NEW HAMPSHIRE RIVER PROTECTION AND ENERGY DEVELOPMENT PROJECT

FINAL REPORT

Prepared by the

NERC

New England Rivers Center

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NEW HAMPSHIRE RIVER PROTECTION AND ENERGY DEVELOPMENT PROJECT

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FINAL REPORT

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EXECUTIVE SUMMARY

Since 1977, interest in the development and redevelopment of existing and new dam sites for hydroelectricity on New Hampshire's rivers has increased substantially. This renewed interest in hydroelectric development was precipitated by state and federal laws which encouraged the utilization of renewable resources to reduce dependence on foreign oil and to decentralize energy sources.

Both state and federal law presently attract private entrepreneurs into hydro development by guaranteeing a market for their power at a price that would make development economically viable.

The State of New Hampshire has consistently adopted legislation to encourage and streamline hydropower development. Since 1978, state legislation has enabled hydropower developers to sell power to retail energy consumers, authorized the Water Resources Board to be in the hydropower business and lease state-owned dams, eliminated the municipal debt ceiling with regard to hydro bonds, reduced property taxes on hydro, and established a municipal bond bank for hydro and authorized hydro projects to be financed by industrial development bonds.

Federal law has enabled qualifying facilities to wholesale their power at a utility's avoided cost, allowed interconnection with utilities, relieved qualifying facilities from state public utilities' regulation, allowed special tax benefits for private hydropower development and greatly streamlined the federal licensing and exemption procedure.

The above incentives have spurred development proposals on over eighty sites on New Hampshire's rivers. It appears that smaller, yet less economical, hydro sites may be developed with minimal environmental impact. However, larger, yet sometimes more economical, hydro sites may have adverse impacts on federal anadromous fish restoration programs, recreational boating, wildlife habitat and other river values.

Hydro developers are concerned about the existing procedures for resolving conflicts among competing water users affected by proposed hydroelectric projects. They believe that existing federal project licensing procedures are at times abused by project opponents who manipulate the licensing requirements and judicial appeals to delay projects until they are abandoned for want of patience and financial resources. Indeed, they contend that some otherwise beneficial projects may never even be started given the threat of project delay based on environmental opposition. Whether projects are abandoned after their commencement or never started at all, the result is that some projects are eliminated from consideration without their relative merits and demerits being comprehensively weighed. Hydro developers believe that in conflict-laden hydro projects the public interest in any particular project transcends the particular interest of project supporters and detractors, and that serving the public interest may require compromise by all parties [illegible]

Running parallel to the state policies which encourage hydro development are other state policies which are intended to protect river resources. In 1971, a joint resolution of the New Hampshire legislature stated in part:

> "Certain rivers possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural or similar values ... it is the policy of the state that these rivers are to be preserved in free-flowing condition ... and protected for the benefit and enjoyment of present and future generations."
>
> Chapter 470, Laws of 1971

In 1977 the State Planning Office conducted a study of New Hampshire's rivers which identified significant free flowing and undeveloped rivers. With respect to hydro development the Board of Directors of the New Hampshire Fish and Game Department has adopted a resolution in opposition to the construction of any new dams and has opposed specific hydro proposals.

For their part, private river conservation interests are concerned that hydro development will, in some instances, have a negative impact on valuable natural and recreational resources. With approximately 3000 dams in place in the state and additional projects proposed, these interests suggest that free flowing water is an ever receding resource which becomes more significant as the supply diminishes. They contend that while the supply of free flowing water is decreasing, the popularity of recreational boating and fishing is increasing. A recent University of New Hampshire study indicates that well over one half of New Hampshire's 200,000 fishermen prefer to fish for cold water species associated with rivers. These interests believe that the increased significance of rivers to the people of the state is largely attributable to high federal and state investment in water pollution control and anadromous fish restoration. They contend that hydro development may jeopardize the 15 year old anadromous fish restoration program and may in some instances diminish the value of improvements made through pollution control expenditures.

Responsible river conservation interests recognize the need for a balanced approach to hydro development which acknowledges and evaluates all public values which might be positively or negatively affected by development. They also recognize the need for evaluations to be made from a statewide and long term perspective.

It is apparent that river conservation interests have been forced to respond to the substantial increase in hydro development proposals without having an adequate data base upon which to evaluate the relative importance of specific river stretches which might be affected. Concurrently, some hydro developers have proceeded without knowing if or to what extent specific hydro proposals would be vigorously contested on environmental grounds. Too often the result has been costly and needlessly time consuming for all parties involved.

In December, 1981, the New England Rivers Center undertook a New Hampshire River Protection and Energy Development Project which sought to bring together divergent interests and analyze this problem in a comprehensive and rational fashion. In order to insure that all points of view were represented, an Advisory Committee was created with representation from environmental groups, hydro developers, and state agencies. This Committee met regularly throughout the project to provide direction and to assess the questions raised in each of the study's phases. The Committee has reviewed and has agreed to the contents of the report.

The underlying rationale for the project was that a comprehensive and objective statewide hydropower and river resource inventory could serve as the framework within which decisions might be made which will both encourage hydro development and reduce the loss of important resources.

The project's goal was therefore to develop a data base of relevant information, to identify potential conflicts between hydropower development and other resource values on New Hampshire's rivers, and to suggest methods for reducing those conflicts.

Specific products generated by this project included (1) a list of potential hydropower sites which are economically feasible and/or under consideration for development, (2) a list of river segments which have significance as natural resources, and (3) an assessment of the extent of perceived conflict between development and natural resources.

The major findings of the project are as follows:

1. New Hampshire's rivers are capable of providing a broad range of significant recreational, cultural and economic benefits to the people of the state. These benefits include energy generation, flow regulation and water storage, boating, fishing public water supplies, scenic and cultural enrichment, and riparian wildlife habitat. Within the state there are strong proponents for each of these river related benefits. There also appears to be a widespread recognition that a balanced perspective for the use of the state's river resources is both possible and desirable.

Such a balanced approach must recognize both the potential benefits of the individual hydro proposal and the natural and recreational significance of the affected river segment. Beyond the economic benefits to individual developers, there are a number of public benefits to hydropower development. The include energy production, displacement of foreign oil, employment benefits, increased public revenue, public safety, and in many cases environmental and recreational enrichment. The natural and recreational benefits derived from rivers, while more difficult to determine, are significant nonetheless. Tourism is the state's second largest industry and, with large numbers of licensed fishermen and organized boating groups, the state must recognize the importance of those rivers utilized by these recreation interests.

2. This study has identified 88 sites located on 35 rivers which appear to be economically feasible for development or in which there is presently a demonstrated interest in development. (See Appendix A.) If fully developed, these 88 sites could add approximately 130 MW of installed capacity to the state's existing hydropower output.

3. Eighty-seven New Hampshire rivers and river segments have been identified which have significant natural, recreational, or cultural values. (Appendix F) A comparative analysis conducted from a statewide perspective has identified 24 river segments which, due to their cumulative environmental value, were judged to be the state's outstanding river resources. (Appendix G)

4. An assessment of potential conflict between environmental values and hydro development proposals yielded the following results:

Statewide Conflict Summary

	Potential Development Sites *	Generating Capacity (MW)	Percent of Total Potential New Generation
A. Feasible sites statewide	88	133.3	100
B. Sites not on outstanding river segments	59	47.5	36
C. Sites on outstanding river segments	29	85.8	64
(1) High conflict, resolution difficult	6	48.7	37
(2) High conflict, resolution possible	6	5.8	4
(3) Conflict, resolution probable	5	12.1	9
(4) No conflict, conflict resolved	12	19.2	14
D. Total Low Conflict Sites (B, C-3, C-4)	76	78.8	59

* Hart Island is not included in this summary. As the development of either the Hart Island or the Chase Island project would likely preclude the development of the other, this summary includes only one of these similarly sized projects.

Low conflict projects typically utilize intact existing dams and do not greatly alter existing flow patterns. Generally, higher conflict projects utilize undeveloped sites or sites where major alteration is proposed.

This study concludes that twelve of the eighty-eight more economical hydro sites statewide, which comprise forty-one percent of New Hampshire's hydroelectric generating capacity, are high conflict sites facing likely environmental opposition.

The remaining seventy-six hydropower sites are low conflict sites and may be developed with little or no environmental impact. The aggregate generating capacity of these sites makes up fifty-nine percent of the total generating capacity of all sites.

5. The Advisory Committee has considered and discussed a number of policy recommendations based on these findings. It has also identified state policies which encourage hydro development and policies which protect river resources. The Committee agrees that the state's regulatory process should reconcile these interests at the earliest possible time. The Committee recommends the following actions to achieve this goal:

A. The State of New Hampshire should develop a consistent, coherent policy for the long range use of its river resources which will provide direction to all state agencies and will minimize interagency conflicts.

B. The state regulatory process should encourage earlier identification of environmental issues.

C. The state regulatory process should be modified to provide a non-adversarial forum for the developer, agencies, and river conservation interests to meet and present their positions.

D. The State of New Hampshire should review, update, and publish the data base generated in the present study on a periodic basis.

