ISINGLASS RIVER MANAGEMENT PLAN

Prepared for the

Isinglass River Local Advisory Committee

by the Strafford Regional Planning Commission

June 30, 2008

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The Isinglass Local Advisory Committee (IRLAC) prepared the River Management Plan with assistance from the Strafford Regional Planning Commission and the NH Department of Environmental Services Rivers Management and Protection Program. The Plan was completed in June 2008.

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The Isinglass River Local Advisory Committee recognizes the professional contributions to this plan of Steven Couture, NH Rivers Coordinator (NHDES, Rivers Management and Protection Program), and the stakeholders and partners that provided technical and editorial assistance in development of this document.

MISSION STATEMENT

The Isinglass River, the river corridor and the greater Isinglass watershed have experienced and continue to experience effects of increased development and population growth in the coastal watershed of southeast New Hampshire. Although development immediately adjacent to the river has been minimal, there remain a large number of undeveloped parcels within the river corridor. In addition, development adjacent to the river's tributaries has resulted in construction of numerous road crossings, and loss of forested lands and open space within the watershed.

The Isinglass River Management Plan (the Plan) proposes a management approach focused on protecting and conserving the rivers many resources, protecting riparian and aquatic habitat, advocating for water quality and quantity to sustain aquatic and recreational uses, and balancing the development of land and water uses for recreation with other public needs within the river corridor and watershed.

The Isinglass River Local Advisory Committee (IRLAC) advocates for implementation of the Plan and supports integration of its goals and strategies by the corridor communities in their planning initiatives and land use decisions.

The mission of the Isinglass River Local Advisory Committee is to carry out its duties and responsibilities established by the New Hampshire River Management and Protection Program (NH RSA Chapter 483) to protect and maintain the resources values and characteristics of the Isinglass River.

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CHAPTER I. INTRODUCTION

A. Background, History and Accomplishments

Isinglass River Protection Project

Formed in 2000, the Isinglass River Protection Project (IRPP) was comprised of a group of local citizens who organized a strong network of support through educational outreach programs, petitions and public meetings. Their members included the "Kids of the River, a group of Barrington Middle School students and two of their parents. The Kids of the River committed themselves to learning about the river and promoting its protection. The students were exceptionally well received during their testimony before the NH House of Representatives committee considering the Isinglass nomination for designation. The IRPP lead efforts to designate the Isinglass River under the NH Rivers Management and Protection Program. Designation was received in 2002. The nomination showcased the river's values and importance to the local communities as a valuable environmental, historical and recreational resource. Following designation of the river, several members of the IRPP were appointed as members of the Isinglass River Local Advisory Committee (IRLAC).

Isinglass River Management Plan: Building Public Awareness and Support (January 2006)

The Isinglass River Local Advisory Committee (IRLAC) began work under a grant from the NH Coastal Program, "Isinglass River Management Plan: Building Public Awareness and Support" during the spring of 2004 which was completed by December 2005. The project goals were to increase public awareness of the Isinglass River as a special natural resource and to increase public support for protection measures and river management planning in the region. In order to develop public support for the Isinglass River, IRLAC focused its efforts to raise public awareness of the river and to publicize the successful nomination of the river into the State of New Hampshire's Rivers Management and Protection Program (RMPP).

The IRLAC began by introducing themselves to the local land use boards in the three riparian communities – the Towns of Strafford and Barrington, and the City of Rochester. IRLAC members and the NH Rivers Coordinator, Steve Couture, met with the Planning Boards of these communities in the spring of 2004. As a result, all three communities agreed to involve the IRLAC in the local planning process by referring land development applicants to the IRLAC early in the site plan development process. IRLAC sent letters to the Planning Board Chairmen in Strafford and Barrington in December 2004, as a reminder and documentation of this agreement for IRLAC project review. The process has been followed successfully, and the IRLAC has reviewed numerous site plan applications, including development projects in Rochester, a residential subdivision in Barrington, several dredge and fill permit applications in the river corridor area, and a large residential subdivision to be located along the "natural" stretch of the river in Strafford. In addition, all three communities have adopted extra protection measures for the Isinglass River into their respective local zoning ordinances.

The IRLAC also completed a landowner survey, which was mailed to all riparian households, accompanied by a letter of introduction and the DES Isinglass River fact sheet. The survey was

undertaken in coordination with the Isinglass River Protection Project, the citizen's group that came together to forward the nomination of the Isinglass River into the RMPP. Members of the former IRPP remain active in river protection, stream assessment, and water quality testing. The survey results have indicated that the public recognized the importance of the Isinglass River as a special natural resource and conservation area.

To publicize the Isinglass River and promote stewardship, the IRLAC participated in several area festivals in 2004, 2005 and 2007. The IRLAC booths at these events focused on wildlife information (including NH Fish & Game's fur collection), and provided a variety of Isinglass River maps, fact sheets, Shoreland Protection stewardship information sheets, and maps of hiking trails near the river. Finally, the IRLAC produced a promotional brochure for the Isinglass River. The brochure has been widely disseminated, and has helped get the word out about the special nature of the river as a unique regional natural resource.

Isinglass River Conservation Corridor Project in Strafford

In early 2008, a proposal by the Trust for Public Land (TPL), the Town of Strafford, and Bear-Paw Regional Greenways to conserve almost 300 acres along the Isinglass River was ranked first in the nation out of 44 projects eligible for federal Coastal and Estuarine Land Conservation Program (CELCP) funding. The New Hampshire congressional delegation also lent their support to the proposal. TPL led the effort by negotiating with the landowner and preparing the grant application. The Strafford Conservation Commission agreed to contribute to the project. The project partners are also working to secure the $1.3 million CELCP grant as well as support from NH Fish and Game, the Land and Community Heritage Investment Program (LCHIP), the Strafford School Administrative Unit, and private landowners.

This project will protect 7,800 feet of frontage along the Isinglass, property that was originally slated and approved for a 58-unit housing development. This is an extremely valuable conservation effort since the Isinglass is one of only 15 rivers in NH that are officially recognized as having outstanding natural and cultural resources. It is also home to vital habitat for a variety of wildlife species and it is a popular recreational destination for fishing, hiking, and for canoeing and kayaking. The Isinglass River corridor possesses some of the highest quality wildlife habitat in the state and the presence of six threatened or endangered species at either the state or national level have been reported in the area.

B. Necessity of the River Management Plan

In June 2002, the Isinglass River became one of 15 rivers designated by the Governor and Legislature of the State of New Hampshire as deserving of extra protection under the state's Rivers Management and Protection Program (RMPP). The designation recognized the special qualities of the Isinglass River and, under the provisions of RSA 483, the designation provides increased protection against the construction of new dams, damaging channel alterations, water quality impairment, and the siting of solid and hazardous waste facilities in the river corridor.

While designation of the Isinglass River improved the protection and management of the river itself, ongoing efforts at the local level are needed to address the use and conservation of the river corridor and watershed. A growing recognition by local citizens and officials of the Isinglass River's valuable contribution to the overall quality of life in their communities is evidenced by the twenty-four letters of support submitted in conjunction with the Isinglass designation into the RMPP.

Purpose
The primary purpose of the Isinglass River Management Plan is to incorporate the goals of the IRLAC, the corridor communities and the river users; and to protect the rivers natural, recreational, cultural and historic resources.

C. River Management Plan Purpose and Goals

The purpose of the Isinglass River Management Plan is to:

1. Identify exiting resources and current conditions
2. Identify priority management issues
3. Prioritize management issues and develop strategies to address them
4. Develop and implement an action plan to achieve the management priorities

The primary goal of the plan is to establish a unified framework from which river corridor communities and watershed communities can work together to achieve protection of the Isinglass River and its resources. Priority management issues identified in the plan include the following:

1. Water Quality and Quantity Protection
2. Flood Management and Remediation
3. Land Protection - Resource and Habitat Conservation
4. River Corridor and Watershed Planning
5. Stewardship, Education and Outreach

D. Scope of the River Management Plan

The River Management Plan will focus on the river corridor as described above and will consider the character, resources, land use and development within the greater Isinglass River watershed in order to comprehensively evaluate linkages between river and watershed resources and uses, and to assess any potential threats to the river.

The River Management Plan will identify short-term, intermediate and long-term goals for river and watershed protection along with strategies to address them. An Action Plan will organize the goals and strategies in a timeframe that allows for effective and timely implementation.

E. Plan Development Process and Participants

The IRLAC worked with the Strafford Regional Planning Commission to develop the Isinglass River Management Plan. Tasks completed in development of the Plan included: mail surveys sent to property owners and elected officials; interviews with the Conservation Commissions in the Towns of Barrington and Strafford and the City of Rochester; key person interviews with representatives from local governments and agencies and nonprofit groups active in the watershed; and public informational meetings for review and comment on the draft and final river management plans.

Public Participation Process

Participants: Key Person Interviewees; elected officials and town administrators of Strafford, Barrington and Rochester; Strafford, Barrington and Rochester Planning Offices, Planning Boards and Conservation Commissions, and the Cocheco River Watershed Coalition.

1. Notified participants and watershed stakeholders of the opportunity to review and comment on the Final Draft River Management Plan to Participants.
2. Made available Final Draft River Management Plan to the general public for review and comment on the Strafford Regional Planning Commission website.
3. Notified elected officials, town and city staff, local land use boards, conservation. commissions, stakeholders and other interested parties in the river corridor and watershed of the Community Meeting scheduled for June 2, 2008.
4. Submitted the Final River Management Plan to NH DES Rivers Coordinator for review and comment.
5. Met with IRLAC at their June 2008 meeting to finalize the River Management Plan.
6. Distributed the River Management Plan to IRLAC, watershed communities and other stakeholders in the region.
7. Posted the River Management on the SRPC website for access to the public.
8. Distributed press release to regional media outlets to notify the public of River Management Plan completion and where the Plan can be accessed.

CHAPTER II. THE ISINGLASS RIVER DESIGNATION

As part of its designation as a protected river, the Isinglass River was divided into three segments based on the land use and environmental characteristics of the river and river corridor – a natural segment and two rural segments. Following is a detailed description of each segment and a map showing their locations along the river corridor.

Table 1. Location and Length of Designated River Segments

Segment Designation	Location	Segment Length (linear miles)
Rural River	In the Town of Stafford from the outflow of Bow Lake Dam to immediately downstream of the Route 202A bridge	0.54
Natural River	From immediately downstream of the Route 202A bridge in the Town of Strafford to immediately upstream of the Route 126 bridge in the Town of Barrington	5.75
Rural River	From immediately upstream of the Route 126 bridge in the Town of Barrington, to the confluence with the Cocheco River in the City of Rochester	11.64
Total Miles		**17.93**

A. Natural River Segment and Requirements

The middle reach of the Isinglass River from immediately downstream of the Route 202A bridge in the Town of Strafford to immediately upstream of the Route 126 Bridge in the Town of Barrington, a distance of 5.75 miles, is designated as a "natural river". Natural rivers constitute outstanding natural resource waters and are defined under RSA 483 as *"free-flowing rivers or segments characterized by the high quality of natural and scenic resources. River shorelines are in primarily natural vegetation and river corridors are generally undeveloped. Development, if any, is limited to forest management and scattered housing.*" The lack of development, free flowing nature of the river, wetland complexes, and undisturbed riparian land that exists through this section clearly meets the requirements of this classification.

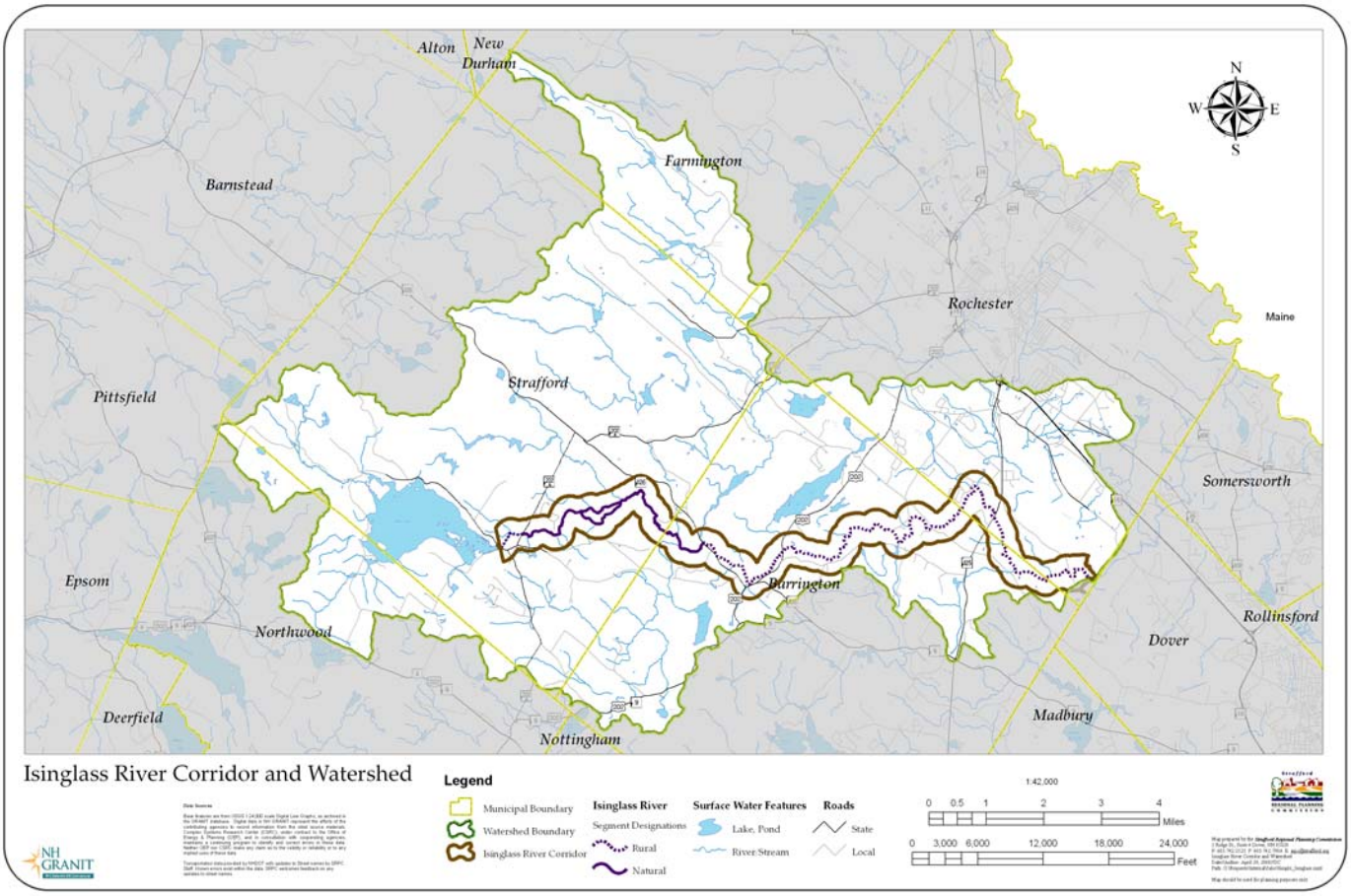
B. Rural River Segment and Requirements

The River is a "rural river" in the Town of Stafford from the outflow of Bow Lake Dam to immediately downstream of the Route 202A bridge, a distance of 0.54 miles; and from immediately upstream of the Route 126 bridge in the Town of Barrington, to the confluence with the Cocheco River in the City of Rochester, a distance of 11.64 miles.

