:

> *Existing non-hydropower structures that added hydropower generating equipment after August of 1998:* any dam or other diversion structure that was not originally built with hydropower generation equipment, but which added hydropower generation equipment that began generating electricity after August of 1998, provided the added hydropower generation equipment:
>
> (i) did not require or include any new dam or other diversion structure, and
>
> (ii) did not require or include any new diversion, storage, or other use of water, or otherwise change the timing of use of the water, i.e., the same (or a lesser) amount of water is utilized by the dam or diversion structure, during the same time periods, before and after the addition of hydropower generation equipment; and
>
> (iii) the Governing Board determines that there was not active consideration of dam removal prior to the addition of hydropower equipment to the facility.

Subparagraph (i) was designed to ensure that no incentives were provided for the construction of new dams or similar diversion structures. Subparagraph (ii) was added to ensure that projects that worsened conditions for fish and wildlife, such as by changing operations from run of river to peaking, could not be certified. The language was meant to provide as objective a standard as possible.

Subparagraph (iii) was included to ensure the program would not certify dams that had been considered for removal, but were then retained because of the addition of hydropower. The current criteria address dam removal by precluding certification of any facility that resource agencies have recommended be removed. The Board thought this might not be broad enough to address situations where local or regional interests had been advocating for a dam's removal (without any activity by a resource agency) and that such efforts could be stopped by the addition of hydropower capacity.

The Board struggled with how best to address this dam removal potential and still keep the program as objective as possible. Identifying specific standards proved difficult—how may people or groups have to be advocating for a dam's removal before it would meet the requisite threshold? How would that advocacy be demonstrated? If one letter to the editor was not enough, were fifteen? Did it matter who was advocating removal and who wasn't? In the end, the Board determined this required an admittedly subjective determination on their part as to whether there was "active" consideration of dam removal prior to the new capacity addition.

Since the LIHI program evaluates facilities, and not the power produced, the Board also made clear that it would not be making distinctions between "old" and "new" hydropower generation. For example, under the proposal if a hydropower project has a capacity of 30 MW and through a turbine upgrade now has a capacity of 32 MW, the owner can apply for certification of the (now) 32 MW facility. If the project obtains certification, it will be certified as a 32 MW Low Impact Hydropower Facility. The owner may want to market 2 MW as "new" hydropower for applicable renewables programs, but it will be up to the owner to meet the terms of such programs. The Institute would not be responsible for certification or verification of power amounts.

The proposals relating to addressing "new" hydropower received the most attention from public commenters. Once again, reviews were mixed with some supporting the concept, but with detailed suggestions about specific items. Opposition to the proposals ranged from a concern that the expansion was premature, to a concern that this would serve as a disincentive to decommissioning dams and river restoration.

Based on the public comments, Institute staff developed a revised proposal. The proposal made the threshold eligibility limits applicable to both "new" hydropower at existing facilities and "new" hydropower at non-hydropower dams. In addition, changes were recommended to make the language of those limitations more clear in their intent. While these changes made the limitations more subjective, Institute staff believed they were more likely to telegraph to the public and dam owners what would be expected, and that some amount of subjectivity in addressing "new" hydropower was appropriate. The following was the proposed new language for "new" hydro eligible for certification:

"New" hydropower facilities-- existing dams that added or increased power generation capacity after August of 1998: any dam existing in August of 1998 (whether or not used for generating electricity at that time) that added or increased power generation capacity that began generating electricity after August of 1998 (whether by addition of generating equipment, efficiency upgrades to existing equipment, or other means), provided the added or increased capacity:

> (i) was created by modifications or additions to the existing facility (that is, modifications or additions to the existing dam, and/or if applicable, existing powerhouse) and did not require or include any new dam or other diversion structure; and
>
> (ii) the added or increased capacity did not include or require a change in water flow through the facility that worsened conditions for fish, wildlife, or water quality (for example, operations did not change from run-of-river to peaking); and
>
> (iii) the existing dam had not been recommended for removal or decommissioning by resource agencies, or recommended for removal or decommissioning by a broad representation of interested persons and organizations in the local and/or regional community prior to the added or increased capacity. Exceptions to this rule will be considered but only upon a showing that the added or increased capacity resulted in specific measures to improve fish, wildlife, or water quality protection at the existing dam.

The LIHI Governing Board adopted this proposal unanimously. As a result, by the end of 2001 LIHI had expanded the program to address "new" hydropower at existing dams. Additional questions were added to the background section of the questionnaire to address these new parameters. An applicant seeking certification of a "new" hydropower facility will have to meet the threshold tests of those initial questions, and then will have to meet the existing Low Impact criteria. Appendix A contains the most current version of the LIHI certification questionnaire; Appendix B contains the most current version of the certification criteria and instructions.

PART III THE STATUS AND FUTURE OF LOW IMPACT CERTIFICATION

The Low Impact Certification Program has been in effect for just over two years. Ordinarily, a two-year time frame would provide a good basis from which to assess the status and future growth of the program. However, these past two years have been anything but ordinary in the U.S. energy markets. With the unraveling of the California markets starting in 2000, and the sudden demise of the energy-trading giant Enron Corporation in late 2001, there are tremendous uncertainties about the shape, direction, and pace of growth for retail competition and green power markets in the United States. While these uncertainties make an assessment of Low Impact certification's status and future difficult, some basic conclusions can be drawn.

As will be explored in the following sections, despite the loss of the California markets, interest in green power in active restructured markets is holding steady, and in the case of utility-run green pricing programs, continuing to rise. Hydropower is playing a role in green power offerings, but almost always with some sort of limit placed on its participation. This confirms the central premise of the LIHI program—that consumers and power marketers do not assume that all hydropower is environmentally preferable, and that some sort of differentiation by the environmental community is expected. However, as will be explored in section B, the standard most often applied is still the "small" hydro capacity standard, which suggests that the LIHI program has some barriers to overcome in becoming an accepted standard. In addition, however, activities at the state, federal, and even international level may provoke additional interest in hydropower differentiation generally, and the Low Impact program specifically. Recommendations are also provided for how research and development efforts could help projects participate in the LIHI program, and, by definition, in green power marketing.

A. Status of the Green Power Markets

Low Impact certification is voluntary, and it takes time, money, and exposes the project to additional public scrutiny—in sum, a dam owner seeking certification will need some incentive to do so. The drafters of the certification program expected that the emerging green power markets would provide such an incentive. There would be a pool of consumers willing to buy green power, including certified hydropower, for a price premium significant enough to prompt interest. Or, even in the absence of a price premium, a power generator would seek certification to help demonstrate a commitment to the environment as a part of corporate environment goals.

In 1998 and 1999 when the Low Impact program was under development, there were reasons to be optimistic about the rapid growth and development of demand for green power and the markets to supply it. New England, Pennsylvania, and California had opened their markets to competition. Other states were also moving towards deregulation, and green power generators and marketers were becoming more numerous. The early signs about demand for "green" power were encouraging. Especially enticing to generators and marketers was the research suggesting that consumers were willing to pay a premium for green power. See, e.g., Fahrar 1999.

In 2002, the outlook is a bit different. While there is nothing to suggest that consumer interest in green power has diminished, the optimism about a robust and aggressive start to green power marketing has dimmed. Most analysts conclude that green power marketing is here to stay, but

that the growth and development will be slow and that the upper end in terms of percentage of consumers is uncertain. A recent forecast published by the National Renewable Energy Laboratory (NREL) suggests that, like other green or environmental product offerings, green power will follow an "S" curve of growth—a "slow, initial market entry followed by rapid growth before tapering off at higher market penetration levels" (Wiser, Bolinger, Holt & Swezey 2001). The reasons for the changes in optimism are many, including the general economic downturn, difficult market structures, and higher wholesale prices. [16] Another reason for the shift from exuberant optimism to more sober reflection was the collapse of the California market.

California's troubles were becoming apparent in the summer of 2000 when prices for electricity in the California Power Exchange (PX) skyrocketed. Prior to May 2000, prices for power never rose above $200 per MWh in any single hour, and the average price didn't exceed $90. By the summer of 2000, prices were exceeding $750 per megawatt hour in single hours, and averages were exceeding $300 per day and were going higher (O'Neill 2000). In San Diego, where consumers were exposed to the market fluctuations (rate freezes had been lifted in that region), the market price of electricity zoomed 510%, after San Diegans had been told to expect a 20% *decrease* in electricity prices (Shames 2000). In the rest of the state, in the market territories for Pacific Gas & Electric (PG&E) and Southern California Edison (SCE), the rate freeze had not been lifted, forcing those utilities to buy power at the high rates without the ability to pass costs on to consumers.

As the power costs failed to shrink, and supplies became exceedingly tight, blackouts occurred with painful regularity. Eventually, the crisis resulted in the bankruptcy of PG&E, the largest investor owned utility in the country, and the near bankruptcy of SCE. The PX was abolished in January of 2001, and the state of California began to purchase power directly through its Department of Water Resources via long-term contracts at rates that would have seemed exorbitant less than a year earlier. In September 2001, the California Public Utilities Commission cancelled retail choice for residential consumers.[17]

The reasons for California's collapse are hotly debated. Some assert it was a combination of unfortunate factors—high demand (warmer than expected weather), low supply (due to few new plants, and lower than expected imports of hydropower from the Pacific NW), more plants down due to maintenance than expected, high natural gas prices, along with what were seen as obstructive or irrational market rules. Others alleged that out of state companies that were now owners of in-state generation had exercised market power by intentionally withholding generation to drive up spot prices.

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[16] For example, high wholesale prices in the PJM power pool during the summer of 2000 led a number of competitive suppliers to withdraw from the market because they could not longer compete with the price available to customers remaining with their original suppliers. This dampened the market for environmentally preferred power, which had captured about 20 percent of all switching customers.

[17] Interim order D.01-09-060, effective September 20, 2001; a proposal for a rulemaking to permanently address direct access was issued in January of 2002, see R. 02-01-011.

Whatever the causes, the effects of California's collapse were felt nationwide. California proved to be fertile ground for green power before its collapse,[18] and green power generators and consumers everywhere felt its loss. Because of the connectivity of all western power markets, the short supplies and market prices in California affected power prices all over the west. Regulated utilities were forced to seek significant rate increases to cover the higher costs of energy purchases.[19] In addition, the disaster in California gave pause to the other states on the verge of restructuring, or considering it.[20] Most recently, the spectacular demise of the Enron Corporation in late 2001 has only increased skepticism among policymakers and consumers about the wisdom of restructuring, which would also mean a delay in the development of additional competitive markets for green power.

Despite these events, interest in green power has not faded. Perhaps the clearest example of this can be seen in the continuing growth of utility green pricing programs. In a green pricing program, a regulated utility provides its customers the option to support green power, either through direct purchases of blocks or capacity, or through contributions to the utility's efforts to develop green power generation. These green pricing programs have been increasing over the past several years, to the point that there are now nearly 90 programs in 29 states (National Renewable Energy Laboratory 2001b). For the most part, the programs are focused on new renewables, and are dominated by wind power, but not entirely, as will be discussed in the following section.

B. Hydropower In the Green Power Market—an Overview

To understand the status and future of the Low Impact Hydropower Certification program, it helps to understand how hydropower has, and has not been, participating in green power markets. The following tables provide some basic information about the role of hydropower in existing retail markets, as well as in green pricing programs.

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[18] According to CRS, over 90 percent of the 200,000 consumers who at one time switched power suppliers in California chose a green power product, see http://www.resource-solutions.org/press/crisis.html.

[19] One public utility in the west told LIHI that this was the reason for its decision not to seek certification for one of its larger hydropower facilities—the application fee for certification was seen as too high given that the utility had just had to seek a significant rate increase from its customers.

[20] With the notable exception of Texas, which proceeded to open its markets to competition January 1, 2002, and where shopping activity is lively. Green Mountain Energy Company reports that early indications are that there is considerable interest in its green power product, which comes from 100 percent new wind generation (Tom Rawls, personal communication, February 12, 2002). Maryland, Virginia, and Illinois have also opened to competition, although there is not much activity yet amongst residential customers.

