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March 2, 2009

C. Wayne Ives, P.G. Hydrogeologist  
Watershed Management Bureau  
NH Department of Environmental Services  
P.O. Box 95 – 29 Hazen Drive  
Concord, NH 03302-0095

Re: Comments and Questions by Town of Durham and the University of New Hampshire on  
Draft Lamprey River Proposed Protected Instream Flow Report

Dear Mr. Ives:

Thank you for this opportunity to submit a preliminary set of comments on the draft Lamprey River Proposed Protected Instream Flow Report (Report) dated December 9, 2008. The University of New Hampshire and the Town of Durham, operating together and jointly overseeing the operation of the UNH/Durham Water System (UDWS), appreciate the opportunity to provide comments and questions regarding the Report for consideration. The UDWS operations are cooperatively managed by the Durham Water/Wastewater/Stormwater Committee which is an equal partnership made up of both Durham and University officials including Durham's Public Works Director and the Durham Town Engineer, and UNH's Assistant Vice President of Energy and Campus Development and the UNH Director of Energy and Utilities. Staff of the UDWS have actively participated in Lamprey River Instream Flow Pilot Study (Study) with the Director of Public Works, Town Engineer and the UDWS Chief Operator as members of the Water Management Planning Area Advisory Committee, and the assistant Water Treatment Plant Operator sitting on the Technical Review Committee.

Although our comments reflect the Town's and the University's broad interests in the Lamprey River, the attached set of comments and questions on the Report relate principally to our joint responsibility for managing the UDWS. We recognize and appreciate the effort that has gone into conducting the Study and developing the Report, and we applaud the dedication to basing the ultimate protected instream flows on the best science possible.

The UDWS's comments and questions address the underlying legal underpinning and the process of the establishing protected instream flows (PISFs) for the designated reach of the Lamprey River, and many technical comments and questions about the criteria applied and assumptions made in the modeling and field work done to develop the proposed protected instream flow levels. Our comments are broad, and they are intended to be constructive. We remain supportive of the motivating purposes of this endeavor -- we fully recognize the importance of preserving the Lamprey River. But we are concerned that despite the substantial work to date and the lengthy process to get to this point, the draft PISFs are not ready to be finalized. This is a pilot study, and our view is that more thought and analysis must still be done

to address questions about the assumptions, data, modeling and regulatory drivers that form the basis of the proposed PISFs.

You know better than most that this is a very challenging, difficult and complicated project, with many difficult and complicated issues. With little time remaining before you must establish a final set of protected instream flows, we fully understand the time pressures facing you. That notwithstanding, however, it is vital that the final product have the confidence of all the participants in the process and the affected water users. This is especially so for a municipality whose public water supply is potentially greatly affected and that must communicate and convince the Town residents of the appropriateness and reasonableness of the end result.

We appreciate the truly impressive efforts that underlie this Report. You and your colleagues at DES, the Technical Review Committee members, the contractors retained to assist you, and those other members of the public actively involved are to be commended for your efforts. Again, we remain supportive of the intent of this project to determine appropriate instream flows and ultimately to devise a management scheme under which all affected water users can cooperate and coordinate their efforts to make the most effective use of this precious riparian resource.

We look forward to continuing our work with you to gain the most benefit and learning from this significant pilot project. Thank you again for your thoughtful consideration of our comments and questions.

Sincerely,



Paul D. Chamberlin, P.E.  
Assistant Vice President  
Energy & Campus Development



David Cedarholm, P.E.  
Town Engineer

Enclosures: Comments & Questions from the Town of Durham and UNH  
Attachments

cc: Harry Stewart, P.E., DES Water Division Director  
Paul Currier, DES Watershed Bureau Administrator  
Todd Selig, Town Administrator  
Michael Lynch, Director of Public Works  
James Dombrosk, UNH Director of Energy and Utilities  
Wesley East, UDWS Chief Operator  
Dana Bisbee, Esq.  
Michael Metcalf, P.E.  
James Emery, P.G.

**Comments by Town of Durham and the University of New Hampshire on  
Draft Lamprey River Proposed Protected Instream Flow Report  
(March 2, 2009)**

**The UNH/Durham Water System's Interest In This Pilot Project**

The UNH/Durham Water System ("UDWS") recognizes and appreciates the effort that has gone into conducting the Lamprey River Protective Instream Flow Pilot Study (Study) and developing the Report, and we applaud the dedication to basing the ultimate protected instream flows on the best science possible.

Although our comments reflect the Town's and the University's broad interests in the Lamprey River, the attached set of comments and questions on the draft Report relate principally to our joint responsibility for managing the UDWS. We remain supportive of the motivating purposes of this endeavor -- we fully recognize the importance of preserving the Lamprey River. But we are concerned that despite the substantial work to date and the lengthy process to get to this point, the draft PISFs are not ready to be finalized. This is a pilot study, and our view is that more thought and analysis must still be done to address questions about the assumptions, data, modeling and regulatory drivers that form the basis of the proposed PISFs.

The Town of Durham and the University of New Hampshire jointly own and operate the UNH/Durham Water System. The system provides public water for both the Town residents and businesses and the University campus. The system uses water from the Lee Well, from the Oyster River upstream of the water treatment plant at the UNH campus, and from the Lamprey River. It is the latter source that is potentially affected by the instream flow levels established in this pilot project. That withdrawal is currently active and has been in place since 1970 when a pump station was placed on the banks of the Lamprey River to supplement the Oyster River source. The piping of the water from the Lamprey River was modified in 1999 to connect directly to the water treatment plant to improve efficiency and conservation. The modification resulted in a §401 Water Quality Certification issued by DES in 2001. The original authority for withdrawing water from the Lamprey River was granted by the Legislature in Ch. 332 of the Laws of 1965, in which the Towns of Durham, Epping, Lee, Newmarket and Raymond were granted the right of water from the Lamprey River for public water supply purposes, to the exclusion of all other public municipalities. The withdrawal occurs from a reservoir created by the Town-owned Wiswall Dam, which also provides water storage.

The UDWS's concerns about the Draft Lamprey River Protected Instream Flow Report (Report) relate principally to the confidence in the underlying methodology and to the potential real impact on the water system. We are concerned both with the confidence level established scientifically in the Report itself and the validity of the assumptions used, and the confidence with which all of the interested parties, including the Town and the University, can articulate the rationale for these protected flows. The UDWS is most concerned, however, with its ability to reasonably use water from the Lamprey River, withdrawing amounts needed for the Town and UNH while being mindful of the need to wisely manage the river flows.

## **Statutory and Regulatory Framework**

At the outset, it is important to note that the instream flows that are being proposed for the Lamprey River result from a pilot project established by the Legislature in 2002. Ch. 278 of the Laws of 2002 established this pilot program under the overarching context of the Rivers Management and Protection Act, RSA Ch. 483. The purposes of the Rivers Management and Protection Program are numerous -- in general to ensure the continued viability of New Hampshire's rivers as valued economic and social assets of the State, and specifically to preserve various significant features, including regulating both quantity and quality of instream flow, as well as protecting outstanding characteristics, like public water supply.

The Rivers Management and Protection Act does require that protected instream flows be established for each river designated under that program, which includes the Lamprey River. See RSA 483:15(i). That requirement was modified however, to require that instream flows be established for only the Lamprey and Souhegan Rivers in the pilot program created in 2002.

In developing protected instream flows ("PISFs"), Department of Environmental Services ("DES") is guided both by the requirements of RSA 483:9-c, which establishes the specific authority for the adoption of protected instream flows, and Ch. 278 of the laws of 2002 (and subsequent extensions of that session law), which created the instream flow pilot program. The pilot program required the creation of a Technical Review Committee (TRC) and a Water Management Planning Area Advisory Committee (WMPAAC) for both the Lamprey and Souhegan Rivers, and established a public hearing and comment component in the development of both instream flows and water management plans. The current deadlines for completion of the pilot program require that DES adopt the final protected instream flows for both rivers by April 1, 2009 and implement protected instream flows and water management plan by October 1, 2009. Before that can be accomplished, however, DES must conduct yet another public hearing, this one jointly with the Senate Environment Committee and the House Resources, Recreation and Development Committee. See Ch. 5:3, III(a) of the Laws of 2008.

RSA 483:9-c sets forth the general requirements for the adoption of protected instream flows. Of particularly importance to the UDWS, is the following requirement:

Each protected instream flow shall be established and enforced to maintain water for instream public uses and to protect the resources for which the river or segment is designated. Instream public uses shall include the state's interest in surface waters including, but not limited to, navigation; recreation; fishing; storage; conservation; maintenance and enhancement of aquatic and fish life; fish and wildlife habitat; wildlife; the protection of water quality and public health; pollution; aesthetic beauty; and hydroelectric energy production.

RSA 483:9-c(I). Further, the procedure for adoption of any instream flows "shall include an assessment of the effect of a protected instream flow upon the existing hydropower generation, water supply, flood control, and other riparian users." RSA 483:9-c,III. Last, RSA 483:9-c,IV

requires that protected instream flow levels be maintained at all times, except when they result from natural causes “or when the commissioner determines that a public water emergency exists, which affects public health and safety.”

DES’s Administrative Rules, PART Env-Ws 1905, set out the procedure for the establishment of protected instream flows. Env-Ws 1905.02 establishes the requirements for the Study. Subsection (b) requires the identification of all instream public uses and all designated uses under the Federal Clean Water Act, and subsection (c) requires the identification of all resources for which a river is designated. Env-Ws 1905.03, in turn, requires that DES consider all of the comments received during the public hearing and comment to review the protected instream flows relative to the following factors, including the outstanding characteristics identified in RSA 483:1 (which includes public water supply), the factors identified in RSA 483:6,IV(a) (which includes “community resources”), instream public uses identified at 483:9-c, “information relevant to flow conditions that will conserve, protect, maintain, or restore resources for which the river is designated”, and “other information relevant to the proposed protected instream flows”. See Env-Ws 1905.03(b)(1-3,10,14).

Env-Ws 1905.04 sets forth the requirements for DES’s final decision in designating protected instream flows. Among other requirements, DES must explain the scientific basis before it establishes PISFs and it must assess how the final decision meets the requirements of RSA 483:9-c,III (requiring that the instream flows maintain instream public uses and protect the resources for which the river was designated under the river’s management and protection program.)

The UDWS has organized its comments and questions around the following three overriding themes, relative to whether the legal, technical, and procedural requirements have been adequately addressed in the Report:

- A. Did DES apply the correct factors (IPUOCRs) in establishing protected instream flows as required by state law?
- B. Are the technical aspects of the Report sound and does the Report provide a high enough level of confidence in the Study?
- C. Has the process included sufficient, meaningful input, from the TRC, Affected Water Users, and other interested parties?

## **Comments/Questions**

### **A. Did DES Apply the Correct Factors (IPUOCRs) in Establishing Protected Instream Flows as Required by State Law?**

A-1. DES did not factor the UDWS needs into its analysis of PISFs. RSA 483:9-c requires that both instream public uses and uses for which the River was designated under the Rivers Management and Protection Act be maintained and protected. We appreciate that it is difficult to reconcile all of the protected uses in establishing PISFs, but the Town and UNH's public water supply is both an instream public use and a key reason why the River was designated in the first instance. However, the Report has not considered the needs of the UDWS at all in establishing protected flows.