Rural rivers are defined under RSA 483 as *"...those rivers or 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, diversion works and other minor modifications."* The Isinglass River, as it flows through these

sections, travels under numerous bridges and a combination of extensive forested uplands and wetlands, limited commercial development, and scattered residential housing. The result is a predominantly undeveloped section of river that clearly meets the definition of a rural river.

Figure 1. Watershed and Designated Segments Map



C. Comprehensive Shoreland Protection Act (CSPA)

As compiled by NH Office of Energy and Planning, the Isinglass River is a fourth order river from its juncture with Nippo Brook in Barrington to its confluence with the Cocheco River in Dover. Fourth order rivers and streams are subject to the requirement of the CSPA. However, with the 2007 changes to the CSPA, the entire designated length of the Isinglass River – from Bow Lake Dam to its confluence with the Cocheco River- is now subject to the requirements of the CSPA as a designated river. As announced in May 2008, the 2007 changes to the CSPA will take effect July 1, 2008.

D. River Corridor and Watershed Characteristics

River Corridor

As defined by RSA 483:4, the Isinglass River Corridor includes the river and the land area located within a distance of 1,320 feet (one quarter mile) of the normal high water mark or to the landward extent of the 100 year floodplain as designated by the Federal Emergency Management Agency (FEMA), whichever distance is greater. The Isinglass River corridor is located within the communities of Strafford, Barrington and Rochester consisting of 4,768 acres of land and water. Refer to the river corridor and designated river segments shown in Figure 1.

Table 2. River Corridor and Watershed Acreage by Community

Community	% Community in Watershed	Corridor Acres	Watershed Acres	% Watershed Area
Barrington	44	2,612.7	13,638.2	26.5
Dover	0.1	0	13.1	0.03
Farmington	17	0	3,925.3	7.6
New Durham	<0.1	0	0.5	<0.1
Northwood	17	0	3,252.3	6.4
Rochester	24	812.7	7,078.5	13.8
Strafford	72	1,342.2	23,487.0	45.8
Total		**4,767.6**	**51,398.6**	

Watershed

The Isinglass River watershed spans more than 10 times the area of the river corridor, spanning 51,399 acres of land and water and twice as many communities. However, the three river corridor communities (Strafford, Barrington and Rochester) represent nearly 86 percent of the total watershed area. The Isinglass River watershed includes all or portions of the following communities: Barrington, Dover, Farmington, Northwood, Rochester, and Strafford. The Isinglass River corridor (land within 1,340 feet of the river's banks) extends through the communities of Strafford, Barrington and Rochester.

The Isinglass River is a tributary to the Cocheco River in the Piscataqua River Basin of southeast New Hampshire. The Isinglass River watershed comprises one-third of the Cocheco River watershed. The confluence of the Isinglass and Cocheco Rivers is near the City of Rochester and City of Dover boundaries.

Cocheco River Watershed Coalition

The Cocheco River Watershed Coalition (CRWC) - a non-profit advocacy group - was founded in 1998 to maintain a healthy watershed by identifying and protecting important natural resources, by forming a water quality monitoring network, and by educating and engaging citizens in these efforts. The Coalition has completed several comprehensive studies of the watershed including: *Cocheco River Watershed Environmental Quality Report,* February 2005 (prepared for Cocheco River Watershed Coalition, Dover, NH by Thomas R. Fargo and Danna B. Truslow, D.B. Truslow Associates, Rye, NH), *Watershed Restoration and Implementation*

Plan for the Cocheco River, June 2006 (prepared for Cocheco River Watershed Coalition, Dover, NH by Danna B. Truslow, D.B. Truslow Associates, Rye, NH). These studies include detailed information about water quality monitoring results on the Lower Isinglass River.

The *Watershed Restoration and Implementation Plan for the Cocheco River* recognizes the Isinglass River as an integral component to achieving the goals of the Plan. The Plan includes the following recommended actions relating to water quality in the Isinglass River subwatershed:

- ✓ Meet NH Class B water quality standards by 2015
- ✓ Reduce stormwater runoff volume and improve treatment at existing and future stormwater structures
- ✓ Increase use of best management practices and low impact development and innovative stormwater technology at 3 or more sites per year for no increased and/or reductions of pollutant loads

In May 2008, the Cocheco River Watershed Coalition submitted a nomination for designation of the Cocheco River to the New Hampshire Department of Environmental Services, Rivers Management and Protection Program. Indeed, designation of the Cocheco River would enhance protection and management of resources for both rivers and throughout the greater Piscataqua watershed.

CHAPTER III. RESOURCE IDENTIFICATION

A. Identification and Description of River Resources

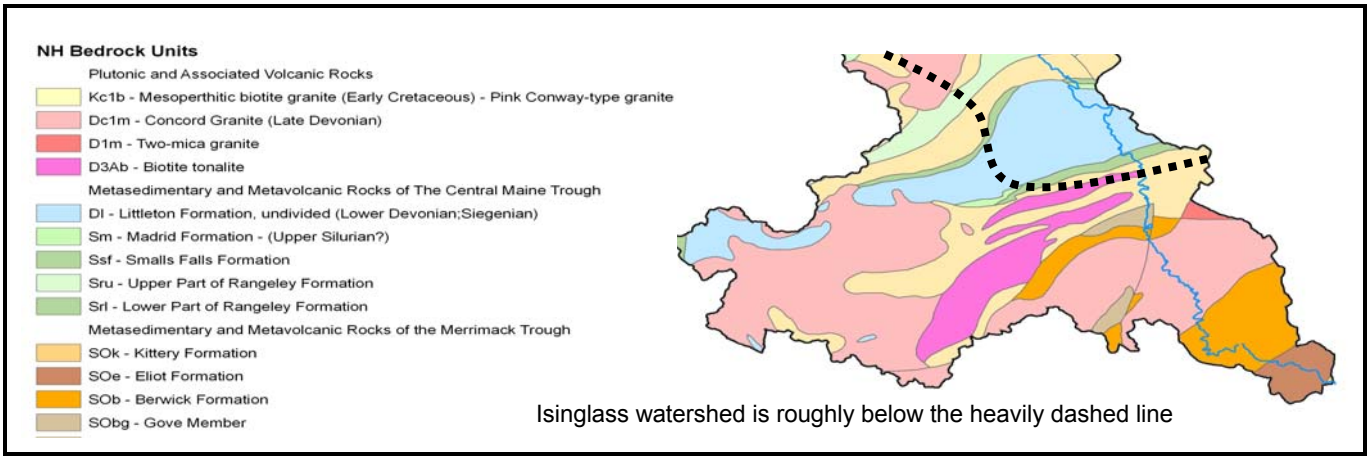
1. Natural Resources

Geologic Resources

Similar to most of New Hampshire, the bedrock underlying the Isinglass River corridor was covered by unconsolidated stratified drift deposits of till deposits following the last glaciation. These course-grained deposits are the basis for stratified-drift aquifers that are common and productive water sources in the watershed. These deposits also provide significant sources of gravel and sand for construction purposes.

Much of the Isinglass watershed is underlain by plutonic and metasedimentary rock formations. Plutonic, or igneous, formations include coarse-grained granitic rocks. Refer to Figure 2 below for the distribution and description of these rock types.

Figure 2. Geologic formations of the Isinglass River watershed



[Source: USGS, Water Resources of New Hampshire and Vermont, Pembroke, NH]

In areas where the underlying bedrock protrudes, unique rock formations are visible and account for the scenic cascades and waterfalls over which the river flows. A study of the river corridor's surficial geology concluded that the contemporary Isinglass riverbed is a remnant of a much larger river channel, known as the Mallego Channel, that was anywhere from 40 to 70 feet deep.

A valuable mineral - known as mica - was mined from the Town of Strafford during the early 1900s from igneous and volcanic bedrock formations (course grained granitic types) that are exposed on the land surface and underlay the watershed. Mica, also referred to as "Isinglass", was used commercially to make windows, lampshades, clock faces, and other goods and accounts for the river's name.

Aquifers

In New Hampshire, aquifers are classified into two major types: bedrock and stratified drift.

Bedrock Aquifers
Bedrock aquifers consist of fractured bedrock and ledge (highly fractured shallow bedrock). Interconnected fractures form fracture systems, which are highly variable in their occurrence, connectivity and potential water yield. Groundwater may be stored within fractures, and wells drilled into large fractures or extensive fracture systems may yield high amounts of groundwater. However, wells that do not hit a fractured area are likely to yield little, if any, water. One of the most reliable but often costly methods for locating fractures and fracture systems is by conducting geophysical mapping of the subsurface bedrock. Test wells are necessary to quantify potential water yield. The Isinglass watershed is underlain by bedrock, which provides sufficient yield for residential and some commercial uses.

Stratified Drift Aquifers
Stratified drift aquifers are composed of layers of sand and gravel deposited by retreating glaciers. These layers are partially or fully saturated by groundwater below the land surface. Water yield from stratified drift aquifers is highly affected by groundwater recharge from precipitation and snowmelt and atmospheric conditions (drought). These sand and gravel deposits are widespread in large river valleys and form broad gently to steeply sloping hills on the landscape.

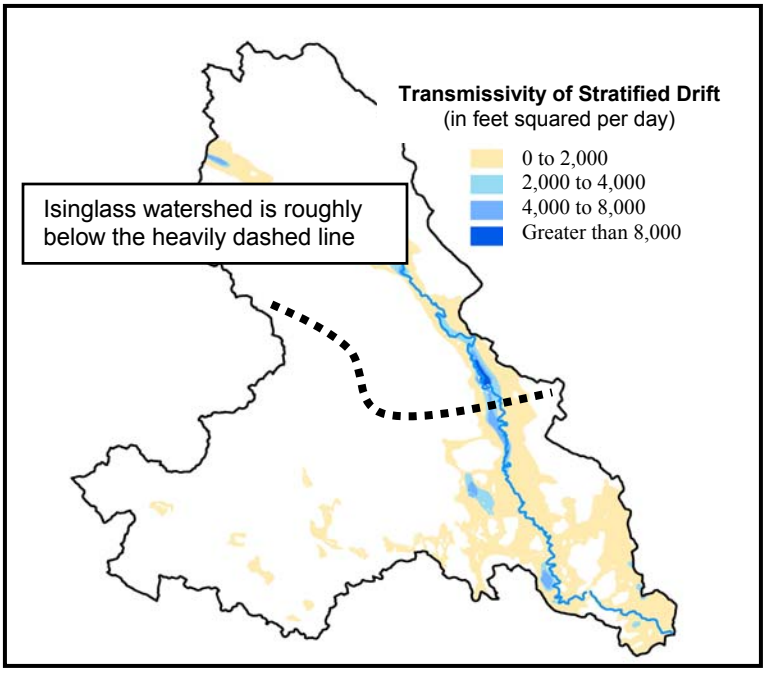
Stratified drift aquifers comprise nearly 14 percent of the total land area of the Isinglass watershed. Refer to Figure 8 - Land Use Assessment Map for the distribution of stratified drift aquifers in the watershed.

Table 3. Acreage of Stratified Drift Aquifers by Community

Community	Corridor Acres	Watershed Acres	% Watershed
Barrington	1,047.7	2,149.4	4.2
Rochester	579.4	4,238.3	8.3
Strafford	145.7	666.4	1.3
Total	**1,772.8**	**7,054.1**	**13.7**

Transmissivity
Transmissivity of stratified drift aquifers is estimated to be largely 0 to 2,000 feet squared per day, with isolated areas of 2,000 to 4,000 feet squared per day and 4,000 to 8,000 feet squared per day. Refer to Figure 3 below for the distribution and estimated transmissivity of stratified drift aquifers in the Isinglass River watershed.

Figure 3. Estimated transmissivity of the stratified drift aquifers of the Isinglass watershed



[Source: USGS, Water Resources of New Hampshire and Vermont, Pembroke, NH]

Local Protections of Groundwater Resources

Barrington has a Groundwater Protection Overlay District (Zoning Ordinance Article 12) that consists of the entire area within the municipal boundaries of the town and requires town-wide implementation of best management practices for all regulated development and development performance standards.

Rochester has an Aquifer Protection Zone (Zoning Ordinance Chapter 42.21) that limits impervious surface to 40 percent (up to 60 percent with sufficient treatment and recharge), and prohibits on-site disposal of solid wastes (other than brush or stumps), liquid or leachable wastes (other than from septic systems) or any materials or substances classified as hazardous by the State or the EPA.