HYDROPOWER POTENTIAL ASSESSMENT

A. HYDROPOWER ASSESSMENT: INTRODUCTION

A major premise of the study was that detailed information regarding hydro development in New Hampshire will be required if informed future decisions are to be made. To this end it was determined that the study should develop the following information: (1) a comprehensive but realistic list of potential hydropower sites which are considered to be viable due to economic feasibility and/or recognized development interest, and (2) an identification of public benefits associated with hydropower development.

While the study did identify minimum criteria which proposed projects must meet to be identified as economically viable and located projects meeting these criteria, it did not attempt a relative site-by-site ranking of these projects. Such an assessment would have required the comparison of projects being considered by diverse development interests with a wide range of unique economic requirements; a project identified as economically attractive by one developer would not necessarily be as attractive to another.

Likewise, relative public benefits were not assessed on a site-by-site basis. Rather, general public benefits were identified and enumerated with the recommendation that these be assessed on individual sites and be included as a formal component of the review and licensing process.

B. HYDROPOWER ASSESSMENT: METHODOLOGY

A four-step process was used to meet the above stated objectives.

Step 1: Preliminary Identification of Potential Hydropower Sites

It was determined that the following three sources could, in combination, yield the most up-to-date and accurate information.

1) Federal Energy Regulatory Commission Applications

All New Hampshire project proposals filed with the FERC were identified through a review of FERC published project updates. A list was developed which identified 95 projects in various phases of the FERC approval process.

2) New Hampshire Water Resource Board Existing Dam List As Evaluated by the Public Service Company of New Hampshire

The NHWRB has identified 560 existing dam sites without generation within the state which have generation potential greater than 50 KW. Using this list of existing dams and a list of undeveloped sites the PSNH identified those projects that were determined to be capable of generating electricity for less than 10¢ KWH levelized and those projects capable of generating electricity at between 10¢ and 13¢ KWH levelized. This determination was made using a computer model which incorporated the following information:

a. cost of project including civil and equipment costs
b. hydraulic head
c. water flow
d. financing costs
e. estimated installed capacity
f. regulatory process variables

In all cases site characteristics and environmental concerns were assessed. The most rational design and operating mode given these considerations was utilized in making cost and power estimates. The present study utilized a list which included all sites which were identified as meeting either the 10¢ or the 13¢ standard. The relative ranking of sites as a result of the PSNH evaluation is given in the last column of the figure in Appendix A.

3. New England River Basins Commission Hydropower Expansion Study

Using a specific set of hydrologic, engineering and economic assumptions, the NERBC generated a list of projects which met predetermined economic viability standards. The present study utilized a list which included sites meeting NERBC criteria given a 70% plant factor and 15% interest rate.

Step 2: Development of a Comprehensive List of Hydropower Sites

The lists generated from the above three sources were synthesized into one comprehensive list. All sites which met the criteria for inclusion in any one of these three lists were included in this master list.

Step 3: Review and Development of a Finalized Comprehensive List

The list was reviewed by the Advisory Committee for accuracy and a revised final list was developed.

Step 4: Identification of Public Benefits

To obtain a list of public benefits a review of the literature was undertaken and knowledgeable hydropower and resource experts were consulted. The preliminary list was reviewed by the Advisory Committee and a final list was produced.

C. HYDROPOWER ASSESSMENT: FINDINGS

1. Listings of Hydropower Sites

The final list of potential hydropower sites is shown in Appendix A. As a rule capacity and annual energy output figures were those identified in FERC permit applications. When not available the NHWRB figures were used. In all cases the capacity and output data from all three information sources were compared to identify discrepancies. Summary findings follow:

Federal Energy Regulatory Commission

Pending permit applications	41
Preliminary permit in effect	21
Applications for license	22
Applications for exemption	11

New England River Basins Commission

Economically feasible existing sites	93
Economically feasible undeveloped sites	4

New Hampshire Water Resource Board/Public Service Company of N.H.

Existing dams with high economic potential (less than 10¢)	43
Other existing dams with economic potential (less than 13¢)	41

FERC/NERBC/PSNH Synthesis

Rivers with hydropower interest	35
Sites identified by above three sources	95-100
Sites included in study list (deletes those sites already on line and competing FERC applications)	89
Total new generating capacity	133.3 MW

2. Benefits of Hydropower Development

The study identified the following potential public benefits of hydropower. The exact benefits must of course be determined on a case-by-case basis.

a. Energy Independence

The ability of a hydro site to provide energy and displace oil is a tangible and easily quantified public benefit which serves to improve national security, national economic welfare, and the economic welfare of the region where the site is located.

b. Benefits to the Electric Utility

Some sites offer considerable advantages to the local utility company by providing peak load or otherwise firm capacity (i.e. storage sites) and by displacing or deferring the need for additional transmission lines, substations, and/or generating stations (i.e. hydro sites in remote or high growth areas). These advantages can carry real, measurable benefits for the rate payer.

c. Economic Benefits

Hydroelectric projects have positive local and regional employment impact in both the short and the long term. Employment for skilled and unskilled workers during construction is an obvious benefit. Not so obvious are the long term and short term multiplier effects of this employment for the local economy. In the short term, construction workers will spend their paychecks locally and thereby improve local business. In the long term, project operation and maintenance will likely be locally contracted and profits will likely be reinvested locally or regionally. Likewise, long term economic benefits to residential, commercial, and industrial electric customers will result from hydropower development, thus increasing disposable income of individuals and retained earnings of business consumers.

d. Public Revenue Benefits

State and local governments receive increased revenues in the form of income and property taxes (or, as is the case in New Hampshire, payments in lieu of taxes) and in the form of royalties on state or municipally owned dams. Additionally, dam maintenance expenses at state and municipally owned dams, including repairs, insurance, and site security, will be taken on by the developer, thereby saving money for the taxpayer.

e. Public Safety

Public safety is often improved at existing dams by dam repairs required prior to hydroelectric development. If a dam's structural condition is poor and if it is located in a high hazard location, the benefits of hydroelectric development are obvious and substantial. This information can be obtained, on a site-by-site basis, for a large list of dam sites which have been subject to safety inspections performed over the past five years by the U.S. Army Corps of Engineers. Insurance coverage on a dam site will likely increase when hydroelectric development occurs. As a condition imposed by projects' creditors, on-site liability, downstream liability, and dam replacement will all be more adequately covered than was the case prior to development. Likewise, owners of most existing dams have not prepared plans for informing the public of emergency situations or for tending to dangerous circumstances as they arise. The establishment of Emergency Action Plans as a condition for a FERC license is thus another factor which will enhance public safety.

f. Flood Control

Downstream water users may benefit by the controlled flows which often result from a hydro project. Such improved flow control can enhance flood control and lessen downstream washout.

g. Environmental Benefits

Benefits to the environment as a result of hydropower development may include the following:

(1) Fish and Wildlife

A project which decreases the likelihood of dangerously low summer flows may be of benefit to downstream fish, especially salmonids. Impoundments in suitable terrain may also provide additional marsh related wildlife habitat or lake fishing opportunities. Likewise, it is often the case that areas immediately downstream from dams provide high quality fishing opportunities. In addition, anadromous fishery restoration efforts will benefit from the development of hydropower facilities at existing dams when, as a condition for license, the development proposal provides for fish passage which might otherwise remain unprovided.

(2) Boating

Dams often extend the boating season and add to the reliability of flow. Opportunities may also be increased for lake boating (sailing, etc.). Where hydroelectric development results in otherwise unprovided canoe portages, warning signs, and other recreational facilities (as part of the comprehensive, multi-use development required by the Federal Power Act), this should be acknowledged as a benefit.

(3) Miscellaneous Recreation

Impoundments often provide opportunities for water related park development and can provide opportunities for swimming, passive recreation, lake fishing, and boating.

(4) Community Improvement

A development which reconstructs dilapidated facilities or which can be integrated into more comprehensive community development will provide benefits to the public. This especially would be the case in urban areas where hydro rehabilitation may act as a catalyst for broader community revitalization. The restoration of urban breached dams additionally improves recreational use potential and enhance the property values for property owners on the impoundment (particularly where a lake level management plan is formulated).

(5) Waste Assimilation

Seasonally balanced flows as a result of hydro development can assist in the flushing of pollutants which might not be transported in low flow periods.

RESOURCE ASSESSMENT

A. RESOURCE ASSESSMENT: INTRODUCTION

A major premise of the study was that there exists a need for a comprehensive river resource evaluation which, in combination with statewide hydropower information, could assist in the identification of potential conflict situations and provide the framework for the design of comprehensive resource utilization strategies. The results of such a resource evaluation could prove informative to developers assessing potential project opposition and mitigation costs. It could also be of value to regulatory agencies in the review of project applications and to environmental interest groups in the setting of conservation priorities.

It was determined that an assessment model would be developed which (1) identifies unique and highly significant resources, (2) rates all significant rivers and streams according to overall resource value as revealed by demonstrated public use and public preference as well as expert opinion and independent assessment, and (3) addresses the needs of a broad range of New Hampshire citizen interests. Following this general model, an assessment procedure was developed that identified and documented the state's most significant river resources in terms of composite natural and recreational value.