A-2. Further, the rules that prescribe how DES is to establish PISFs require that DES identify and catalog all outstanding characteristics, all instream public uses, all designated uses under the Federal Clean Water Act, and all resources listed under RSA 483:6, IV(a) for which the River is designated.

Public water supply is an instream public use that must be considered in establishing PISFs. The statutory definition states that instream public uses "shall include the State's interest in surface waters, including, but not limited to, navigation; recreation; fishing; storage; conservation; maintenance and enhancement of aquatic and fish life; fish and wildlife habitat; wildlife; the protection of water quality and public health; pollution; aesthetic beauty; and hydroelectric energy production." See RSA 483:9-c,(I). While this list does not specifically mention public water supply, that is certainly part of the "State's interests in surface waters," and it is also consistent with the protection of "water quality and public health." Moreover, the list is not all inclusive, in any event. Instream public uses include, but are not limited to, the particular list.

Furthermore, the PISFs must protect the uses for which the River was designated. As set forth in both the 1989 River Nominating Form submitted by the Lamprey River Watershed Association (see Attachment 1), and the DES Report to the general court on the Lamprey's designation dated July 1990 (see Attachment 2), the UNH/Durham water supply is an important factor underlying the River's designation.

In Env-Ws 1905.03, DES is also required to use any comments received during the public hearing and comment to review the proposed protected instream flow relative to certain factors, these include outstanding characteristics set forth in RSA 483:1, the factors listed in RSA 483:6, IV(a), instream public uses, resources for which the River is designated, and other information relevant to the proposed protected instream flows. Env-Ws 1905.03(b)(1,2,3,10,14). The comments that the UDWS is providing herewith relate in large part to its public water supply. Those comments must be factored into the PISFs because public water supply is an outstanding characteristic, identified in RSA 483:1, it is a community resource which is listed under RSA

483:6, it is an instream public use, it is a resource for which the River was designated, and, in any event, it is very relevant to the proposed protected instream flows.

Notwithstanding the requirement that public water supply be considered in establishing PISFs, the actual basis -- the “determinant (*sic*) factors” (see page 1 of the Executive Summary) - for DES’s proposed PISFs disregards the public water supply needs for the UDWS and focuses exclusively on aquatic species.

A-3. It is not clear from the statute or regulations what standard DES must apply in determining the appropriateness of the proposed PISFs. The underlying statutory requirement is clear that instream public uses and designated uses must be protected. Under that broad requirement, the proposed PISFs are insufficient in that they do not protect the UDWS public water supply. Moreover, RSA 483:9-c,III specifically requires that DES assess the effect of protected instream flows on existing water supply. This requirement is carried forward in the regulations as well, in Env-Ws 1905.04(b)(4).

## **B. Are the Technical Aspects of the Report Sound and Does the Report Provide a High Enough Level of Confidence in the Study?**

B-1. The purpose of the PISF Study is to apply the best available science to develop an approach that will protect and maintain existing instream public uses, outstanding characteristics, and resources (IPOUCRs). Yet, in general and despite extensive data gathering, the Study appears to lack focus on the specific goals of the study, focusing more on habitat enhancement research and less on maintaining and protecting existing instream public uses and resources as the statute requires.. The Study concludes that certain aquatic species during critical bio-periods drive minimum flows, and we agree with the goal of assessing reasonable habitat enhancement as part of the instream water flow study. But there is no assessment in the PISF Study of these flows along with corresponding public water supply needs. Since public water supply is both a designated use and an existing public use, the Study is incomplete. The Study at various times includes consideration of the Natural Flow Paradigm, the “naturalized” hydrograph, and “pre-colonial” conditions. Whether and to what extent the goal of the Study is to establish instream flows that will enhance aquatic habitat in order to support a “naturally-occurring” ecosystem is not at all apparent. Thus, the PISF Report should state what the precise goal of the proposed protected instream flows are, and acknowledge the criteria/limits of the desired enhancements of aquatic and fish life.

B-2. The Report describes the target fish community (TFC) model and empirical habitat suitability criteria model that were developed for “reference conditions consisting of limited flow disturbance and habitat impairment” -- which are intended to represent an expected “naturalized” river. These conditions differ dramatically from the actual conditions of the river which contains an established water supply reservoir that services the largest community in the watershed. Early sections of the Report state that the reference conditions are based on the “naturalized” river, which was developed using an artificial pre-colonial corrected hydrograph that was intended to include adjustments for water withdrawals and excluded the human made

impoundments (Wiswall and Macallen). In later sections of the report, it is difficult to discern whether the results are relative to the actual existing conditions or the simulated expected (“naturalized”) conditions. The methodology describing how the “naturalized” river was developed lacks detail and scientific reference. It also is not clear how the Study accounted for water withdrawn from users in the watershed and Pawtuckaway Lake or for the effect of seasonal water retention in the many impoundments within the watershed. Rather, the Study establishes reference conditions that are dramatically different from current conditions and any conditions that can reasonably be expected to exist in the foreseeable future. How these reference conditions provide a meaningful basis for the Study and its conclusions is not addressed. Additionally, establishing reference conditions that exclude the human made impoundments, particularly the water supply reservoir, sets a standard that may well be unrealistic, artificially conservative, and potentially unachievable. To what extent and how was consideration given during the Study that the baseline conditions may be too unrealistic? What was done to ensure this the pre-colonial/naturalized baseline conditions would not produce overly conservative results?

B-3. Basing the PISFs on what could be overly conservative simulated reference conditions that do not reflect the existing hydrologic conditions or habitat and excludes the public water supply reservoir violates the statutory requirements in RSA 483:9-c which states "each protected flow shall be established and enforced to maintain water for instream public uses and to protect the resource for which the river or segment is designated." This statement contains two distinct requirements: (1) maintain water for instream public uses; and (2) protect the resource for which the river or segment is designated.

With respect to the first requirement, the UDWS is an instream public use that was identified as such in the 2005 IPUOCR Report. Based on the statute, each protected flow shall be enforced to "maintain" water for instream public uses including public water supply.

Public water supply is listed in Table 2-1 of the 2006 Final Report on IPUOCRs as a flow-dependant IPUOCR. The analysis of the assessment method for public water supply for all flow-dependant IPUOCRs is set forth on pages 39-40 of the 2006 report. The “proposed assessment for public water supply” initially calls for a record review of public water supply systems to evaluate the timing, magnitude and duration of withdrawals. Yet, in the draft PISF Report, the only analysis of the UDWS is one paragraph on page 18 which references a personal communication with Wesley East and three sentences summarizing the 2000-2005 water user reports submitted by the UDWS. Further, the 2006 IPUOCR Report states that the “impact” of the withdrawal of water from the river by the Town of Durham/UNH will be evaluated (emphasis added). The draft final Report provides no assessment whatsoever of flow requirements for public water supplies. (See p. iii-iv of the Report’s Table of Contents)

Thus, DES has not analyzed at all the flows necessary for the public water supply; rather, it has indicated that it will look at the impact of the withdrawal on other aquatic resources. The Report did not consider the flow demands needed to maintain public water supplies and artificially elevated the value of the minimum protect flow requirements estimated for all other instream public uses through an overreaching goal of enhanced baseline conditions. With respect to second requirement of RSA 483:9-c, the UDWS was designated as an important

resource which warranted legislation in 1965 identifying the Lamprey River as a public drinking water source for present and future generations of Durham and neighboring Towns. In 1990, the segment of the Lamprey River containing UDWS reservoir and pumping station was designated as a "rural river" under RSA 483:15 due in part to the established economic and social value of the UDWS (see Attachments 1 and 2). The 1990 Rivers Management and Protection Program's Statement of Policy, RSA 483:1, provides in part that "New Hampshire's rivers and streams comprise one of its most important natural resources, historically vital to New Hampshire's commerce, industry, tourism, and the quality of life of New Hampshire people. It is the policy of the state to ensure the continued viability of New Hampshire rivers as valued economic and social assets for the benefit of present and future generations." RSA 483:1 also includes public water supply as an outstanding characteristic to be conserved and protected through the regulation of instream flows. The designation of the same segment of the Lamprey under the National Wild and Scenic Rivers Program was driven in part to protect the water supply from a hydroelectric developer. Its classification as a "recreational" river in the Wild and Scenic Program is based on the existence of the UDWS reservoir and the degree of development on the reach. The other two classifications, "wild" and "scenic" do not allow human-made impoundments.

B-4. The PISF Study did not consider the public water supply needs of the UDWS and its challenges in meeting existing needs and anticipated future demand during low flow conditions, and the Study inappropriately assumed that system's needs would be met "through adaptive management practices (artificial recharge, conservation, development of alternative water sources, or off-stream storage, etc.)" (see pages 20 and 21) without considering practical and potential limitations. The established Lamprey River PISFs need to protect the UDWS in accordance with 483:9-c, and for the following reasons:

- The UDWS is a flow dependent instream public use and a resource for which the Lamprey River was designated.
- The potential for water supply demand reduction through water conservation has technologic and social/political limits. Estimating the potential to reduce average water supply demand must be based on an evaluation of realistic water conservation measures, existing and expected future water user trends and demographics, and a realistic assessment of the future potential for water conservation measures. The UDWS is committed to a water conservation program, and since 1999 the UDWS has invested more than \$1M on water conservation efforts associated exclusively with the Lamprey River withdrawal. Considering the success that the UDWS has had with maintaining below average per capita water demands, implementing a more aggressive water conservation program has limitations.

The availability of alternative water sources is also limited, particularly in the Seacoast area. Permitting and constructing the infrastructure for new water sources is extremely costly, and dependent on funding approval through public referendum or vote of elected officials, neither of which can be assured. Thus the degree to which the alternative drinking water sources will contribute to the UDWS's future needs is not fully assessed.

- The population of water users in Durham and UNH is expected to more than double in the foreseeable future (as suggested in the recently updated Draft Water Resource Management Plan). Utilizing the Lamprey River as a water source has been a primary component in the total extended source equation since 1965 (see Attachment 3 - excerpts from the February 1965 Camp, Dresser & McKee, *Durham, New Hampshire, Report on Additional Water Supply*).
- UDWS reliance upon the Oyster River is less dependable than the Lamprey River. Due to the pending nomination of the Oyster River into Rivers Management and Protection Program, it is likely that future established Oyster River PISFs will further limit water availability.
- The §401 Water Quality Certification (“WQC”) limits are not well supported by science, and are believed to be overly conservative. It has been the UDWS’s understanding, based on the early §401 WQC negotiations, that the §401 WQC established interim conditions that would one day be superseded by the more scientifically-based PISFs and the water management plan. Attachment 4 includes a series of tables that were presented at the January 14, 2009 public hearing. The lower right table in Attachment 4 provides the results from an assessment of the PISFs with respect to the UDWS’s §401 WQC conditions over the full record of Lamprey River flow data. This table reveals that §401 WQC conditions were naturally exceeded on a regular basis including during average and wet years, and confirms that the §401 conditions likely come into effect prematurely.
- We believe the UDWS’s reliance upon surface water is small relative to the Lamprey’s flows even at river flows as low as 4 or 5 cfs (relative to the Packers Fall Gage). Our analysis suggests that the system’s average withdrawal has negligible effects on stream flow and water level fluctuations during Lamprey flow as low as 4 or 5 cfs. However, such an analysis is missing from the Study.
- Since the Water Management Plan places the responsibility of preparing water conservation and water use plans for the UDWS on DES (Env-Ws 1906.02 and 1906.03), it is imperative that a PISF be established that considers the needs of the UDWS prior to development of the Water Management Plan.