Wildlife Resources

The Isinglass River corridor supports a diversity of habitats including wetlands, forests, and open space that is home to a wide variety of wildlife. Especially important are the large tracts (>500 acres) of unfragmented land that extend northward from the river corridor. Similarly, the wetland complexes scattered throughout the river corridor, such as those where Nippo Brook and the Mohawk River drain into the Isinglass, serve as important wildlife refuges and travel routes. A total of seven wildlife species listed as threatened or endangered at either the state or national level, have been reported in the Isinglass River corridor. These include the bald eagle, common loon, osprey, Cooper's hawk, common nighthawk, whippoorwill, and the small-footed bat. According to the New Hampshire Fish and Game Department, the wildlife habitat in the river

corridor is rated as moderately diverse to very diverse depending on the potential for human encroachment.

NH Wildlife Action Plan
The New Hampshire Fish and Game Department collaborated with partners in the conservation community to create the state's first Wildlife Action Plan. The plan, which was mandated and funded by the federal government through the State Wildlife Grants program, provides New Hampshire decision-makers with important tools for restoring and maintaining critical habitats and populations of the state's species of conservation and management concern. It is a pro-active effort to define and implement a strategy that will help keep species off of rare species lists, in the process saving taxpayers millions of dollars.

The New Hampshire plan is a comprehensive wildlife conservation strategy that examines the health of wildlife. The plan prescribes specific actions to conserve wildlife and vital habitat before they become more rare and more costly to protect. The New Hampshire Wildlife Action Plan reports that the Isinglass River corridor and watershed contain several Core Focus Areas and highest quality habitat in NH and in a biological region (as defined in the plan). Refer to Figure 5 - Areas of Ecological Significance for the Core Focus Areas and Highest Quality Habitat Areas identified in New Hampshire's Wildlife Action Plan map.

Table 4. Significant Habitats By Type as Identified in the NH Wildlife Action Plan

Habitat Type	Corridor Acres	% Corridor Area	Watershed Acres	% Watershed Area
Appalachian Oak/Pine	2,133	44.8	23,010	44.8
Floodplain Forest	1,321	27.7	2,108	4.1
Grasslands	154	3.2	2,649	5.2
Hemlock, Hardwood, Pine	1,566	32.9	17,270	33.6
Marshlands	195	4.1	2,410	4.7
Peatlands	25	0.5	577	1.1
Ridge Talus	2	0.1	74	0.2
Total	**5,395**	**113.3**	**48,098**	**93.6**

Vegetation and Natural Ecological Communities

The vegetation occurring within the Isinglass River corridor is consistent with that found in the coastal drainage of New Hampshire and reflects a diversity of upland, lowland, and wetland plant species. New Hampshire's Natural Heritage Inventory (NHI) reports 11 plant species from the municipalities that the Isinglass flows through that are rare, of special concern, or threatened at the state level. They are huckleberry, large yellow lady's slipper, pitcher plant, ginseng, trailing arbutus, American plum, wild lupine, slender crabgrass, riverbank quillwort, Englemann's quillwort, and climbing hempweed. Black gum/red maple and northern New England rich mesic forest types have also been identified as "exemplary natural communities", as defined by NHI, that occur within the Isinglass corridor. It is important to note that much of the riparian zone immediately adjacent to the river is largely forested and acts as an important buffer providing shade and filtering of potential pollutants.

The Land Conservation Plan for New Hampshire's Coastal Watersheds
To advance the long-term protection of exceptional and irreplaceable natural, cultural, recreational and scenic resources, the State of New Hampshire, acting through the NH Coastal Program and the NH Estuaries Project, developed a comprehensive, science-based land conservation plan - *The Land Conservation Plan for New Hampshire's Coastal Watersheds* (2007). The overarching goal of the Plan is to focus conservation on those lands and waters that are most important for conserving living resources - native plants, animals, and natural communities - and water quality in the coastal watersheds. The Plan offers regional strategies for maintaining diverse wildlife habitat, abundant wetlands, clean water, productive forests, and outstanding recreational opportunities into the future.

The Plan identifies Conservation Focus Areas – areas where several resource values coincide and overlap, identifying locations with multiple conservation values and potentially higher priority for protection. *Conservation Focus Areas* are considered to be of exceptional significance for the protection of living resources and water quality in the coastal watersheds and consists of two parts: the Core Focus Area and Supporting Landscape Area. *Core Focus Areas* contain the essential natural resources for which the focus area was identified, with the boundary fitted to the real world of roads, forest edges, rivers and wetlands. *Supporting Landscape Areas* comprise the natural lands that buffer and sometimes link core areas and help to maintain habitat and ecological processes. The Core Focus Areas and Supporting Landscape Areas identified in the Isinglass River corridor and watershed include: Blue Hills (Farmington, Strafford), Upper Isinglass (Strafford, Barrington), Middle Isinglass (Barrington), Lower Isinglass (Barrington), Preston Pond (Barrington, Rochester), and Rochester Neck (Barrington, Rochester). These Areas are shown in Figure 5 – Areas of Ecological Significance Map.

Table 5. Core Focus Areas and Supporting Landscape Areas Identified in the Isinglass River Corridor and watershed by *The Land Conservation Plan for New Hampshire's Coastal Watersheds* (2007)

Conservation Focus Area	Corridor Acres	% Corridor	Watershed Acres	% Watershed
Blue Hills CFA	0	0	14,721.2	28.6
Blue Hills SLA	81.5	1.7	2,819.0	5.5
Rochester Neck CFA	500.1	10.5	1,073.0	2.1
Lower Isinglass CFA	729.2	15.3	1,251.9	2.5
Lower Isinglass SLA	80.5	1.7	382.8	0.7
Preston Pond CFA	0	0	342.5	0.7
Preston Pond SLA	0	0	398.6	0.8
Middle Isinglass CFA	277.3	5.8	504.4	1.0
Middle Isinglass SLA	30.3	0.6	330.8	0.6
Upper Isinglass CFA	685.0	14.4	853.8	1.7
Upper Isinglass SLA	505.7	10.6	1,311.4	2.6
Bumfagging Hill CFA	0	0	121.5	0.2
Bumfagging Hill SLA	0	0	174.5	0.3
Stonehouse Brook CFA	0	0	726.5	1.4
Stonehouse Brook SLA	0	0	1,110.1	2.2
Total Area	**2,889.5**	**60.6**	**26,121.7**	**50.8**

CFA = Conservation Focus Area SLA = Supporting Landscape Area

Forests

Forested lands comprise 72 percent and 74 percent of the river corridor and watershed, respectively. Forested lands include a network of interspersed tributary streams and wetland complexes, including 2,946 acres of forested wetlands. The high percentage of forested conditions indicates a very low development density in the river corridor and watershed overall. As shown in Figure 6 - Base Map, many tributaries, wetlands and other surface waters are buffered by forest cover.

Table 6. Forest Cover by Acreage and Type

Forest Type	Corridor Acres	% Corridor	Watershed Acres	% Watershed
Mixed Forest	2,335.3	48.9	23,671.6	46.1
Beech/Oak	206.6	4.3	5,493.9	10.7
Other Hardwoods	240.6	5.1	4,390.9	8.5
White/Red Pine	531.3	11.1	3,280.4	6.4
Hemlock	30.9	0.7	646.7	1.3
Forested Wetland	103.9	2.2	536.0	1.0
Orchard	0	0	23.7	0.1
Total	**3,448.7**	**72.3**	**38,043.2**	**74.0**

Wetlands

Within the watershed, wetlands identified by the U.S. Fish and Wildlife, National Wetlands Inventory (NWI) are located primarily adjacent to the Isinglass River and the major tributaries. Wetland types include freshwater emergent (seasonal or permanent open water), forested and shrub, riverine, lake, and pond environments. These freshwater wetlands constitute important riparian habitats within the watershed drainage system. Tables 7 and 8 report the acreage of wetlands by type and by community within the corridor and watershed.

Table 7. Wetlands by Type and Acreage in the River Corridor and Watershed

NWI Wetland Type	Corridor Acres	% Corridor Area	Watershed Acres	% Watershed Area
Freshwater Emergent	44	0.9	676	1.3
Freshwater Forested/Shrub	429	9.0	2,946	5.7
Freshwater Pond	16	0.4	283	0.6
Lake	1.1	0.02	67	0.1
Riverine	20	0.4	35	0.1
Total	**510**	**10.7**	**4,006**	**7.8**
Very Poorly Drained Soils (Hydric A)	177	3.7	2,742	5.3
Poorly Drained Soils (Hydric B)	411	8.6	5,068	9.9

[Source: National Wetlands Inventory (NWI)]

As shown in Figure 6 - Base Map, Strafford, Barrington and Farmington have numerous isolated wetland complexes interspersed among large forested areas and within large blocks of

undeveloped and agricultural lands. Wetlands are also prevalent within the riparian areas of the Isinglass River and many of the smaller tributaries.

In Dover and Rochester, the majority of wetlands are located on undeveloped forested lands, agricultural lands, within the riparian corridors of the Isinglass River and the Cocheco River and smaller tributaries. Several isolated wetland complexes are interspersed among large forested areas within large blocks of undeveloped lands.

Table 8. Wetland Acreage in the River Corridor and Watershed by Community

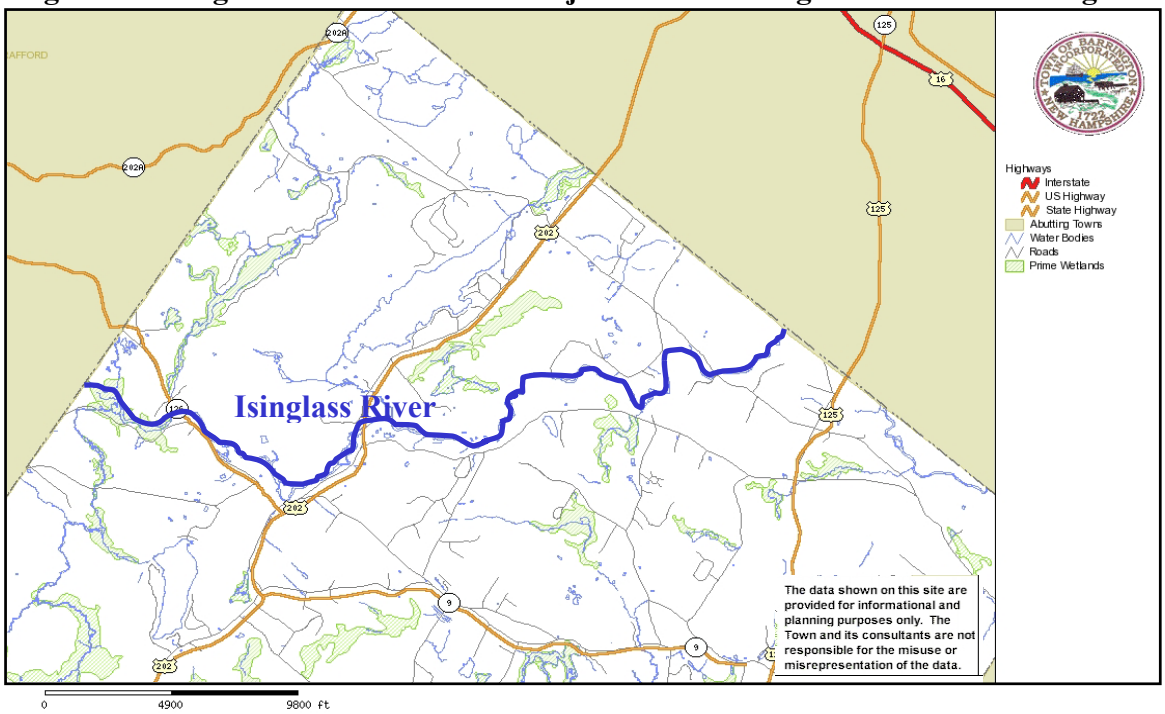
Community	Corridor Acres	Watershed Acres
Barrington	257.2	1,315.0
Farmington	0	287.6
Northwood	0	264.4
Rochester	73.7	423.9
Strafford	172.2	1,715.1
Total	503.1	4,006.1

[Source: National Wetlands Inventory (NWI)]

Prime Wetlands of Barrington

The Town of Barrington has designated Prime Wetlands, some of which are located within the Isinglass River corridor and all are within the watershed. The Barrington Zoning Ordinance, Article 9 Wetlands Protection District Overlay requires that a minimum buffer of one hundred (100) feet be maintained from the edge of a designated Prime Wetland. The ordinance provides that Planning Board may require a larger buffer around a Prime Wetland if an assessment of its functions indicates that such an increase is warranted to protect the roles the wetland serves that of value to the public or the environment.

Figure 4. Designated Prime wetlands adjacent to the Isinglass River in Barrington



Streams and Rivers

As reported in the table below, the Isinglass River flows for 17.4 miles within the watershed. Tributary streams and rivers comprise 24.9 miles within the Isinglass corridor and 135.3 miles within the watershed. The Isinglass mainstem represents 13 percent of the total stream and river miles in the watershed.

Table 9. Miles of Tributary Streams and Rivers in the River Corridor and Watershed

Resource	Type	Watershed Miles	% Watershed Miles	Corridor Miles	% Corridor Miles
Isinglass River and River Segments				17.4	--
	Rural 1	11.1	8.2	11.1	44.5
	Natural	5.8	3.5	5.8	23.2
	Rural 2	0.5	0.4	0.5	2.1
Cocheco River		5.8	4.3	--	--
Streams/Rivers	Intermittent	58.1	42.9	3.1	12.3
	Perennial	77.3	57.1	21.9	87.7
	First Order	73.5	54.3	5.0	38.6
	Second Order	26.3	19.5	2.0	14.8
	Third Order	15.5	11.5	5.9	43.5
	Fourth Order	20.0	14.8	12.1	3.2
	Fifth Order	0.02	0.01	0	0
Total Miles		**135.3**		**24.9**	

[Source: National Hydrography Dataset (NHDES) November 2006]

Primary headwater streams - first order streams - comprise 54 percent of the total tributary stream miles within the watershed. Headwater streams having a watershed area less than one square mile are considered primary headwater streams, and can be ephemeral, intermittent or perennial. The health of larger streams, rivers, and other surface waters in the watershed depend upon an intact primary headwater stream network. In particular, the stream network in the upper parts of the watershed greatly affects downstream water quality.