Table 10 Retail Green Product Offerings That Included Hydropower, 2000

	Total Number of Products	Number of Products With Hydropower	Percentage With Hydropower	Type of Hydropower Included
California	9	5	55%	Small, large
Connecticut	1	1	100%	Small
Maine	1	1	100%	<100MW
New Jersey	2	2	100%	Small, large
Pennsylvania	7	4	57%	Small, large
TOTALS	20	13	65%	

Sources: Swezey. & Bird 2000, Center for Resource Solutions 2001

Table 11 Retail Green Product Offerings That Included Hydropower, 2001[21]

	Number of Products	Number of Products with Hydropower	Percentage of Products with Hydropower	Type of Hydropower Included
Connecticut	3	2	67%	Small
Massachusetts	1	0	0%	
New Jersey	2	2	100%	Small, large
Pennsylvania	7	4	57%	Small, large
Rhode Island	1	0	0%	
Texas	1	0	0%	
TOTALS	15	8	53%	

Sources: National Renewable Energy Laboratory 2001a; Connecticut Energy Cooperative.

As is shown here, hydropower is an element in over half the retail green power products, even if the proportion of hydropower by actual kilowatt-hours varies by product.[22] These tables also document the importance of the California market for growing green power, and the impact of losing it—nearly half of all the offerings of green power retail products in the U.S. were offered in California before the market collapsed.

[21] Since the beginning of 2002, some additional products have been added in Texas (but none with hydropower), and Maryland has also added product offerings, including two with hydropower, through Pepco Energy Services. The hydropower in the Pepco products is undifferentiated.

[22] For example, over 10 percent of the Green-e certified power sold in 2000 contained hydropower, and most of that was "small" hydro (Center for Resource Solutions 2001b), while in Connecticut, some of the products there include primarily hydropower, e.g. 67% of the EcoWatt product offered by Connecticut Energy Co-op is primarily small hydropower (National Renewable Energy Laboratory 2001a), although with the certification of the Putnam project, which now supplies the Co-op, the Co-op product now includes some power from a LIHI-certified facility.

In terms of green pricing programs, hydropower is again playing a role, albeit a smaller one:

Table 12 Green Pricing Programs That Included Hydropower, 2001

	Total Number of Programs	Number that Include Hydropower	Percentage with Hydropower	Type of Hydropower Included
Alabama	2	0	0%	
Arizona	3	1	33%	Small
California	7	2	29%	Small
Colorado	7	0	0%	
Florida	4	0	0%	
Georgia	1	0	0%	
Hawaii	1	1	100%	
Idaho	2	0	0%	
Indiana	3	1	33%	"Low head"
Iowa	3	0	0%	
Kansas	1	0	0%	
Kentucky	1	0	0%	
Michigan	4	1	25%	Small
Minnesota	8	0	0%	
Mississippi	1	0	0%	
Missouri	1	0	0%	
Montana	1	1	100%	Small
North Dakota	1	0	0%	
Nebraska	3	0	0%	
New Mexico	2	0	0%	
Ohio	1	1	100%	42 MW facility
Oregon	5	1	20%	Small, and LIHI certified*
South Carolina	1	0	0%	
South Dakota	1	0	0%	
Tennessee	1 (TVA)	0	0%	
Texas	4	0	0%	
Utah	1	0	0%	
Washington	9	2	22%	Small and "qualified"**
Wisconsin	6	2	33%	Small, large
Wyoming	1	0	0%	
TOTALS	86	12	14%	

* LIHI certified power is eligible, but has not been utilized yet

**Washington recently enacted a requirement that utilities in the state offer customers an option to purchase qualified alternative energy resources, including hydropower; the definition for "qualified" hydropower is complex, addressing fish passage and whether the facility is new or not, as well as allowing some "run of river" facilities to qualify, see RCW Section 19.29A.090(4).

Sources: National Renewable Energy Laboratory 2001b, and contacts with utilities offering the programs

The most likely factor for hydropower's more limited role in green pricing programs is that most of these programs focus on "new" power generation sources, rather than existing developments, and "new" hydropower is not nearly as common as other new developments, such as new wind developments. Depending on how it is defined, there is very little "new" hydropower under development, at least relative to its existing capacity, although estimates of the potential for new hydropower resources are high.[23]

Summary

Perhaps the most important thing to glean from these tables is that nearly all the retail products and nearly all green pricing programs that include hydropower also place some limits on the type of hydropower eligible. Thus, the experience of hydropower in the markets to date confirms the fundamental premise of the Low Impact certification program—some kind of differentiation regarding hydropower is required.

As a general matter, this bodes well for the certification program, as it suggests the public and power marketers do understand that not all hydropower is acceptable as a "green" source, and that some differentiation is necessary. The bad news is, the so-called "small" hydro standard remains dominant. Marketers, utilities, and others developing these programs and products either know, or they assume, that the public wants "small" hydropower, even though it is not an effective standard for evaluating the impacts to the environment, and even though it will do nothing to address the environmental attributes of the bulk of the capacity of hydropower in this country. Interestingly, the use of "large" hydro is more prevalent in retail products than in green pricing programs. This may be because retail products are under greater pressure to be price competitive, such that hydropower's perceived negative attributes are outweighed by its cost competitiveness—existing hydropower is a relatively low cost source of green power, so it can help keep the overall price of green power products down.

C. Barriers to Growth

Like all aspects of the green energy markets, the Low Impact Hydropower Certification Program faces an uncertain transition period. The certification program also has a number of specific barriers to overcome as well, as discussed below.

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[23] In 1998, the Department of Energy published an assessment of the number of undeveloped hydropower resources in the United States, including completely undeveloped sites, existing dam sites without hydropower, and existing hydropower dam sites with the potential for new capacity (Conner, Francfort, & Rinehart 1998). The assessment concluded that there were some 5,667 sites, totaling nearly 30,000 MW of capacity available for development; the report found 2,761 undeveloped sites (8,166 MW); 2,527 sites with developments but no hydropower (16,998 MW), and 389 sites with developments and existing hydropower but room for more capacity (4,316 MW).

1. Continued vitality of the "small hydro" standard

Perhaps the most immediate obstacle to the growth of the Low Impact hydropower certification program is the continued use and vitality of the "small hydro" standard in retail power products, green pricing programs, certification standards, and as a description for "green" hydropower by a wide variety of actors in the markets. As has been discussed previously, the "small hydro" standard provides no means of identifying or evaluating a hydropower project's actual impacts on the environment, and its continued use as a means of identifying green or environmentally preferable power is highly misleading.

The continued popularity of "small hydro" can probably be attributed to three factors: (1) the lack of knowledge about hydropower generation and its potential impacts; (2) misapplication of the generally accepted rule that "small is better" (begun with PURPA) or at least small is perceived to be better (if the standard were "small *scale*" hydro or "*small size dams/impoundments*" it might be less arbitrary); and (3) ease of application—one single readily available fact about a hydropower project will determine whether it will "pass."

In sum, the "small hydro" standard is easy, quick, requires no changes to the project, is easy to explain and apply, and has the patina of acceptability. Low Impact certification, on the other hand, is rigorous, requires site-specific analysis, may require changes in the project, is not as easy to explain or apply, and is relatively unknown. So long as the "small hydro" standard remains in common use it may discourage eligible projects from seeking out Low Impact certification.

2. Awareness of the Low Impact program

The continuing vitality of the "small hydro" standard partly reflects the fact that LIHI has not yet been able to reach all of the various people and organizations that may be interested in hydropower for green marketing. Still, the awareness, understanding, and acceptance by power generators, power marketers, environmental organizations, and the general public, varies tremendously.

Hydropower generators

Hydropower generators (both public and private) appear to be generally aware of the Low Impact certification program because of descriptions in industry journals (Ayer 2002; Hosko 2000), other reports and articles (Raphals 2001), and participation by LIHI in industry conferences (Grimm 2001). The level of understanding of the program is also generally high, though individual dam owners still have misconceptions about the program (i.e., that it is governed by American Rivers, rather than an independent organization; that it requires a 200 foot buffer zone around all impoundments; that any resource agency recommendation will govern the standards, rather than final recommendations adopted as part of a formal proceeding, etc).

While awareness and understanding of the program appears high, acceptance by the hydropower project owners is, as a general rule, low. In conversations with dam owners around the country,

it appears there are three key factors for the lack of acceptance. First, the reliance on resource agency recommendations for some of the certification standards remains a sore point. Dam owners object to the role of resource agency conditioning in the licensing process because they believe the agency measures can be arbitrary and unscientific, but perhaps the biggest concern is that the agencies do not generally take the expense of the measures into account (Keil 2002). By relying on resource agency recommendations, dam owners fear that the LIHI program will serve as an incentive for agencies to set arbitrarily difficult and expensive conditions.

Second, dam owners often assert that the application fee is too high, particularly in relation to the uncertain economic return for being certified. The application fee is based on a sliding scale, based on the average generation of the facility over a ten-year period. The lowest fee charged is $2,500 for projects that average 5 annual megawatts or less (the standard is expressed in "annual" megawatts which is a conversion from the usual standard of megawatt hours); the highest fee, for projects that generate 205 MW or more, is $57,500. (The complete application fee schedule is located in Appendix C). The fees are used to cover the costs of the program, including the independent consultants utilized to verify applications, the costs of an appeals panel (if necessary), and for processing costs, including staff time. Particularly for the smaller capacity projects, the costs to LIHI of processing the application exceed the fee required, especially if the project raises complex issues, as was amply demonstrated by the Island Park project.

Nonetheless, with the uncertainty over demand for green power and the small premiums available,[24] the fee structure may be prohibitive for some small capacity applicants as well as large capacity applicants. The Governing Board will continue to evaluate the situation, and may, at its next program review meeting, develop incentives or other alternatives to the current fee structure.

Third, some dam owners and industry advocates generally object to any effort to differentiate between hydropower projects on the general principal that all hydropower should be considered "green" and receive the same treatment as other renewables such as wind and solar power. There may come a time when differentiation is unnecessary, but given that the potential for significant adverse environmental impacts from hydropower is far greater than most other non-hydropower renewables,[25] such a position is unrealistic at best. As was shown previously (tables 10-12), the existing green power markets have so far have indicated a demand for differentiation between hydropower facilities.

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[24] The best price premiums for products that include hydropower are the utility-offered green pricing programs, where premiums for hydro or blended products with hydro in the mix range from 1.38 cents per kilowatt hour, to 5 cents per kilowatt hour; retail products in competitive markets show lower margins, of 0 or negative to 1.44 cents per kilowatt hour (Swezey & Bird 2000).

[25] With the possible exception of biomass, which also can create significant adverse impacts through NOx emissions and unsustainable harvest practices.

Power marketers

Generally, power marketers appear to be aware of the certification program, but the level of understanding of the program is minimal, usually in direct relation to the individual's knowledge of hydropower and its impacts. Most power marketers contacted (other than Green Mountain) seem to assume that it only applies to "small" hydropower. Also, the complexities and detail of the Low Impact certification discourage them. They seek a system that is credible, but also very simple. Even after describing the purpose of an impact-based standard, some power marketers expressed an interest only in small certified projects, again, underscoring the perception that the public believes that "small" hydro is the only "green" hydro. Others noted, however, that existing hydropower's relative low cost made it attractive for use in blending with other non-hydro green power sources to bring the overall cost of the a green power offering down.

Environmental organizations

As previously described, there are a number of environmental organizations that directly or indirectly support the Low Impact program, including organizations that expressly support the goals and objectives of the program, or which use the program for their own green power systems, e.g., the Power Scorecard. Other environmental organizations may be aware of the program, but their level of understanding generally coincides with the understanding the organization has about hydropower and hydropower licensing issues. River and watershed organizations that have participated in hydropower licensing processes generally have a good understanding of the program, although it can often be hard for some organizations to support the concept of hydropower being considered "environmentally preferable." For example, the International Rivers Network (IRN) which challenges large scale dam building all over the world, is concerned that the LIHI program weakens the message about the potentially severe and irreversible impacts of hydropower dams.

Also, environmental organizations that advocate for the use and development of non-hydro renewables, particularly solar and wind power, express concerns over certifying hydropower. Representatives of these organizations are concerned that allowing hydropower to participate in green energy markets will overwhelm other renewables because of the tremendous existing capacity for hydropower. (This is, in fact, one reason that the Institute developed its Renewables Advisory Panel, to advise the Board on how the program impacts non-hydro renewables).

Hydropower does, indeed, generate a significant proportion of the available renewables relative to other non-hydro renewables. [26] As displayed in Table 5, LIHI estimates that there is the potential for over 3,000 MW of hydropower capacity to be certified. While this is a small percentage of the total hydropower capacity, it is a relatively high amount compared with non-hydro renewables. As more certified Low Impact hydropower becomes available, other green

[26] In 1999, for example, over 80 percent of the total net generation of renewable electricity came from conventional hydropower (not including pumped storage facilities)(Energy Information Administration 2001).

power programs may begin to place a limit or a cap on the amount of certified hydropower that is eligible.