B-5. Table B-1 below tabulates the results of an assessment prepared by the Town of the recommended flow criteria from Table 23 of the Report for the common shiner during the Rearing & Growth (R&G) bioperiod flows as they would potentially have been applied during the eight notable low flow event between 1980 and 2007 based on recession data recorded at the Packers Falls USGS stream gage. During each of these notable low flow events the Packers Falls USGS gage recorded flows of 11 cfs or less. Each column contains the flow relative to the specific year that would have been observed at the end of the allowable durations for the common, critical and rare PISFs. The allowable duration for the common, critical and rare PISFs are 46 days, 15 days, and 6 days respectively. For example: in 2007 a “rare” flow of 16 cfs was

observed on August 21<sup>st</sup>. At the end of the allowable duration of 6 days (August 27<sup>th</sup>) the observed flow was 11 cfs (see shaded cell below). The flows continued to fall to the “lowest flow recorded” for that recession event of 6.6 cfs (in bold) until it rained on September 6<sup>th</sup>. The “Y” signifies that yes the allowable duration was exceeded, or “N” for no it was not exceeded.

**Table B-1**

Observed Flows at End of the Allowable Duration for the Common Shiner R&G PISFs

<b>Common Shiner R&amp;G PISF</b>	<b>1980</b>	<b>1983</b>	<b>1984</b>	<b>1995</b>	<b>1999</b>	<b>2002</b>	<b>2003</b>	<b>2007</b>	<b>Average</b>
<b>COMMON</b> <110 cfs 46 days	20 Y	12 Y	19 Y	4.2 Y	9.3 Y	4.1 Y	NA	8.1 Y	11
<b>CRITICAL</b> <22 cfs 15 days	8.6 Y	7.4 Y	10 Y	2.5 Y	12 Y	5.6 Y	16 Y	6.6 Y	8.6
<b>RARE</b> <16 cfs 6 days	12 Y	9.1 Y	12 Y	7 Y	9.3 Y	6.5 Y	11 N	11 Y	9.7
Lowest Flow Recorded	4	7.4	10	1.6	2.3	1.8	11	<b>6.6</b>	5.8

Notes: 1. Y indicates that the PISF flow duration was exceeded  
 2. N indicates that the PISF flow duration was not exceeded  
 3. NA indicates that the PISF flow duration was not reached

As noted in Table B-1, the common and rare PISFs in 2003 are the only instances in which the allowable durations were either not reached or not exceeded. These results suggest that the PISFs and/or the allowable durations are overly stringent due to the fact that they are exceeded in seven of the eight years of very low summer flows over the last 28 years. Thus, for this one bio-period alone, there would be violations of the minimum protected flows for about one in four of the years in question, including almost every summer of low flow conditions. This data and analysis also begs the question of what underlying problem with the common shiner has been experienced over this time frame to suggest that higher flows must be maintained in order to accommodate their rearing and growth needs.

B.6 The draft PISF Report states that the “the following discussion summarizes the scientific basis” for the protected flows for the human recreational (boating and swimming) and water supply uses of flow [was] developed using questionnaires and surveys.” (See page xv). Evaluating a flow-dependent public water supply using only questionnaires and surveys is far too simplistic of an approach to be considered a “scientific basis” for the evaluation of a public water supply’s flow needs. The one questionnaire provided to the Town was rejected due to the

subjective nature and concerns about their likelihood of producing biased results (see Attachment 5). This concern was communicated by the Town by e-mail to the administrator of the questionnaire Shannon Rogers, and voiced at the subsequent WMPAAC meeting. The Report provides no summary of the information relative to water supply uses gleaned from the questionnaires and surveys. Also, was an additional survey requested? The Town of Durham only received this one questionnaire.

In contrast to the Report's limited concern for public water supply needs, the Report goes on to say "From long term records of naturalized flows, a daily record of available habitat is established." (See page xix). The naturalized flows are improperly referred to as being part of a record here and throughout the Report. These references imply that there is a "record" of naturalized flows but there is not. Our understanding is that the term *naturalized flows* represents flows that were developed from modeling of the river as it may have existed in pre-colonial times by removing surface and groundwater withdrawals, adding return flows from dam operations, and other adjustments to account for apparent human impacts since the Colonial period began. The result is an estimated naturalized flows based on numerous assumptions, which may or may not be valid. Describing the estimated naturalized flows as based on a long term record is misleading and suggests that the naturalized flows represent a record of fact-based observations.

B-7. The Study appears to have done a thorough assessment of the recreational flow needs, including an extensive survey of boaters, lengthy discussions about the dozens of interviews with swimmers and boaters. See page 6-18. However, there is no mention in the Report of the extensive interview with Durham Town Engineer David Cedarholm conducted by Shannon Rogers of UNH on June 14, 2006 in which the UDWS's dependence upon the Lamprey River as a drinking water source was discussed in detail. As noted above, the Town did not respond to the questionnaire/survey sent to UDWS because of the subjective nature of the questions.

B-8. The discussion about the UDWS is oversimplified and it excludes any discussion about the important role the Lamprey River plays in meeting the overall UDWS's needs during times of peak demands. In particular, there is no discussion about the critical role of the Lamprey River during times when low summer flows in the Oyster River and the Lamprey River correspond with peak demands triggered by the start-up of the UNH fall semester. There is also no mention of the future role that Lamprey River has been expected to play in meeting the Town's population growth since utilizing the Lamprey River as a drinking water source was first conceived and legislated in 1965. See page 18-21.

B-9. The Report inaccurately states that the UDWS has chosen not to withdraw water when flows fall below 13 cfs "because they have not installed or identified a monitoring system upstream of the (Wiswall) dam". The UDWS has explored numerous locations upstream of the dam to monitor inflow to the Wiswall Reservoir and has been unsuccessful in identifying an acceptable upstream location due to variety of obstacles (i.e. difficult access, private property issues, poorly defined river channel during low flows, concerns with vandalism, etc.). The UDWS received verbal approval from DES in the fall of 2008 to implement a flow monitoring

plan that involves calculating inflow based on measurements of outflow at the Wiswall Dam, rate withdrawal at the pump station, and change in reservoir storage.

B-10. The Report indicates that the planned diversion of water from the Lamprey River for artificial recharge near the Spruce Hole Bog would occur during the spring flows. (See page 19). Development of the Spruce Hole aquifer has not been approved by either Durham or the University, and the DES large groundwater withdrawal permit application is still pending. Furthermore, the timing of when the diversion might take place has not been conclusively determined. While the study should include discussion of the potential development by Durham and the University of this water source, it is not appropriate for the Study to include assumptions regarding development of the Spruce Hole aquifer, particularly when the Report implies that the Spruce Hole aquifer may serve as mitigation of withdrawal limitations from the Lamprey that may result from the Study.

B-11. The Report states that instream fauna will govern the proposed PISFs to the exclusion of the UDWS because public water systems have options to reduce water withdrawals through adaptive management practices (artificial recharge, conservation, development of alternative resources, offstream storage, etc.) while the instream fauna and their supporting habitat would not (see page 20-21). This is the essence of DES's rationale for not analyzing the flow needs of the UDWS. As stated above, this assumes wrongly that the public water supplies have all or most of the options listed available to them, or that some or all of the options are without limitation. It also improperly overrides the second sentence in RSA 483:9-c which states "Each protected instream flow shall be established and enforced to maintain water for instream public uses and to protect the resources for which the river or segment is designated." The UDWS is both an instream public use and a resource for which the segment was designated. This requires that a PISF be established and enforced to maintain and protect its water resource. As an instream public use and protected resource the UDWS flow needs must also be thoroughly assessed and included as part of this Report rather than wait for the Water Management Plan phase.

B-12. As discussed above, the concept of a TFC model based on a fish community that might be expected to reside in an unimpacted stream without impoundment dismisses the UDWS as an instream public use and protected resource; therefore, violating RSA 483:9-c. This approach is expected to produce unrealistic PISFs for species and habitat that are potentially incompatible with the UDWS and its water supply reservoir.

B-13. . The discussions on the Target Fish Community (TFC) and the MesoHABSIM modeling frequently reference the choices, decisions, and selections that the consultants made in the process of developing the expected fish and benthic community used in the Study. These and the other analyses (i.e. habitat suitability and flow requirement assessments, flood plain transects, habitat mapping surveys) performed in the Study that are based on professional judgment are all potentially subjective sources of error. When compounded, they contribute to diminishing the overall technical confidence, accuracy, and validity of the results. The Report needs to identify the parameters that potentially contribute to the sources of error and describe the quality assurance and data validation that was used to minimize the potential for compounding error.

B-14. The Report indicates that none of the rare, threatened, and endangered (RTE) turtle species (blandings, spotted, wood turtles) were observed in the designated reach due to impoundments, recreation, and human activity, and lack of suitable nesting sites. The Report states that turtle nesting sites require dry sandy banks, (which are not typically found in the Wiswall area), and that the turtles prefer tributaries rather than the main river channel. Although the Report (see pages 78-80) implies that these species do exist because there may be available turtle habitat, they apparently prefer habitat found in the tributaries of the Lamprey. It is not clear how the PISFs allow for this. Also, we do not see in the Report the data that confirms that TRE turtle habitat exists within the influence of the Wiswall reservoir. The National Wild and Scenic designation reach of the Lamprey River is classified as "recreational" river which includes impoundments which should be noted in the baseline reference conditions. This designated impounded/recreational status has been identified as not compatible with RTE species & habitat; therefore, the PISF should be adjusted accordingly.

The flow requirements for RTE turtles (and other species) are apparently based on flows patterns that include pre-1955 data as examples of problems, and do not account for the impact of recreation and human activity (see page 48). This tends to elevate a protective status of an absent IPOUCR, and it is also indiscriminately applied to the entire designated segment. The result is artificially conservative and potentially an overestimation of the impact of one IPOUCR on another IPOUCR, regardless of whether actual overlap exists between the two. We are concerned that this unfairly influences the future limits that the PISFs will imposed on the UDWS reservoir/withdrawal.