The importance and benefits provided by primary headwater streams include: reduction of sediment delivery downstream, reduction in nutrient loading (nitrogen and phosphorous), flood storage and control, and wildlife habitat corridors and aquatic habitat. The economic reasons to protect and improve primary headwater streams include: protection of public drinking water sources; maintenance of recreational uses of lakes, ponds and rivers; minimizing damage to infrastructure (bridges, culverts, dams) and property; and maintaining channel morphology and land stability.

Fishery

Although the Isinglass River is naturally a warm water fishery, the river is managed by the NH Fish & Game as a put-and-take coldwater fishery that provides habitat for approximately 20 resident warm and coldwater fish species. Naturally occurring game species include the small and largemouth bass. Naturally occurring nongame fishes include common species such as bluegill, common shiner, fallfish, brown bullhead, and the common sucker. An uncommon

nongame species, known as the blacknose shiner, is found in the Isinglass River and has very limited distribution in New Hampshire. Introduced game species include brook trout and rainbow trout. The river is stocked annually with these trout species. Last stocked in the Isinglass River in 1994, brown trout was recently reintroduced. Much of this stocking occurs in the Town of Barrington between routes 126 and 202.

The New Hampshire Fish and Game Department reports a diverse range of fish habitats in the Isinglass River. The free flowing nature, an extensive riparian buffer, high water quality (see below), and varied substrate types of the Isinglass River are the primary factors that account for the diverse habitats in the river.

Although the Isinglass has no dams, culverts for road crossings may act as barriers to fish passage particularly during periods of low flow, because of inadequate size, shape, design, installation, and/or maintenance. Barriers may occur due to excessive culvert height, accelerated stream velocity, and other factors such as excess sediment deposition. Assessment of inadequate culverts would need to be included as part of a feasibility study for fish passage improvement. In some cases, correction of one or more inadequate culverts may be required to improve passage upstream.

Water Quality

The Isinglass River has been designated a Class B water by the General Court. The Department of Environmental Services has periodically monitored (1990, 1998) the water quality of the Isinglass River at two locations, the Route 202 Bridge in Barrington and Rochester Neck Road Bridge in Rochester. In the summer of 2000, the IRPP first conducted volunteer monitoring on the Isinglass River and since then IRLAC members and volunteers have expanded the water quality monitoring program (refer to Chapter IV Section A for detailed description and results of the current monitoring program). Based on sampling results from 1990 through 2007, the river fully supports the standards of this water quality goal. The significance of maintaining a high level of water quality in the Isinglass River is evidenced by the use of the river for recreational purposes, by the presence of a cold water fishery, and its use as a public water supply for the City of Dover. Water quality of the Isinglass River is also a significant contributing factor to the water quality observed in the Cocheco River downstream of their confluence. Refer to Chapter III Resource Assessment for water quality data summary.

Natural Flow Characteristics

From its headwaters at the Bow Lake dam in the Town of Strafford, the Isinglass River is one hundred percent free flowing. The Isinglass watershed is approximately 75 square miles and flows for 17.4 miles. The major tributaries of the Isinglass River include the Mohawk River, Nippo Brook, Berry's River, Green Hill Brook, and the outlets of Hanson and Ayers Ponds.

Refer to Chapter IV, Section D for discharge data from the Isinglass River gage station.

Open Space

The Isinglass River corridor is predominantly undeveloped. From it's beginning at the Bow Lake Dam, the river flows through a short section of moderately dense development in Bow Lake Village before crossing under route 202A. From this point to the route 126 crossing in the Town of Barrington (approximately 6 miles) the river flows through a large tract of undeveloped land consisting of forested uplands and wetlands. Only one distant residential development is contained within the river corridor in this section of river. Access to the river through this stretch is limited to a closed Class VI road, known as Pig Lane, which provides access to a 17-acre conservation area leased by the Town of Strafford from the New Hampshire Water Resources Council.

Though some development is present below the Route 126 bridge downstream to the Route 202 bridge, the river is best characterized as rural, with minimal impact caused by roadways and scattered residential housing. Below the Route 202 Bridge, the nearest roadway to the river is Scruton Pond Road. From here downstream to the Green Hill Road Bridge, high banks covered with a mix of deciduous and coniferous forests and a few seasonally wet floodplain areas buffer the river. Through this section of the river corridor, much of the land abutting the river is privately owned and remains undeveloped.

A majority of the development within the Isinglass corridor occurs from the Green Hill Road Bridge downstream to the river's confluence with the Cocheco River. This development, however, is limited to small cluster housing, small commercial development on NH Route 125, and bridge crossings. In fact, one of the largest pieces of land dedicated to open space in the Isinglass corridor occurs within the City of Rochester and is owned by Waste Management of New Hampshire, known as the Turnkey Recycling & Environmental Enterprises facility. Waste Management of New Hampshire has dedicated over 100 acres of riverfront property from this operation to publicly accessible open space. Although no permanent development restrictions are placed on it, this parcel of land has a network of forested streamside trails, a picnic area, and a site for a canoe launch.

2. Managed Resources

Impoundments

There are no man-made impoundments on the Isinglass River. Six breached dam sites have been identified from a database maintained by the Department of Environmental Services. Several dams do exist on tributaries to the Isinglass River. Several beaver dams also exist in the Natural section of the river.

Water Withdrawals and Discharges

The City of Dover maintains the only registered water withdrawal (>20,000 gallons per day) on the Isinglass River. Dover withdraws an average of 830,000 gallons of water per day from the Isinglass River from a point just downstream of the Rochester Neck Road Bridge in the City of

Rochester. The water is pumped to a recharge well and serves as public water supply. One additional withdrawal point is known within the watershed, on the Berry's River, a main tributary to the Isinglass River. Water is diverted from the Berry's River to the City of Rochester's water supply reservoir. However, because the city only reports the total amount of treated water they produce it is not possible to know how much of that water comes from the Berry's River. Currently no permitted point source wastewater discharges exist on the Isinglass River.

U.S. Geological Survey and NHDES have recently reactivated a gage station on the Isinglass River. Refer to Chapter IV. Resource Assessment, Section C. Instream Flows for information and discharge statistics.

Instream Flows

As outlined in the Isinglass River Nomination, the Department of Environmental Services assisted the IRPP in an assessment of registered water withdrawals (>20,000 gallons per day) in relation to the proposed draft instream flow rules dated June 1, 2001 ("proposed rules"). The assessment identified two active registered water users within the Isinglass watershed, namely the Cities of Rochester and Dover. Both communities utilize surface waters within the watershed as municipal water supplies. Although both users report apparent exceedances of the General Standard, there are three important points that must be noted. First, the water use records utilized for this analysis represent an average of four years of data, rather than a given month within a single year. Second, stream flows from the Isinglass are estimates since no current or historical gage data exist from this river. Third, and most importantly, under the proposed rules the General Standard would only be utilized: 1) as a framework for prioritizing watersheds through which designated rivers flow that are in need of additional study for establishing watershed-specific instream flow standards, and 2) for development of a water use management plan.

The General Standard should not be viewed as an ultimate quantitative water use threshold. Rather, based on the analysis completed for the river nomination, it is apparent that the Isinglass would be one of many watersheds through which designated rivers flow that do not meet the General Standard under the proposed rules. Under the proposed rules, the Department would create a priority list for those designated rivers or sections of designated rivers that require additional water use planning. Any further action on the priority list would be subject to legislative oversight, funding appropriation, an intensive river-specific study to determine the flows that are protective of the all the river's uses, including public water supply; and a negotiated water management plan that outlines each user’s allocation of available water.

Instream Flow Pilot Projects

The Lamprey and Souhegan River In-Stream Flow Programs including their Water Management Plans to support the protected flows, are scheduled for completion in January 2009. However, there are delays that will likely extend this date for the Lamprey project. The Lamprey Program is currently completing the protected flow analysis and drafting the proposed protected instream flow report. The Lamprey Technical Review Committee (TRC) will review the first draft by June 2008, after which a public hearing will be held on the Proposed Protected Instream Flows after approval by the TRC. Following the public hearing and comment period, the Commissioner

of DES will establish the final protected flows as water quality standards for the Lamprey Designated River. Once water use and operational data for the water users and dam owners affected by the rules is compiled, dam management plans, water use plans, and conservation plans will be developed for the affected parties. These sub-plans in concert will comprise the overall water management plan designed to meet the protected instream flows. Water Management Plans become effective when adopted by the Commissioner of DES.

After the Lamprey River Pilot Program is completed, the DES will need to rewrite the instream flow rules to include the other Designated Rivers, and produce management plans for them. If the legislative review approves the Lamprey River model for developing instream flows, eventually the process will be used for other Designated Rivers including the Isinglass River.

Riparian Interests and Flowage Rights

The only known dam flowage rights on the river belong to the New Hampshire Water Resources Board and were granted by the Public Service of New Hampshire in 1962 at all historic mill sites on the river. These rights do not detail any specific flooding elevation, rather "all rights of the grantor are transferred to the grantee".

Hydroelectric Resources

There are no existing hydroelectric power production facilities on the Isinglass River. Although potential hydroelectric power sites have been identified on the river, none have been pursued. Under the state's Rivers Management and Protection Program, establishment of new dams (such as for new hydroelectric facilities) is prohibited in Natural and Rural designated river segments. This restriction applies to the entire designated length of the Isinglass River.

3. Cultural and Historical Resources

Historical or Archaeological Resources

Similar to many of the waterways of New Hampshire, there is ample evidence of pre-European settlement in the Isinglass River corridor and watershed. Both artifacts and written histories of riverside trails suggest that native inhabitants of this region utilized the Isinglass River as a food and water source, as well as a travel way. Colonization of this region by European settlers led to more intense use of the resources contained within the river corridor and surrounding watershed, including wood harvesting for ship masts and subsequent utilization of the river to transport the materials downstream to a more accessible seaport. At least nine historic mill sites are known to exist on the Isinglass River. These were used to produce a variety of goods ranging from flour to lumber. The remnants of these mill sites are still visible at several locations along the river, with perhaps the most impressive being the Locke Mill site in the City of Rochester. Other notable historic resources contained within the riverfront communities include the Ayers Lake Campground, eligible for historic listing at the state level; and the Squanamagonic Community, an example of pre-European development and a potential historic district.

Community Resources

The importance of the Isinglass River as a community resource is reflected in the local planning and protection efforts of the three communities along the River. The river is recognized extensively by the Town of Barrington and has been included in its *Regional Environmental Planning Report* and the Town's *Master Plan*. Strafford and Rochester have also recognized the importance of the river as a community resource through the lease or purchase of riverfront lands that ensure public access and protect the undeveloped nature of riparian lands.

Waste Management of New Hampshire holds an annual River Festival that serves to provide an important link to the general public by attracting many visitors to the Isinglass River and providing educational opportunities to learn about the rivers functions and valuable resources.

4. Recreational Resources

Fishery

The Isinglass River is stocked annually with approximately 5,000 brook trout and rainbow trout, and is managed by the New Hampshire Fish and Game Department as a "put-and-take" coldwater fishery. There are additional angling opportunities for warm water fish, including species such as bass. The Isinglass is considered an important seacoast trout stream by local anglers and is heavily utilized as such during May and June. Most of the fishing is done along Routes 126 and 202 in the Town of Barrington.

Boating and Other Recreational Uses

The free-flowing nature of the Isinglass River provides both challenging whitewater and relaxing flat-water boating opportunities for canoeists and kayakers. Below the Route 126 Bridge to the Route 202 bridge the river provides excellent access for anglers and paddlers. The rapids beginning along Route 126 and are best run in the spring at medium to high water. Published river guides rate the river as Class II whitewater recreational site. Less challenging stretches of the river provide paddlers with opportunities for wildlife and scenic viewing.

Swimming, hiking, and bird watching are other recreational activities that people enjoy in or near to the Isinglass River. The multipurpose recreational facility owned by Waste Management of New Hampshire provides opportunities for hiking, swimming, and picnicking. Recent efforts by the Town and volunteer groups in Barrington resulted in the establishment of a riverside park with walking trails. The Pig Lane Road access is a popular walking trail and affords excellent opportunities to see upland wildlife species such a deer and owls.

Table 10. Recreational Areas in the Isinglass River Corridor

Recreational Area	Ownership	Location
Foss Mill Site: fishing, birding, walking	State of NH, leased to Town of Strafford	Accessed from Pig Lane
Barrington Isinglass River Walk: walking trails	Town of Barrington	Scruton Pond Road (approximately 2 miles from Route 125)
Flagg Road easement/B&M: canoe access, fishing, birdwatching	City of Rochester; Guilford Transportation	Flagg Road (approximately 1.5 miles from Route 125)
Turnkey Recreational Area: Forest Management and Trail Center, hiking, scenic Locke's Falls, skiing, swimming, hunting (105 acres)	Waste Management of New Hampshire	Rochester Neck Road (off Route 125)
Access to Isinglass and Cocheco, picnicking, fishing, boating; site for a canoe launch	Waste Management of New Hampshire	Rochester Neck Road (at bridge)

Public Access

There are 14 public and private access points to the Isinglass River, some publicly owned and some privately owned.