Other sectors, and the general public

Individuals and organizations outside of these spheres appear to have little awareness of the program, and so it is too soon to tell what the understanding and acceptance of the program will be. However there do appear to be regional differences. In the Pacific Northwest, for example, where debates over how to protect and preserve endangered salmon runs are much in the news, there is also considerable discussion about the role of hydropower generation and its impacts. Here, there is a general rejection of the concept of "small hydropower" being necessarily "green," and considerable interest in LIHI certification. It is no surprise that Renew 2000, the green power certification program developed specifically for the Northwest, by Northwest stakeholders, allows only LIHI-certified hydropower into the program (see section D.2, below).

In New England, on the other hand, despite the presence of large number of hydropower dams (there are over 400 licensed or exempt projects, which may include multiple dams), they tend not to be large-scale projects. In several contacts with New England stakeholders who are not active in river conservation or related issuers, there appears to be a general perception that hydropower is a benign power source, at least relative to fossil fueled power production, which is relatively high in the region. Thus, there appears to be less interest in differentiating hydropower.

These variations beg the question of whether the LIHI criteria should be region-specific. LIHI criteria are already "regionalized" to the extent that the criteria standards rely on the recommendations of state and federal resource agencies, and those recommendations will vary from region to region according to local goals and objectives. LIHI has rejected suggestions to specifically regionalize the standards, however, such as eliminating an entire standard for one region of the country or another. The LIHI Board may revisit this issue in the future if it determines that the standards must be regionally varied in order to be credible *and* accepted.

At the present time, the Low Impact certification program has probably not affected electricity customers directly. There are two few certified facilities and even fewer retail or other products offering power from LIHI-certified facilities. One of the ultimate goals of the Low Impact certification program is to help inform concerned energy consumers of the impacts of hydropower generation and the benefits of utilizing power produced from certified Low Impact facilities. One way the Institute may be able to do this is to require any sellers of power produced from certified Low Impact facilities to provide a link to the LIHI website so that consumers may see and review the details of the specific projects that are being used to supply the power.

3. Funding issues

Another obstacle to the growth of the certification program is, as with many non-profits, a lack of robust funding. The Institute depends entirely on foundation funding and income from application fees to implement the certification program. The Institute expected to be mostly

reliant on foundation funding in the early stages of operations, but to have an increasing percentage of the direct costs of the program supported by application fees.

Despite being a fledgling organization in a crowded universe of environmental organizations, LIHI has managed to garner considerable foundation grant funding (over a quarter of a million dollars), which attests to the interest and belief in efficacy of the program.[27] Nonetheless, with the few applications to the program and the unexpectedly high direct costs for processing those applications,[28] the Institute is more reliant on foundation funding than it had anticipated. In the wake of the stock market declines, the national recession, and a shifting of priorities after the September 11 terrorist attacks, such funding is more difficult to attract.

D. Stimulants to Growth

Despite the obstacles and the general uncertainty as to the growth of the green market, the Institute is taking steps to encourage use of the certification program. In addition, there are other events and actors beyond the Institute that are also helping establish Low Impact certification as the accepted standard.

1. Steps LIHI is taking to stimulate use of the certification program

LIHI is taking several steps to encourage use of the certification program. First, as described in part II, LIHI is evaluating potential projects for certification and will actively seek to recruit those projects that appear to be good candidates. As a part of recruitment, LIHI may enlist representatives of the supporting environmental organizations to help advertise and market those projects that do earn certification—for example, a flyer or message in newsletters encouraging members to support retail or green pricing products that contain power from LIHI-certified facilities. If even a few additional customers switch to retail green power providers because of the inclusion of LIHI-certified power, it should help encourage additional demand and interest in the certification. Second, LIHI will continue to conduct outreach efforts with hydropower generators, power marketers, renewable energy organizations, river conservation organizations, and others to educate them about the program and its purposes, and to gain feedback about improvements.

Third, the LIHI Board will continue its efforts to review and update the program. For example, the Institute is continuing to evaluate possible means to use standards other than resource agency recommendations as the basis for the criteria, which may include a modification to the "all or nothing" approach, or a graduated certification system (good, better, best). The Institute is also considering options for establishing a simplified streamlined process for certifying small scale, run of river facilities that could be quicker and cheaper than the current program, to help attract a

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[27] Funders to date include the Bullitt Foundation, the Charles Stewart Mott Foundation, the Compton Foundation, and the John Merck Fund.

[28] The Institute expended over $19,000 in the technical review and analysis of the Island Park and Stagecoach applications; the total application fees received were $5,000.

core of such facilities to the program and retaining the current program for the more complex and/or larger scale projects.

2. Acceptance and use by other certification and rating organizations

Low Impact certification has been adopted by the primary certification and rating organizations operating in the United States. In addition to confirming the credibility of the Low Impact standards, the adoption by these other programs should stimulate additional applicants to the program. The following briefly describes these additional certification and rating systems, and how they utilize Low Impact certification.

CRS/Green-e

---Green-e label

CRS' Green-e certification program (*see* www.green-e.org) was one of the first and is one of the most extensively relied upon to evaluate power products for retail customers. In order for a renewable electricity product to display the Green-e logo, fifty percent or more of the power must come from renewable electricity sources (including a certain percentage of "new" renewables, although hydropower cannot be used to satisfy that percentage), and the remaining percentage must come from non-nuclear sources with air emissions that are equal to or lower than conventional electricity.

"Small hydro" (30 MW or less) and certified Low Impact hydropower can be used to fulfill the renewable electricity portion of the product; in addition, in the Northeast, hydropower from facilities relicensed after 1986 can do so as well. "Large" hydro (over 30 MW installed capacity) can be used to meet the non-renewable sections of the program. Green-e has committed to phasing out the use of alternative standards for hydro in the future, so that only power from LIHI-certified facilities will be eligible for the renewable portions of the Green-e program.

---Green pricing accreditation

Regulated utilities around the country are increasingly offering their customers an option of supporting some level of green power development or use. CRS has developed an accreditation program for these "green pricing" efforts (*see* www.resource-solutions.org). In addition to accreditation, programs that also meet Green-e standards may display the Green-e logo. CRS developed basic national standards for the green pricing programs, and then local stakeholders are convened to refine that as appropriate for local conditions (stakeholders can make the standards stricter, but not more lenient). The national standards already include "small hydro," and could include certified Low Impact if local stakeholders request it. Generally speaking, however, the accreditation will only apply to programs that offer "new" renewables, and until recently, LIHI did not address "new" hydropower. With the LIHI Board's decision to include "new" hydropower certified Low Impact hydropower has now been adopted for use in accrediting programs in Minnesota and Georgia, and is under consideration in South Carolina.

---TRCS—Tradable renewable energy certificates ("green tags")

The constraints of geography often limit the growth of green power markets since the renewable generating source may not be connected to the transmission system that supplies the green power consumer. One way to overcome this limitation is to segregate the environmental attributes of the environmentally preferable generation and offer those attributes for sale separately. These "green tags" provide a way of marketing environmentally preferable power almost anywhere. There are already a number of green tag trading systems in the United States, see for example, APX, at http://www.apx.com/sGr_html/sGr.html, or the Bonneville Environmental Foundation, at https://www.greentagsusa.org/GreenTags/index.cfm.

With green tag systems, there is the general question of how to define the "environmental attributes" of the tags, which can be a particular problem for hydropower. Unlike wind or solar generation, which have generally positive environmental attributes with few negative environmental impacts, hydropower poses a more difficult question—is it possible to segregate hydropower's positive environmental attributes without factoring in its negative attributes for lands and waters? Low Impact certification could be one way to allow a green tag system to work for hydropower, i.e., hydropower projects that had demonstrated they had minimized their impacts appropriately by obtaining Low Impact certification would be able to sell their green tags.

This is precisely the position taken by CRS. In order to provide some structure and to set minimum standards, CRS developed a certification system for green tags, or tradable renewable certificates (TRCs). CRS has established basic national standards, and is convening local stakeholder groups to help further refine the standards. CRS' TRCs program addresses only "new" renewable sources, including "new" hydropower. CRS has decided that if hydropower is to participate, it must be hydropower produced from LIHI-certified facilities (Center for Resource Solutions 2002).

Renew 2000

Renew 2000 (*see* www.cleanenergyguide.org) is a green energy certification program developed for resources in the Northwest. Certification is offered for two kinds of products, renewable energy block products, and blended energy products. With the block products, the product must include either 50 kilowatt hours (kWh), or 50% new eligible renewable energy, whichever is greater. Blended energy products qualify for certification if they are based on a minimum 50% eligible renewable energy. The remaining 50% must have air emissions and spent nuclear fuel rates that do not exceed the kWh averages for the electricity generating system as defined by state requirements or regional practice. The minimum required use of new eligible renewable energy is 15%. The new renewable energy requirement may be counted toward the overall 50% renewable energy requirement.

Eligible renewable technologies include low emissions biomass, geothermal, solar, wind, and fuel cells using a renewable fuel. The only hydropower that is eligible is hydropower produced from a certified Low Impact facility.

Salmon Friendly Power

The Salmon-Friendly Power plan (*see* www.salmonpower.org) is a program sponsored by the salmon conservation group For the Sake of the Salmon in partnership with utilities in the Northwest and Green Mountain Energy. It is essentially a green pricing program, with a focus on supporting renewables and habitat restoration for salmon. Utility customers can sign up for blocks of power for a few extra dollars per month. Green Mountain will supply the power, and part of the price premium goes to pay for the renewable energy and part goes to fund salmon habitat restoration projects overseen by For the Sake of the Salmon and the Pacific Watershed Fund. LIHI-certified hydropower is the only hydropower eligible for the program.

Power Scorecard™

The Power Scorecard (*see* www.powerscorecard.org) assesses the environmental impact of different types of electric generation wherever retail consumers have a choice of power products (although it currently rates products only in Pennsylvania). The program was developed by six major environmental organizations (Environmental Defense, Izaak Walton League, Natural Resources Defense Council, Northwest Energy Coalition, Pace Law School Energy Project, and the Union of Concerned Scientists). The Scorecard evaluates generation sources based on their impacts to air, land, and water, and on the percentage of new renewables utilized. The program establishes a baseline default score based on the particular technology, and then includes some site-specific analysis for additional refinement. The program is designed to help consumers understand and compare the environmental quality of electricity sources that use very diverse technologies.

In terms of hydropower, a Low Impact certified hydropower project gets a 1.8 rating, which is "very good "—only "excellent" is better. This puts a certified Low Impact project in the same category as landfill gas (internal combustion engine, high nitrogen oxide emission rate), geothermal flash technology, and biomass (with certified sustainable fuel, with nitrogen oxide controls, or with high nitrogen oxide emissions). Projects lacking Low Impact certification but which have been relicensed by FERC since 1986 qualify for a "good" rating; all other hydropower projects receive a default "poor" rating.

3. Research and development that may help hydro qualify under LIHI's certification program

Any research and development that helps reduce the impacts of hydropower dams on river systems would help hydropower qualify for LIHI's certification program. In addition, acceptable objective standards for some of the more difficult criteria areas could avoid the need for relying on resource agency recommendations. From the limited experience of the program so far, the substantive areas causing the most difficultly for projects in meeting the criteria are in regards to instream flow releases, fish passage, and water quality compliance (see Table 6). Recommendations for research and development to address these problems areas follow.

Instream flow releases

The appropriate amount and timing of the flow releases from a hydropower facility for the protection, mitigation, and enhancement of fish, wildlife, and water quality remains one of the most difficult issues for a potentially eligible project. Flow questions inevitably involve a complex interplay between goals and objectives, existing data and studies, and the limits of current systems for modeling different flow levels. Even when the parties may agree on the particular resource goals (which is not always the case), there are frequently disagreements about what flows are necessary.