B-15. Pre-colonial fourth order rivers throughout New England consisted of abundant beaver habitat with numerous impoundments (Naiman, R.J., C.A. Johnson, and J.C. Kelley. 1988. Alteration of North American Streams by Beaver, *BioScience Vol. 38 No.11*). It is not apparent that this type of habitat was considered in the Report. A naturalized "unimpacted" river based on a free flowing unimpounded river is a biased approach and does not consider the full range of possible habitat that may have occurred during the pre-colonial times. The target fish community (TFC), MesoHABSIM model, habitat suitability exercise, and the representative hydrographs need to be reexamined in light of this information. The expected or TFC in a New Hampshire pre-colonial river with abundant beaver may be more representative of a warm regime and less eurythermal, or cold, and more similar to the existing thermal regime.

The Natural Flow Paradigm concept in this study implies that the principal management objective is to allow streams to flow as close to its natural flow regime as possible. This approach seems predicated on river restoration with dam removal in order to comply with the Protected In-Stream Flows (PISF). There is no stated assumption that these structures will be removed in the foreseeable future, so we question the logic of basing protected flows on conditions that do not, and are not likely to, exist.

The Report states that 45% of the protected section is impoundment (see page 82). The Study models baseline conditions in the designated section by assuming removal of Wiswall dam and reducing MacCallen dam by 2 meters (which approximates removal of this structure and the artificial impoundment.) When so much of the designated section is affected by existing impoundment, we do not understand the relevance of establishing protected flows using these

assumptions, unless there is strong potential the dams will be removed and the modeled conditions established. The Report should address this.

B-16. The downstream Affected Water Users and Affected Dam Owners cannot meet stream flow management expectations and comply with protected instream flow rules when, as the Report states, “Pawtuckaway Lake is the dominant water body in the system and is in the center of the watershed.” (See page 4). Unless Dolloff Dam and other entities in the watershed that affect stream flow are brought under integrated management plans, UNH and Durham could be in the untenable position of being required to meet downstream flow requirements when the dominate impoundment in the watershed is excluded from the management umbrella. DES assured UDWS officials during the January 14, 2009 public hearing that in implementing the PISF’s, management plans will be required of all entities in the watershed whose activities may influence flow in the river. How are water management plans for the entire watershed integrated as part of this process? What assurance is offered to the various interests affected in the designated section of the river that use restrictions and protective measures will be equally applied throughout the watershed?

The ability of UDWS to comply with PISF rules is of particular concern when the Report establishes expectations that flow will be augmented in rare habitat conditions. Unless the watershed is managed as a whole, one downstream entity cannot be expected to “augment” flows in extreme conditions when upstream activity is exacerbating the problem.

B-17. Cold water species were noted as being absent in the lower reaches, yet there is no thermal data or thermal analysis. We question whether it is reasonable to assume that cold water species (primarily trout) will hold over during the summer in the lower reaches of the river. The Report cites no evidence that they did historically, or whether their native habitat was historically limited to the upper reaches of the river as is presently the condition.

B-18. The Report implies proactive action in critical low flow period (i.e. flow augmentation for concerns about stressed RTE habitat) without stating what those actions might be. Increased release from the Wiswall Reservoir seems to be the only action available for the lower designated reach. However, an augmented release from the Wiswall Reservoir would not fit within the established framework of the §401 WQC which restricts UDWS’s access to the water stored in the impoundment in order to protect shoreline wetlands surrounding the impoundment. Is an augmenting release from the Wiswall Reservoir contemplated, and if so, under what criteria might the UDWS be directed to release water from the Reservoir to augment downstream flows?

B-19. The discussion on hydrology in the Report and in Appendix 13 lacks depth and scientific reference, and includes no explanation of the assumptions applied to the development of the estimated hydrograph based on a reconstruction of “pre-colonial” flow conditions. The hydrology section needs to include the data of the estimated hydrograph (both in tabular form and graphically represented) and a discussion of how it differs from the observed historical record hydrograph. The absence of the data makes it impossible to conduct a thorough review of the analysis or evaluate the validity of the assumptions and the results. The hydrology discussion does not adequately describe how the influence of Pawtuckaway Lake was

considered and does not give details as to how withdrawals, retention, and releases at Pawtuckaway Lake were accounted for in development of the naturalized pre-colonial hydrograph. Based on DES's NH Water Resource Primer Figure 11-5 (See Attachment 6), Pawtuckaway Lake's influence obviously has a huge impact on flows even today.

B-20. The aerial image showing the river depth of the Wiswall Reservoir on page A12-6 of Appendix 12, appears skewed to one side and inconsistent with physical cross-sections developed through this reach. The bright green color in the image, which is intended to represent the deepest portion of the channel, appears to hug the western river bank which is inconsistent with the sinuosity of the river channel in this reach. This suggests that the GPS/depth data used to generate this figure was improperly geo-referenced which raises concern about the overall accuracy of the Study's depth information. Spatial and depth data validation documentation should be provided.

B-21. Table 6 on Page 22 Includes Atlantic Salmon in the existing fish community. According to the NH Fish and Game Department, there currently are no Atlantic Salmon in the Lamprey River system (email with Cheri Patterson) and the only reason Atlantic Salmon were identified during the 2003 baseline fish sampling was that it the sampling occurred during a salmon reintroduction program that has since been terminated primarily due to water quality and thermal regime issues. Fish and Game reported that the Atlantic Salmon have not returned to the Lamprey in a few years and they have no plans to repeat the Salmon reintroduction program. Two of the six bio-periods for which PISFs are established are based at least in part on Atlantic Salmon, yet there is very little habitat for this species expected in the river (see page 112). The Report is silent on why it makes sense to base PISF flows on a species that is not present in the river. If the State has no commitments to reintroduce the Atlantic Salmon to the Lamprey River, why are flows being based on this species?

Even after a fish ladder is constructed at the Wiswall Dam, the chances that a program to re-establish a Atlantic Salmon population in the Lamprey River System will be successful is highly unlikely for numerous reasons that are mostly out of the control of the affected water users: need for a cold water thermal regime, upstream land use impacts, unsuitable choriotope in available breeding areas, water quality issues, etc.

### **C. Has the Process Included Sufficient, Meaningful Input from the TRC, Affected Water Users, and Other Interested Parties?**

C-1. Even though the January 14, 2009 public hearing was noticed as the joint hearing with the House Resources Committee and the Senate Environment Committee, that hearing did not satisfy the requirements of Ch. 5 of the Laws of 2008. Section 5:3, III (a) which states that DES must conduct the PISF studies and submit a report By April 1, 2009. The next two sentences then state that the department shall hold a public hearing jointly with the Senate and House Committees within sixty days, and that the department consider any public comments received to make revisions to the instream flow levels and water management plans. Holding the required joint hearing prior to the submittal of the final PISF report is inconsistent with the

direct requirements of last year's session law. Further, that hearing was conducted by two DES officials, with no Senate Environment Committee in attendance and only one (the chair) member of the House Resources Committee present. We appreciate that DES has provided substantial opportunity for public input in what is a very open process, but it is important to carefully follow the legal requirements that the Legislature has established.

C-2. Looking further at the procedural requirements of Ch. 5 of the Laws of 2008, the next milestone that DES must achieve is the October 1, 2009 deadline to "adopt and implement the protected instream flows and water management plans". One year later, yet another public hearing and comment is required and a report must be submitted to the Legislature concerning the pilot program by December 1, 2010. UNH and the Town have serious reservations about whether thorough and fully integrated water management plans can be put in place for all water users in the Lamprey River Watershed, in the few months remaining between April 1 and October 1 of this year. As stated above in our technical comments, there has been no real analysis of water needs of the UDWS, and that is also true for other water users on the Lamprey. To undertake the data gathering and analysis, and prepare the necessary conservation, water use, and dam management plans for all the water users seems extremely optimistic. We strongly urge that DES not curtail the necessary analysis and collaboration which is the hallmark of the water management plan process in order to meet a merely aspirational goal set by the Legislature. A legislative extension of the deadlines may be advisable, though not necessary, but it is very important that DES and all interested parties take the time necessary to produce the right results.

C-3. The TRC's Annual Report provided to the Legislature on November 1, 2008 indicated that on September 22, 2008 the 700+ page draft final Lamprey PISF Report was completed and presented to the TRC for review prior to its meeting on October 23, 2008. The TRC met again on November 13, 2008, only three weeks after receiving the draft, and voted to continue to the public hearing/comment phase, but with reservation. Given the length and complexity of the report, this may have not afforded a reasonable opportunity for thoughtful review of the document by TRC members.

C-4 Based on a comparison between the September 22, 2008 Draft Report and the December 9, 2008 Draft Report, there was significant text added to the Report after the TRC voted to continue to the next phase. Some of the text added to the December 9<sup>th</sup> Draft, including the last paragraph on Page 20 (which was awkwardly placed following the discussion about the Newmarket Water Works) contains absolute and unprecedented policy setting discussion that should have been reviewed by the TRC. This discussion is of such importance as to potentially invalidate the vote of the TRC to continue to the next phase. The attached draft letter from the TRC to the Commissioner of DES (see Attachment 7 - draft letter dated December 1, 2008), which was provided to the Town of Durham for review and comment (and may or may not have been sent), evidenced some TRC members' concerns about continuing to the next phase.

C-5. Although the PISF Report represents conscientious and hard work, the work has been done with limited critical review. Based on (1) the limited questions posed many TRC

members, either verbally at meetings or in writing, (2) the confusing and conflicting methodology, the TRC apparently did not – and in fairness could not realistically -- perform a thorough review during critical phases. A third party review needs to be conducted by an impartial entity with clear separation and disconnect from the consulting team, fish and wildlife conservationists, and the affected water users. The selection of the Instream Flow Council (IFC) to conduct the 3<sup>rd</sup> party review, as suggested by the program leaders, would lack the critical impartiality.

C-6. Numerous important references are missing from the list of reference (here are just a few): Poff and Ward, 1990 (Page xviii), Novak and Bode, 1992 (page 22, 23); Bain and Meixler, 2002 (page 21, 22); Richter et al, 1997 (page 92), and Richter et al, 1996 (Appendix 13, Page 2); Bunn and Arthington, 2002 (page 94, 95), Niemi et al, 1990 (page 130). Further, the last paragraph on page 20 contains a reference to a scientific paper that is not in the list of references. The fourth paragraph on page 21 contains multiple references to scientific papers that are not in the list of references, and the second paragraph on page 23 contains a reference to a scientific paper that is not in the list of references. This reference is apparently the source of a key equation explaining Percent Similarity; since the reference is unavailable, please explain the reasoning behind the 0.5 multiplier in the Percent Similarity equation.

C-7. There is confusing inconsistency between the dates indicated on the Report documents available for review on the DES website and available for download from the DES FTP site. There also two separate links on the DES website where digital Reports are available for download; however, one has a December 9, 2008 date and other has a December 10, 2008 date. Both these documents appear to have 12/9/2008 in the footer of the main body of the Report, but the document available on the FTP site has date of 12/10/08 in the footer. What are the differences between these 3 report documents?