Table 11. Public and Privately Owned Access to the Isinglass River

Location	Type of Access	Related Facilities	Ownership
Province Road bridge	Walk to River edge for viewing, fishing	Parking at edge of road	NH Water Resources Council
Route 202A bridge	Walk to River edge for viewing, fishing	Parking at edge of road	NH Department of Transportation
Foss Mill	Rough terrain for bank viewing of mill site	None	State of NH, lease to Town of Strafford
Route 126 Isinglass bridge*	Path to River edge for viewing, fishing, or canoe carry-in	Parking on road shoulder	Jon Olson
Route 126 just west of Province Road*	Walk to River edge for viewing, fishing, or canoe carry-in	Off-road parking	Heirs of Percy Berry
Route 202 bridge*	Walk to River edge for viewing, fishing, or canoe carry-in	Parking on wide shoulder	Linda and Daniel Murray, NH DOT
White Bridge off Scruton Pond Road to west side of bridge*	Walk to River edge for viewing, fishing, or canoe carry-in, walk in from road 1/4 mile	None	Town of Barrington
Brooks Road to White Bridge canoe access	Canoe access by walking in to bridge	Parking at intersection with Keliher Road	Jim and Ann Schulz, Swedish Farm
Keliher Rd. to Town Farm Road*	Walk in approximately one mile for viewing or fishing	Parking at edge of Keliher Road	Harlan Calef Revocable Trust
Green Hill Bridge with informal access to Barr Farm*	Walk to River edge for viewing, fishing, or canoe carry-in	Parking at edge of Berrys Road	Town of Barrington
Boston & Maine railway	Walk to River edge for viewing,	Parking at edge of	City of Rochester

bed off Flagg Road	fishing, or canoe carry-in	railway bed	and Guilford Transportation
Route 125 at bridge	Walk to River edge for viewing or fishing	Parking on narrow shoulder; steep path to River	Private and NH Department of Transportation
Rochester Neck Road at Turnkey Recreational Area	Off-road parking, trails, swimming, fishing, cross-country skiing, viewing of Locke Mills	Parking	Waste Management of New Hampshire
Canoe Landing	Off-road parking, trails at former site	Picnicking and parking at canoe landing	Waste Management of New Hampshire

Notes: *Indicates informal access. Access information acquired locally and from NH Office of State Planning (OSP), January 6, 1998 and from local residents. The table showing public access points has been expanded from the OSP list by local sources.

Publicly owned access points lack dedicated parking, but exist at most of the major bridge crossings (Routes 202A, 126, 202, and 125). The section of river that runs near Routes 126 and 202 has gravel parking areas where the river can be accessed for fishing or paddling. The Pig Lane Road access point provides an opportunity to view the remnants of the Foss Mill. Waste Management of New Hampshire's recreational facility is the only formal access point along the river open to the public. A number of lesser-known privately held access points exist along the river. Refer to Figure 7 - Environmental Characteristics Map for public access locations on the river corridor.

Barrington Isinglass River Walk
[from the publication Walking Trails of Barrington (2006) by James Schulz]
After the Isinglass became a designated river, the Barrington Kids of the River group began a new project. Many years ago, a 12-acre parcel of land on the Isinglass River reverted to Town ownership for non-payment of taxes by its owner. The Town voted to retain the land for future public recreational purposes, and it was this opportunity, which caught the student's attention. The Kids of the River group cleared underbrush to create a picnic area along the river and, with the help of the Barrington Trail Committee, created short trails leading down to the picnic area and the river. The trail entrance is marked with a sign in the parking area.

The River Walk trails begin off of Scruton Pond Road in the northeast part of Barrington. Going west on Scruton Pond Road from Route 125, the park entrance is about 0.5 miles past its intersection with Brewster Road (or 1.5 miles from Route 125). There is a sign near the entrance and a small parking area that allows off-road parking.

Scenery

Scenic opportunities abound in the Isinglass River corridor. Immediately upstream of the Route 202 Bridge crossing the remains of Twombley's Grist Mill can be viewed as well as the narrow sluice that the river flows through.

The Locke Mill site provides, perhaps, the most spectacular view along the river. At this location, visitors are able to observe a 25-foot waterfall and in the springtime, when water levels are high, get a sense for the power of the river.

The *Barrington Isinglass River Walk* offers a trail system (for non-motorized use) with scenic view of the Isinglass River and riparian forests. Refer to description of this site above.

Scenic Views of the Isinglass River

CHAPTER IV. RESOURCE ASSESSMENT

A. Water Quality and Biological Monitoring

Water Quality Monitoring

Water quality measurements repeated over time create a picture of the fluctuating conditions in rivers and streams and help to determine where improvements, restoration or preservation may benefit the river and the communities it supports. Water quality results are also used to determine if a river is meeting surface water quality standards. Volunteer monitoring results, meeting DES Quality Assurance and Quality Control (QA/QC) requirements; supplement the efforts of DES to assess the condition of New Hampshire surface waters. Along with data collected from other water quality programs, specifically the State Ambient River Monitoring Program, applicable volunteer data are used to support periodic DES surface water quality assessments. Assessment results and the methodology used to assess surface waters are published by DES every two years (i.e., Section 305(b) Water Quality Reports) as required by the federal Clean Water Act.

Volunteer River Assessment Program (VRAP)
The 2007 Isinglass Volunteer River Assessment Program constituted the sixth consecutive year of volunteer water quality monitoring on the Isinglass. During the 2007 season (May – September) periodic water quality monitoring was performed on the Isinglass River and some of its tributaries. Field sampling was conducted for air and water temperature, turbidity, pH, dissolved oxygen (in mg/l and % saturation) and specific conductance. Five rounds of sampling (conducted on a monthly basis) occurred at six locations on the Isinglass mainstem and at three tributary locations (Nippo Brook, Mohawk River, Berry's River) just upstream of their respective confluences with the Isinglass River. As time allowed, limited sampling was also conducted at four additional upstream tributary locations. In addition, three rounds of E. *coli* and total phosphorous samples at the six mainstem sites were collected in June, July and August and submitted for laboratory analysis. The 2007 monitoring program was conducted with the assistance of the Cocheco River Watershed Coalition, with a field metering kit donated by Waste Management of New Hampshire, laboratory analysis conducted by NHDES and funded by the Cocheco River Watershed Coalition, with a grant from the NH Coastal Program and donations of both time and materials/supplies from a dozen Isinglass volunteers.

The 2008 VRAP sampling plan includes additional tributary monitoring on Green Hill Brook, Hanson Brook, Stonehouse Brook, Spruce Brook, the outlet of Scruton Ponds, and the inlet and outlet of Ayer's Lake.

Current and historical water quality data has been analyzed and presented by NHDES in their annual "Isinglass River Watershed Water Quality Reports" available on the DES website at http://www.des.nh.gov/wmb/VRAP/isinglass.html. This data will be used for future river and tributary water quality assessment and for purposes of prioritizing IRLAC's future direction and activities within the watershed.

Table 12. Sampling Stations for the Isinglass River Watershed, NHDES VRAP, 2007

STATION ID	WATERBODY NAME	LOCATION	COMMUNITY
10-ISG	Isinglass River	Pig Lane, upstream of snowmobile bridge	Strafford
11-ISG	Isinglass River	Route 202A Bridge	Strafford
12-ISG	Isinglass River	Province Road Bridge	Strafford
04-ISG	Isinglass River	Upstream of Green Hill Road Bridge	Barrington
07-ISG	Isinglass River	Along Route 202 between Route 126 and Scrutton Pond Road	Barrington
08-ISG	Isinglass River	Route 126 Bridge	Barrington
03-ISG	Isinglass River	Route 125 Bridge	Rochester
02-ISG	Isinglass River	Rochester Neck Road	Rochester
01-HBK	Hall Brook	Canaan Road	Strafford
01-MHB	Mohawk River	Route 126 Bridge	Strafford
02-MHB	Mohawk River	Route 202A Bridge	Strafford
03-MHB	Mohawk River	Sloper/Johnsonboro Roads	Strafford
04-MHB	Mohawk River	Ridge Farm Road	Strafford
04-BRY	Berrys River	Kristie Lane	Strafford
00-BRY	Berrys River	Berry River Road	Barrington
02-NIP	Nippo Brook	Province Lane	Barrington
07-BRY	Berrys River	Haywagon Road	Farmington

Table 13. Volunteer River Assessment Program (VRAP) Data from 2002 to 2007

Parameters	D.O	pH	Turbidity	Specific Conductance	E. *coli*
Standards*	5 mg/L	6.5 – 8	<10 NTU	< 100 uS = normal; < 200 uS = low impact	See standard below
Year					
2007[+]	93% met	100% not met	100% met	96% normal 4% low impact	100% met
2006	100% met	100% not met	100% met	100% normal	not reported
2005	100% met	77% not met	100% met	92% normal 8% low impact	not reported
2004	100% met	94% not met	100% met	97% normal 3% low impact	70% met
2003	100% met	70% not met	100% met	78% normal 22% low impact	not reported
2002	100% met	56% not met	100% met	70% normal 30 % low impact	100% met

[+] Includes Tributaries
* State Attainment Standards for Class B Waters
D.O. = Dissolved Oxygen
E. *coli* Standard = 126 CTS/100mL for geometric mean of 3 samples over 60 day period or 406 CTS/100mL in any one sample

The following parameters are also measured as part of the VRAP protocol, however, no attainment standard for Class B waters have been established: specific conductance, nitrate, nitrite, ammonia, total Kjeldahl nitrogen, and total phosphorous.

VRAP Water Quality Monitoring Recommendations
Following is a summary of recommendations from the 2002 to 2007 VRAP annual reports regarding improvement of water quality monitoring in the Isinglass River watershed.

General - for all parameters monitored:

√ Continue sampling at all stations to develop a long-term data set to better understand trends as time goes on.

Dissolved Oxygen

√ If possible, take measurements between 6:00 a.m. and 8:00 a.m., which is when DO is usually the lowest, and between 12:00 noon and 3:00 p.m. when DO is usually the highest. This could be done by using a Hydrolab® DataSonde 4a multiprobe, which is an instrument that can collect data at specific time intervals (e.g., every 1-hour). The instrument can be put in the stream and left alone for a period of several days. The use of this instrument is dependent upon availability, and requires coordination with DES.

√ For 2007: Further investigation should be conducted to determine if the lower dissolved oxygen levels at station 02-ISG are natural or indicative of a dissolved oxygen problem.

pH

√ Consider sampling for pH in some of the tributaries and wetland areas that are influencing the pH of stations with measurements below state standards. Wetlands can lower the pH of a river naturally by releasing tannic and humic acids from decaying plant material. If the sampling location is influenced by wetlands or other natural conditions, then the low pH measurements are not considered a violation of water quality standards. It is important to note that the New Hampshire water quality standard for pH is fairly conservative, thus pH levels slightly below the standard are not necessarily harmful to aquatic life. In this case, additional information about factors influencing pH levels is needed. [From 2002 Isinglass River Water Quality Report]

Turbidity

√ If possible sample for turbidity during or just after wet weather; this will help to understand how the river responds to runoff and sedimentation.

E.Coli

√ Collect three samples within any 60-day period during the summer.

√ Continue to document river conditions and station characteristics (including the presence of wildlife in the area during sampling).

Biological Monitoring

Volunteer Biological Assessment Program (VBAP)

The Volunteer Biological Assessment Program (VBAP) was established in 2005 to supplement biological data collected by the New Hampshire Department of Environmental Services Biomonitoring Program. The Biomonitoring Program regularly collects detailed biological data in order to complete water quality assessments of wadeable streams. VBAP serves to educate the public about water quality issues as interpreted through biological data, build a constituency of volunteers to practice sound water quality management at a local level; and build public support for water quality protection. The Cocheco River Water Coalition began biological assessments on the Isinglass River in 2005 and 2006.

Table 14. Sampling Stations for the Isinglass River Watershed, NHDES VBAP, 2007

STATION ID	WATERBODY NAME	LOCATION	TOWN
04-ISG	Isinglass River	Upstream of Green Hill Road Bridge	Barrington
07-ISG	Isinglass River	Along Route 202 between Route 126 and Scrutton Pond Road	Barrington
10-ISG	Isinglass River	Pig Lane, upstream of snowmobile bridge	Strafford
02-MHB	Mohawk River	Along Sloper Road, downstream of residential bridge	Strafford

During 2007, trained volunteers from the Isinglass River communities collected biological samples at four stations along the mainstem and tributaries of the Isinglass River. Biological monitoring was conducted one time at each station in September. Biotic scores with corresponding narrative categories to describe general water quality were formulated based on macroinvertebrates found in the sample collected. Before collecting macroinvertebrates, an assessment of in-stream and riparian habitat was completed at each station and a representative

sampling reach was identified and measured. Macroinvertebrates were then collected, identified and counted to compute a biotic score (estimated abundance and percentage of EPT - Ephemeroptera, Plecoptera, Trichoptera – pollution intolerant species indicative of high water quality) with a corresponding narrative category describing general water quality. Additional chemical parameters were measured using VRAP Standard Operating Procedures and handheld meters provided by NH DES.

Table 15. VBAP Monitoring in the Isinglass River Watershed, 2005 to 2007

Site Number	04-ISG	10-ISG	07-ISG	02-MHB
2007 Data				
Biotic Score	3.24	4.19	3.87	3.79
Narrative Category	Excellent	Good	Good	Good
EPT (%)	72	56	85	64
2006 Data				
Biotic Score	3.25	--	--	--
Narrative Category	Excellent	--	--	--
EPT (%)	96	--	--	--
2005 Data				
Biotic Score	3.54	--	--	--
Narrative Category	Good	--	--	--
EPT (%)	134	--	--	--

EPT = Ephemeroptera, Plecoptera, Trichoptera – pollution intolerant species indicative of high water quality
Monitoring was conducted in 2005 and 2006 only at Site 04-ISG on the Isinglass River.