Thus, some of the ways in which further research and development could help are:

- By developing new systems of instream flow modeling, particularly of complex interactions of water management in basins to help bridge gaps in instream flow analysis

- There are few if any objective standards or methodologies addressing issues such as ramping rates, and flushing flows, which are increasingly recognized as equally important in defining appropriate water management at projects; additional research as to standards for such requirements would be most helpful

- Continued research and development in turbine efficiency design, as well as funding for upgrades that would allow for the same amount of power to be generated using less water, freeing up more for instream mitigation

Water quality

Of the projects evaluated so far, those that are not good candidates for certification due to water quality problems appear to fail for two reasons: inability to meet or maintain a water temperature criterion, and/or inability to meet or maintain a dissolved oxygen standard. While these are not the only water quality standards that hydropower generation can affect, they appear to be the ones projects are having the most difficultly with. Research and development into the causes, and potential solutions to both problems would be helpful. Examples include:

- As to temperature, it would be helpful to validate or improve existing three-dimensional models of water flow for evaluating temperature issues (as opposed to current one-dimensional models)

- Also as to temperature, improve measurement technology so as to measure at the levels in which temperature standards are often expressed (e.g., hundredths of a degree Celsius)

- Develop methods to conduct remote sensing for water quality parameters in order to expand both the number of sites for monitoring and to help reduce variability in results

Fish passage

Fish passage measures remain contentious as well. The issues range from disputes over goals (which fish to pass, how many need to pass, etc.) to the technology for effective passage, especially given the variety of species and their passage needs. Recommendations for research and development include:

- Continuing efforts to design "fish-friendly" turbines to reduce the mortality rates of fish passing through projects
- Continued research into ways to address juvenile passage strategies through large dams—beyond current knowledge about surface collectors
- Research into innovative ways to get adults past high head dams
- Establishing a national clearinghouse of fish passage designs and technology

E. Legislative, Regulatory and Administrative Activities

There have been no statutory or legislative responses to the certification program specifically, but there are a number of activities at the state, federal, and international level addressing hydropower in green power markets. Those activities, and how the certification program may interact with them, are described below.

1. State Level--RPSs

There are a number of states that have adopted renewable portfolio standards (RPS) that include hydropower:

Table 13 States With An RPS That Includes Hydropower, 2001

	Hydropower Limited?	Description of Limit
Connecticut	No	
Hawaii	No	
Iowa	Yes	"Small" but small not defined
Maine	Yes	100 MW or less installed capacity
New Jersey	Yes	"Meet highest environmental standards" (interim is to use 30 MW or less)
New Mexico	Yes	Must come from New Mexico
Pennsylvania	Yes	"Low head" hydropower (not defined)
Texas	Yes	New only—must be installed after 9/99
Wisconsin	Yes	Less than 60 MW

Sources: Database of State Incentives for Renewable Energy, Arizona Corporation Commission, Iowa Department of Commerce, New Jersey Board of Public Utilities, and Pennsylvania Office of Consumer Advocate.

Generally speaking, an RPS is a regulatory standard that requires utilities to provide some amount of renewable power in their overall portfolio, typically from new facilities. By including hydropower in their RPSs, states could potentially generate interest and inquiries in relation to Low Impact certification.

However, RPSs may also limit use of the certification program. If hydropower generation is developed for compliance with an RPS, it may be precluded from participation in green power products offered in the market for a premium. In other words, if the power is developed in response to regulatory requirements, it may not be appropriate to also offer it for an additional cost to consumers through a green power offering, such as a green pricing program.[29] A hydropower project used to meet a state RPS may be unlikely to also seek Low Impact certification. (On the other hand, since LIHI certifies *facilities* and not the power produced, a certified facility could supply some power to comply with the RPS, and it could also sell some power for the green power market.)

This problem could be resolved if the RPS included only LIHI-certified hydropower. LIHI has fielded inquiries from groups participating in the development of RPSs, or participating in administrative processes to help interpret or set guidelines for an existing RPS about using LIHI or LIHI standards. However, Low Impact certification is intended to be a voluntary program, and so LIHI has not encouraged certification as an RPS requirement.

2. Federal Level

Administrative responses

The U.S. Environmental Protection Agency recently established a recognition program for businesses that purchase green power, *see* www.epa.gov/greenpower. The EPA program will recognize purchases of hydropower, although the definition for eligible hydropower has not been determined. The EPA program website does reference the Green-e and Renew 2000 standards, both of which include certified Low Impact hydropower. The recognition program is designed stimulate development of green power purchasing by businesses, and with the inclusion of certified Low Impact hydropower, it could serve to help develop awareness of and interest in Low Impact certification.

Congressional activity

Pending legislation in Congress addresses incentives for hydropower in several ways, both direct and indirect. In terms of energy legislation, there are several bills that would include "incremental" hydropower in federal renewable incentive programs. For example, Senate Bill No. 1766, introduced by Senate Majority Leader Daschle in December 2001 provides for a

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[29] For example, most of the CRS-sponsored stakeholder agreements for green pricing accreditation prohibit generation that is developed to meet an RPS from being eligible for the green pricing program (although the RPS may still be utilized as the definition for the green power itself).

federal renewable portfolio standard (utilizing a system of credits) that includes "incremental" hydropower. Incremental hydropower is defined as the "additional generation capacity achieved from increased efficiency or additions of capacity after January 1, 2002 at a hydroelectric dam that was placed in service before January 1, 2002." Senator Bingaman introduced SB No. 597 in March of 2001, which would establish federal purchasing requirements for renewable energy including incremental hydropower. On the house side, Rep. Hunter from California introduced HR 3493, which would allow production tax credits for incremental hydropower. The LIHI program can address "incremental" hydropower given the expansion of the program to address "new" hydropower in December of 2001. However, as with a state RPS, it is unclear at this stage whether a federal RPS or a similar regulatory requirement would encourage or discourage certification. In adopting the "new" hydropower eligibility factors, the LIHI Board expressly indicated its intent to revisit the language should Congress pass relevant legislation.

In addition, there are a number of bills pending before Congress that would modify statutory requirements regarding the FERC licensing process. Several of those bills would alter the procedures for resource agencies in making their recommendations for appropriate mitigation measures. Since the LIHI program relies on those recommendations, were these statutory changes to take place, LIHI would have to evaluate whether corresponding changes were needed to the certification criteria.

3. International Activity

Development of a uniform definition or standard for "green" power including hydropower?

The North American Commission for Environmental Cooperation (CEC)[30] held a symposium in late November 2001 to discuss the environmental challenges and opportunities of the evolving North American electricity market. One of the topics for discussion was the applicability of North American Free Trade Agreement (NAFTA) provisions to the trade in electricity. A background paper developed for the symposium explored the possible relationship between NAFTA rules and environmental rules or standards in the electricity sector (Horlick, Schuchhardt & Mann 2001). That background paper specifically raised the issue of the potential for disputes over the exclusion of large scale Canadian hydropower suppliers from access to U.S. markets because of state-based (or proposed federal) renewable portfolio standards that either completely exclude hydropower, or focus on "small hydro" only.[31] The background paper followed a previous paper filed with the Commission by Hydro-Quebec; the Hydro-Quebec paper noted the apparent discrimination against Canadian hydropower, and raised the threat of trade litigation (Hydro-Quebec 2000).

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[30] The CEC is the international organization created by Canada, Mexico and the United States under the environmental provisions of the North American Free Trade Agreement. The CEC was established to address regional environmental concerns, help prevent potential trade and environmental conflicts, and to promote the effective enforcement of environmental law.

[31] The Union of Concerned Scientists has since issued an analysis suggesting the conclusions drawn in this paper were flawed, and the Attorney General of Massachusetts concurred, see Hempling & Rader 2002.

In both papers, however, one of the suggested solutions was cooperation on development of mutually acceptable criteria for green power. At the symposium, an impact-based standard such as the Low Impact standard was suggested as a useful starting point. The LIHI certification program is not readily applicable outside of the United States because of its reliance on the U.S. regulatory proceedings, which have no counterparts in Canada. However, it may be possible to utilize aspects of the LIHI certification program, such as the comprehensive range of resources addressed and the transparency of the program, as a model for a generally applicable North American program. LIHI has, in fact, recently sought funding from the CEC in collaboration with the Helios Centre of Montreal to do a pilot project on developing a proposed standard for small-scale "green" hydropower projects that could be applied in both the United States and in Canada.

International trade in hydropower "green" tags

As previously mentioned (section III.D.2), the use of "green tags" is a means of overcoming geographic barriers between the green power supply and the green power customer. Although hydropower poses some complexities for green tag trading, there is already at least one example of an international green tag purchase: the Dutch company Nuon recently purchased the green tags of a Guatemalan hydropower project (EcoSecurities 2001). As discussed above, Low Impact certification may be especially appropriate for hydropower green tags or tradable renewable energy credits, and, as the Nuon purchase demonstrates, the marketplace for certified Low Impact facilities could be worldwide. Indeed, another recently launched international green tags company, World Wide Green (out of the Netherlands, see www.worldwidegreen.com), will buy and retire an amount in green tags equivalent to a person's (or company's) annual energy consumption. World Wide Green is utilizing the German Institute for Applied Ecology (Oeko-Institut) to evaluate and certify its tags. The only green tags for hydropower the Oeko-Institut and World Wide Green recognize for this program will be from plants that meet either the LIHI standards or the Naturemade Star standards from Switzerland (see Bratrich & Truffer 2001).

F. Summary

The Low Impact Hydropower Certification program faces a number of challenges in becoming the credible and accepted standard for consumers to use when evaluating hydropower for U.S. green power markets. The Institute must convince opinion leaders (including other certification programs) to relinquish the "small hydro" standard; it must convince wary dam owners that certification is obtainable and the process is reasonable and affordable, without simultaneously weakening the standards of the program so as to lose its credibility; it must help establish markets for certified hydropower so that those who make the effort to become certified are rewarded; it must continue to conduct outreach efforts to all sectors involved in the green power markets to educate them about hydropower and why the Low Impact standard is the most credible system available to differentiate it; and it must do all these things while operating on a limited non-profit budget.

The challenges are significant, but not insurmountable. Efforts by the Institute have already begun to bear fruit, including a general increase in the applications for certification, and

increasing consideration and use of the certification program by green power stakeholders, both in the United States and internationally. The Institute's Board will continue to evaluate ways to improve the program and to make it responsive to changes in the emerging green power markets. In addition, despite the problems in California, the growth trends in the use and marketing of green power, whether in retail markets, green pricing programs, or green tag trading are positive. Ultimately, if hydropower is to increase its participation in the green power markets, it will need the LIHI certification program to do so. Without LIHI, "small hydro" will be the only hydropower that earns market incentives to the detriment of the environment and responsible "large" hydro generators.

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APPENDICES

Appendix A—Certification Questionnaire
Appendix B—Certification Criteria
Appendix C—Application Fee Schedule

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LOW IMPACT HYDROPOWER QUESTIONNAIRE

[Excerpted from Part VI, Section E of the Low Impact Hydropower Certification Program. Words in italics are defined in Part VI, Section C, and line-by-line instructions are available in Section D. All documents are available on the Institute's web site]

Background Information	
1) Name of the Facility.	
2) Applicant's name, contact information and relationship to the Facility. If the Applicant is not the Facility owner/operator, also provide the name and contact information for the Facility owner and operator.	
3) Location of Facility by river and state.	
4) Installed capacity.	
5) Average annual generation.	
6) Regulatory status.	
7) Reservoir volume and surface area measured at the high water mark in an average water year.	
8) Area occupied by non-reservoir facilities (e.g., dam, penstocks, powerhouse).	
9) Number of acres inundated by the Facility.	
10) Number of acres contained in a 200-foot zone extending around entire impoundment.	
11) Please attach a list of contacts in the relevant Resource Agencies and in non-governmental organizations that have been involved in Recommending conditions for your Facility.	
12) Please attach a description of the Facility, its mode of operation (i.e., peaking/run of river) and a map of the Facility.	

Questions For "New" Facilities Only: If the Facility you are applying for is "new" i.e., an existing dam that added or increased power generation capacity after August of 1998 please answer the following questions to determine eligibility for the program	
13) When was the dam associated with the Facility completed?	
14) When did the added or increased generation first generate electricity?	
15) Did the added or increased power generation capacity require or include any new dam or other diversion structure?	
16) Did the added or increased capacity include or require a change in water flow through the facility that worsened conditions for fish, wildlife, or water quality, (for example, did operations change from run-of-river to peaking)?	
17 (a) Was the existing dam recommended for removal or decommissioning by resource agencies, or recommended for removal or decommissioning by a broad representation of interested persons and organizations in the local and/or regional community prior to the added or increased capacity? (b) If you answered "yes" to question 17(a), the Facility is not eligible for certification, unless you can show that the added or increased capacity resulted in specific measures to improve fish, wildlife, or water quality protection at the existing dam. If such measures were a result, please explain.	