C-8. The table of content and the main body of the report lacks a consistent sequential section/subsection numbering system. Without a section and subsection numbers, which is standard in any scientific report of this significance, it is extremely difficult to understand when section begin and end and keep track of the context of each subsection relative to the main sections or chapters. It also make is difficult to reference, discuss, or comment on particular parts of the report. It is recommended that a sequential outline style section/subsection numbering system be incorporated into the document.

## **D. Conclusion**

We again want to express our appreciation for the good work, effort, and thinking that has gone into the years of effort to produce this draft PISF Report. The Report contains a very significant amount of valuable data and insights, and all involved have already gained some "lessons learned" from this second of two ongoing pilot projects. The principal "takeaways" thus far for the UNH/Durham Water System are best captured as follows:

-- Further consideration of existing public water supply needs as a flow-dependent instream use and resource is needed. This vital public use must be more fully studied before PISFs are finalized, and not simply deferred until the development of a water management plan for the Lamprey River.

-- The inadequate assessment of public water supply needs is compounded by what may be overly conservative assumptions and methods used to determine flows needed to preserve natural fish and aquatic habitat. The modeled conditions which are based on presumed “pre-colonial” habitat differ dramatically from actual and foreseeable conditions. The rationale, justification for and validity of analyzing fish and aquatic habitat needs from such models is lacking. DES also needs to support the science and the policy judgments that require affected water users to assure flows and limit withdrawals in order to enhance aquatic habitat for selected target species.

-- Considering the overall goal of applying this “pilot study” approach to the remaining rivers in the Rivers Management and Protection Program, the methods, data and analysis from which the conclusions are drawn must be readily and widely accepted. The need for an impartial third party review of the Report is paramount for gaining the confidence and acceptance of the affected water users.

-- Notwithstanding looming Legislative submittal deadlines of April 1, 2009 for the final PISF report and then October 1, 2009 for a water management plan for all affected water users, DES must not rush to conclude this pilot project. Notwithstanding the voluminous amount of data and documentation that has been developed to date, we believe that more time than the mere four weeks remaining is needed to review and consider the PISF Report before it is finalized. And we have serious concerns that a well-considered water management plan can be realistically developed before the October 1 submittal deadline. Either the legislative deadline needs to be extended, or the Legislature will have to forgive DES's taking the time needed to develop it properly.

New Hampshire Rivers Management and Protection Program

## RIVER NOMINATION FORM

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**LAMPREY RIVER IN LEE AND DURHAM, N.H**

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**I NOMINATION INFORMATION**

- A. Name of River: Lamprey River
- B. River Segment: 9.5 miles (approx.), from the Lee /Epping border, through Lee and Durham to the Durham/ Newmarket border.
- C Sponsoring Organization: Lamprey River Watershed Assoc.  
Contact Person: Judith Spang  
Address: RFD 1, Wiswall Rd., Durham, N.H. 03857  
Phone Number (daytime): 659-5936

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We feel the Lamprey River is worthy of protection for several key reasons:

- 1) It is a major tributary to the Great Bay, and as such has a significant impact on the Bay's water quality, and is a natural extension of its wildlife habitat. Great Bay's national importance was recently recognized through its designation as a National Estuarine Research Reserve.
- 2) The large proportion of undeveloped land on the Lamprey makes it a valuable resource in terms of its scenic beauty and its value as a wildlife habitat.
- 3) The Lamprey's high water quality translates into a major regional recreational resource. Fishing, swimming and canoeing are extensive on the river. The river is also Durham's reserve public water supply.
- 4) Community support for protection of the river is high, with almost two-thirds of the shoreland owners requesting designation of the river as a national Wild and Scenic River.

Planning for protection and management of the Lamprey has been underway since 1983, when the Strafford Regional Planning Commission completed the Lamprey River Management Plan (submitted with this nomination). The Lamprey River Watershed Association has been represented in groups working to protect the river through new zoning ordinances and acquisition of easements in both towns

## **NHDES 1990 Lamprey River Designation Report and Recommendations NH Rivers Management and Protection Program**

### **I. Introduction**

The Lamprey River begins in the town of Northwood, New Hampshire, and flows through several towns before becoming a tidal river in Newmarket and emptying into the Great Bay. A 9.5 mile segment of the Lamprey River in the towns of Lee and Durham has been nominated by the Lamprey River Watershed Association for designation into the New Hampshire Rivers Management and Protection Program. The river segment has been evaluated by the Department of Environmental Services and found to qualify for designation.

The Rivers Management and Protection Program Act was passed by the General Court in 1988. The Act states in part: "It is the policy of the state to ensure the continued Unity of New Hampshire rivers for the benefit of present and future generations. The state shall encourage and assist in the development of river corridor management plans and regulate the quantity and quality of in-stream flow along certain protected rivers or segments of rivers to conserve and protect outstanding characteristics including recreational, fisheries, wildlife, environmental, cultural, historical, archaeological, scientific, ecological, aesthetic, and community significance so that these valued characteristics shall endure as part of the river uses to be enjoyed by New Hampshire people."

The Act directs the Department of Environmental Services to receive and evaluate nominations for the designation of rivers or river segments to protect outstanding values and characteristics under the Rivers Management and Protection Program. The Commissioner must forward approved nominations to the next session of the General Court for review and approval.

In fulfillment of this statutory directive, the nomination of the Lamprey River in the towns of Lee and Durham is hereby forwarded to the General Court. The Department of Environmental Services recommends that this river segment be designated into the Rivers Management and Protection Program and be classified as a "Rural River" under the provisions of the protection measure amendments to RSA Ch. 483. The outstanding statewide and local resource values and characteristics which qualify this river segment for designation are described in this report.

### **II. The Lamprey River Nomination**

#### **A. Description**

The nomination of the Lamprey River is limited to the segment of the river that flows through the towns of Lee and Durham (see map). This segment is part of the larger Lamprey River system which flows for 60 miles through the southeastern corner of the state. Although this

segment is located in an area of early settlement and recent population growth and development, the river itself shows remarkably little evidence of man's presence.

Land use along the river segment is primarily rural, with a dozen farms nestled among forestland and scattered single family residences. Although a majority of the riparian land is in private ownership and some residential development has occurred, a large percentage of the land in the river corridor remains in large, undeveloped tracts. Most of the man-made modifications and improvements are well screened from the river by a buffer of trees along the banks. Existing town ordinances support the continuation of appropriate land use in the river corridor by requiring minimum lot sizes of two and three acres and by allowing clustering of homes to provide common areas of open space along the river.

Beginning at the Lee-Epping border, the river flows north past forest, farms, homes, and a campground before turning east and dropping through a breached dam at Wadleigh Falls. Below the falls, the river meanders east and then north to the Lee Hook Road bridge and then turns east once again, flowing by forest, farms, and a large wildlife/marsh area before entering the town of Durham. In Durham, the river pours over the Wiswall Dam and then runs to the rapids at Packers Falls.

## B. River Values and Characteristics

The Rivers Management and Protection Program Act (RSA Ch. 483) lists nine river values and characteristics which may qualify a river for designation into the program. In the towns of Lee and Durham, the Lamprey River supports many of these natural, managed, cultural, and recreational resource values and characteristics at a level of either statewide or local significance. The resource values which qualify the Lamprey River for designation are: wildlife, plant, and fish resources; water quality; scenic values; historic and archaeological sites; community resources; and recreational resources.

### 1. Natural Resources

a. **Wildlife and Plant Resources:** The Lamprey River supports a diverse habitat of wetlands, forest, and open fields that is home to a variety of wildlife and plant species. As a major tributary to the Great Bay National Estuarine Reserve, the river plays an important role in maintaining the overall health of the protected bay's environment. A number of endangered and threatened bird species have been sighted along the river and are believed to rely on the river habitat for food and shelter, including the federally-endangered bald eagle who sometimes forages in the river while wintering at Great Bay. The first osprey nest on the seacoast region during this century was discovered within two miles of the river in 1989. The New Hampshire Natural Heritage Inventory lists 12 endangered or threatened plant species and the threatened spotted turtle as occurring along this segment of the Lamprey River.

b. **Fish Resources:** The Lamprey River supports a significant fishery. Shad, alewives, and salmon are found up to the impassable Wiswall Dam in Durham. Naturally-reproducing species sought by fisherman include small and largemouth bass, chain pickerel, sunfish, american eel, and

brown bullhead. The Fish and Game Department regularly stocks the river with shad, rainbow, brown and brook trout.

c. Water Quality: The Lamprey River has been designated a Class B water by the General Court and is currently partially supporting the standards of this water quality goal. The significance of improving and maintaining a high level of water quality in the river is evidenced by the use of the river segment as a reserve water supply for the town of Durham, the river's critical link to the Great Bay National Estuarine Reserve, and the increasing use of the river for recreation.

d. Scenic Values: Tree-lined riverbanks, pastures, and gently-flowing waters, interrupted by short stretches of rapids, combine to make the Lamprey River an important scenic resource. From the river, few signs of human development or habitation are visible. Views of the river are beautiful from the bridge crossings, particularly at Wadleigh Falls Road, Lee Hook Road, and Packers Falls.

## 2. Cultural Resources

a. Historic and Archaeological Resources: This segment of the Lamprey River is rich in history. Early commercial and industrial growth centered around the use of the rivers falls for saw and grist mills. The Wiswall Falls Mill Site in Durham has been placed on the National Register of Historic Places in recognition of the extensive 19th century mill complex located at this site. On an island below Wadleigh Falls, archaeologists have documented artifacts over 8,000 years old that are among the earliest dated archaeological artifacts in New Hampshire.

b. Community Resource: The importance of the Lamprey River to the towns of Lee and Durham is reflected in the planning efforts of both towns. The Durham Master Plan identifies the river as an important resource. In Lee, a shoreland protection ordinance prevents construction within 100 feet of the river and prohibits the removal of more than 50 percent of the basal area of trees along the river.

## 3. Recreational Resources

a. Boating: Canoeing is a popular activity on the Lamprey River. Although located within 15 miles of the populated seacoast and 60 miles from metropolitan Boston, the upper portion of the river segment in Lee is described in a river guidebook as "a quiet retreat into the woods... past densely forested banks of hemlock and hardwoods..." For the more adventurous, the guidebook recommends Packers Falls in Durham as providing "one of the most challenging rapids in the Piscataqua Watershed." Both public and informal launching areas provide canoe access to the river; no boat ramps have been developed on this segment of the Lamprey River.

b. Fishing: A 1985 survey by the Department of Fish and Game found that anglers from throughout New England spent 875 fishing hours on a 3/4 mile segment of the Lamprey River below Wiswall Falls in a single month. Fishing continues into the winter, with ice-fishing popular along the length of the segment. Salmon Unlimited has negotiated agreements with private landowners along key areas of the river segment to allow access for fishermen.

c. Other Recreation: Swimming, tubing, horseback riding, bird watching, and camping are other recreational activities that people enjoy on or next to the Lamprey River. The town of Durham owns two recreational areas in the river corridor: an 80 acre parcel at Doe Farm has trails for hiking, jogging, and skiing and the Packers Falls Recreation Area provides public access to the whitewater for canoeing, swimming and tubing. The privately-owned Durham Boat Company offers instruction, storage, and launching facilities for sculling shells below Moat Island. Three campgrounds located in the river segment have facilities for seasonal camping.