Lay Lakes Monitoring Program

2006 was the twenty-third year that the Bow Lake Campowner's Association participated in the New Hampshire Lakes Lay Monitoring Program (LLMP). In 2006, volunteer water quality data were collected in Bow Lake between June and September with supplemental data collected by the University of New Hampshire Center for Freshwater Biology on August 17, 2006. Generally speaking, the 2006 Bow Lake seasonal water transparency reading was high and averaged 19.1 feet; the amount of microscopic plant "algal" growth was low; and the phosphorous (nutrient) concentrations were low and reflected conditions typical of an unproductive New Hampshire Lake. Bow Lake is an "aging" lake, meaning it is transforming through the process of eutrophication, a natural process by which all lakes age and progress from clear, pristine lakes to green, nutrient enriched lakes over thousands of years. However, low dissolved oxygen concentrations near the lake bottom suggest Bow Lake is better characterized as a borderline unproductive/moderately productive "transitional" nutrient lake.

Findings from the 2006 water quality survey of Bow Lake, conducted by the University of New Hampshire Center for Freshwater Biology (coordinated by Jeffrey Schloss and Robert Craycraft) in conjunction with the Bow Lake Campowner's Association, are summarized below.

Table 16. 2006 Bow Lake Seasonal Average Water Quality Data and Water Quality Classification Criteria Used by the New Hampshire Lakes Lay Monitoring Program

Parameter	Oligotrophic "Pristine"	Mesotrophic "Transitional"	Eutrophic "Enriched"	Bow Lake Average (range)	Bow Lake Classification
Water Clarity (meters)	>4.0	2.5-4.0	<2.5	5.8 meters (range 4.7-7.3)	Oligotrophic
Chlorophyll a (ppb)	<3.0	3.0-7.0	>7.0	1.9 ppb (range 1.1-3.1)	Oligotrophic
Phosphorous (ppb)	<15.0	15.0-25.0	>25.0	8.2 ppb (1 entry)	Oligotrophic

ppb = parts per billion

B. Watershed Stream Assessments

Overview

2007 marked the initial effort by Isinglass River volunteers to develop an ongoing and useful stream assessment program for the Isinglass River. During the summer, six Isinglass volunteers met in the field to learn from him the basics of stream assessment including:

- the purpose and local community goals of stream assessment;
- field data gathering tools and techniques; and
- different methods of evaluating and reporting on field-obtained data.

During the fall of 2007, a small group of IRLAC members reviewed published approaches to stream assessment and different examples of field data sheets. The group developed a four-page field data sheet (refer to Appendix F) to assist volunteers in assessing conditions and collecting data within 100-feet of the river's edge, as well as on both sides of the riverbank. These data sheets were tested in the field along a short stretch of river just below the Route 202 Bridge in Barrington. The field test resulted in modifications being made to the data sheets.

Later in the fall of 2007, seven Isinglass volunteers gathered for an informal training session on using the new data sheets; approaches to field work; considerations for accessing the river via private property; and personal safety precautions to take while conducting stream assessments. The group then split up into two groups to perform their first assessments of two river segments on the Isinglass mainstem: one along Route 126 upstream of the junction of Routes 126 and 202; and one segment upstream of the Route 125 bridge.

Information gathered in those assessments has not yet been analyzed however the data gathered will be combined with data gathered during the 2008 season along other stream segments. Additional minor modifications were also made to the data sheets as a result of user feedback during the initial assessments.

Initial Assessment Results

Of the three locations that were assessed in 2007:

- The segment upstream of the Route 125 bridge and behind the Riviera Motel showed the largest impacts with significant amounts of trash and debris, evidence of erosion, abandoned water piping along the shore, sheds built too close to the river, etc.
- The segment downstream of the Route 202 Bridge which is a well-known fishing spot, showed some impacts of minor erosion from foot traffic, litter, and most significantly - debris from the April 2007 flooding including large asphalt pieces from the road near the bank.
- The segment upstream from the junction of Routes 202 and 126 was the least impacted of the three sites, although there was evidence of some human activity and invasive species (oriental bittersweet).

2008-2009 Stream Assessment Work Plan

Activity	Timeframe
Identify and prioritize stream segments for assessment	April – May 2008
Conduct volunteer training session	May 2008
Conduct stream assessments	May – October 2008
Evaluate assessment data and develop map of assessed segments identifying areas of concern	November- February 2009
Summarize and report findings	March 2009

C. Water Withdrawals

There are currently two active registered water users within the Isinglass watershed, namely the Cities of Rochester and Dover. Both communities utilize surface waters within the watershed as municipal water supplies. The City of Dover maintains the only registered water withdrawal (>20,000 gallons per day) on the Isinglass River. Water is diverted from the Isinglass River just downstream of the Rochester Neck Road Bridge in the City of Rochester and pumped to a recharge well, located in the greater Cocheco River Watershed, and which serves as a public water supply. The City of Rochester diverts water from the Berry's River to the City's water supply reservoir in Farmington and further downstream, to the water supply reservoir located on Route 202A both of which located in the greater Cocheco River Watershed. Both of these withdrawals represent significant inter-basin transfers of water out of the Isinglass River subwatershed.

D. Instream Flows

The Isinglass has not attained the minimum base flow requirements in recent years. Annual observations confirm that the Berry's River is flow-limited during the summer months, which may signal a response to direct water withdrawals. Annual observations confirm that the Isinglass River is also flow limited during the summer months in response to management of water levels at Bow Lake. With reactivation of the USGS gage station on the Isinglass River it may be possible to accurately determine the affects from the controlled releases at Bow Lake dam and intra-basin transfer of water from the subwatershed on instream flows. Refer to the section below for more information about the Isinglass River gage station.

After the Lamprey River Instream Flow Pilot Program is completed, and if the legislative review approves the Lamprey and Souhegan River models for developing instream flows, the NHDES will rewrite the instream flow rules to include the other Designated Rivers and management plans will be developed for these rivers. Establishment of instream flow rules and standards for the Isinglass River will likely be modeled after the results of the Lamprey River Pilot Project. The outcomes of applying an approved model to develop instream flow rules for the Isinglass River will likely serve to inform development of appropriate strategies and actions in the River Management Plan to achieve identified instream flows. Initially, the pilot project was scheduled for completion by Summer 2008. However, because the Lamprey River Pilot project timeframe was recently extended to January 2009, instream flow rules could not be developed in time to incorporate them into the 2008 River Management Plan.

Isinglass River Discharge

Reactivation of the USGS Isinglass River gage station is part of a 2-year multipurpose stream flow monitoring network expansion project for 15 new stream gages across New Hampshire. The expansion project was requested by the New Hampshire Rivers Management Advisory Committee (RMAC), proposed by the Stream Gage Task Force (SGTF), and funded by the New Hampshire Legislature. The station is operated in cooperation with the New Hampshire Department of Environmental Services.

The gage information is: USGS Gage Station #010728700 Isinglass River, Strafford, Strafford County, NH:
Hydrologic Unit Code 01060003
Latitude 43°14'05", Longitude 70°57'25" NAD27
Drainage Area 73.6 square miles
Gage Datum 115 feet above sea level NGVD29

Table 17. Annual Average and Annual Peak Discharges of the Isinglass River

Year	Annual Average Discharge (cfs)	Annual Peak Discharge (cfs)
2003	not reported	862
2004	140	1,740
2005	158	1,780
2006	239	4,370

[Source: USGS Gage Station #010728700 Isinglass River, Strafford, NH]

The limited discharge record for the Isinglass River shows a marked increase in the annual peak discharge in 2006, which likely is due to large storm events during the spring of that year. This increase in annual peak discharge represents a 199 percent increase compared with the average discharge from 2003 to 2005. This statistic is comparable with the same record from the Cocheco River gage station in Rochester, which shows a 197 percent increase in 2006 compared with the average discharge from 2003 to 2005.

E. Water Quality

Point Source Pollution

Point Discharges
Currently no permitted point source wastewater discharges exist on the Isinglass River.

Point Sources
A comprehensive inventory of potential point sources of contamination has not been developed for the Isinglass River corridor and watershed. The NH Department of Environmental Services maintains a database of Potential Contamination Sources within wellhead and water supply protection areas as well as a database of property owners and businesses that contain point sources of pollution such as hazard waste generators, and under ground and above ground storage tanks.

Non-Point Source Pollution

Stormwater
Storm water is generated by precipitation, surface runoff and snow melt from land, pavements, building rooftops and other impervious surfaces. Studies conducted in the northeast and by the Center for Watershed Protection (Maryland) have documented that by converting as little as ten percent of a watershed to impervious surfaces, stream water quality, stream channel structure, and species habitat begins to deteriorate. Above 25 percent impervious surface cover, water quality is seriously degraded. The 2005 report *The Effects of Urbanization on Stream Quality at Selected Sites in the Seacoast Region in New Hampshire, 2001-03*[1], found that, at sites with between 8 to 14 percent impervious surface, the watershed generally showed changes in stream quality as measured by reductions in the combined water quality, habitat condition and biological condition score for these sites.

Other Sources
Other potential sources of non-point source pollution include: subsurface waste disposal systems, road salt and maintenance, underground and aboveground storage tanks, agriculture, forestry, silviculture, and resource extraction. There is no comprehensive inventory or estimate of pollutant contribution from these types of potential nonpoint sources of pollution in the Isinglass watershed. Agriculture, forestry, silviculture, and resource extraction are regulated by federal

[1] Deacon, Jeffrey, R., Soule, Sally A., and Smith, Thor E., *Effects of Urbanization on Stream Quality at Selected Sites in the Seacoast Region in New Hampshire, 2001-03*, U.S. Geological Survey Scientific Investigations Report 2005-5103.

and state laws and require implementation of best management practices to protect water quality on active sites. New and replacement subsurface waste disposal systems are permitted by the state; however, malfunctioning and failing septic systems can go undetected as there are no routine inspection procedures in most communities.

CHAPTER V. LAND USE ASSESSMENT

A. River Corridor and Watershed Assessment Map

Figure 8 - Land Use Assessment Map graphically summarizes land use elements for each corridor community including: protected lands, locally regulated buffers, setbacks and overlay districts, state regulated buffers and setbacks, and local land use and zoning districts. The following sections of this Chapter will describe in detail each of these elements.

B. Assessment of Land Use in the River Corridor and Watershed

Land Use in the River Corridor

Developed land within the river corridor is predominantly residential. Two residential subdivision developments are situated along the Isinglass: one just below Route 202A in the Town of Strafford and a second off Flagg Road in the City of Rochester. The remaining residential development is scattered throughout the river corridor on individual lots. Industrial and commercial land use within the corridor is limited to a motel, a construction equipment rental company, an auto body business, and an inactive gravel pit. The Waste Management of New Hampshire landfill facility in Rochester represents by far the largest industrial activity within the corridor. However, it is set back from the river and has an extensive forested riparian corridor between the landfill and the river.

In comparison, undeveloped lands represent 3,977 acres or 83 percent of the total area of the river corridor. Approximately 217 acres – a mere 5.5 percent - of these undeveloped lands are within regulatory buffers and setbacks from the river where development is restricted or prohibited altogether. Ultimately, there remains great potential for conversion of undeveloped lands within the river corridor.

Table 18. Land Use By Type and Acres In the River Corridor and Watershed

Land Use Type	Corridor Acres	% Corridor Area	Watershed Acres	% Watershed Area
Residential (single-, two- and multi-family, mobile home parks, group)	514	10.8	4,953	10.4
Commercial/Business (services, retail, office, mixed use)	48	1.0	238	0.5
Industrial	9	0.19	86	0.2
Transportation, Communication, Utilities	193	4.1	1,256	2.7
Municipal (recreation and open space, parks), Cemeteries	26	0.6	268	0.6
Undeveloped Lands (agriculture, forests, water, wetlands)	3,977	83.4	40,669	85.7

[Source: Strafford Metropolitan Planning Organization (SMPO) Database, 2007]

Land Use in the Watershed

Land use throughout the watershed follows similar trends as the river corridor, with residential uses accounting for 10 percent or 4,953 acres of developed lands. Although the percent of undeveloped lands increases only slightly to nearly 86 percent at the watershed scale, the amount of land available for potential development is far greater – 40,669 acres within the watershed.

C. Local Zoning Districts and Use Regulations

Nearly 66 percent of the river corridor and watershed are zoned for agricultural and residential uses only.

Table 19. Area of Zoning Districts in the Watershed by Community

Community	Zoning District	Corridor Acres	% Corridor Area	Watershed Acres	% Watershed Area
Barrington	General Residential	2,295	48.2	11,571	22.5
	Neighborhood Residential	205	4.3	701	1.4
	Village	0	0	217	0.4
	Regional Commercial	32	0.7	528	1.0
Dover	Rural	0	0	13	0.1
Farmington	Agricultural Residential	0	0	3,872	7.5
New Durham	Residential/Agricultural	0	0	0.5	negligible
Northwood	General	0	0	3,194	6.2
Rochester	Agricultural	337	7.1	4,303	8.4
	Residence 1 and 2	0	0	1,112	2.0
	Industrial 2, 4, 4A	193	4.1	1,558	1.5
	Business 1 and 2	0	0	106	0.01
Strafford	Agricultural/Residential	1,342	28.2	22,205	43
Zoning District Totals by Type					
Agricultural		337	7.7	4,303	8.7
Agricultural/Residential		3,842	87.2	32,475	65.8
Village		0	0	217	0.5
Commercial/Industrial/General*		225	5.1	5,386	10.9

* General District includes residential and nonresidential uses

Environmental and Resource Based Overlay Districts

Each community has adopted environmental and resource based Overlay Districts that apply within the river corridor and/or watershed.

Barrington

Wetlands Protection District Overlay (Article 9). Requires a 50-foot buffer from the edge of any wetland and a minimum 100-foot buffer from prime wetlands.

Shoreland protection District Overlay (Article 11). Requires a 75-foot setback for structures from the shoreline of perennial streams and lakes or ponds greater than 2 (two) acres, and a 100-foot setback for structures from the mean high water mark of the Isinglass River.