A. Flows	PASS	FAIL
Is the Facility in Compliance with Resource Agency Recommendations issued after December 31, 1986 regarding flow conditions for fish and wildlife protection, mitigation and enhancement (including in-stream flows, ramping and peaking rate conditions, and seasonal and episodic instream flow variations) for both the reach below the tailrace and all bypassed reaches?	YES = Pass, Go to B N/A = Go to A2	NO = Fail
2) If there is no flow condition recommended by any Resource Agency for the Facility, or if the recommendation was issued prior to January 1, 1987, is the Facility in Compliance with a flow release schedule, both below the tailrace and in all bypassed reaches, that at a minimum meets Aquatic Base Flow standards or "good" habitat flow standards calculated using the Montana-Tennant method?	YES = Pass, go to B NO = Go to A3	
3) If the Facility is unable to meet the flow standards in A.2., has the Applicant demonstrated, and obtained a letter from the	YES = Pass, go to B	NO = Fail

relevant Resource Agency confirming that demonstration, that the flow conditions at the Facility are appropriately protective of fish, wildlife, and water quality?		
B. Water Quality	PASS	FAIL
Is the Facility either: In Compliance with all conditions issued pursuant to a Clean Water Act Section 401 water quality certification issued for the Facility after December 31, 1986? Or In Compliance with the quantitative water quality standards established by the state that support designated uses pursuant to the federal Clean Water Act in the Facility area and in the downstream reach?	YES = Go to B2	NO = Fail
2) Is the Facility area or the downstream reach currently identified by the state as not meeting water quality standards (including narrative and numeric criteria and designated uses) pursuant to Section 303(d) of the Clean Water Act?	YES = Go to B3 NO = Pass	
3) If the answer to question B.2 is yes, has there been a determination that the Facility is not a cause of that violation?	YES = Pass	NO = Fail
C. Fish Passage and Protection	PASS	FAIL
Is the Facility in Compliance with Mandatory Fish Passage Prescriptions for upstream and downstream passage of anadromous and catadromous fish issued by Resource Agencies after December 31, 1986?	YES = Go to C5 N/A = Go to C2	NO = Fail
Are there historic records of anadromous and/or catadromous fish movement through the Facility area, but anadromous and/or catadromous fish do not presently move through the Facility area (e.g., because passage is blocked at a downstream dam or the fish run is extinct)?	YES = Go to C2a NO = Go to C3	
If the fish are extinct or extirpated from the Facility area or downstream reach, has the Applicant demonstrated that the extinction or extirpation was not due in whole or part to the Facility?	YES = Go to C2b N/A = Go to C2b	NO = Fail
If a Resource Agency Recommended adoption of upstream and/or downstream fish passage measures at a specific future date, or when a triggering event occurs (such as completion of passage through a downstream obstruction or the completion of a specified process), has the Facility owner/operator made a legally enforceable commitment to provide such passage?	YES = Go to C5 N/A = Go to C3	NO = Fail
3) If, since December 31, 1986: a) Resource Agencies have had the opportunity to issue, and considered issuing, a Mandatory Fish Passage Prescription for upstream and/or downstream passage of anadromous or catadromous fish (including delayed installation as described in	NO = Go to C5 N/A = Go to C4	YES = Fail

C2a above), and b) The Resource Agencies declined to issue a Mandatory Fish Passage Prescription, c) Was a reason for the Resource Agencies' declining to issue a Mandatory Fish Passage Prescription one of the following: (1) the technological infeasibility of passage, (2) the absence of habitat upstream of the Facility due at least in part to inundation by the Facility impoundment, or (3) the anadromous or catadromous fish are no longer present in the Facility area and/or downstream reach due in whole or part to the presence of the Facility?		
4) If C3 was not applicable: Are upstream and downstream fish passage survival rates for anadromous and catadromous fish at the dam each documented at greater than 95% over 80% of the run using a generally accepted monitoring methodology? Or If the Facility is unable to meet the fish passage standards in 4.a., has the Applicant demonstrated, and obtained a letter from the US Fish and Wildlife Service or National Marine Fisheries Service confirming that demonstration, that the upstream and downstream fish passage measures (if any) at the Facility are appropriately protective of the fishery resource?	YES = Go to C5	NO = Fail
5) Is the Facility in Compliance with Mandatory Fish Passage Prescriptions for upstream and/or downstream passage of Riverine fish?	YES = Go to C6 N/A = Go to C6	NO = Fail
6) Is the Facility in Compliance with Resource Agency Recommendations for Riverine, anadromous and catadromous fish entrainment protection, such as tailrace barriers?	YES = Pass, go to D N/A = Pass, go to D	NO = Fail
D. Watershed Protection	PASS	FAIL
Is the Facility in Compliance with Resource Agency Recommendations, or, if none, with license conditions, regarding protection, mitigation or enhancement of lands inundated by the Facility or otherwise occupied by the Facility, and regarding other watershed protection, mitigation and enhancement activities?	YES and N/A= Pass	NO = Fail
E. Threatened and Endangered Species Protection	PASS	FAIL
Are threatened or endangered species listed under state or federal Endangered Species Acts present in the Facility area and/or downstream reach?	YES = Go to E2 NO = Pass, go to F	
2) If a recovery plan has been adopted for the threatened or endangered species pursuant to Section 4(f) of the Endangered Species Act or similar state provision, is the Facility in Compliance with all recommendations in the plan relevant to the Facility?	YES = Go to E3 N/A = Go to E3	NO = Fail

3) If the Facility has received authority to incidentally Take a listed species through: (i) Having a relevant agency complete consultation pursuant to ESA Section 7 resulting in a biological opinion, a habitat recovery plan, and/or (if needed) an incidental Take statement; (ii) Obtaining an incidental Take permit pursuant to ESA Section 10; or (iii) For species listed by a state and not by the federal government, obtaining authority pursuant to similar state procedures; is the Facility in Compliance with conditions pursuant to that authority?	YES = Go to E4 N/A = Go to E5	NO = Fail
4) If a biological opinion applicable to the Facility for the threatened or endangered species has been issued, can the Applicant demonstrate that: The biological opinion was accompanied by a FERC license or exemption or a habitat conservation plan? Or The biological opinion was issued pursuant to or consistent with a recovery plan for the endangered or threatened species? Or There is no recovery plan for the threatened or endangered species under active development by the relevant Resource Agency? Or The recovery plan under active development will have no material effect on the Facility's operations?	YES = Pass, go to F	NO = Fail
5) If E.2. and E.3. are not applicable, has the Applicant demonstrated that the Facility and Facility operations do not negatively affect listed species?	YES = Pass, go to F	NO = Fail
F. Cultural Resource Protection	PASS	FAIL
If FERC-regulated, is the Facility in Compliance with all requirements regarding Cultural Resource protection, mitigation or enhancement included in the FERC license or exemption?	YES = Pass, go to G N/A = Go to F2	NO = Fail
If not FERC-regulated, does the Facility owner/operator have in place (and is in Compliance with) a plan for the protection, mitigation or enhancement of impacts to Cultural Resources approved by the relevant state or federal agency or Native American Tribe, or a letter from a senior officer of the relevant agency or Tribe that no plan is needed because Cultural Resources are not negatively affected by the Facility?	YES = Pass, go to G	NO = Fail
G. Recreation	PASS	FAIL
If FERC-regulated, is the Facility in Compliance with the recreational access, accommodation (including recreational flow releases) and facilities conditions in its FERC license or exemption?	YES = Go to G3 N/A = Go to G2	NO = Fail
If not FERC-regulated, does the Facility provide recreational access, accommodation (including recreational flow releases) and facilities, as Recommended by Resource Agencies or other agencies responsible for recreation?	YES = Go to G3	NO = Fail

Does the Facility allow access to the reservoir and downstream reaches without fees or charges?	YES = Pass, go to H	NO = Fail
H. Facilities Recommended for Removal	PASS	FAIL
Is there a Resource Agency Recommendation for removal of the dam associated with the Facility?	NO = Pass, Facility is Low Impact	YES = Fail

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LOW IMPACT HYDROPOWER CERTIFICATION PROGRAM

PART VI
CERTIFICATION CRITERIA
(As Revised November 28, 2001, and January 17, 2002)

A. INTRODUCTION

The Low Impact Hydropower Institute ("Institute") has established the Low Impact Hydropower Certification Program ("Certification Program") to certify hydropower facilities that are well sited and well operated in accordance with objective and scientific environmental standards. The Certification Program's goals are to reduce the environmental impacts of hydropower generation, and to create a credible and accepted standard for consumers to use in evaluating hydropower. The Certification Program's objective to meet these goals is to establish certification criteria that hydropower facilities must meet in the following eight areas: (1) river flows, (2) water quality, (3) fish passage and protection, (4) watershed protection, (5) threatened and endangered species protection, (6) cultural resource protection, (7) recreation, and (8) facilities recommended for removal. A hydropower Facility meeting all eight certification criteria will be certified as a Low Impact Hydropower Facility, and will be able to use this certification when marketing power to consumers. This document contains a questionnaire (Section E) containing the criteria for determining whether a hydropower Facility is Low Impact. It also contains definitions for the questionnaire (Section C) and line-by-line instructions (Section D).

B. CERTIFICATION PROCESS

Certification under the Low Impact Hydropower Certification Program is designed to be a fair and efficient process. A complete description of the certification procedures is included in Part III. Briefly, an Applicant fills out a certification questionnaire, attaches supporting information and forwards the completed application to the Low Impact Hydropower Institute. The Certification Administrator posts the complete application on the Institute's Web page for a 60-day public comment period, and forwards the full package (with any public comments) to the Application Reviewer. The Application Reviewer reviews the package, conducts any factual investigation needed to resolve factual disputes and evaluate the veracity of claims, and returns the application to the Certification Administrator with a certification recommendation. The Institute's Governing Board makes a preliminary certification decision, which is posted on the Institute's Web page for 30 days. If no appeal is requested by either the Applicant or any

member of the public who commented on the application package, the decision becomes final. Any appeals are referred to the Institute's Appeals Panel for review. Certification recommendations from the Appeals Panel are referred to the Governing Board, which makes the final certification decision.

C. DEFINITIONS

Defined terms are capitalized throughout and italicized when they are first used in the questionnaire.

1. "Applicant:" The party applying for Low Impact Hydropower Certification. This will usually be, but need not be, the Facility owner or operator.

2. "Compliance:" A Facility is in Compliance with a requirement or recommendation if it complies at the time the questionnaire is filled out and has not had any material violations or formal notices of violation issued by a state or federal agency within the last year. If the Facility has been in violation of a requirement or recommendation but the Applicant does not believe the violation is material, the violation must be disclosed and its materiality explained in the application.

3. "Cultural Resource:" Material remains of past human life or activities that are of significant cultural or archaeological interest. Of cultural or archaeological interest means capable of providing scientific or humanistic understandings of past human behaviors, cultural adaptation, and related topics through the application of scientific or scholarly techniques such as controlled observation, contextual measurement controlled collection, analysis, interpretation and explanation. This term includes, but is not limited to, objects made or used by humans, such as pottery, basketry, bottles, weapons, weapon projectiles, tools, structures or portions of structures, pit houses, rock paintings, rock carvings, intaglios, or any portion or piece of the foregoing items, and the physical site, location or context in which they are found, or human skeletal materials or graves.

4. "Facility:" A hydropower dam and associated project works, with one power generation source (*i.e.*, powerhouse). If a licensed hydropower project contains multiple dams and power sources, each power source shall be considered a separate Facility and shall complete this form separately. For instance if a Federal Energy Regulatory Commission ("FERC") license has four dams and four powerhouses, there are four Facilities. If the FERC license has two dams but only one powerhouse there is one Facility. If a single dam has multiple powerhouses, there is one Facility if the powerhouses are operated together as a unit. Resources jointly held by multiple Facilities may be allocated among Facilities within the same watershed, and consolidated applications may be submitted for multiple Facilities within a watershed. However, the owner/operator must document that the jointly held resources have not been allocated for the certification of another Facility.