### III. Local Support

Local support for the designation of this segment of the Lamprey River into the Rivers Management and Protection Program is very strong. Both the Lee and Durham Boards of Selectmen and Conservation Commissions have voted to support the designation. More than 80 people attended a public hearing held at the Jeremiah Smith Grange Hall in Lee on December 4, 1989; an overwhelming majority of those in attendance expressed support for the designation. In fact, many people who spoke at the hearing advocated the classification of the Lamprey River as a "Natural River" and voiced strong support for the adoption of stringent protection measures for the river segment.

In June 1989, a federal license was issued for the construction and operation of a hydroelectric facility at the Wiswall Falls Dam in Durham. The proposed facility has been a source of controversy in the town for a number of years, and the issuance of a license by the Federal Energy Regulatory Commission has re-invigorated local efforts to stop the project and provide permanent protection for the river from new hydroelectric facilities. The license is currently under appeal by both the state and private parties, and a local effort is underway to have this segment of the river studied under the federal Wild and Scenic Rivers Program. Ninety percent of the riparian landowners in Durham and more than fifty percent in Lee have endorsed a request for the federal study.

### IV. Summary and Recommendations

As it flows through the towns of Lee and Durham, the Lamprey River supports a variety of significant state and local resources. To better protect and manage these resources, the Department of Environmental Services recommends the following actions:

Recommendation 1: The General Court should adopt legislation which designates the Lamprey River in Lee and Durham into the Rivers Management and Protection Program and classifies the segment as a "Rural River."

Under the provisions of the protection measure amendments to RSA Ch. 483, a rural designation will provide increased protection for the river against water quality impairment, new dam construction, damaging channel alterations, and the siting of solid and hazardous waste facilities within the river corridor. A designation will also require the establishment of protected instream flow levels to maintain the minimum amount of water in the river that is necessary to safeguard public trust resources, including water quality, recreation, fisheries, and scenic values. A Local River Management Advisory Committee will be established to coordinate local issues related to

the protection and management of the river and will provide local residents with a direct avenue for formal input to state decisions that affect the river. Finally, a designation will result in the development of a long-range management plan for the river that coordinates state planning and management of fisheries, water quality and quantity, and recreation.

A "Rural River" classification is recommended for this segment of the Lamprey River. Under the proposed amendments to RSA Ch. 483, rural rivers are defined as "those rivers or river segments adjacent to lands which are partially or predominantly used for agriculture, forest management, and dispersed or clustered residential development. Some instream structures may exist, including low dams...". The Lamprey River in the towns of Lee and Durham clearly meets this definition: the riverbanks are predominantly forested; land use within the corridor is a mix of forest, farms, and single family residences; and the dam at Wiswall Falls is an existing instream structure.

The designation of the Lamprey River as a "Rural River" under the Rivers Management and Protection Program will clearly express the intent of the General Court with regard to the protection and management of the river and will focus attention on the river as a natural resource of both statewide and local significance. This attention will help to insure greater scrutiny of plans or proposals which have the potential to significantly alter or destroy those river values and characteristics which qualify the Lamprey River for designation.

Recommendation 2: The towns of Lee and Durham should continue to work toward the protection of the Lamprey River through the adoption of local river corridor management plans, including comprehensive shoreland protection ordinances.

While a state designation will improve the protection and management of the river itself, continuing local efforts will be needed to address the use and conservation of the river corridor. A growing recognition by local citizens of the Lamprey River's valuable contribution to the overall quality of life in their communities is evidenced by their desire to see it designated into the state program. Citizen appreciation and concern for the river should be reflected in the decisions and actions of local officials. Upon request, the Department of Environmental Services will provide technical assistance to the towns of Lee and Durham on the development of local river corridor management plans, including comprehensive shoreland protection ordinances.

In summary, the establishment of a clear policy and specific instream protection measures by the General Court, and a continuing commitment on the part of local governments and residents to protect and manage the river corridor through sound land use decisions will ensure that the outstanding resources of the Lamprey River will "endure as part of the river uses to be enjoyed by New Hampshire people."

Source: [http://des.nh.gov/organization/divisions/water/wmb/rivers/lamp\\_report.htm](http://des.nh.gov/organization/divisions/water/wmb/rivers/lamp_report.htm)

DURHAM, NEW HAMPSHIRE

REPORT ON ADDITIONAL  
WATER SUPPLY

FEBRUARY, 1965



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WATER RESOURCES  
WATER AND AIR POLLUTION  
WATER WORKS - WATER TREATMENT  
SEWERAGE - WASTES TREATMENT  
REFUSE DISPOSAL - FLOOD CONTROL  
REPORTS DESIGN SUPERVISION

Board of Selectmen  
Durham  
New Hampshire

Attention: Mr. James C. Chamberlin, Chairman

Report on Additional Water Supply

Gentlemen:

In accordance with the terms of the contract for engineering services accepted December 7, 1964, we have made an engineering investigation of the present and future water supply requirements of the Town of Durham and the University of New Hampshire. The results of our investigations are presented in detail in the main body of the report and are summarized below.

SUMMARY

The water supply for the University and the Town is obtained from a small impounding reservoir on the Oyster River on University property. The water is treated by a rapid sand filtration plant operated by the University and a review of the analyses made by the New Hampshire State Health Department shows that the treated water meets standard requirements for public water supply purposes. The impounded reservoir has a capacity of about 9 million gallons (with flashboards) and because of this relatively small capacity can develop a safe yield of scarcely 0.5 mgd (million gallons per day). This amount of water, even now, is not sufficient to meet the needs of the Town and the University. We estimate that by the year 2010, a total safe yield of 2.1 mgd will be required. An investigation of the topography in the vicinity of, and a short distance above the present impoundment shows that it would not be feasible to develop a storage reservoir of the required capacity in that vicinity, because of the lack of a suitable dam site.

Board of Selectmen -2-

Other possible dam sites on the watershed of the Oyster River were investigated and surveys were made to determine their suitability for impounding the necessary storage. The most suitable site found is just above Snell Road in Lee where the watershed is 8.8 sq miles. At that location a dam and spillway 400 ft in length with a maximum height of 30 ft above the stream bed, would impound about 200 million gallons at Elev. 122. That impoundment would have a safe yield of 2.1 mgd. An adequate spillway would be provided to permit flood waters to pass downstream and prevent damage to the dam. Under normal operation, water would be released as needed downstream to the existing reservoir and treatment plant, allowing the new reservoir to fill during times of high flow.

We have investigated the problems of flowage and water rights on the Lamprey River and have analyzed the available records of flow with a view to diverting water from the Lamprey River by pumping to the Oyster River watershed where water would then flow to the existing water supply reservoir downstream on the Oyster River. The Packers Falls Dam, together with water and flowage rights, are owned by Carl and Ruth Spang of Wellesley, Massachusetts. We have conferred with Mr. Spang relative to the Town of Durham acquiring the dam and accompanying rights and believe that the Town could purchase them for the present value of the dam. On that basis we have estimated the cost of constructing the Packers Falls Dam at current prices, and that cost, less the cost of necessary repairs on the existing dam, would, in our opinion, be a fair price for the Town to pay to gain control of the dam and the water and flowage rights.

There are also other privately-owned water rights on the Lamprey River above the Packers Falls Dam, but the only right to divert water from the Lamprey River watershed is the right granted to the Manchester Waterworks by Chapter 344 of the Acts of 1961. Information obtained from the office of the Manchester Waterworks indicates that, if that right were ever exercised, the diversion would be from the north branch of the Lamprey River where the watershed is 14.6 sq miles. Inasmuch as the watershed area at Packers Falls is 183 sq miles, the diversion of 14.6 sq miles would have little effect on the flow of the Lamprey River at Durham. An analysis of the flow of the Lamprey River for the years 1935 to 1963, inclusive, shows that the flow at the gaging station below the dam is more than 6 mgd 98 per cent of the time, so that 2 mgd could be diverted with little or no noticeable effect on the river, except during very dry periods.

Soundings taken of the river indicate that with the use of 24-in of flashboards, 112 million gallons of storage could be provided above the dam. Utilizing that storage, 2 mgd could be diverted without seriously depleting the storage and still permit minimum flows to be released downstream, even during severe droughts. It would not be necessary to install flashboards until the water demands of Durham require 2 mgd of additional flow.

If the Lamprey River is to be used as the additional source of water supply, a pumping station would be constructed on the northeasterly bank of the river, probably southwest of the intersection of Packers Falls Road and Wednesday Road in Durham. The pumping station would be equipped with a pump having a capacity of 3.5 to 4 mgd and powered by an electric motor. The pumping station would be operated only a few hours each day when the flow in the Oyster River is not sufficient to meet Durham's water supply demands. When the flow in the Oyster River is adequate to meet water supply needs, no pumping from the Lamprey River will be necessary. Under present conditions of water use, it would be necessary to pump only during extended drought periods.

A force main about 4,700 ft long will be required to carry the water from the pumping station to a point where it can flow by gravity to the existing Oyster River Reservoir. We strongly advise against discharging the water into one of the smaller tributaries of the Oyster River because of the inevitable losses which will occur in the small, flat streams, particularly during dry periods. However, this could be done as a temporary measure for a few years if it should be desired to postpone a portion of the cost.

The pump would lift the water through the force main to a point near the intersection of Mill Road and Packers Falls Road from whence it would flow by gravity to the upper reaches of the Oyster River Reservoir.

We estimate the cost of constructing an earth dam and concrete spillway in the Oyster River just above Snell Road in Lee to be \$560,000. This includes the construction of a new bridge over the river at Snell Road as well as engineering and contingencies, but it does not include the cost of the land which would be flooded, plus a marginal strip around the reservoir. The total area of land needed would be about 80 acres, all in the Town of Lee.

We estimate the cost of constructing an intake, pumping station and pipeline to pump water from the Lamprey River to the Oyster River about a mile upstream from the water treatment plant to be \$200,000. We estimate the cost of acquiring the Packers Falls Dam and making the necessary repairs on it to be \$50,000. The total cost of the Lamprey River project is, therefore, estimated to be \$250,000. We recommend the adoption of the Lamprey River project.

In our investigations of water and flowage rights on both the Oyster and Lamprey Rivers, we found that the McCallen Company of Newmarket has certain rights in both rivers. In order to clarify the right of the Town of Durham to use

the Lamprey River, we recommend that legislation be introduced this year in the New Hampshire legislature to authorize Durham to use the Lamprey River as a source of water supply. A suggested draft of legislation to cover that matter is appended to the report. When that authorization has been granted, additional legislation should be filed to clarify the right of the Town of Durham and the University of New Hampshire to use the Oyster River as a source of public water supply.

We acknowledge with appreciation the cooperation and direct assistance furnished us by Mr. Hugh A. Moulton, Superintendent of Public Works, Professor Charles O. Dawson, Chairman of the Subcommittee on Water, and other municipal officials and employees during the investigation. We also appreciate the cooperation of the New Hampshire State Health Department for furnishing copies of water analyses and the New Hampshire Water Resources Board for data on dams on the Lamprey River and the Oyster River.