Groundwater Protection District Overlay (Article 12). Consists of the entire area within the municipal boundaries of the town; requires town-wide implementation of best management practices for all regulated development and performance standards for uses including storage of manure, fertilizers, and regulated substances; requires performance standards for uses within the Stratified Drift Aquifer Area, including implementation of a stormwater management plan for uses that render impervious more than 15 percent or more than 2,500 square feet of any lot, and any additional studies necessary to protect the quality of groundwater.

Floodplain Management District Overlay (Article 13). All new construction or substantial improvements must be designed to prevent flotation, collapse or lateral movement of structures; constructed by methods and practice that minimize flood damage; and designed to minimize or eliminate discharges from water and sewer systems to flood waters. This Article also requires that all new construction or substantial improvements be elevated to, or above the 100-year flood elevation and flood proofed below the 100-year flood elevation.

Rochester

Conservation Overlay District (Chapter 42.19). Requires buffers for protected rivers, perennial streams and wetlands, and identifies specific high-risk uses and activities that are prohibited within the District

Regulatory Floodway Zone (Chapter 42.20). Prohibits within the Regulatory Floodway any development or encroachment resulting in an increase in flood levels during the base flood discharge. New and replacement water and sewer systems proposed in flood prone areas will be designed to minimize or eliminate infiltration of flood waters and located to avoid impairment or contamination during periods of flooding Documentation of certification of flood-proofing and the as-built elevation of all new or substantially improved structures must be provided All new construction and substantial improvements of residential and non-residential structures shall have the lowest floor and basement elevated at or above the 100-year flood level (non-residential structures and utility/sanitary facilities can alternatively be flood-proofed).

Aquifer Protection Zone (Chapter 42.21). Limits impervious surface to 40 percent (up to 60 percent with sufficient treatment and recharge); and prohibits on-site disposal of solid wastes (other than brush or stumps), liquid or leachable wastes (other than from septic systems), or any materials or substances classified as hazardous by the State or the EPA.

Cluster Development (Chapter 42.24). Restricted to the Agricultural Zone with a minimum lot size of 10,000 square feet for single family and 7,500 square feet for each dwelling unit in a multi-family dwelling. All lots must connect to public water and sewer. All land not part of lots or streets shall be designated common land. Density shall not exceed one and a half (1.5) times the number of lots permitted in the Agricultural Zone, however density may be increased up to two times the permitted number of lots when state certified affordable housing is provided;

Strafford

Shoreland Protection (Article 1.4.1.J). The Town adopted the State Comprehensive Shoreland Protection Act (CSPA) as a local ordinance, giving the Town authority to enforce the provisions of the CSPA.

Conservation Development (Article 1.4.3). Development density as permitted by conventional zoning requirements (minimum lot size of 2 acres) but awards a maximum 10 percent density bonus for additional and innovative protection of viewscapes, meadows, water bodies, wetlands, wildlife habitat and corridors, creation of central greens or common lands, or protection of mature well-stocked forest land.

Wetland Conservation Overlay District (Article 1.4.4). Requires setbacks for structures and septic systems from the river, and buffers to wetlands, perennial streams and vernal pools.

Minimum Lot Size

State Requirements

As required by the Comprehensive Shoreland Protection Act (CSPA) within the 250-foot protected shoreland, minimum lot size in areas dependent on septic systems shall be determined by soil type and suitability.

Local Requirements

Minimum lot size requirements vary widely by community and by zoning district. Lot size requirements by community and zoning district are summarized in the table below.

Table 20. Minimum Lot Size for Local Zoning Districts in Watershed by Community

Community	Zoning District	Minimum Lot Area
Barrington	General Residential	80,000 sf [1] (1.84 acres)
	Neighborhood Residential	
	Regional Commercial	40,000 [2] (0.92 acres)
Dover	Rural	
Farmington	Agricultural/ Residential	3 acres
New Durham	Residential/ Agricultural	60,000 sf [3] (1.4 acres)
Northwood	General	2 acres
Rochester	Agricultural	40,000sf (0.92 acres) without services, 30,000sf (0.69 acres) with water or sewer, 20,000sf (0.46 acres) with water + sewer
	Industrial I2, I4, I4A	
Strafford	Agricultural/ Residential	2 acres

[1] Minimum lot sizes and frontage may be reduced as part of a Conservation Subdivision in accordance; minimum lot size for one dwelling unit is 80,000 sq. ft. and must include at least 60,000 sq. ft. free of Hydric A soils, open water, bogs, marshes, rivers, streams, or exposed ledge; additionally, the 60,000 sq. ft. must contain at least 35,000 sq. ft. of contiguous upland soils (these requirements are applied for each dwelling of 2 or more bedrooms in a multi-family dwelling)

[2] Minimum lot sizes for residential dwelling units in the RC district; minimum lot size for nonresidential uses in the RC district is 40,000 sq. ft. which must include an area of contiguous upland soils of not less than 35,000 sq. ft.

[3] Minimum lot sizes within all subdivisions shall meet the lot size requirements as specified in Table 1A, "Minimum Lot Size by Soil Type-H.I.S.S.", or as specified in Table 1B. "Minimum Lot Size by Soil Type-U.S.D.A. Soil Survey"

Permitted Uses

The table below describes the general uses permitted within the zoning districts in the watershed. Several communities may allow additional uses by grant of a Special Exception from the Zoning Board of Adjustment.

Table 21. Permitted Uses for Zoning Districts in the Watershed by Community

Community	Zoning District	Permitted Uses
Barrington	General Residential	Low density residential development allowed in traditional subdivisions; cluster Conservation Subdivisions permitted to encourage preservation of natural resources and open space; regulations promote continuation of the historical land development patterns identified in the 2004 Master Plan; small-scale business uses or establishments allowed, if uses operated in conjunction with residential uses and developed in compliance with specific standards
	Neighborhood Residential	Permits medium density residential development in the central area of the town; regulations provide incentives for developing larger tracts to promote efficient land use and create open space for public recreation and conservation; primary goal identified in the 2004 Master Plan to create trail linkages to public and commercial activities in Village District and surrounding districts; regulations allow small-scale business uses or establishments if operated in conjunction with residential uses and developed in compliance with specific standards
	Regional Commercial	Mixed-Use; Residential dwelling units, excluding accessory dwelling units, as part of a mixed-use development
Farmington	Agricultural Residential	Non-commercial keeping of animals, commercial agriculture including animal husbandry, sale of agricultural products raised on site, aquaculture, forest management, timber harvesting, commercial processing of wood, logging, non-commercial mineral extraction, dog kennels, agricultural uses not specified
New Durham	Residential/ Agricultural	Single- and two-family dwellings with garages and accessory buildings, in-law apartment contiguous with primary single-family residence, home occupations, sale of home food and garden produce, farm and garden activities, 75-foot development setback from cemeteries
Northwood	General	Single- and two-family dwellings, forestry and agriculture, church, home occupation, telecommunication antenna, school, accessory use; other residential and non-residential uses permitted in compliance with certain performance criteria
Rochester	Agricultural	Single- and two-family dwellings, cluster development, mobile home, mobile home park or subdivision, modular home, accessory building or use, temporary structures

	Industrial I2, I4, I4A	Temporary structures, wireless communication facilities, industry, research testing, wholesale or storage warehouse, truck terminal, bus garage, contractor's storage yard, feed and fuel storage/sales, sawmill, accessory building or use (industrial); I4 solid waste facility; I2 bottling works, ice cream manufacture
Strafford	Agricultural/ Residential	Buying, selling, exposing for sale of home produce and products; office of a professional person; boarders or leasing/renting of rooms or buildings; home occupations in a residence; single-, two- and three-family residences including accessory buildings and building for agricultural purposes; convalescent and nursing homes for elderly, churches, schools, and recreational facilities. Although not specifically zoned, establishment of business or industry enterprises that are an asset to the town is encouraged.

Prohibited Uses and Activities

Certain uses that pose a high risk for impact to, or contamination of, resources; or a threat to public health are commonly prohibited in sensitive areas such as aquifer and wellhead protection zones and riparian and wetland buffers. Each of the corridor communities specifically prohibits some of these uses either within the river corridor or throughout their community.

Barrington prohibits the following uses and activities *in all zoning districts*:

- ✓ Storage, reprocessing, recycling, treatment or disposal of chemicals, hazardous substances, wastes or materials, municipal or industrial or medical waste, or metals;
- ✓ Slaughtering and processing of animals and animal byproducts, as a principal or significant accessory use.

Rochester prohibits the following uses and activities *in the Conservation Overlay District* (75 foot river buffer):

- ✓ Expansion of motor vehicle recycling and junkyards;
- ✓ Storage of petroleum products, hazardous chemicals or materials;
- ✓ Accessory structures constructed with any of the following materials- asphalt shingles or pressure treated or chemically treated/preserved wood;
- ✓ Parking or storage of unregistered vehicles.

Strafford prohibits the following uses and activities *in the Town*:

- ✓ Stockpiling and land spreading of Class B sewage sludge containing disease causing pathogens, heavy metals, parasites, and hazardous organic chemicals, and stockpiling and land spreading of industrial paper mill sludge containing toxic substances.

D. State and Local Setback and Buffer Requirements

For all three river corridor communities, the local requirements for structure setbacks or river buffers from the Isinglass River exceed the requirements of the NH Comprehensive Shoreland Protection Act (CSPA). (Refer to Table 22 below for state and local setback requirements). Except in Rochester, which requires a 75-foot no disturbance buffer, the CSPA requirements for a 25-foot naturally vegetated buffer provides the primary protection against disturbance to riparian vegetation and habitat along the Isinglass River. In addition, the CSPA includes limitations on impervious surface coverage within the 250-foot shoreland and restricts the use of pesticides and fertilizers within 25 feet of the reference line, with only low phosphorus, slow release nitrogen fertilizer permitted beyond 25' from the reference line.

Table 22. State and Local Requirements For Setbacks and Buffers from the Isinglass River

Resource	Requirement	CSPA	Strafford	Barrington	Rochester
Isinglass River	Structure Setback	50 ft	75 ft	100 ft	---
	Septic System Setback	75 ft	100 ft	---	---
	River Buffer	50 ft[1]	---	---	75 ft
	Impervious Surface Cover	25-30%	---	See note[+]	---
Tributary Streams	Structure Setback	N/A	50 ft	---	---
	Stream Buffer	N/A	25 ft[2]	75 ft	50 ft[5]
Wetland	Wetlands Buffer*	N/A	25 ft[2]	50 ft[3]	50 ft[4]
Vernal Pool	Septic System Setback		100 ft		
	Structure Setback		75 ft		
Prime Wetlands	Buffer	---	---	100 ft	---

[1] Limited clearing of trees based on points system; no land disturbance or removal of ground cover
[2] Wetlands >3,000 square feet and vernal pools; no disturbance allowed except by Conditional Use Permit
[3] Grandfathered lots require 35-foot wetland buffer
[4] Also from poorly and very poorly drained soils and vernal pools; the land surface within 25 feet of the edge of the wetland shall not be altered. Herbicides and heavy equipment are prohibited within 25 feet of the edge of the wetland. New lawns may be established beyond 25 feet from the edge of the wetland
[5] From named streams and surface waters (see Table 1 in Conservation Overlay District)
* Buffers – no land disturbance or clearing of natural vegetation permitted
[+] Impervious surface cover limited to 15 percent in the Stratified Drift Aquifer Area in the Groundwater Protection District Overlay
CSPA – New Hampshire Comprehensive Shoreland Protection Act

Other Local Requirements

Strafford

Wetlands - structure setback of 50 feet; septic setback of 75 feet from poorly drained soils and 100 feet from very poorly drained soils.

Septic setback of 100 feet from all perennial streams and abutting wetlands.

Regulate development of lands designated as special flood hazard zones as defined in the flood insurance study completed for the Town.

Rochester

Solid Waste Facilities setback 100 feet from 100-year floodplain of the Isinglass River.

Within Aquifer Protection District, impervious surface limited to 40 percent (up to 60 percent with sufficient treatment and recharge).

Definition of A Structure

Barrington. Anything constructed, installed, placed or erected, whether above or below grade; unless otherwise stated, signs, stonewalls, septic systems, driveways, parking lots, home propane and heating oil tanks, and fences are not subject to setback requirements.

Rochester. Anything constructed or erected, the use of which requires location on the ground, or attachment to something having location on the ground.

Strafford. A combination of materials to form a construction that is safe and stable, including among others but not limited to dwellings and shall include any part thereof.

Table 23. Requirements Within the Setbacks and/or Buffers to the Isinglass River

Community	Zoning District/Overlay Zone	Conditional Uses/Exemptions
Barrington	*Shoreland Protection Overlay Zone –* *Isinglass River Overlay Zone* Consists of all properties located within one hundred (100) feet of the mean high water mark of the river; no structure of any type including by way of example and not by way of limitation, all buildings, garages, sheds, parking lots, and driveways, may be constructed.	None specified.
Strafford	*Wetland Conservation District* Buffer means the protected upland adjacent to wetlands and surface waters Note: not a no-disturbance buffer.	*Exemptions* Repair or replacement of an existing building provided the new or repaired structure, including any impermeable surfaces, shall not extend further into the buffer area than the footprint of the original structure; Forest management activities (conducted in accordance with the BMPs for Erosion Control on Timber Harvesting Operations in New Hampshire 2004) and agriculture; Construction of an unpaved road by the property owner for land access purposes; Replacement of failing septic systems.
Rochester	*Conservation Overlay District* The required 75-foot river buffer means the protected upland areas adjacent to wetlands and surface waters Note: buffer disturbance permitted if qualify and receive approval for Conditional Use or Buffer Reduction.	*Conditional Uses*: Roads and other access ways; drainage ways; pipelines, power lines and other transmission lines; docks, boat launches, and piers; domestic water wells and associated ancillary pipes/equipment, replacement septic tanks and leach fields *Buffer Reductions*: may be permitted for expansion of existing structures and construction of a new structure for lots located in the Industrial I, Industrial 2, Industrial 3, Business 1, and Business 2 districts

State of New Hampshire

The Comprehensive Shoreland Protection Act (CSPA) (RSA 483-B) currently applies from the point where the Isinglass River intersects Nippo Brook in Barrington to its confluence with the Cocheco River. As announced in May 2008, enactment of the 2007 revisions to the CSPA have been repealed from the original date of April 1, 2008 and ***will become effective beginning July 1, 2008***. The revised CSPA encompasses the entire protected Isinglass River and includes requirements for a 50-foot setback from the reference line for all primary and accessory structures; limited tree removal based on a grid and point system from 0-50 feet of the reference line with no disturbance of ground cover permitted; and limits on impervious surface coverage from 50-150 feet of the reference line. Refer to Appendix C for a summary of the 2007 changes.