B. RESOURCE ASSESSMENT: METHODOLOGY

The resource assessment process incorporated (1) existing published research information, (2) information supplied by professional resource experts, and (3) input by resource users and the interested public. A review of all results was incorporated into the process. The process included the following five steps:

Step 1: Identification of River Value Categories and Evaluation Criteria

In order to represent a wide range of river resource value interests, the study identified a varied list of river related resource values. The following twelve categories were selected for evaluation:

White Water Boating
Flat Water Boating
Canoe Camping
Anadromous Fish
Inland Fish
Undeveloped Character
Scenic
Critical Ecologic
Wildlife
Geologic/Natural Features
Water Supply and Quality
Historical/Cultural

For each of these resource value categories criteria were identified which could be used to assess significance. (Appendix D)

Step 2: Identification of Rivers for Evaluation

A master list of New Hampshire rivers was developed using the 1977 New Hampshire Rivers Study as a base. The largest rivers were divided into smaller segments and a list of 88 rivers and river segments resulted. The master list of rivers and a map which locates these rivers can be found in Appendices B and C.

Step 3: Identification and Evaluation of Rivers by River Category

Using the criteria established in Step 1, rivers were evaluated according to their relative resource values as described in Appendix D. The terms "highest significance," "high significance," and "significance" were used to designate the relative importance of each river in a given resource value category. In all cases, preliminary evaluations were reviewed by resource experts and user groups before being finalized. Appendix E lists those rivers found to be significant in each category.

An example of a resource evaluation form used to assess inland fishery resources may be found at the end of Appendix D.

Step 4: River Category Synthesis

A matrix was then constructed which correlated river segments with resource values. The result was a chart which depicted the cumulative resource values for each of the 88 river segments under evaluation. (Appendix F)

Step 5: Comparative River Evaluation

Initially, a "quantitative" assessment was completed which simply totaled the number of categories in which a river had met the minimum criteria. In addition, a more definitive "qualitative" assessment was completed which assessed the composite value of a river given its various ratings (i.e. highest, high, and significant) in each category. For each category in which a river was recognized, it was given a value of 4 for highest significance, 2 for high significance, or 1 for significance. For each river these point values were totaled. Rivers were then ranked according to overall qualitative value.

Based on these ratings the Advisory Committee approved a final list of the state's most significant natural and recreational resource rivers.

C. RESOURCE ASSESSMENT: FINDINGS

As described in the methodology section, the evaluation phase of the resource assessment combined findings in an effort to obtain a listing of each river's composite natural and

recreational values. The results of this process are summarized in Appendix F. As shown in the last two columns of that figure, qualitative and quantitative values were tabulated. From this information 24 river segments on 16 rivers were identified as possessing the state's highest natural and recreational resource values.

These rivers are as follows:

Ammonoosuc River
Androscoggin River (Errol to Pontook)
Androscoggin River (Pontook to Berlin)
Baker River
Blackwater River
Connecticut River (Headwaters to Halls's Stream)
Connecticut River (Hall's Stream to Gilmore Dam)
Connecticut River (Ryegate Dam to Wilder Dam)
Connecticut River (Wilder Dam to Bellows Falls)
Connecticut River (Bellows Falls to Mass. line)
Contoocook River
Dead Diamond River
Lamprey River
Magalloway River
Merrimack River (Franklin to Manchester)
Merrimack River (Manchester to Mass. line)
Pemigewassett River
Pemigewassett River, East Branch
Pine River
Saco River
Souhegan River
Swift Diamond River
Swift River (Saco Basin)
Wild Ammonoosuc River

A complete listing of significant New Hampshire rivers ranked by composite river resource value may be found in Appendix G. The findings of the evaluation of individual resource categories may be found in Appendix E.

IDENTIFICATION OF POTENTIAL CONFLICT

A. CONFLICT ANALYSIS: INTRODUCTION

The objectives of the conflict analysis component of the study were (1) to identify potential conflicts between hydropower development and natural or recreational river values, and (2) to assess the severity of these potential conflicts. Recognizing that an indepth assessment of each development proposal will be required before the actual extent of impact can correctly be ascertained, the present analysis has not attempted to determine the actual impact of a proposed project on any resource value. Rather, it has identified "perceived conflict" which could cause environmental issues to be raised during the licensing process.

B. CONFLICT ANALYSIS: METHODOLOGY

The analysis of potential conflict consisted of four steps.

Step 1: All potential hydropower sites located on high resource value rivers were identified and mapped.

Step 2: Using an evaluation form developed for the purpose, specific information regarding each of those sites was gathered. An emphasis was placed on engineering details, site characteristics, and resource values.

Step 3: Using this evaluation procedure, and in consultation with resource experts, a general assessment of potential impacts was completed. All sites were given an initial rating according to the extent of the potential conflict.

Step 4: The Advisory Committee then reviewed each project in detail and placed each in one of four "perceived conflict" categories. The four categories were:

(1) High conflict, resolution difficult

This category includes those projects in which the highest amount of controversy is anticipated. Projects are characterized by a high degree of interest group concern and resolve regarding one or more significant environmental values associated with the site and by a corresponding determination by the developers that the economic viability of the proposed project would be seriously threatened by project alterations that would be acceptable to resource interests. Intervention status will likely be sought by a number of interest groups when these projects enter the FERC permit process.

(2) High conflict, resolution possible

Projects in this category are characterized by a recognition that they could have potential impacts on environmental values. However, mitigation measures and/or projects design compromises could likely resolve conflict while maintaining the economic viability of the project.

(3) Conflict, resolution probable

While conflict between environmental values and the development proposals is present at sites in this category, the conflict is minimal and/or minor adjustments in project design could alleviate conflict.

(4) No conflict, conflict resolved

Due to location and/or project design, projects in this category will likely not affect identified resource values. Also included in this category are projects where preliminary agreements have been reached which are acceptable to all concerns.

CONFLICT ANALYSIS: FINDINGS

Appendix H lists sites on high resource value rivers, pinpoints the likely conflict issues, and rates the relative extent of perceived conflict between environmental values and development proposals. The following table summarizes these findings and identifies the generating capacity associated with each conflict category.

Statewide Conflict Summary

	Potential Development Sites *	Generating Capacity (MW)	Percent of Total Potential New Generation
A. Feasible sites statewide	88	133.3	100
B. Sites not on outstanding river segments	59	47.5	36
C. Sites on outstanding river segments	29	85.8	64
(1) High conflict, resolution difficult	6	48.7	37
(2) High conflict, resolution possible	6	5.8	4
(3) Conflict, resolution probable	5	12.1	9
(4) No conflict, conflict resolved	12	19.2	14
D. Total Low Conflict Sites (B, C-3, C-4)	76	78.8	59

* Hart Island is not included in this summary. As the development of either the Hart Island or the Chase Island project would likely preclude the development of the other, this summary includes only one of these similarly sized projects.

Rivers identified as highest resource value rivers that have little hydro development interest or potential include:

Baker River
Dead Diamond River
Magalloway River
Pine River
Saco River
Swift Diamond River
Swift River
Wild Ammonoosuc River

Rivers not on the highest resource value list with significant hydro development interest and potential include:

Ashuelot River (4 sites, 6.8 MW capacity)
Piscataquog River (4 sites, 5.9 MW capacity)
Salmon Falls River (9 sites, 8.6 MW capacity)
Winnipesaukee River (8 sites, 9.9 MW capacity)

High conflict projects typically are located at undeveloped or breached sites or involve major alteration of existing dams. They are also typically store-and-release facilities located on larger volume rivers. The conflict often focuses on fish and wildlife concerns, with anadromous fishery concerns predominating in many instances. Recreational boating conflicts, while more restricted than fish and wildlife conflicts (6 identified potential conflicts as opposed to 16 identified potential fish and wildlife conflicts) are nonetheless a major focus of conflict on those sites where this activity occurs. Ironically, high conflict sites are also typically major potential power producers. The twelve sites that were identified as likely to produce high conflict are, in combination, capable of generating 41% of the state's new hydroelectric capacity. Six of these twelve sites (with 37% of the total new capacity) were identified as being the most problematic.

In contrast to high conflict sites, the low conflict projects located on high resource value rivers are all located at existing dams. In most instances major structural or operational alterations are not proposed and many will be operated in a mode approximating run of the river. While the 59 potential sites not located on highest resource value rivers were not evaluated in detail, a review of these sites suggests that there are controversies associated with only a limited number of these sites (e.g. Warner and Cocheco River projects) and that these controversies are resolvable to the point that none should be rated "high conflict."

The generating capacity of individual low conflict projects is often less than that of individual high conflict projects, though the cumulative energy contribution of these sites is substantial.

Conflict assessment results suggest that the great majority of the proposed hydropower projects in New Hampshire (76 out of a possible 88) can be developed with minimal controversy and low environmental impact. Given that acceptable compromises can be reached, an additional six projects can be added to this list. Thus, the state of New Hampshire has the potential for generating an additional 79 to 85 megawatts of hydropower from sites where controversy can be minimized. This represents 59 to 63 percent of the state's realistic potential for new hydropower.