Very truly yours,

CAMP, DRESSER & McKEE

By



Roland S. Burlingame

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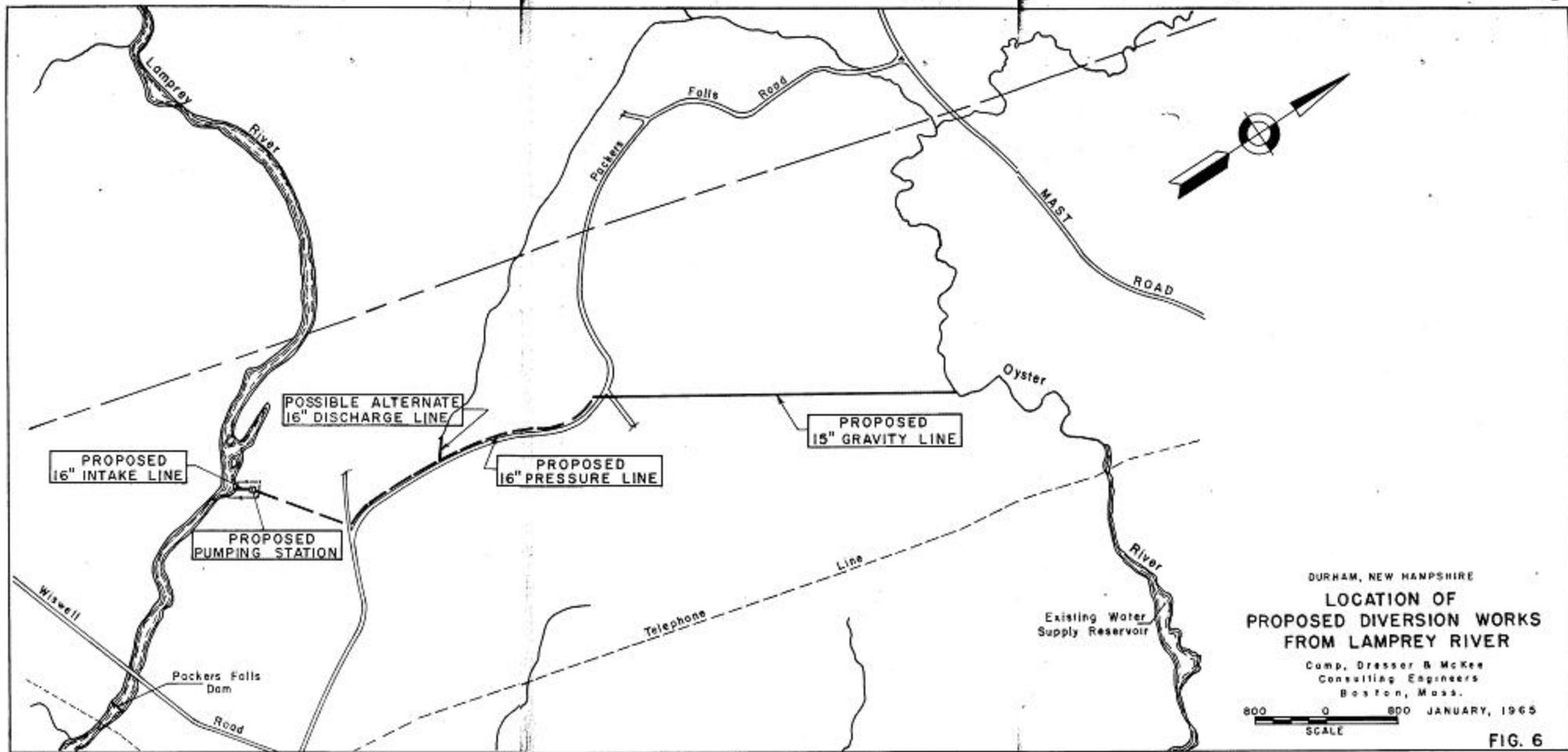
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# ATTACHMENT 4

Bioperiod	Rearing & Growth	Salmon Spawning	Overwintering
Approximate dates	July 5 - Oct. 6 (94 days)	Oct. 7 - Dec. 8 (63 days)	Dec 9 - Feb. 28 (82 days)
<b>Fish Based Proposed Protected Instream Flows</b>	Recommended flows Common shiner	Recommended flows Atlantic Salmon	Recommended flows Flow
<b>Common flow (cfs)</b>	110	90	239
<b>Common flow (cfsm)</b>	0.60	0.49	1.31
Allowable duration under (days)	46	17	20
Catastrophic duration (days)	81	55	57
<b>Critical flow (cfs)</b>	22	40	110
<b>Critical flow (cfsm)</b>	0.12	0.22	0.60
Allowable duration under (days)	15	11	10
Catastrophic duration (days)	32	33	37
<b>Rare flow (cfs)</b>	16	20	73.6
<b>Rare flow (cfsm)</b>	0.09	0.11	0.40
Allowable duration under (days)	6	6	7
Catastrophic duration (days)	28	11	30

Note: watershed area above USGS gage at Packers Falls = 183 sq. mi.

Bioperiod	Rearing & Growth	Salmon Spawning	Overwintering
Approximate dates	July 5 - Oct. 6 (94 days)	Oct. 7 - Dec. 8 (63 days)	Dec 9 - Feb. 28 (82 days)
<b>Three-year average flow (1990 to 1992)</b>	Recommended flows Common shiner	Recommended flows Atlantic Salmon	Recommended flows Flow
<b>Common Flow in cfs</b>	110	90	238
Times not met, <PISF, and (%)	204 (72)	8 (4.2)	91 (37)
Allowable duration under in days*	46 (1)	17 (0)	20 (1)
Catastrophic duration in days*	81 (1)	55 (0)	57 (0)
<b>Critical flow in cfs</b>	22	40	109.8
Times not met, <PISF and (%)	105 (37)	3 (1.6)	13 (5.3)
Allowable duration under in days*	15 (2)	11 (0)	10 (0)
Catastrophic duration in days*	32 (1)	33 (0)	37 (0)
<b>Rare flow in cfs</b>	16	20	73.2
Times not met, <PISF, and (%)	70 (25)	0 (0)	0 (0)
Allowable duration under in days*	6 (2)	6 (0)	7 (0)
Catastrophic duration in days*	28 (1)	11 (0)	30 (0)

Note: Allowable and catastrophic durations in days, and the number of years that duration was exceeded in ().

Bioperiod	Rearing & Growth	Salmon Spawning	Overwintering
Approximate dates	July 5 - Oct. 6 (94 days)	Oct. 7 - Dec. 8 (63 days)	Dec 9 - Feb. 28 (82 days)
<b>Three-year low flow (1964 to 1966)</b>	Recommended flows Common shiner	Recommended flows Atlantic Salmon	Recommended flows Flow
<b>Common Flow in cfs</b>	110	90	238
Times not met, <PISF, and (%)	261 (93)	128 (68)	180 (73)
Allowable duration under in days*	46 (3)	17 (3)	20 (3)
Catastrophic duration in days*	81 (1)	55 (2)	57 (1)
<b>Critical flow in cfs</b>	22	40	109.8
Times not met, <PISF and (%)	203 (72)	61 (32)	111 (45)
Allowable duration under in days*	15 (3)	11 (3)	10 (2)
Catastrophic duration in days*	32 (3)	33 (0)	37 (1)
<b>Rare flow (cfs)</b>	16	20	73.2
Times not met, <PISF, and (%)	167 (59)	15 (7.9)	58 (24)
Allowable duration under in days*	6 (3)	6 (1)	7 (2)
Catastrophic duration in days*	28 (2)	11 (1)	30 (0)

Note: Allowable and catastrophic durations in days, and the number of years that duration was exceeded in ().

### Assessment of Protected Instream Flows

#### Durham/UNH Water Supply

Lamprey Flow 45 to 21 cfs, can withdraw 1.8 cfs  
Lamprey Flow 21 to 13 cfs, can withdraw 0.4 cfs  
Lamprey Flow < 13 cfs, withdrawal only from storage

Representative Hydrograph	45-21 cfs		21-13 cfs		<13 cfs	
	Days	%	Days	%	Days	%
Last five years	150	8.2	99	5.4	158	8.7
Wet three years	86	7.8	64	5.8	37	3.4
Average three years	73	6.7	52	4.7	53	4.8
Dry three years	149	13.6	82	7.5	146	13.3

Number of days that streamflow falls within 401 Certificate condition and the per cent of time in the representative period.

## Lamprey River Stakeholder Survey

You have been invited to continue your participation in a research project that will study how local stakeholders use and value the Lamprey River. These uses and values are being incorporated into the Lamprey River Instream Flow Study and Water Management Plan. Several months ago you contributed to our research by participating in an interview in which you described how you use the Lamprey River and explained what you value about the river. Your insights were extremely helpful and allowed us to successfully begin this important part of our research. We have analyzed the collective interview responses of respondents and are trying to prioritize the many values and priorities articulated during the interviews in the attached survey. Along with this survey, we have provided you with a summary of the information that we gained from the series of interviews.

In order to make sure that we are interpreting your responses appropriately, we are asking for your assistance again. By completing this brief survey, you can provide us with feedback on how we interpreted your interview responses as well as assist us in determining how the many values related to the Lamprey River should be prioritized. Priority rankings will be incorporated into a broader citizen survey of watershed residents as well as used in the development of the Water Management Plan. If this is a paper copy of the survey, you can fill it out and mail it back in the stamped and addressed envelope provided. If you are receiving this survey through e-mail, you may fill it out on the computer using Microsoft Word and e-mail it back to Shannon Rogers at [shrogers@unh.edu](mailto:shrogers@unh.edu). Your name will only be associated with your survey for analysis purposes and your responses will be kept confidentially at UNH. Your name will NOT be associated with your response in any public documents.

This project is being conducted by Shannon Rogers, graduate research assistant in the Department of Resource Economics & Development, and Dr. John Halstead, professor and chairperson of the Department of Resource Economics & Development at the University of New Hampshire (UNH). You may contact Shannon at [shrogers@unh.edu](mailto:shrogers@unh.edu) or 603-817-4847 and Dr. Halstead at [johnh@unh.edu](mailto:johnh@unh.edu). The use of human subjects in this project has been approved UNH Institutional Review Board (IRB) for the Protection of Human Subjects in Research. If you have questions about your rights as a research subject, you may contact Julie Simpson in UNH's Office of Sponsored Research, 603-862-2003 or at [julie.simpson@unh.edu](mailto:julie.simpson@unh.edu).