5. "Mandatory Fish Passage Prescription:" Upstream and downstream fish passage requirements issued by Resource Agencies that must be included in a FERC license or exemption or otherwise must be complied with by the Facility owner/operator,

usually pursuant to Section 18 of the Federal Power Act, or, if applicable, Section 4(e) of the Federal Power Act, Section 401 of the Clean Water Act, the Endangered Species Act, or other relevant state or federal provisions. For the purposes of these criteria, recommendations included in an Endangered Species Act Biological Opinion or Recovery Plan are considered Mandatory Fish Passage Prescriptions. If a single Resource Agency has made differing prescriptions, the most recent prescription shall apply. If different Resource Agencies have made differing prescriptions, the most environmentally stringent prescription shall apply. For example, if the National Marine Fisheries Service issues a prescription requiring fish ladders with 99% fish passage survival, the US Fish and Wildlife Service issues a fish ladder prescription with 90% survival, and then the National Marine Fisheries Service revises its prescription to require 94% survival, to qualify as Low Impact Hydropower, the fish ladder at the Facility must have 94% survival.

6. "Native American Tribe:" Federally-recognized Native American tribes which are affected by the Facility and with governing authority over natural resources reserved by or protected in treaties, executive orders or federal statutes.

7. "Resource Agency:" A state, federal or tribal agency whose mission includes protecting fish and wildlife, water quality and/or administering reservations held in the public trust. This includes the US Fish and Wildlife Service, the National Park Service, the US Bureau of Indian Affairs, the US Bureau of Land Management, the National Marine Fisheries Service, the US Forest Service, the US Environmental Protection Agency, the Northwest Power Planning Council, Native American Tribes, the state department of environmental protection, the state departments of natural resources and fish and game, and any other similar agency. "Resource Agency" does not include the Federal Energy Regulatory Commission, nor does it include the Tennessee Valley Authority, the Bonneville Power Administration, the US Army Corps of Engineers, or the Bureau of Reclamation in their capacity as owner or operator of a Facility.

8. "Resource Agency Recommendations:" Recommendations or conditions for operation, maintenance, construction of structures of the Facility submitted by Resource Agencies for the Facility. Resource Agency Recommendations considered in Low Impact Hydropower certifications shall be:

Issued pursuant to a proceeding. Valid Resource Agency Recommendations are those issued pursuant to a legal or administrative proceeding or other legally enforceable agreements between a Resource Agency and the dam owner/operator. The proceeding anticipated to apply for most privately-owned Facilities is a FERC licensing or exemption proceeding. For a FERC-regulated Facility, these recommendations would include proposed or mandated license conditions submitted through the FERC licensing or other processes pursuant to Federal Power Act Sections 4(e), 18, 10(a) or 10(j), Clean Water Act Section 401, the Endangered Species Act or other state or federal provisions. For non FERC-regulated Facilities, the proceedings anticipated to apply include consultation pursuant to the Endangered Species Act, federal or state Clean Water Act proceedings, Northwest Power Act proceedings and other proceedings resulting in a legally enforceable agreement between the Facility owner/operator and a Resource Agency.

Resource Agency Recommendations that are subsequently overturned by a legal proceeding cease to be valid for the purposes of certification.

Recent. If a single Resource Agency has made multiple recommendations, the most recent recommendation shall apply. This principal also applies when there is a settlement. If a Resource Agency is party to a settlement, or otherwise formally concurs in a settlement, the settlement terms are considered to be the most recent Resource Agency Recommendation for these purposes. If, however, a Resource Agency is not party to a settlement and does not formally concur in the settlement, the most recent recommendation of that Resource Agency, and not the settlement terms, apply for purposes of certification.

Environmentally Stringent. The most environmentally stringent recent Resource Agency Recommendation shall apply where different Resource Agencies have made differing recommendations. If a condition in the Facility's FERC license or exemption (or other operating requirement, if not FERC-licensed) is less environmentally stringent than a Resource Agency Recommendation, the Facility must meet the Resource Agency Recommendation to be certified as Low Impact Hydropower. For example, if the US Fish and Wildlife Service originally recommended a 100 cfs minimum flow, and the State Department of Fish and Game recommended 50 cfs, then the US Fish and Wildlife Service revised its recommendation to 80 cfs, and FERC issued a license with a 40 cfs minimum flow, to qualify as Low Impact Hydropower the Facility must release 80 cfs.

Resolution of Conflicting Resource Agency Recommendations. Where there are conflicting Resource Agency Recommendations and the conflict is not resolved by applying the most Recent and most Environmentally Stringent Recommendations, the conflict shall be resolved by applying the Recommendations based upon the health of threatened or endangered biological organisms first, the health of other biological organisms second, Cultural Resources third and recreation fourth, unless there is a statutory mandate to resolve the conflict otherwise. For example, Recommendations designed to protect threatened or endangered species (a Biological Opinion, for instance) would prevail over recommendations regarding recreation. If a conflict still exists among Resource Agency Recommendations, the Governing Board will make a determination which Recommendation shall apply. For guidance regarding conflicts among Resource Agency Recommendations, consult the Administrator.

9. "Riverine Fish:" A fish that spends its entire life cycle in the river, and does not migrate to the ocean. Riverine Fish are often called resident fish.

10. "Take:" For purposes of impacts to threatened or endangered species, Take means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct.

D. LINE-BY-LINE INSTRUCTIONS

1. General Instructions:

These instructions provide guidance on answering questions in the Low Impact Hydropower questionnaire (Section E). Remaining requirements for completing a certification application can be found in Part III—Certification Procedures, Section II.A.1, "Submission of Application Package."

The questionnaire is broken into nine sections: a background information section and one section each for the eight criteria (flows, water quality, fish passage and protection, watershed protection, threatened and endangered species protection, Cultural Resource protection, recreation, and Facilities recommended for removal). To be certified as Low Impact Hydropower, a Facility must pass each of the eight criteria.

All of the questions on the questionnaire (other than the background information questions) are designed to be answered by Yes, No or N/A (not applicable). If the Applicant is seeking certification of a "new" Facility, that is, an existing dam that added or increased power generation capacity after August of 1998, then there are several additional background questions (questions 13-17) that must be answered to determine whether the "new" Facility is eligible for certification.

After the background section, the questionnaire has two columns on the right of each question that allow an Applicant to circle Yes, No or N/A. A circled response in the far right column will fail the criterion. Circled responses in the middle column will either pass that criterion or allow the Applicant to proceed to the next question within that criterion. This column contains instructions as to whether the Facility has passed that criterion or whether another question must be answered within the criterion. In order to ensure that the right questions are answered, please answer the questions in order within each criterion.

One of the most potentially confusing aspects of the questionnaire is understanding which Resource Agency Recommendations are relevant for answering several of the questions. Please see the definitions of Compliance and Resource Agency Recommendation for guidance in answering any question referring to a Resource Agency Recommendation. To answer the question, review any recommendations made by a Resource Agency in an administrative or judicial proceeding, and determine which recommendation should be applied using the conditions set in the question and the conditions and priorities set in the definition of Resource Agency Recommendation. If a condition in a Facility's FERC license or exemption is less Environmentally Stringent than a Resource Agency Recommendation, the Facility must comply with the Resource Agency Recommendation to qualify as Low Impact Hydropower. Settlements in FERC or other proceedings, where a Resource Agency is party to, or concurs in, the settlement, have the effect of becoming the latest Resource Agency Recommendation for that Resource Agency on the topics covered by the settlement.

In order to document compliance with several of the criteria (*e.g.,* questions A.1., A.2., B.1.a., B.1.b., C.1., C.2.b., C.3.c., C.4.a., C.5., C.6., D.1., E.2., E.3., E.5.), the Applicant is required to seek a letter from the Resource Agency official authorized to make recommendations for the Resource Agency in other comparable circumstances, such as in FERC proceedings. This requirement to seek a letter from the Resource Agency provides an opportunity for the Applicant to expedite the application review process and ensures that all relevant Resource Agency officials are notified of the impending application. As part of the application review, the Application Reviewer will be contacting the relevant Resource Agency officials to confirm that: (1) the Resource Agency Recommendations identified by the Applicant are still valid and are the most recent Recommendations from the Resource Agency; and (2) the Applicant is in compliance with the Recommendations. A letter from the Resource Agency submitted by the Applicant as part of the Application Package will make this review process simpler and faster. If the Applicant is not able to obtain such a letter, this does not create a bar to submitting an application to the Institute. Rather, if the Applicant is unable to obtain such a letter, the Applicant should submit the Application Package, include an explanation of why no letter was obtained, and provide any information acquired in oral conversations with the Resource Agency. If the letter will take a while to obtain from the Resource Agency, the Applicant may submit its Application Package, include an explanation of correspondence with the Resource Agency regarding the letter, and forward the letter to the Certification Administrator when it is received.

For two criteria (Questions A.3. and C.4.b.), a letter from a Resource Agency is allowed to stand in place of a recent Resource Agency Recommendation and serve as the standard with which the Applicant must comply. If the Applicant seeks to meet the terms of criteria A and C through these provisions, the Applicant must obtain the letter to comply; an explanation of why the Applicant was unable to obtain the letter will not be sufficient.

If a dam owner/operator owns or operates multiple Facilities in a watershed that are operationally or hydrologically connected, the owner/operator may choose to submit a consolidated application for those Facilities. Each Facility must independently qualify under all criteria, and must each fill out a certification questionnaire. However supporting information and materials may be submitted jointly. The total watershed protection requirement for the multiple Facilities may be submitted as a package, and need not be expressly allocated to specific Facilities as long as the total Watershed Protection required for each Facility is met.

The date of December 31, 1986 is used throughout the criteria because the Electric Consumers Protection Act, with its explicit requirement for balancing power and non-power values in FERC licensing proceedings, became effective after that date.

Applicants are encouraged to consult with the Low Impact Hydropower Institute if they have any questions in preparing an application.

2. Line-By-Line Instructions:

Background Information:

Questions 1-5 – These questions are self-explanatory.

Question 6 – Please describe the Facility's regulatory status. For FERC-regulated Facilities please provide the FERC license or exemption number, dates of licensing and next relicensing, and status of any relicensing or post-licensing proceedings. For federal Facilities please provide a citation to the authorizing law and describe any recent or ongoing legal or regulatory proceedings that affect operations at the Facility.

Question 7 – This question is self-explanatory.

Question 8 – Provide the acreage (or square feet) of the footprint of the non-reservoir buildings and other equipment associated with the Facility, such as the dam, penstocks, and power house. Response to this question is requested but not required pending revisions to the watershed criterion in 2003.

Question 9 – Provide the area inundated by any reservoir associated with the Facility, measuring from the high water mark. Inundated land does not include the area of the natural river or stream bed inundated by the reservoir or the area of any natural lakes expanded through artificial means (the area of the river bed or lake may be subtracted from the total area covered by the reservoir). If exact measurements of the natural riverbed or lake are not available, please provide an approximation and explain your estimate. Response to this question is requested but not required pending revisions to the watershed criterion in 2003.

Question 10 – Provide the area of the perimeter of the impoundment extending from the reservoir high water mark in an average water year to a distance of 200 feet perpendicular to the perimeter of the impoundment. Response to this question is requested but not required pending revisions to the watershed criterion in 2003.

Question 11 – To make review of the application more efficient, please attach a list of contacts. The Resource Agency contacts should be the persons or offices that would be most knowledgeable about the recommendations made regarding the Facility and that have greatest knowledge about its operations. Also include contacts for any non-governmental organizations or individual that have been involved in proceedings involving the operations of the Facility (*e.g.*, intervenors in relicensing, plaintiffs in lawsuits, participants in stakeholder proceedings).

Question 12 – Please provide a brief description of the Facility and its mode of operation (*i.e.*, peaking, run-of-river). The Low Impact Hydropower Institute will use this information to gain a general understanding of the Facility, so please include any information you believe would be useful in explaining your Facility to a person knowledgeable about hydropower operations. Photographs, maps and diagrams are welcome.

Questions Regarding "New" Facilities:

Questions 13-17 – These questions are only to be answered if the Facility in question is a "new" Facility, that is, an existing dam that added or increased power generation capacity after August of 1998. If the Facility in question (including the dam portion of the Facility) was completed and producing electricity before August of 1998, the Applicant can skip questions 13-17 and proceed to section A.

Question 13 – Please identify the date that the dam portion of the Facility was completed. If the dam was not completed as of August 1, 1998, the Facility is not currently eligible for the certification program.

Question 14 – Please identify the date that the added or increased generation capacity first came online, that is, the date that the added or increased generation was first producing electricity.

Question 15 – Please describe whether the added or increased capacity at the existing dam required the construction of any additional dam or water diversion structure. If it did, the Facility is not currently eligible for the certification program.