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APPENDICES

APPENDIX A

NEW HAMPSHIRE RIVER PROTECTION AND ENERGY DEVELOPMENT PROJECT

SUMMARY OF POTENTIAL HYDROPOWER SITE INFORMATION

FERC STATUS KEY
* = competing FERC application
1 = preliminary permit application
2 = preliminary permit in effect
3 = license application
4 = exemption application
5 = granted

ECONOMIC RATING KEY
1 = Power produced at under 10¢ KWH
2 = Power produced at under 13¢ KWH
3 = Power produced at over 13¢ KWH

RIVER	PROJECT	TOWN	FERC #	FERC STATUS	NHWRB #	NERBC #	CAPACITY (KW)	ANNUAL OUTPUT (MWH)	ECON. RATING
Ammonoosuc	Woodsville	Woodsville	4374	5	112.03	NH1826	550		-
Ammonoosuc	Bethlehem Dam	Bethlehem	4719	1	25.01	NH445	550		3
Ammonoosuc	Lisbon	Lisbon	3464	1	138.01	NH2276	850	4493	1
Ammonoosuc	Ammonoosuc River Dam	Grafton Co.	4609	4	17.02	NH00314	300	2500	1
Androscoggin	Pontook	Dummer	2861	5	69.01	NH61202	8500	15000	1
Androscoggin	Errol Dam	Errol	3133	2	80.01	NH1351	2500	16811	1
Ashuelot	Surry Mtn. Lake Dam	Surry	3302	1	230.05	NH73912	1480	3369	-
Ashuelot	Nash Mill Dam	Marlow	3309	5	152.05	NH62645	250		-
Ashuelot	Ashuelot Paper Co. Dam	Winchester	3284	2	299.01	NH4405	3100		-
Ashuelot	Robertson Hydro	Winchester	4211	1	299.02/.03	NH4406/07	2000		1
Blackwater	Blackwater Dam	Webster	6100	2	248.06	NH74276	3249		1
Branch	Branch River Mill	Wakefield	3615	5	241.01	NH64079	30		-
Cocheco	Waldron Dam	Strafford	5747	1	67.02	NH1149	120	1095	2
Cocheco	Cocheco Falls	Strafford	4718	3	67.04	NH61151	700	4853	1
Cocheco	Gonic Saw Mill Dam	Strafford	4567	1	204.01	NH3515	300	1515	2
Connecticut	Chase Island	Sullivan	5708	1	N/A	NH90986	18300	109128	3
Connecticut	Hart Island	Corn Plain	2855	2	N/A	NH90985	15000	124600	3
Connecticut	Murphy Dam	Pittsburg	3006*	2	194.12	NH3312	2000	12917	1
Connecticut	Dodge Falls	Grafton	3117	5	17.01	NH313	5000	22800	1
Contoocook	Hopkinton Power	Hopkinton	5735	1	121.02	NH1957	740	2949	-
Contoocook	Hopkinton, Everett & Sprague Dams	W. Hopkinton	3426	2	121.19	NH71974	1015		1
Contoocook	Hoague - Sprague	W. Hopkinton	4337	5	121.01	NH61956	1000	7000	-
Contoocook	Noone Mills	Peterborough	3616*	4	191.02	NH3236	280	1000	3
Contoocook	Hillsborough	Hillsborough	6116	5	116.01	NH1872	1000	4000	1

NEW HAMPSHIRE RIVER PROTECTION AND ENERGY DEVELOPMENT PROJECT

DIX A

SUMMARY OF POTENTIAL HYDROPOWER SITE INFORMATION

STATUS KEY
competing FERC application
preliminary permit application
preliminary permit in effect
3 = license application
4 = exemption application
5 = granted

ECONOMIC RATING KEY
1 = Power produced at under 10¢ KWH
2 = Power produced at under 13¢ KWH
3 = Power produced at over 13¢ KWH

RIVER	PROJECT	TOWN	FERC #	FERC STATUS	NHWRB #	NERBC #	CAPACITY (KW)	ANNUAL OUTPUT (MWH)	ECON. RATING
C ocook	Penacook Upper Falls	Penacook	3342*	2	51.06	NH60898	2200		-
C ocook	Penacook Lower Falls	Penacook	3342	5	51.08/ 26.07	NH20900/ 60473	2800		-
C cook	Contoocook River Park	Concord	3248	1	51.02	NH894	1300	9884	-
Con ocook	Rolfe Canal	Concord	3240	3	51.04	NH896	1400	12300	-
Con ocook	Penacook	Penacook	3299	2	91.05	NH20897	1530	6530	-
I glass	Isinglass River	Barrington	?	?	15.07	NH20272	266	1598	3
I el	Israel River	Lancaster			131.04		160	1257	2
L y	Macallen Dam	New Market	6602	1	177.01	NH3020	750	3500	1
L y	Wiswall	Durham		1	71.04	NH1237	640	3135	1
La y	Wadleigh Falls	Lee		3	135.02	NH22221	160	680	3
M	Campton Dam	Campton	3253	5	35.01	NH599	250	1826	2
Na oma	Mascoma Lake	Grafton	5050	2	134.01	NH2195	160	1400	2
M mack	Sewalls Falls	Concord	2965*	1	51.01	NH893	5000	24600	1
N mack	Moores Falls	Litchfield	N/A		N/A	NH92706	14800	104720	3
M meeting	Merrymeeting	Alton	5285	1	6.02	NH00088	57		-
N	Mine Falls	Nashua	3442	2	165.01	NH2827	1360	8043	1
N	Jackson Mills	Nashua	3229	3	165.02	NH2828	1300	5949	1
N ound	Newfound	Bristol	3107	3	31.09	NH60556	1487		1
N Brook	Noname Brook	Conway	N/A		52.07	NH20943	605	3704	-
N Branch	Steeles Pond	Antrim	3087*	5	9.02	NH60156	710	3830	-
N sit	Peterborough Hydro	Peterborough	5114	1	191.15	NH3230	700		3
N mit	River Street	Hillsborough	4253	3	191.07/ 191.08	NH63241 63242	100		3
O e	Central Maine Power	Effingham			75.01	NH1281	730	4252	1
Ot Brook	U.S. Army Corps of Engineers Flood Control	Keene			126.10	NH72075	700	2951	1

NEW HAMPSHIRE RIVER PROTECTION AND ENERGY DEVELOPMENT PROJECT

APPENDIX A

SUMMARY OF POTENTIAL HYDROPOWER SITE INFORMATION

FERC STATUS KEY

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2 = preliminary permit in effect
3 = license application
4 = exemption application
5 = granted

ECONOMIC RATING KEY

1 = Power produced at under 10¢ KWH
2 = Power produced at under 13¢ KWH
3 = Power produced at over 13¢ KWH

RIVER	PROJECT	TOWN	FERC #	FERC STATUS	NHWRB #	NERBC #	CAPACITY (KW)	ANNUAL OUTPUT (MWH)	ECON. RATING
Pemigewassett	Livermore Falls	Campton	3572	3	35.05	NH20603	1400	11116	1
Pemigewassett	Franklin Falls	Franklin	3301	2	87.22	NH71474	5000	4500	1
Pemigewassett,E.Br.	Lincoln Hydro	Lincoln	4647	1	137.01	NH22257	750	3225	1
Piscataquog	Weare Reservoir	Weare	5667	3	247.01	NH04234	100		2
Piscataquog	Greggs Falls	Goffstown	3180	2	93.01	NH1580	4000	6728	1
Piscataquog	Hadley Falls	Goffstown	5379	5	93.02	NH61581	261		2
Piscataquog	Kelly's Falls	Manchester/ Goffstown	3039	3*	150.02	NH2581	1000	1555	2
Saco	Saco River	Conway			52.07	NH20943	290	2249	2
Saco	Saco River	Conway			52.08	NH20944	380	2963	1
Salmon Falls	Somersworth	Somersworth	3820	3	218.02	NH03708	1500	9793	1
Salmon Falls	Boston Felt Hydro	Rochester	4542	1	204.06	NH03920	300		3
Salmon Falls	North Rochester	N. Rochester	3985	4	204.08	NH63522	250		3
Salmon Falls	Rollinsford	Rollinsford	3132/3777	3	205.02	NH63541	1492	8073	1
Salmon Falls	S. Milton	Milton	3984/3222	4	161.02	NH62763	1000		-
Salmon Falls	Milton Leather Board	Milton	5598	3	161.04	NH02765	600		2
Salmon Falls	Spaulding Fiber Dam	Milton	3222/3984	1	161.02	NH62763	1075		-
Salmon Falls	Milton	Milton	3349	1			1075		-
Salmon Falls	Great Falls Lower	Somersworth	4451	3	218.01	NH03707	1289		1
Souhegan	Pennichuck	Merrimack	3561		156.01	NH2681	450	2709	2
Squamscott	Ashland	Ashland	5274	5	10.01	NH60183	80	400	3
Squamscott	Mill Pond	Grafton	5638	4	10.06	NH00188	100		3
Squamscott/Exeter	Exeter River Hydro	Brentwood	4254	4	29.01	NH60524	72	328	3
Sugar	Sugar River	Claremont	2944	2	47.01	NH00796	1425	3419	1
Sugar	Sugar River Hydro	Newport	3320		178.04/.07	NH3040/ 3043	450	843	3