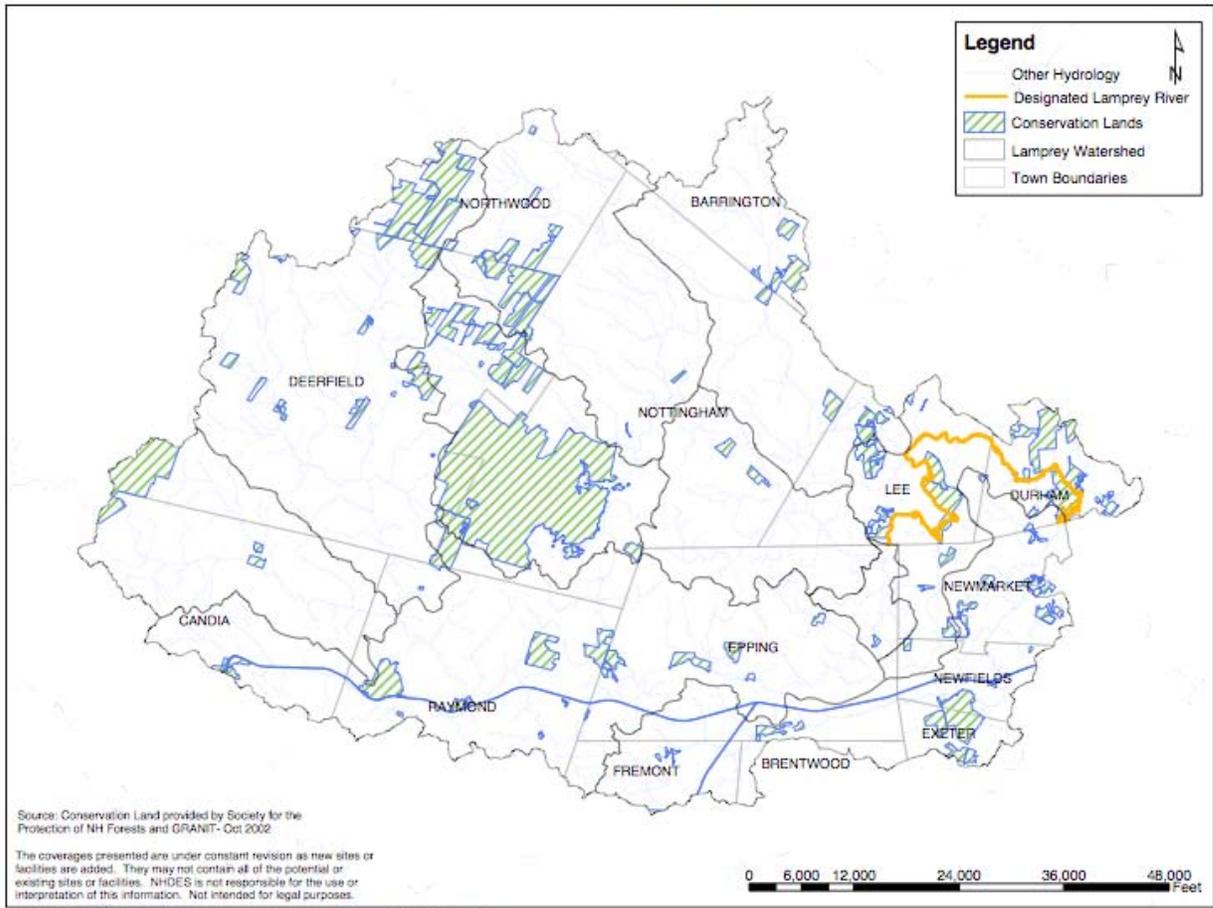
Lamprey River at Packer's Falls

The following map is taken from the New Hampshire Department of Environmental Studies Instream Flow Pilot Program Website.

[http://www.des.state.nh.us/rivers/instream/Lamprey/lamprey\\_maps.htm](http://www.des.state.nh.us/rivers/instream/Lamprey/lamprey_maps.htm)

Please use the map to become familiar with the boundaries of the watershed and the designated reach for the Lamprey Instream Flow Study. We hope this will assist you in completing the following survey.

### Conservation Lands - Lamprey River WMPA



## Possible Conflicts in the Lamprey Watershed

All natural resource management issues involve tradeoffs and there are often conflicts amongst different interest groups. A primary goal of conducting the interviews you participated in was to identify the many interests as well as areas of possible conflict amongst the various interests. Because the interviews were conducted with a variety of different stakeholders who use and appreciate the river in many ways, there were many areas of possible discord, including the list below. *Please read these possible conflicts and rank each conflict on how important you think it is to consider in the development of the Water Management Plan a scale from 1-10, with 1 being the most important and 10 being the least important.*

1. Read description of conflict



2. In the right hand column, please rank the conflicts on how important you think they are to consider in the Water Management Plan Development. Use rankings from 1-10, with 1 being the most important and 10 being the least important.



<i>Description of Possible Conflict</i>	<b>Ranking</b>
<p><b>1. Boundaries of Instream Flow Study</b> The portion of the river involved in the Lamprey Instream Flow study is located in the towns of Durham and Lee, however the Water Management Plan may affect other towns in the watershed.</p>	
<p><b>2. Commercial Uses vs. Ecological Uses</b> Using the Lamprey for business and development purposes can conflict with the needs of fish and wildlife in the river.</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div>	
<p><b>3. Extractive Use vs. Active Use vs. Passive Use</b> People can use the Lamprey by taking water from the river, using it for recreation, or enjoying it for scenic or ecological values.</p> <div style="display: flex; justify-content: space-around; align-items: center;">    </div>	
<p><b>4. Right to Current Use of Water vs. Right to Future Use of Water</b> Some people/groups in the watershed who are not currently using water from the river may want to use water from the river in the future.</p>	

<i>Description of Possible Conflict</i>	<b>Ranking</b>
<p><b>5. Confidence in the Decision Making Process</b>  Those that have confidence in the decision making process may be more willing to accept the outcomes of the Water Management Plan. Those that lack confidence in the decision making process may be less likely to accept the outcomes.</p> 	
<p><b>6. Town vs. Town</b>  Towns may not be willing to cooperate over water use issues or other issues related to the river.</p>	
<p><b>7. Development of Future Water Supplies vs. Physical Development that Usually Follows New Water Supplies</b>  When looking for alternatives to the Lamprey River for water supply, developing new water supplies is an option for some. However, with the development of new water supplies often comes more physical development (housing, business, etc.).</p> 	
<p><b>8. Riparian Landowners vs. Other Users of the River</b>  Those that own land on the river may have more access to the water and different values than other users of the river</p>	
<p><b>9. Dam Usage on the River</b>  Dams can be used to create reservoirs for recreation or they can be used for water supply and flow management or both.</p> 	
<p><b>10. Complete Water Use vs. Some Water Recycled Back into the System</b>  Some water users who withdraw from the river may feel that they should be given special consideration because some of their water use was recycled back into the system.</p>	

Please indicate which of the following things may conflict by drawing a line between the words listed below. You may draw multiple lines and the lines do not need to go from one column to another, they can be in the same column.

Fish and wildlife habitat

Economic development

Housing values

Recreation

Access to the river

Protection of land along the river

Health effects

Agricultural needs

Water supply

Water quality

Property taxes

Cultural/historical values

Public input

**Other Comments:**

We truly appreciate your continued involvement in the Lamprey River Instream Flow Study and Water Management Plan Development. Please provide us with any comments you might have regarding, this survey, the Instream Flow Study and Water Management Plan. Your opinions matter!

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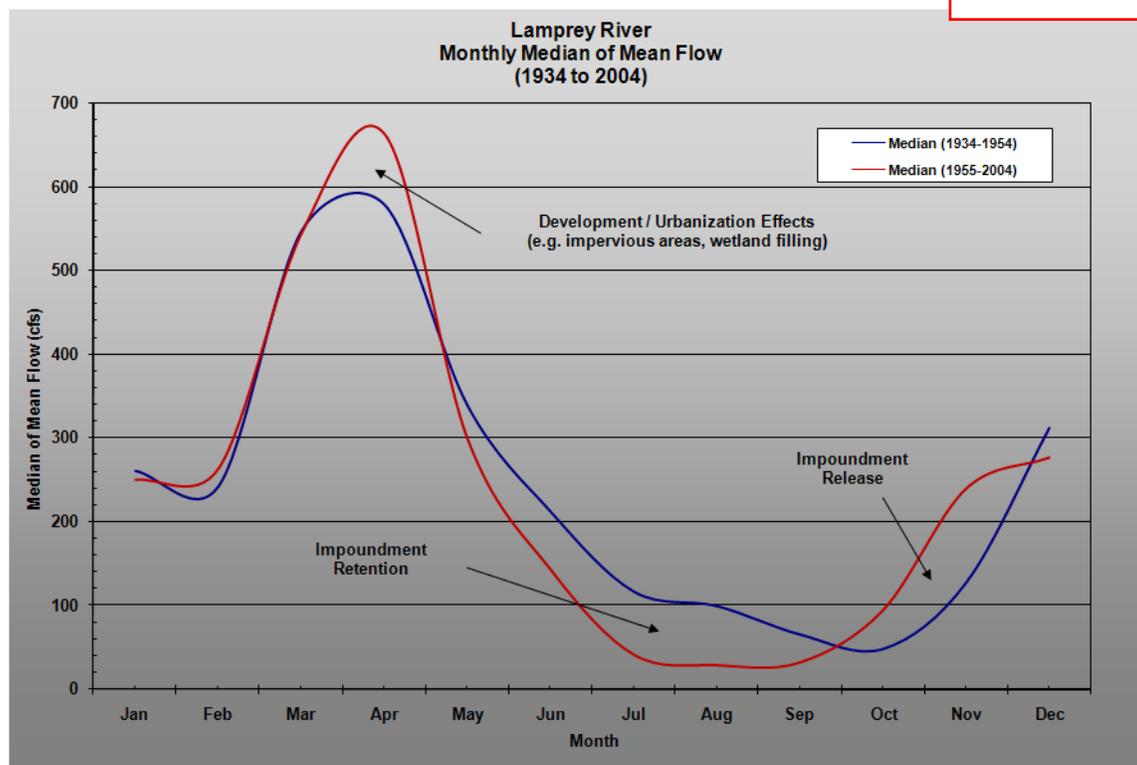
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Thank you for your participation!



**Figure 11-5. Flows in the Lamprey River have been significantly affected over the years by the construction of dams and changes in their operation. Data Source: U.S. Geological Survey, 2005.**

Owners of homes or commercial interests that have built in areas that could be inundated from a dam failure flood typically know little about the potential devastation that an upstream dam could cause should it fail. Even if people are aware of dams, they still have unrealistic expectations of the ability of the dams to reduce flooding downstream. Many dam owners do not realize their responsibility and liability toward the downstream public and environment. Adequate understanding of proper dam maintenance and upgrade techniques is a typical problem among many owners.

## 11.3 Current Management and Protection

### 11.3.1 Ongoing and Recently Passed Legislation

#### *Increased Fees to Support Inspection*

During the 2006 legislative session, the New Hampshire Legislature passed HB 664, which increases the fees charged for a permit to construct or reconstruct a dam as well as the annual dam registration fees. In addition to covering the costs of inspection and permitting, the resources provided with these fee increases will allow DES to increase follow-up inspections and institute enforcement actions, where necessary, to reduce the number of non-compliant dams by 75 percent.