Question 16 -- Please describe whether the addition of, or increase in generation capacity included or required a change in the water flow through the Facility that worsened conditions for fish, wildlife, or water quality. For example, if the addition of power generation to the existing dam requires a change in operations from run of river to a peaking operation, this would be a change in the water flow through the project that worsened conditions for fish, wildlife, or water quality, and the Facility would not be eligible for certification. Supporting documentation should include a brief narrative comparison of the conditions for fish, wildlife, and water quality before, and after the added or increased capacity. In addition, a letter from a relevant Resource Agency confirming that the addition of or increased in generation capacity did not include or require a change in the water flow through the Facility that worsened conditions for fish, wildlife, or water quality is encouraged.

Question 17 – For question 17(a), please indicate whether the existing dam of the Facility was recommended for removal or decommissioning by Resource Agencies, or recommended for removal or decommissioning by a broad representation of interested persons and organizations in the local and/or regional community prior to the added or increased capacity.

If you answered "yes" to question 17(a), the Facility is not eligible for certification, unless you can show (under 17(b)) that the added or increased capacity resulted in specific measures to improve fish, wildlife, or water quality protection at the existing dam. If such measures were a result, please describe the measures and how they improved fish, wildlife, or water quality protection at the Facility. Letters from the relevant Resource Agencies confirming the improvements are encouraged.

A. Flows

The Flows Criterion is designed to ensure that the river has healthy flows for fish, wildlife and water quality, including seasonal flow fluctuations where appropriate. For instream flows, a certified Facility must comply with recent Resource Agency Recommendations for flows, or meet one of two alternative standards to demonstrate that flows are appropriately protective of water quality, fish and wildlife.

Question A.1. – If the Facility is in Compliance with the relevant Resource Agency Recommendation pursuant to the conditions in the Resource Agency Recommendation definition, the Facility will pass the Flows criterion. If it is not, the Facility will fail the criterion. The Resource Agency Recommendations on flows must be for fish, wildlife and water quality protection, mitigation and enhancement. If such a recommendation is for purely recreational purposes, it does not apply here (though it may apply in Criterion G below).

If there has been no relevant Resource Agency Recommendation since December 31, 1986, the appropriate response is "N/A" and the questions in Section A.2. should be answered. Documentation should include the Resource Agency Recommendation and evidence of Compliance. The Applicant should seek to obtain a letter from the Resource Agency official authorized to make recommendations for the Resource Agency in other comparable circumstances, such as in FERC proceedings. The letter should confirm that: (1) the Resource Agency Recommendation is still valid and is the most recent Recommendation from the Resource Agency; and (2) the Facility is in Compliance with that Recommendation. Please see the general instructions above for more guidance regarding this letter.

For Facilities without post-December 31, 1986 Resource Agency Recommendations regarding flow conditions for fish, wildlife and water quality, there are two alternatives for meeting the criterion:

Question A.2. –In Question A.2., the Applicant may show that the Facility is operated with a flow release schedule that meets the specified standards (Aquatic Base Flow or "good" habitat flow standards using the Montana-Tennant method). References and methodologies for these specified methods are available from the Low Impact Hydropower Institute. Please provide documentation of the calculation used to determine the required flow and evidence of Compliance with those flows. The Applicant should seek to obtain a letter from the Resource agency official authorized to make recommendation for the Resource Agency in other comparable circumstances, such as in FERC proceedings. The letter should confirm that the Facility is in Compliance with the applicable flow standard. Please see the general instructions above for more guidance regarding this letter.

Question A.3. – If the Facility cannot meet the standards in A.2., the Applicant may demonstrate that the flows at the Facility are adequately protective of fish, wildlife and water quality. This demonstration must be confirmed through a letter from the Resource

Agency official authorized to make Recommendations for the Agency in other comparable circumstances, such as in FERC proceedings. Because this letter is being used as a substitute for an Agency having the opportunity to make a formal Resource Agency Recommendation, the letter must be prepared for the purpose of this application; a general letter will not be sufficient, nor will an explanation of why the Applicant was unable to obtain a letter. The letter must state that the flow schedule at the Facility is adequately protective for fish, wildlife and water quality, and confirm that the Facility is in Compliance with the flow schedule. The letter should also, if possible, refer to the Resource Agency's substantive flow standards for protection of fish, wildlife and water quality. A letter stating only that a flow standard has not been legally required or that the flow conditions meet the legal requirement is not sufficient. Documentation should include the letter, and evidence of Compliance with the flow conditions specified in the letter. The process set out in A.3. is effective until January 1, 2004 and may be extended, canceled or made permanent by the Governing Board upon review of the results.

B. Water Quality:

The Water Quality Criterion is designed to ensure that water quality in the river is protected. The water quality criterion has two parts. First, a Facility must demonstrate that it is in Compliance with state water quality standards, either through producing a recent Clean Water Act Section 401 certification or providing other demonstration of Compliance. Second, a Facility must demonstrate that it has not contributed to a state finding that the river has impaired water quality under Clean Water Act Section 303(d). The water quality criterion is under consideration for substantial revision in 2003. The revisions will be developed with public input, and revisions may include (but are not limited to) revisions that would require a Facility to have a limited program of regular water quality monitoring and reporting.

Question B.1. – Question B.1. requires Compliance with water quality standards. For Low Impact Certification, a "Yes" answer is required for *either* Question B.1.a. or B.1.b.

> **Question B.1.a.** – Compliance with a water quality certification issued under Clean Water Act Section 401 after December 31, 1986 is required under Question B.1.a. A waiver of certification authority by the state does not qualify as water quality certification. If the water quality certification has been waived, the Facility must meet this part of the water quality criterion through B.1.b. Documentation should include the water quality certification and evidence of Compliance with that certification. The Applicant should seek to obtain a letter from the Resource Agency official authorized to make recommendations for the Resource Agency in other comparable circumstances, such as in FERC proceedings. The letter should confirm that: (1) the water quality certification is still valid and is the most recent water quality certification from the Resource Agency; and (2) the Facility is in Compliance with all conditions issued pursuant to that water quality certification. Please see the general instructions above for more guidance regarding this letter.

Question B.1.b. – For Question B.1.b., the Facility must demonstrate actual Compliance with the quantitative standards established by the state to support the designated uses for that body of water. Documentation should include the quantitative standards and evidence that the water quality in the Facility area and the downstream reach meet those standards. The Applicant should seek to obtain a letter from the Resource Agency official authorized to make recommendations for the Resource Agency in other comparable circumstances, such as in FERC proceedings. The letter should confirm that the Facility is in Compliance with the applicable water quality standards. Please see the general instructions above for more guidance regarding this letter.

Question B.2. – Question B.2. ensures that the relevant stretch of river has not been identified by the state pursuant to Clean Water Act Section 303(d) as having impaired water quality. Documentation for this question should include the relevant portion of the most recent list of water bodies designated under Section 303(d).

Question B.3. – If the relevant stretch of river has been designated as having impaired water quality under Section 303(d), the Facility may still pass the water quality criterion if there has been a determination that the Facility does not contribute to the water quality problem. This determination may include the state's identification of a list of causes of the violation that does not include the Facility, a letter from the state explaining that the Facility is not a cause, or a letter from the Facility owner/operator that explains obvious exclusions from causation (*e.g.,* violations due to toxic chemicals from an upstream plant unrelated to the Facility).

C. Fish Passage and Protection:

The Fish Passage and Protection Criterion is designed to ensure that, where necessary, the Facility provides effective fish passage for Riverine, anadromous and catadromous fish, and protects fish from entrainment. For Riverine, anadromous and catadromous fish, a Facility must be in Compliance with both Recent Mandatory Fish Passage Prescriptions and Recent Resource Agency Recommendations regarding fish protection.

If anadromous or catadromous fish historically passed through the Facility area but are no longer present, the Facility will pass this criterion if the Applicant can show both that the fish are not extirpated or extinct in the area due in part to the Facility and that the Facility has made a legally binding commitment to provide any future fish passage Recommended by a Resource Agency.

When no recent Mandatory Fish Passage Prescription exists for anadromous and catadromous fish and the fish are still present, the Facility must demonstrate either that there was a recent decision that fish passage is not necessary for a valid reason, that existing fish passage survival rates at the Facility are greater than 95% over 80% of the run, or obtain a letter from the relevant Resource Agency supporting the existing fish passage.

Question C.1. – The least complex method of satisfying the fish passage requirements is Compliance with upstream and downstream Mandatory Fish Passage Prescriptions issued after December 31, 1986. If a Mandatory Fish Passage Prescription has been issued for the Facility since December 31, 1986, please provide it and evidence of Compliance. The Applicant should seek to obtain a letter from the Resource Agency official authorized to make recommendations for the Resource Agency in other comparable circumstances, such as in FERC proceedings. The letter should confirm that: (1) the Mandatory Fish Passage Prescription is still valid and is the most Recent Prescription from the Resource Agency; and (2) the Facility is in Compliance with the Prescription. Please see the general instructions above for more guidance regarding this letter. If a Mandatory Fish Passage Prescription has not been issued, or has not been issued since December 31, 1986, the response to C.1. is "N/A" and Questions C.2. through C.4. apply. Note that fish passage for Riverine fish is required only if there is a Mandatory Fish Passage Prescription. If there is no such Prescription, then there is no requirement for Riverine fish passage (Questions C.2. through C.4. apply only to anadromous and catadromous fish).

Question C.2. – Question C.2. applies if there are historic records of anadromous or catadromous fish movement through the Facility area, but these fish do not presently move through the area. If there are no such records, the correct answer to Question C.2. is "No" and the Applicant should proceed to Question C.3. If anadromous or catadromous fish are present at the Facility, the correct response is "No" and the Applicant should proceed to C.3.

> **Question C.2.a.** – If the Applicant can demonstrate that the Facility is not responsible in whole or part for the extirpation or extinction of the fish from the Facility area, the Facility will pass this question. One way that this can be demonstrated is by obtaining a letter from an official at the U.S. Fish and Wildlife Service or National Marine Fisheries Service who is authorized to make recommendations for the agency in other comparable circumstances, such as in FERC proceedings.
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> **Question C.2.b.** – If a Resource Agency has recommended installation of fish passage in the future, then the Facility owner/operator must make a legally enforceable commitment to provide passage in order to meet the fish passage criterion. If there is no such recommendation, the correct answer is N/A and the Applicant should proceed to C.3. Documentation should include the Resource Agency Recommendation and evidence of the commitment to meet that requirement in the future. The Applicant should seek to obtain a letter from the Resource Agency official authorized to make recommendations for the Resource Agency in other comparable circumstances, such as in FERC proceedings. The letter should confirm that: (1) the Recommendation for future passage is still valid and is the most recent Recommendation from the Resource Agency; and (2) the Facility is in Compliance with that Recommendation. Please see the general instructions above for more guidance regarding this letter.

Question C.3. – Question C.3. applies only if: (a) no Mandatory Fish Passage Prescription has been issued since December 31, 1986; (b) no Resource Agency Recommendation for future fish passage has been issued; and (c) Resource Agencies have had the opportunity to issue a Mandatory Fish Passage Prescription since December 31, 1986 but declined to do so. In this circumstance, the reasons for the Resource Agencies declining to require fish passage become important. If there has been no opportunity for the Resource Agency to issue a fish passage prescription since December 31, 1986, the correct response is "N/A" and the Applicant should proceed to C.4.

> **Question C.3.c.** – Question C.3.c. outlines three reasons for a Resource Agency decision not to require fish passage that will cause a Facility to fail the fish passage criterion. In each case, the reasons relate to the physical nature of the Facility or the environmental impacts that the Facility has caused. The first reason, technological infeasibility of fish passage, is expected to apply primarily to dams which are too high for effective fish passage. However, it may also apply in other situations, such as when a migratory fish species (*e.g.,* sturgeon) is not capable of successfully using fish passage. The second reason is that the Facility has destroyed upstream habitat for the migratory fish, and thus there is no reason to pass fish. The third reason is that the fish are no longer present (*e.g.,* extirpated from the river or extinct), in whole or part as a result of the Facility. In each of these three cases, the Facility cannot be considered to be Low Impact because the Facility has had a direct adverse impact on the migratory fish. Documentation should include evidence of the rationale for the Resource Agency's decision not to recommend fish passage. The Applicant should seek to obtain a letter from the Resource Agency official authorized to make recommendations for the Resource Agency in other comparable circumstances, such as in FERC proceedings. The letter should confirm the reasons for declining to issue a Mandatory Fish Passage Prescription for the Facility. Please see the general instructions above for more guidance regarding this letter.