NEW HAMPSHIRE RIVER PROTECTION AND ENERGY DEVELOPMENT PROJECT

NDIX A

SUMMARY OF POTENTIAL HYDROPOWER SITE INFORMATION

C STATUS KEY

competing FERC application
preliminary permit application
= preliminary permit in effect
3 = license application
4 = exemption application
5 = granted

ECONOMIC RATING KEY

1 = Power produced at under 10¢ KWH
2 = Power produced at under 13¢ KWH
3 = Power produced at over 13¢ KWH

RIVER	PROJECT	TOWN	FERC #	FERC STATUS	NHWRB #	NERBC #	CAPACITY (KW)	ANNUAL OUTPUT (MWH)	ECON. RATING
ook	China Dam	Pembroke	3200	1	190.01	NH63216	1500	6320	-
ncook	Suncook Leathers Hydro	Pittsfield	4480	1	195.11	NH63346	450	2091	3
ncook	Webster-Pembroke	Pembroke	3179	3	190.03	NH3218	1861	7086	-
r Ammonoosuc	Red Dam	Northumberland	5691	1	182.04	NH03105	261		-
r Ammonoosuc	Weston	Northumberland	5692	1	182.02	NH03103	500		-
r Ammonoosuc	Brooklyn Dam	Northumberland	5690	1	182.03	NH03104	500		2
r Ammonoosuc	Northumberland	Coos County	5689	1	182.01	NH03102	2500	14286	-
r	Davisville Dam	Warner	4456	1	243.01	NH24150	800		-
t Brook	Wildcat	Jackson	4107	withdrawn	123.04	NH2008	400	2393	-
ipesaukee	Clement Dam	Tilton	2966/3312	3	237.01	NH24016	1200		1
ipesaukee	C.P.Stevens	Franklin	3093/3760	3	87.07/.08	NH1459/1460	1400		-
ipesaukee	Franklin Elec. Light & Power	Franklin	3454	1	87.08	NH1460	800		-
ipesaukee	Franklin Development	Franklin	3118	1	87.07/.08	NH1459/1460	3000		-
ipesaukee	Lochmere	Belmont	2982	4	21.07	NH382	892	3906	1
ipesaukee	Cotton Mills Dam	Tilton	3221	3	237.02	NH4016	400	3260	1
ipesaukee	Lakeport Dam	Laconia	3312	3	130.01	NH2129	998	2595	2
ipesaukee	Franklin Mills	Franklin	3760	4	87.07/.08	NH1459/1460	1250		-

APPENDIX B

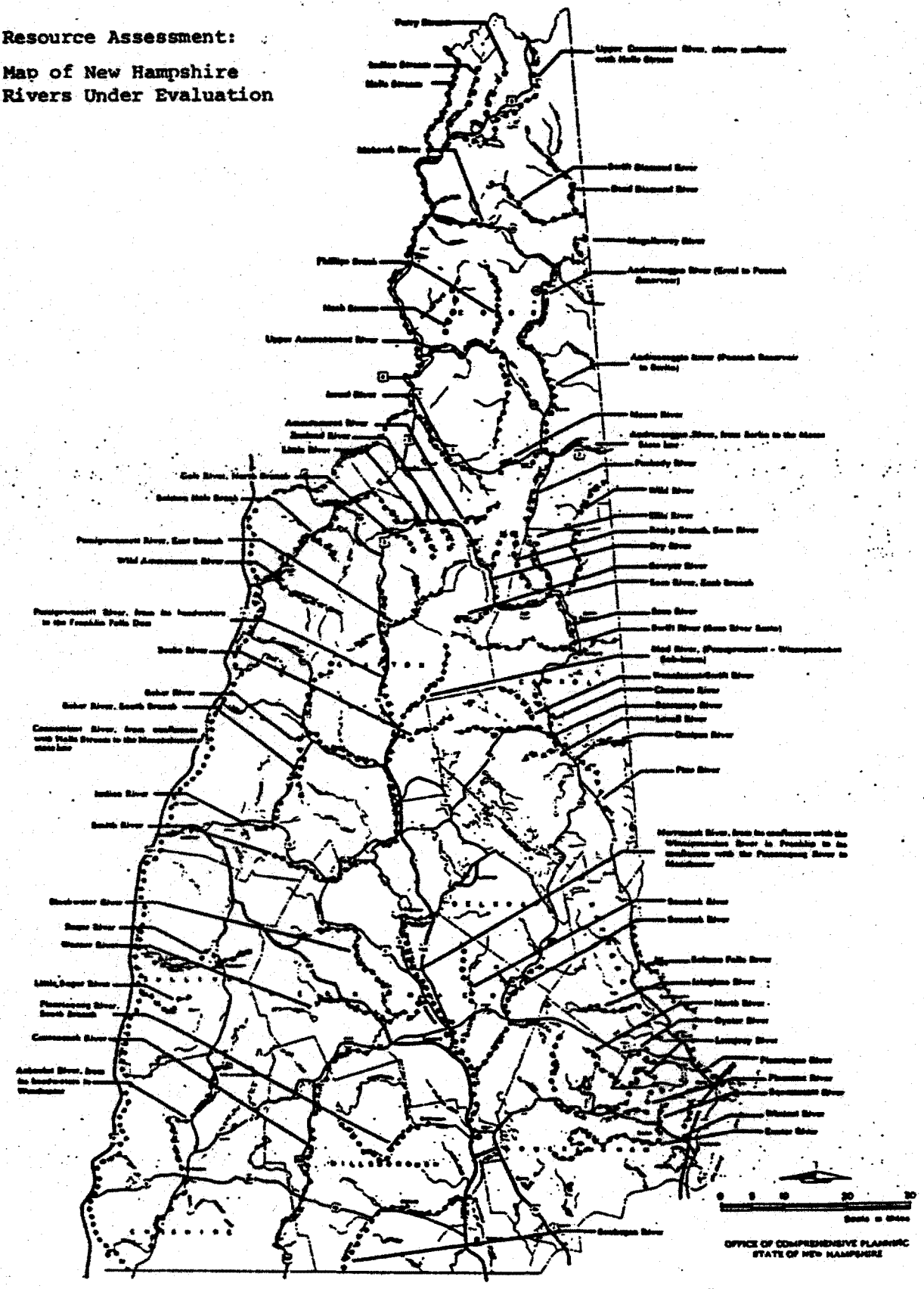
Resource Assessment:
Initial List of New Hampshire Rivers Under Evaluation

1. Ammonoosuc River
2. Androscoggin River (Errol to Pontook Reservoir)
3. Androscoggin River (Pontook Reservoir to Berlin)
4. Androscoggin River (Berlin to Maine state line)
5. Ashuelot River
6. Ashuelot River, South Branch
7. Baker River
8. Baker River, South Branch
9. Bearcamp River
10. Beaver Brook
11. Beebe River
12. Bellamy River
13. Blackwater River
14. Carrol Stream
15. Chocorua River
16. Cocheco River
17. Cockermouth River
18. Cold River
19. Connecticut River (Headwaters to Hall's Stream)
20. Connecticut River (Hall's Stream to Gilman Dam)
21. Connecticut River (Gilman Dam to Ryegate Dam)
22. Connecticut River (Ryegate Dam to Wilder Dam)
23. Connecticut River (Wilder Dam to Bellow's Falls)
24. Connecticut River (Bellow's Falls to Massachusetts state line)
25. Contoocook River
26. Dead Diamond River
27. Dry River
28. Ellis River
29. Exeter/Squamscott River
30. Fowler River
31. Gale River, North Branch
32. Halls Stream
33. Hampton/Taylor River
34. Indian River
35. Indian Stream
36. Isinglass River
37. Israel River
38. Lamprey River
39. Little River
40. Little Sugar River
41. Lovell River
42. Mad River
43. Magalloway River
44. Mascoma River
45. Mohawk River
46. Merrimack River (Franklin to Mancheste
47. Merrimack River (Manchester to Massachusetts state line)
48. Merrymeeting River
49. Moose River
50. Nash Stream
51. Nashua River
52. Newfound River
53. Nissitissit River
54. North River
55. Ossipee River
56. Otter Brook
57. Oyster River
58. Peabody River
59. Pemigewassett River
60. Pemigewassett River, East Branch
61. Perry Stream
62. Phillips Brook
63. Pine River
64. Piscassic River
65. Piscataqua River
66. Piscataquog River
67. Saco River, East Branch
68. Saco River, Main Branch
69. Saco River, Rocky Branch
70. Salmon Falls River
71. Salmon Hole Brook
72. Sawyer River
73. Smith River
74. Soucook River
75. Souhegan River
76. Sugar River
77. Suncook River
78. Swift Diamond River
79. Swift River (Saco Basin)
80. Tioga River
81. Upper Ammonoosuc River
82. Warner River
83. Wild River
84. Winicut River
85. Winnipesaukee River
86. Wonalancet/Swift River
87. Wild Ammonoosuc River
88. Zealand River

APPENDIX C

Resource Assessment:

Map of New Hampshire
Rivers Under Evaluation



APPENDIX D

RESOURCE ASSESSMENT: CATEGORY EVALUATION PROCEDURES

1. Recreational Boating

All three boating categories (white water, flat water, and canoe camping) were evaluated in a like manner. For each, a set of criteria was established, an evaluation form was developed, and an evaluation procedure involving recognized experts was initiated.

General criteria used to evaluate boating values included:

a. WATER QUALITY

The extent to which water quality is compatible with a high quality boating experience.

b. CORRIDOR DEVELOPMENT

The extent to which a river's shoreline is free of development (structures, roads, etc.).

c. AESTHETIC EXPERIENCE

The extent to which a river procides a satisfying boating experience (scenery, solitude, variety, unique features, etc.).

d. LENGTH OF TRIP

The extent to which trip length enhances the boating experience.

e. LENGTH OF SEASON

The extent to which a river provides an extended use season due to sustained flow.

f. PREDICTABILITY OF FLOW

The extent to which seasonal and/or diurnal flow is predictable.

Additional criteria included:

White Water Only

g. FREQUENCY OF RAPIDS

The extent to which a river possesses numerous runnable rapids.

h. QUALITY OF RAPIDS

The extent to which a river provides a quality experience for white water boaters (Class III-IV rapids, suitability for closed boats, suitability for advanced and expert boaters, etc.).

Flat Water Only

g. RECREATIONAL OPPORTUNITIES

The existence of associated recreational opportunities (scenic side trips, hiking, picnicking, fishing, etc.).

h. NAVIGABILITY

The suitability of a river for flat water boating use (lack of obstructions, safety, good flow).

Canoe Camping Only

g. AVAILABILITY OF CAMP SITES

The extent to which camp sites open to the public are available.

h. DESIRABILITY FOR EXTENDED TRIP

The extent to which a river would attract canoe camping use (length, associated recreational opportunities, back country qualities, etc.).

Respondents were also asked to provide the following information on high priority rivers:

a. TYPE OF USE

The predominant type of boating use (individuals or large groups? local, statewide, or New England region? organized events and annual races? etc.).

b. AMOUNT OF USE

The amount of boating use relative to other New Hampshire rivers (highest, high, medium, low).

c. ECONOMIC IMPORTANCE

Evidence of importance to the local tourist industry (commercial outfitters or guides, canoe rentals, retail sales, general tourist attractions, etc.).

Using an evaluation form similar to the sample fishery form (page 32), respondents were asked to rate boating resources according to the above criteria using high, medium, and low designations. They were then asked to rate the rivers in order of overall significance and to identify those rivers which should be recognized as the state's most outstanding boating resources.

Preliminary ratings represented a consensus of opinion among experts. Final ratings were developed after review of preliminary ratings by additional boating interests.

Experts who assisted with this procedure included representatives from the Appalachian Mountain Club, the North Eastern Canoe Racers Association, the Merrimack Valley Paddlers Association

2. Inland Fisheries

Inland fisheries were evaluated and given relative ratings through the use of an evaluation form (see page 32) and the following set of criteria:

a. SPECIES COMPOSITION

The existence of fish species of major importance by virtue of being (1) rare in the region, (2) highly preferred by anglers, or (3) of major ecological importance.

b. WATER QUALITY

The extent to which overall water quality is capable of sustaining preferred fish resources.

c. AQUATIC HABITAT QUALITY

The existence of natural features favorable to fish production and sustenance of preferred fish species (adequate flow, cover, etc.).

d. FISHING QUALITY

An evaluation of recreational fishing results (success rate, size of take, desirability of species taken, etc.).

e. AESTHETIC EXPERIENCE

The ability of a river segment to provide a satisfying recreational fishing experience (scenery, solitude, challenge, variety, etc.).

f. CURRENT USE

The popularity of a river segment as a recreational fishery resource.

g. ECONOMIC IMPORT

The importance of recreational fishing on the river segment to the regional economy (use of local guides, retail sales, etc.).

h. ADDITIONAL CRITERIA

Any further criterion felt to be important should be identified.

The evaluation form also provided space for respondents to provide information regarding the following fishery attributes which a given stream might possess:

- DESIRABLE SPECIES

  A list of the most significant fish species found in the river segment by order of importance.

- FISHING ACCESS

  An identification of the type (auto, foot trail, boat, etc.) and quality (easy, adequate, poor, restricted, etc.) of public access.

- FISH SOURCE

  An identification of predominant source of desirable fish (native or exotic, self-reproducing or stocked).

Respondents were asked to rate New Hampshire rivers for each of the above criteria using high, medium, and low designations. They were then asked to rate these rivers in order of overall significance as fishery resources and to identify those which they consider to be the state's most outstanding.

Those completing the evaluation form and providing review of preliminary results included the New Hampshire Fish and Game Department, New Hampshire Trout Unlimited local chapters, local fishing clubs, and interested citizens. The final listing of important fishery resources represents a consensus of opinion regarding resource significance.

3. Anadromous Fish

To be considered in the anadromous fish category, a river must (1) have an existing anadromous fish population, (2) show evidence of ongoing restoration efforts, or (3) show evidence of a documented restoration plan. Rivers identified as highest priority for Atlantic Salmon and American Shad restoration were given a "highest significance" (4) rating. Other rivers with evidenced anadromous fish runs were given a "high significance" (2) rating. Rivers of potential value as support to salmon and shad restoration efforts were given a "significance" (1) rating. An evaluation procedure similar to the inland fishery procedure validated this ranking concept.

Sources of information included Merrimack and Connecticut River restoration management plans, U.S. Fish and Wildlife anadromous fish maps, and NERBC fishery maps. Review was provided by the New Hampshire Fish and Game Department, the U.S. Fish and Wildlife Service, Trout Unlimited, and Salmon Unlimited.

4. Undeveloped Character

Undeveloped character was assessed using three criteria: (1) the degree of corridor development (minimal development, less than 10% development, and over 10% development), (2) presence of roads (no roads, road access only, road crossings, and parallelling roads), and (3) freedom of flow (free flowing, non-free flowing).

Rivers given the "highest significance" rating met the most restrictive condition of all three criteria and are therefore (1) mostly undeveloped, (2) devoid of road access, and (3) free flowing. The "high significance" category included rivers which are mostly undeveloped and which have only limited access (i.e. road crossings and/or auto access points). All free flowing rivers not identified in the "highest significance" category were also included. Rivers which are mostly undeveloped and which have a parallelling road were placed in the "significance" category.

Information for this category was derived from the original data sheets used in the 1977 New Hampshire Wild, Scenic and Recreation Rivers study.

5. Scenic Values

Scenic ratings were derived from three previous studies which identified scenic values related to New Hampshire rivers. These studies included the NERBC's Water, Watts and Wilds, the National Park Service's National Rivers Inventory and the State of New Hampshire's Wild, Scenic and Recreation Rivers study.

Those rivers identified as being of highest significance as scenic resources must have been given that designation by all three previous studies. Rivers labeled "high significance" were identified by two of these sources. Rivers labeled "significant" were identified by one of these sources.

6. Critical Ecologic

Critical habitat for federally designated endangered wildlife species (bald eagle), state designated wildlife species (loon and osprey) and endangered plants (astralagus robbinsii var. jesupi which is under consideration for designation) was identified. Any river with documented evidence of substantial use by these species was given a "highest significance" rating. Rivers with suspected habitat were given a "high significance" rating.

Information for this category was supplied by the New Hampshire Audubon Society and review was provided by the Audubon Society, the U.S. Fish and Wildlife Service, and the New Hampshire Fish and Game Department.

7. Wildlife

Critical river related habitat for non-endangered species of high value to New Hampshire residents (including deer, moose, furbearers, and waterfowl) was assessed by the New Hampshire Fish and Game Department. Criteria included (1) the extent of habitat, (2) the relative productivity of the habitat, and (3) the relation of the habitat to riverine systems.

Rivers were included in highest significance, high significance, or significance categories according to the determination made by New Hampshire Fish and Game. Results were reviewed by members of New Hampshire Wildlife Federation.

8. Geology/Natural Features

While there exist a number of river related geologic and natural features which are of scientific, educational, and scenic significance (including waterfalls, gorges, white water rapids, and islands), a state-wide survey has yet to be undertaken. However, state and university geologists and existing scientific and tourist publications were consulted. All noteworthy geologic features identified by these sources are included in this report.

Due to the lack of substantive evaluation information, no significance ranking was attempted and all identified geologic features were given the same value for the purposes of this study.

9. Water Supply and Water Quality

All rivers which are utilized as community drinking supplies or which have been given a state "class A" water quality designation were rated "highest significance."

The New Hampshire Water Supply and Pollution Control Commission provided initial information and reviewed preliminary findings.

10. Historic/Cultural

Historic and cultural resources identified included historic covered bridges, river related historic sites and architectural features, and historically significant logging runs. Unfortunately, no assessment of significant river related archeological sites presently exists.

As available information was not standardized, no relative rating of historic/cultural sites was attempted. For the purposes of this study, all sites were given the same rating.

Sources of information included the National Register of Historic Places, the National Park Service's Heritage Conservation division, New Hampshire Historical Markers, assorted state tourist publications, and knowledgeable individuals.