Question C.4. – Question C.4. is applicable if: (a) there is no post-December 31, 1986 Mandatory Fish Passage Prescription; (b) there was not a Recent Resource Agency decision that fish passage is not necessary; and (c) the fish are still present at the Facility. Question C.4. considers the actual performance of the fish passage provisions at the Facility. There are two alternatives for passing this question.

> **Question C.4.a.** – The first alternative is to demonstrate 95% upstream and downstream passage survival rates over 80% of the run. Please provide the studies used to support the survival rate claimed, including methodology, data and conclusions. The Applicant should seek to obtain a letter from the Resource Agency official authorized to make recommendations for the Resource Agency in other comparable circumstances, such as in FERC proceedings. The letter should confirm that the Facility is meeting the stated passage standard. Please see the general instructions above for more guidance regarding this letter.

> **Question C.4.b.** – If the Facility cannot meet the standards in C.4.a., the Applicant may demonstrate that the upstream and downstream fish passage

provisions (if any) at the Facility are adequately protective of the fishery resources. This demonstration must be confirmed through a letter from an official at the U.S. Fish and Wildlife Service or National Marine Fisheries Service who is authorized to make Recommendations for the Agency in other comparable circumstances, such as in FERC proceedings. The letter must state that fish passage (whether present or absent) is acceptable to the Resource Agency and adequately protective of the fishery resource. The letter should also, if possible, refer to the Resource Agency's substantive standards for protection of the resource. A letter simply stating that fish passage provisions have not been required is not sufficient. Because this alternative is being used as a substitute for a Resource Agency's having the opportunity to make a more formal prescription, the letter must be prepared for the purpose of this application; a general letter will not be sufficient, nor will an explanation of why the Applicant was unable to obtain a letter. Documentation should include the letter, and evidence of Compliance with the passage conditions specified in the letter. This letter option is effective until January 1, 2004, and may be extended, canceled or made permanent by the Governing Board upon review of the results.

Question C.5. – If a Mandatory Fish Passage Prescription for Riverine fish has been issued for the Facility, the Applicant must demonstrate that the Facility is in Compliance with the Prescription. Documentation should include a copy of the Prescription and evidence of Compliance. The Applicant should seek to obtain a letter from the Resource Agency official authorized to make recommendations for the Resource Agency in other comparable circumstances, such as in FERC proceedings. The letter should confirm that: (1) the Mandatory Fish Passage Prescription is still valid and is the most Recent Prescription from the Resource Agency; and (2) the Facility is in Compliance with the Prescription. Please see the general instructions above for more guidance regarding this letter. If a Mandatory Fish Passage Prescription has not been issued for Riverine fish the response to C.5. is N/A. Note that fish passage for Riverine fish is required only if there is a Mandatory Fish Passage Prescription. If there is no such Prescription, then there is no requirement for Riverine fish passage (Questions C.2. through C.4. apply only to anadromous and catadromous fish).

Question C.6. – This entrainment provision applies to Riverine, anadromous and catadromous fish. Documentation should include the Resource Agency Recommendation and evidence of Compliance. The Applicant should seek to obtain a letter from the Resource Agency official authorized to make recommendations for the Resource Agency in other comparable circumstances, such as in FERC proceedings. The letter should confirm that: (1) the Recommendation is still valid and is the most recent Recommendation from the Resource Agency; and (2) the Facility is in Compliance with the Resource Agency Recommendation. Please see the general instructions above for more guidance regarding this letter. If no entrainment Resource Agency Recommendation was issued, the proper response to Question C.6. is N/A.

D. Watershed Protection:

The Watershed Protection Criterion is designed to ensure that sufficient action has been taken to protect, mitigate and enhance fish and wildlife habitat in the watershed. A certified Facility must be in Compliance with Resource Agency or FERC Recommendations regarding watershed protection, mitigation or enhancement. The watershed criterion is under consideration for substantial revision in 2003. Any revisions will be developed with public input, and revisions may include (but are not limited to) an additional requirement for a 200 foot buffer zone around Facility impoundment(s), dedication of habitat for conservation purposes, establishment of an enhancement fund to support watershed protection activities, or some combination of the three.

Question D.1. Certification requires Compliance with Resource Agency Recommendations and FERC license or exemption provisions regarding land impact mitigation and watershed protection, mitigation and enhancement (e.g., erosion control measures, shoreline buffer zones, off-site wetlands enhancements, etc). Please document the Resource Agency Recommendations or license requirements and provide evidence of Compliance. The Applicant should seek to obtain a letter from the Resource Agency official authorized to make recommendations for the Resource Agency in other comparable circumstances, such as in FERC proceedings. The letter should confirm that: (1) the Recommendation is still valid and is the most Recent Recommendation from the Resource Agency; and (2) the Facility is in Compliance with the Recommendation. Please see the general instructions above for more guidance regarding this letter. If no relevant Recommendation was issued, and there are no relevant requirements in the Facility's FERC license or exemption, the proper response to Question D.1. is N/A.

E. Threatened and Endangered Species Protection:

The Threatened and Endangered Species Protection Criterion is designed to ensure that the Facility does not negatively impact state or federal threatened or endangered species. The Facility may pass this criterion in two different ways. The first is a three step process: (1) show Compliance with relevant conditions in the species recovery plan (Question E.2.); (2) show Compliance with relevant conditions in an incidental Take permit or statement, biological opinion, habitat conservation plan, or similar state document (Question E.3.); and (3) demonstrate that the incidental Take document and/or biological opinion issued relevant to the Facility was designed to be a relatively permanent solution to the endangered species issue (Question E.4.). The second way to pass the criterion is to affirmatively demonstrate that the Facility does not affect the species (Question E.5.).

Question E.2. – In Question E.2., the Applicant must demonstrate that the Facility is in Compliance with all relevant conditions in the recovery plan for the threatened or endangered species. If no recovery plan has been issued, the correct answer to Question E.2. is N/A and the Applicant should proceed to Question E.3. Documentation should include the recovery plan and evidence of Compliance. The Applicant should seek to obtain a letter from an official at the Resource Agency that issued the recovery plan who

is authorized to make comments on behalf of the Resource Agency regarding listed species in other comparable circumstances, such as in FERC proceedings. The letter should confirm that: (1) the recovery plan is still valid; and (2) the Facility is in Compliance with the all relevant conditions contained in that recovery plan. Please see the general instructions above for more guidance regarding this letter.

Question E.3. – In Question E.3. the Applicant must show Compliance with relevant conditions in an incidental Take permit or statement, biological opinion, habitat conservation plan, or similar state document. If no such authority has been issued, the correct answer to Question E.3. is N/A and the Applicant must pass this criterion through Question E.5. Documentation should include the relevant endangered species document and evidence of Compliance with conditions in that requirement. The Applicant should seek to obtain a letter from an official at the Resource Agency that issued the document who is authorized to make comments on behalf of the Resource Agency regarding listed species in other comparable circumstances, such as in FERC proceedings. The letter should confirm that: (1) the document is still valid; and (2) the Facility is in Compliance with all relevant conditions contained in the document. Please see the general instructions above for more guidance regarding this letter.

Question E.4. – If the Facility has received authority to incidentally Take a listed species, the Applicant must still demonstrate that this authority was designed to be a relatively permanent solution to the endangered species issue. This can be demonstrated in one of four ways.

> **Question E.4.a.** – First, if the authority was issued along with long term operational requirements such as a FERC license or habitat conversation plan, this is good evidence that the endangered species resolution was designed to last several decades and the Facility will pass the criterion.
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> **Question E.4.b.** – Second, if the biological opinion was issued pursuant to or consistent with a recovery plan, there is also strong evidence that this was designed to be a permanent solution and the Facility will pass the criterion.
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> **Question E.4.c.** – Third, the lack of active planning on behalf of the Resource Agencies for a more comprehensive resolution of the endangered species issues is good evidence that the Facility-specific resolution was designed to be relatively permanent, and thus the Facility will pass the criterion. However, if a Resource Agency has set a deadline for completion of a recovery plan within two years, this is a sign that the recovery plan is under active development, and thus the Endangered Species Act operational authority issued to the Facility was not expected to last a long time. A good example of this is the biological opinion issued in 1995 regarding operation of federal dams on the Columbia River. When this document was issued in 1995, it was expressly designed to be a temporary solution and the relevant agencies are actively developing a more comprehensive recovery plan under a 1999 deadline.

Question E.4.d. – Fourth, even if a recovery plan is under active development, the Applicant still has an opportunity to demonstrate that the recovery plan is not likely to have a material affect on the Facility's operations, either because the Facility does not materially effect the conditions of concern to the species, or because the Facility is already required to take the actions likely to be required in the recovery plan. This is designed to provide an option only for obvious exclusions to a recovery plan (for example, if the recovery plan will only address water withdrawals and the Facility does not make or affect such withdrawals, or if the Facility is already subject to a long-term habitat conservation plan, the conditions of which the recovery plan may not alter).

Question E.5. – If the relevant Resource Agency has not yet issued the requisite authority to Take listed species, the Facility may pass the criterion if the Applicant can affirmatively demonstrate that the Facility does not affect the species. Documentation should include a basis for the conclusion and supporting studies. The Applicant should seek to obtain a letter from a relevant Resource Agency official who is authorized to make recommendations on behalf of the Resource Agency regarding listed species in other comparable circumstances, such as in FERC proceedings. The letter should confirm that the Facility does not negatively affect the listed species. Please see the general instructions above for more guidance regarding this letter.

***F. Cultural Resource Protection*:**

The Cultural Resource Protection Criterion is designed to ensure that the Facility does not inappropriately impact Cultural Resources. Cultural Resources must be protected either through Compliance with FERC license or exemption provisions, or through development of a plan approved by the relevant state or federal agency or Native American Tribe.

G. Recreation:

The Recreation Criterion is designed to ensure that the Facility provides access to the water and accommodates recreational activities. A certified Facility must be in Compliance with terms of its FERC license or exemption related to recreational access, accommodation and facilities. If not FERC-regulated, a Facility must be in Compliance with similar requirements as Recommended by Resource Agencies.

A certified Facility must also provide access to water without fee or charge. However, if a state or federal agency has prohibited or recommended prohibiting access to any part of the reservoir or downstream reach, this provision does not apply to that area. While access must be free, charges may be imposed for use of project amenities, such as recreational facilities or parking, so long as it is possible to gain access to the reservoir and downstream reach at the Facility without charge.

H. Facilities Recommended for Removal:

The Facilities Recommended for Removal Criterion is designed to ensure that F is not certified if there is a Resource Agency Recommendation that a dam associated with the Facility should be removed. If a Resource Agency has Recommended removal of a dam associated with the Facility, then the Facility may not qualify as Low Impact Hydropower.

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LOW IMPACT HYDROPOWER CERTIFICATION PROGRAM

ATTACHMENT C
APPLICATION FEE SCHEDULE

Size*	Fee
0-5	$2,500
6-10	$5,000
11-15	$7,500
16-25	$10,250
26-35	$13,000
36-45	$15,750
46-55	$18,500
56-65	$21,000
66-75	$23,000
76-85	$25,500
86-95	$27,500
96-105	$30,000
106-115	$32,500
116-125	$35,000
126-135	$37,500
136-145	$40,000
146-155	$42,500
156-165	$45,000
166-175	$47,500
176-185	$50,000
186-195	$52,500
196-205	$55,000
205+	$57,500

* Ranges expressed in average annual megawatts.

Average annual megawatts are calculated as follows: [(average annual generation) / (installed capacity * 8760 hours)] * installed capacity. Average annual generation shall be calculated based on a ten-year average. For capacity added after 1998, average annual generation shall be calculated based on a three-year average, or the anticipated average annual generation if operational less than 3 years. Documentation of average annual generation must accompany the fee.

The fee level for a consolidated application shall include a base charge for the total average annual megawatts included in the consolidated application based on the fee

schedule above, plus a $2,000 fee for each dam included within the application. (A consolidated application may be submitted by an Applicant that owns or operates multiple facilities in a watershed that are operationally or hydrologically connected.)

These fees are for the first year of Institute operations. The level of fee for application for re-certification will be developed by the Governing Board and will differ from the fee for initial application. The Governing Board will periodically review the level of both the Application Fee and Re-Certification Application Fee.