NEW HAMPSHIRE RIVERS EVALUATION FORM Name/Organization:

NEW ENGLAND RIVERS CENTER

NEW HAMPSHIRE RIVERS: FISHERIES -32-

I. RIVER (Name/Segment)	II. EVALUATION CRITERIA H=High M=Medium L=Low								III. ATTRIBUTES			IV. RATING	
	Species Composition	Water Quality	Aquatic Habitat Quality	Fishing Quality	Aesthetic Experience	Current Use	Economic Importance	Additional Criteria	Species	Access	Fish Source	Priority Ranking	Identify Most Outstanding Rivers
CONNECTICUT STRATFORD TO PITTSBURG	H+	H+	H+	H+	H	H+	M	NO KILL AREA	BROWN, BROOK TROUT RAINBOW, L.L. SALMON	ROADSIDE	HOLDOVER, STOCKED	1	✓
ANDROSCOGGIN BERLIN TO ERROL	H+	H+	H+	H+	H+	H+	H+		L.L. SALMON, BROOK, BROWN, RAINBOW	ROADSIDE	"	1	✓
AMMONOOSUC	H	H	H	H	H	H	M		RAINBOW, BROOK, HOLDOVER BROWN	ROADSIDE – GOOD	MOSTLY STOCKED	1	✓
BAKER	H	H	H	M+	H	M	L	SALMON	ATLANTIC SALMON, BROOK	FAIR TO GOOD	HOLDOVER + STOCKED	2	✓
BEEBE	M	H	M	M	H	M			RAINBOW/BROOK	ROADSIDE – GOOD	STOCKED	2	
CONTOOCOOK	H	M		M+	H	M			BROWN, RAINBOW, BROOK	ROADSIDE	HOLDOVER BROWN, STOCKED	2	
DEAD DIAMOND	M	H+	H	H+	H	M	L		NATIVE BROOK, RAINBOW	POOR	NATIVE, HOLDOVER, STOCKED	1	
ELLIS	M	H	H	M	H	H+	H		RAINBOW, BROOK	ROADSIDE	99% STOCKED	2	
INDIAN STREAM	M	H	H	M	H+	L	L		BROOK TROUT	DIFFICULT	10% NATIVE 90% STOCKED	2	
MAD	H	H+	H	H	H+	H	H	SALMON	ATLANTIC SALMON BROOK, RAINBOW	ROADSIDE	90% STOCKED	2	✓
MERRIMACK MANCHESTER TO MOORES FALLS	H	M	M	H	L	L	H+	SALMON	BASS, CARP, SHAD TROUT, EELS, SALMON	LIMITED	NATIVE + RESTORATION	1	
MOOSE	L	M	M	M	H	M	M		BROOK, RAINBOW	LIMITED	99% STOCKED	3	
PEABODY	M	M	L	M	M	H	H		RAINBOW BROOK L.L. SALMON (SOME)	ROADSIDE	95% STOCKED	—	
PEMIGEWASSET	M	H+	H	M	H	M	M	SALMON	RAINBOW, BROOK ATLANTIC SALMON	MOSTLY ROADSIDE	99% STOCKED	1	✓
PINE	M	H	H	H	H	M	M		BROOK, RAINBOW	DIFFICULT	HOLDOVER BROOK FROM OSSIPEE LAKE	1	✓

APPENDIX E

Resource Assessment:

Recreational and Natural Resource Category Findings

The following rivers were identified as being of highest significance in each natural and recreational value category.

White Water Boating

Ammonoosuc River
Androscoggin River (Errol to below Pontook)
Connecticut River (Hanover to Claremont)
Contoocook River
Pemigewassett River (East Branch and Bristol Gorge)
Saco River
Swift River
Souhegan River

Flat Water Boating

Androscoggin River (Errol to Berlin)
Bearcamp River
Connecticut River (above Hall's Stream)
Magalloway River
Ossipee River
Saco River (lower)

Canoe Camping

Androscoggin River
Connecticut River (all segments except Gilman Dam to Ryegate Dam)
Magalloway River
Pemigewassett River
Pine River
Saco River

Anadromous Fish

Ammonoosuc River
Baker River
Connecticut River
- Hall's Stream to Gilman Dam
- Ryegate Dam to Hanover
- Hanover to Bellows Falls
- Bellows Falls to Massachusetts border

Merrimack River
- Franklin to Manchester
- Manchester to Massachusetts border

Pemigewassett River (East Branch to Franklin)
Pemigewassett River, East Branch
Wild Ammonoosuc River

Note: While the Lamprey River is not a part of the salmon/shad restoration program, it should be recognized as the state's most significant river for other anadromous species.

Inland Fisheries

Ammonoosuc River
Androscoggin River (Errol to Berlin)
Connecticut River (all segments)
Dead Diamond River
Ellis River
Hall's Stream
Indian Stream
Lamprey River
Merrimack River (all segments)
North River
Pemigewassett River
Pemigewassett River, East Branch
Pine River
Soucook River
Swift Diamond River
Wonalancet/Swift River

Undeveloped Rivers

Dead Diamond River
Dry River
Indian Stream
Nash Stream
Perry Stream
Saco River, Rocky Branch
Swift Diamond River

Scenic Values

Connecticut River (Headwaters to Gilman Dam)
Pemigewassett River, East Branch
Saco River
Swift Diamond River

Critical Ecologic Values

Androscoggin River (all segments)
Blackwater River
Magalloway River
Connecticut River
    Hall's Stream to Gilman Dam
    Gilman Dam to Ryegate Dam
    Hanover to Claremont
Hampton/Taylor River
Merrimack River (all segments)
Pemigewasett River (Plymouth to Franklin)
Piscataqua River

Wildlife

Androscoggin River (Errol to Pontook)
Contoocook River
Dead Diamond River
Magalloway River

Water Supply

Ammonoosuc River
Androscoggin River
Contoocook River
Exeter River
Gale River
Lamprey River
Little River
Mascoma River
Oyster River
Souhegan River
Wild Ammonoosuc River
Zealand River

Water Quality

Bellamy River
Blackwater River
Gale River
Piscassis River
Saco River, East Branch
Upper Ammonoosuc River
Wild Ammonoosuc River

Geologic/Natural Features

Ammonoosuc River
Androscoggin River
Ashuelot River
Baker River
Bearcamp River
Beaver Brook
Beebe River
Cocheco River
Cockermouth River
Cold River
Connecticut River
Cutter River
Dead Diamond River
Dry River
Isinglass River
Pemigewassett River
Pine River
Piscataquog River
Saco River
Souhegan River
Sugar River
Swift River
Wild Ammonoosuc River
Wonalancet/Swift River

Note: The above list includes all rivers found to be significant. No priority ranking within this list was attempted. For evaluation purposes all were given a numerical rating of "2" (high significance).

Historical/Cultural

Ammonoosuc River
Ashuelot River
Baker River
Bearcamp River
Beebe River
Blackwater River
Cocheco River
Cold River
Connecticut River
    above Hall's Stream
    Hall's Stream to Gilman Dam
    Ryegate Dam to Hanover
    Hanover to Claremont
Contoocook River
Ellis River
Israel River
Pemigewassett River
Perry Stream
Piscataquog River
Saco River
Soucook River
Sugar River
Swift River
Warner River
Wild Ammonoosuc River

Note: The above list includes all rivers found to be significant. No priority ranking within the list was attempted. For evaluation purposes all were given a numerical rating of "2" (high significance).

APPENDIX F COMPOSITE RESOURCE VALUE FINDINGS

hest Significance = 4
gh Significance = 2
gnificance = 1

	RESOURCE CATEGORIES												CUMULATIVE RATINGS	
	White Water Boating	Flat Water Boating	Canoe Camping	Anadromous Fish	Inland Fish	Undeveloped Character	Scenic	Critical Ecologic	Wildlife	Geologic/ Natural Features	Water Quality (q) Water Supply(s)	Historical/ Cultural	Cumulative Score: Quantitative	Cumulative Score: Qualitative
monoosuc	4			4	4		1			2	4(s)	2	7	21
droscoggin (Errol to Pontook)	4	2	4		4	1	2	4	4	2	4(s)		10	31
droscoggin (Pontook to Berlin)	4	2	4		4	1	2	4	1		4(s)		9	26
droscoggin (Berlin to Maine)			4			1	1	4					4	10
huelot	2						1			2		2	4	7
huelot, South Branch	1												1	1
ker		4	2	4	2					2		2	6	16
ker, South Branch					1	1							2	2
rcamp	2	2	2		2	1				2		2	7	13
aver Brook		1			2					2			3	5
be	1			1	1	2				2		2	6	9
ellamy				2	2				1		4(q)		4	9
ackwater	1			1	1		2	4			4(q)	2	7	15
rrol Stream					2								1	2
ocorua					1								1	1
heco				2	1			2		2		2	5	9
kermouth					2					2			2	4
d	2									2		2	3	6
nnecticut (Headwaters to Halls Stream)		2	1		4		4	4	2	2		2	8	21
nnecticut (Halls Stream to Gilman Dam)		4	4	4	4		4	4	2	2		2	9	30
nnecticut (Gilman Dam to Ryegate Dam)					4			4	2				3	10
nnecticut (Ryegate Dam to Wilder Dam)			4	4	4			4	2	2		2	7	22
necticut (Wilder Dam to Bellows Falls	4	4	4	4	4			4	2	2		2	9	30

COMPOSITE RESOURCE VALUE FINDINGS

Highest Significance = 4
High Significance = 2
Significant = 1

	RESOURCE CATEGORIES												CUMULATIVE RATINGS	
	White Water Boating	Flat Water Boating	Canoe Camping	Anadromous Fish	Inland Fish	Undeveloped Character	Scenic	Critical Ecologic	Wildlife	Geologic/ Natural Features	Water Quality (q) Water Supply(s)	Historical/ Cultural	Cumulative Score: Quantitative	Cumulative Score: Qualitative
Connecticut (Bellows Falls to Mass. Line)		4	4	4	4			2	2	2			7	22
Contoocook	4		1	1	2			2	4		4(s)	2	9	20
Cutler										2			1	2
Dead Diamond					4	4	2		4	2			5	16
Dry					1	4				2			3	7
Ellis	2				4	1						2	4	9
Exeter/Squamscott		1	1	2	2			2			4(s)		6	12
Fowler					2								1	2
Gale	2				2	2					4(s,q)		5	10
Hall's Stream					3	1	1						3	5
Hampton/Taylor				2				4	2			2	4	10
Indian River					2		1						2	3
Indian Stream		1			3	4			1				4	9
Isinglass	2				2					2			3	6
Israel	2			1	2							2	4	7
Johns				1	2								2	3
Lamprey	2	2	1	2	3						4(s)		6	14
Little				1	2						4(s)		3	7
Little Sugar					1	1	1						3	3
Lovell					2	2							2	4
Mad	2			2	2	1							4	7
Magalloway		2	4		1	1		4	4				6	16
Mascoma	2				2						4(s)		3	8
Merrimack (Franklin to Manchester)		1	2	4	3		1	4	2				7	17

COMPOSITE RESOURCE VALUE FINDINGS

Highest Significance = 4
High Significance = 2
Significance = 1

	RESOURCE CATEGORIES												CUMULATIVE RATINGS	
	White Water Boating	Flat Water Boating	Canoe Camping	Anadromous Fish	Inland Fish	Undeveloped Character	Scenic	Critical Ecologic	Wildlife	Geologic/ Natural Features	Water Quality (q) Water Supply(s)	Historical/ Cultural	Cumulative Score: Quantitative	Cumulative Score: Qualitative
Merrimack (Manchester to Massachusetts)	2	1	2	4	3			4	2			2	8	20
Merrymeeting					2								1	2
Mohawk					1								1	1
Moose					1								1	1
Nash Stream	1				1	4	2						4	8
Nashua				1									1	1
Newfound					2								1	2
Nissitissit									1				1	1
North					3								1	3
Ossipee		2	2		1	1							4	6
Otter Brook	1												1	1
Oyster				2	1		1				4(s)		4	8
Peabody					1								1	1
Pemigewassett	4		4	4	4		4	4		2		2	9	28
Pemigewassett, East Branch	4			4	4		4						4	16
Perry					1	4	2		1			2	5	10
Phillips					2		1						2	3
Pine		4	4		4	1				2			5	15
Piscassic					1	1					4(q)		3	6
Piscataqua				2	2			4					3	8
Piscataquog	2	1		1	2					2		2	6	10
Saco, Main	4	2	4		2		4			2		2	7	20
Saco, East Branch	1				2						4(q)		3	7
Saco, Rocky	1				2	4							3	7

COMPOSITE RESOURCE VALUE FINDINGS

Highest Significance = 4
High Significance = 2
Significance = 1

	RESOURCE CATEGORIES												CUMULATIVE RATINGS	
	White Water Boating	Flat Water Boating	Canoe Camping	Anadromous Fish	Inland Fish	Undeveloped Character	Scenic	Critical Ecologic	Wildlife	Geologic/ Natural Features	Water Quality (q) Water Supply(s)	Historical/ Cultural	Cumulative Score: Quantitative	Cumulative Score: Qualitative
Salmon Falls		1		2	1	2		2					5	8
Salmon Hole						2							1	2
Sawyer					1	2			1				3	4
Smith	2				2	1	2						4	7
Soucook		4		1	3		2					2	5	12
Souhegan	4			1	1		2			2	4(s)		6	14
Sugar	2				1		1			2		2	5	8
Suncook	2				1								2	3
Swift Diamond	1				4	4	4	2	2				6	17
Swift (Saco Basin)	4				2	2	2			2		2	6	14
Tioga					1								1	1
Upper Ammonoosuc		1			1		1		2	2			5	7
Warner	1	1			1							2	4	5
Wild					2	2	2						3	6
Wild Ammonoosuc	1			4	1	2				2	4(s,q)	2	8	16
Winicut													0	0
Winnipesaukee					2			2					2	4
Wonalancet/Swift					4					2	4(q)		3	10
Zealand					1	2					4(s)		3	7

APPENDIX G Resource Assessment:

Listing of Rivers According to Composite Resource Values

Highest Composite River Resource Values (qualitative rating of 14+)

Ammonoosuc River
Androscoggin River
(Errol to Pontook)
(Pontook to Berlin)
Baker River
Blackwater River
Connecticut River
(Headwaters to Hall's Stream)
(Hall's Stream to Gilman Dam)
(Ryegate Dam to Wilder Dam)
(Wilder Dam to Bellows Falls)
(Bellows Falls to Mass. line)
Contoocook River
Dead Diamond River
Lamprey River
Magalloway River
Merrimack River
(Franklin to Manchester)
(Manchester to Mass. line)
Pemigewassett River
Pemigewassett River, East Branch
Pine River
Saco River
Souhegan River
Swift Diamond River
Swift River (Saco Basin)
Wild Ammonoosuc River

High Composite River Resource Values (qualitative rating of 10-13)

Androscoggin (Berlin to Maine line)
Bearcamp River
Connecticut River (Gilman Dam to Ryegate Dam)
Exeter/Squamscott River
Gale River
Hampton/Taylor River
Perry Stream
Piscataquog River
Soucook River
Wonalancet/Swift River

Moderate Composite River Resource Values (qualitative rating of 6-9)

Ashuelot River
Beebe River
Bellamy River
Cocheco River
Cold River
Dry River
Ellis River
Indian Stream
Isinglass River
Israel River
Little River
Mad River
Mascoma River
Nash Stream
Ossipee River
Oyster River
Piscassic River
Piscataqua River
Saco River, East Branch
Saco River, Rocky Branch
Salmon Falls River
Smith River
Sugar River
Upper Ammonoosuc River
Wild River
Zealand River

Other Rivers Identified as Significant in One or More Resource Categories

Ashuelot River, South Branch
Baker River, South Branch
Beaver Brook
Carrol Stream
Chocorua River
Cockermouth River
Cutler River
Fowler River
Hall's Stream
Indian River
Johns River
Lovell River
Merrymeeting River
Mohawk River
Moose River
Nashua River
Newfound River
Nissitissit River
North River
Otter Brook
Peabody River
Phillips Brook
Salmon Hole Brook
Sawyer River
Suncook River
Tioga River
Warner River
Winnipesaukee River

PPENDIX H

RESOURCE AND DEVELOPMENT CONFLICT MATRIX

New Hampshire River Protection and Energy Development Project

RIVER	PROJECT	White Water Boating	Flat Water Boating	Canoe Camping	Anadromous Fish	Inland Fish	Undeveloped Character	Scenic	Critical Ecologic	Wildlife	Geologic/ Natural Features	Water Supply and Quality	Historical/ Cultural	DEGREE OF PERCEIVED CONFLICT
mmonoosuc	Woodsville													4
mmonoosuc	Bethlehem Dam				x	x								2
mmonoosuc	Lisbon													4
mmonoosuc	Ammonoosuc River Dam													4
ndroscoggin	Pontook	x				x					x			1
ndroscoggin	Sawmill Dam													4
ndroscoggin	Errol Dam					x			x					3
lackwater	Blackwater Dam									x				2
onnecticut	Hart Island	x		x	x	x	x		x	x	x			1
onnecticut	Chase Island		x	x	x	x	x		x	x	x			1
nnecticut	Murphy Dam		x			x				x				3
necticut	Dodge Falls													4
ntoocook	Honkinton Power													4
ontoocook	Hopkinton-Everett													3
ontoocook	Hoague-Sprague													4
ontoocook	Noone Mills													4
ontoocook	Hillsborough													4
ntoocook	Penacook Lower													4
ontoocook	Penacook Upper													4
ontoocook	Contoocook River Park													4
ontoocook	Rolfe Canal													3
mprey	Macallen Dam				x									2
prey	Wiswall				x									2
rimack	Moores Falls			x	x	x	x			x				1
rimack	Sewalls Falls				x	x				x				1
nigewasset	Livermore Falls				x	x		x			x			1
nigewasset	Franklin Falls				x	x				x				3
digewasset, E. Br.	Lincoln Hydro	x			x	x				x				1
hegan	Pennichuck				x	x								2
mprey	Wadleigh				x									2

DEGREE OF PERCEIVED CONFLICT

1. High Conflict; Resolution Difficult
2. High Conflict; Resolution Possible
3. Conflict; Resolution Probable
4. No Conflict; Conflict Resolved