E. Effectiveness of Local Land Use Requirements

Land Use and Population Trends

Land use decisions have a profound impact on the environmental and economic sustainability of communities. Both need careful consideration in order for both humans and their environment to thrive. The undeveloped nature of the river corridor and watershed and its proximity to the rapidly developing urban and suburban areas of Strafford County and the seacoast region make the protection of Isinglass River and watershed a high priority.

Impervious Surface Cover
The Complex Systems Research Center at the University of New Hampshire conducted the study *Impervious Surface Mapping in Coastal New Hampshire* (2006)[2], which evaluated impervious surface coverage and population trends from 1990 to 2005 for communities in the coastal watershed. (Refer to Section D. for information from this study about the condition of riparian buffers in the river corridor and watershed.) Study data was compiled for the watershed communities to evaluate impervious surface coverage and population trends for the Isinglass river corridor and watershed. This data is presented below in Table 24.

Table 24. Impervious Surface Coverage Statistics for the Isinglass-Nippo Brook Watershed from 1990 to 2005

Isinglass River Subwatersheds (HUC 12)	**Acres**			
	Area	**1990**	**2000**	**2005**
Bow Lake	9,125	121.0	184.7	216.7
Long Pond	10,153	148.0	220.7	248.9
Lower Isinglass	14,609	802.7	1,183.8	1,339.2
Nippo Brook-Isinglass River	17,389	266.0	373.5	452.8
Isinglass River Watershed	**Area**	**1990**	**2000**	**2005**
Total % Impervious Surface	---	2.6	3.8	4.4
Total Area - Impervious Surface	51,276	1,337.7	1,962.7	2,257.6

[Source: UNH Complex Systems Research Center *Impervious Surface Mapping in Coastal New Hampshire* (2006)]

[2] *Impervious Surface Mapping in Coastal New Hampshire* (2006) by David Justice and Fay Rubin, Complex Systems Research Center at the University of New Hampshire

As reported in Table 24, impervious surface coverage in the Isinglass River watershed has increased from 2.6 percent in 1990 to 4.4 percent in 2005, an increase of 69 percent. If increased at the current rate, total impervious surface coverage for the watershed will reach the critical 10 percent threshold for the protection of surface water quality in about 45 years.

Population Growth

As reported in Table 25, population in the watershed communities has increased from 47,561 in 1990 to 56,989 in 2005, a 20 percent increase during the fifteen (15) year period from 1990 to 2005. Note: This Plan does not address whether population has increases in each community, have occurred within or outside the Isinglass River watershed.

Table 25. Population Statistics from 1990 to 2005[3]

Population	% Community in Watershed	1990	2000	2005
Barrington	44	6,164	7,475	8,071
Rochester	24	26,630	28,641	30,337
Strafford	72	2,965	3,626	3,962
Farmington	17	5,739	5,774	6,540
Northwood	17	3,124	3,640	3,897
Total		**47,561**	**52,857**	**56,989**

Zoning Districts and Overlay Districts

Zoning is predominantly agricultural and residential in the river corridor (87 percent) and watershed (66 percent). As report previously in this Chapter (Section C Local Zoning Districts and Use Regulations), the amount of land available in watershed for development is approximately 40,669 acres. The conversion of 40,669 acres to developed lands, particularly for residential subdivisions, could represent an enormous shift in the character of the watershed.

Table 26. Acreage of Zoning Districts by Type

Zoning District	Corridor Acres	% Corridor Area	Watershed Acres	% Watershed Area
Agricultural	337	7.7	4,303	8.7
Agricultural/Residential	3,842	87.2	32,475	65.8
Village	0	0	217	0.5
Commercial Industrial/General*	225	5.1	5,386	10.9

* General District includes residential and nonresidential uses

[3] *Environmental Indicator Report - Land Use and Development*, Prepared By Phil Trowbridge NHEP Coastal Scientist, New Hampshire Department of Environmental Services, Watershed Management Bureau, Prepared For New Hampshire Estuaries Project University of New Hampshire

Riparian Buffer Conditions Within the Corridor

Riparian areas and buffers are the vegetated uplands adjacent to surface waters and wetlands that help reduce the adverse effects of human activities on these resources. The primary function of a buffer is to physically protect and separate a wetland from future disturbance.

Riparian areas and buffers provide valuable functions and services including:

- √ absorbing and filtering runoff to protect water quality
- √ intercepting and slowing runoff to prevent erosion
- √ providing habitat for wetland species and upland species
- √ improving landscape aesthetics
- √ maintaining recreational uses

The Complex Systems Research Center at the University of New Hampshire conducted a *Stream Buffer Characterization Study* (2007)[4], sponsored by the New Hampshire Estuaries Project, which mapped and evaluated the condition of riparian buffers for communities in the coastal watershed. Study data for the watershed communities was compiled to evaluate impervious surface coverage and population trends for the Isinglass river corridor and watershed.

Table 27. Buffer Condition Data in the Isinglass River Watershed from the New Hampshire Estuaries Project "Stream Buffer Characterization Study"

Buffer Characterization	Decision Rule	Acres of 150-foot buffer in watershed	Acres of 300-foot buffer in watershed
Intact	<10% impacted	69.3	247.3
Mostly Intact	1-25% impacted	14.2	65.7
Somewhat Modified	25-50% impacted	42.9	42.7
Impaired	>50% impacted	1.7	134.9
Total Land Area (acres)		***2,145.7***	***4,353.2***
% Total Watershed Land Area		**4.2**	**8.5**

***** Note: The *Decision Rule* establishes categories based on the degree to which each buffer or buffer segment was impacted by human activity, specifically the percent of land area within the buffer mapped by land use type as either developed, transportation, or agriculture.

As reported in Table 27, the total land area of 150-foot and 300-foot buffer represents only a small fraction of the total land area within the watershed. However, the benefits provided with respect to water quality and wildlife habitat in the watershed are significant. Riparian areas and buffers adjacent to intermittent, headwater, first order and second order tributaries are particularly valuable as these smaller tributaries represent 74 percent of the total tributary, stream and river miles in the watershed. Refer to Table 9 for a summary of stream miles by stream order.

[4] Complex Systems Research Center at the University of New Hampshire, *Stream Buffer Characterization Study* (2007)

CHAPTER VI. PRIORITY MANAGEMENT ISSUES IN THE RIVER CORRIDOR AND WATERSHED

A. Priority Management Issues in the Isinglass River Corridor

The following priority management issues were identified during development of the Isinglass River Management Plan.

1. **Water Quality and Quantity Protection**
   Viability of the Fishery
   Maintain High Water Quality of the River
   Protect and Restore Riparian Buffers
   Protect Public and Private Drinking Water Sources
   Raise Awareness of Non-Point Source Pollution
   Maintain Class B Status to Maintain Recreational Uses
   Balance Uses While Preserving the River's Quality

2. **Flood Management and Remediation**
   Preserve Flood Storage Areas
   Reduce and Prevent Flood Damage to the River and its Riparian Areas
   Improve Habitat Protection at River and Tributary Crossings
   Improve Road Management Post-Flood Cleanup Practices
   Improve Stormwater Management Methods

3. **Land Protection, Resource and Habitat Conservation**
   Prioritize Lands for Protection and Conservation
   Implement Instream Flows for Habitat and Recreation
   Preserve Forests, Open Space and Habitat
   Conserve Riparian, Shoreland and Water Quality Buffers
   Preserve Historic Resources in the River Corridor

4. **River Corridor and Watershed Planning**
   Coordinate Watershed Planning With Partner Agencies and Organizations
   Coordinate Watershed Planning Among the Communities

5. **Stewardship, Education and Outreach**
   Raise Awareness of the River and Its Resources
   Foster stewardship of riparian landowners and all residents in the watershed
   Pursue education and outreach across various media

CHAPTER VII. IMPLEMENTATION STRATEGIES

Based on the priority management issues, the following goals, objectives, and implementation strategies have been developed. In this chapter, the strategies are numbered sequentially and placed in order of the recommended time frame for completion, Short Term, Intermediate Term and Long Term.

ACTION 1. WATER QUALITY AND QUANTITY PROTECTION

GOAL 1-1: SUPPORT AND EXPAND WATER QUALITY MONITORING PROGRAM TO ENHANCE UNDERSTANDING OF THE RIVER'S RESOURCES AND GOALS OF THE MANAGEMENT PLAN

OBJECTIVE 1: Support the existing water quality monitoring and stream assessment program

Strategies:

1. Obtain funding to support and expand the existing water quality monitoring program and purchase additional testing equipment as needed.

Time Frame: Short Term/Ongoing

2. Coordinate with state and non-profit partners to provide training for new volunteers for the water quality monitoring and stream assessment programs.

Time Frame: Short Term/Ongoing

3. Recruit new volunteers for the water quality monitoring and stream assessment programs by developing outreach materials and opportunities.

Time Frame: Short Term/Ongoing

4. Identify additional sampling sites and data needs of constituents in the watershed for targeting water quality monitoring and stream assessment programs.

Time Frame: Short Term/Ongoing

OBJECTIVE 2: Identify long-term comprehensive water quality monitoring and stream assessment goals for all tributaries in the watershed.

Strategies:

5. Document the existing implementation plan for comprehensive water quality monitoring and stream assessment programs (refer to Chapter IV for recommendations to incorporate results from the NHDES VRAP annual reports in the plan).

Time Frame: Short Term

6. Implement the recommendations from the NHDES VRAP annual reports to improve the water quality monitoring program.

Time Frame: Long Term

7. Continue collecting data to support adherence to water quality standards for designated uses and to support fisheries and habitat protection within the watershed.

Time Frame: Long Term/Ongoing

GOAL 1-2: DEVELOP TECHNICAL TOOLS FOR USE IN GUIDING WATER QUALITY MONITORING, STORMWATER MANAGEMENT, LAND USE REVIEWS, BUFFER RESTORATION AND MANAGEMENT, AND LAND CONSERVATION PLANNING IN THE WATERSHED

OBJECTIVE 1: Develop a detailed drainage network map of the watershed

Strategies:

8. Develop a detailed drainage network map of the watershed, including but not limited to subwatersheds, tributaries, soils, slopes, vegetative cover, land cover, and infrastructure.

Time Frame: Short Term

9. Use the drainage network map, air photography and GIS data to analyze developing areas, unvegetated riparian areas, and locations where best management practices should be implemented to protect water quality.

Time Frame: Intermediate

10. Utilize the detailed drainage map and analysis to identify water quality issues in the river corridor and watershed.

Time Frame: Long Term

GOAL 1-3: MAINTAIN AND RESTORE RIPARIAN, SHORELAND AND WATER QUALITY BUFFERS

OBJECTIVE 1: Maintain riparian, shoreland and water quality buffers along the river and its tributaries

Strategies:

11. Support state enforcement of Comprehensive Shoreland Protection Act and enforcement of local requirements relating to buffers and setbacks for development in the river corridor (and watershed where applicable).

Time Frame: Short Term/Ongoing

12. Meet annually with local land use boards to encourage adoption or strengthening of buffer requirements in subdivision and site plan regulations that pertain to the Isinglass River and its tributaries.

Time Frame: Short Term/Ongoing

13. Include local land use boards, elected officials and municipal staff in all education, outreach and publicity initiatives relating to buffers and buffer protection as outlined in this Plan.

Time Frame: Short Term/Ongoing

OBJECTIVE 2: Restore riparian, shoreland and water quality buffers along the river and its tributaries

Strategies:

14. Using the detailed drainage map and analyses (see Goal 1-2), identify areas where riparian and shoreland buffers are degraded or do not exist.

Time Frame: Intermediate/Ongoing

15. Utilize sample planting plans and guidance brochures on planting and caring for buffers developed by UNH Cooperative Extension to educate riparian property owners about water quality. Provide this information through the IRLAC website and at presentations, workshops and other public events.

Time Frame: Intermediate/Long-Term

16. Participate in state and national programs that fund implementation of buffer restoration.

Time Frame: Intermediate/Ongoing

GOAL 1-4: SUPPORT DEVELOPMENT OF MINIMUM INSTREAM FLOW RULES TO ADDRESS LOW SUMMER WATER LEVELS THAT ADVERSELY AFFECT HABITAT QUALITY FOR FISH AND OTHER WILDLIFE AND ADVERSELY IMPACT RECREATIONAL USE OF THE RIVER

By October 2009, the Lamprey River In-Stream Flow Programs is scheduled for completion, including a Water Management Plans to support the protected flows. If the legislative review approves the Lamprey River model for developing instream flows, NHDES will eventually adopt the process to develop instream flow rules for other Designated Rivers including the Isinglass River. Below are preliminary objectives for coordination and implementation of instream flow standards.

OBJECTIVE 1: Work with the Bow Lake Camp Association, the NH Department of Environmental Services and Trout Unlimited to balance priorities for implementation of instream flow standards.

OBJECTIVE 2: Subsequent updates of this plan should include identification options to address recreational use of the lake and water quality issues of concern.

GOAL 1-5: PROVIDE EDUCATION AND OUTREACH ABOUT THE IMPACTS OF NON-POINT SOURCE POLLUTION ON THE RIVER AND ITS TRIBUTARIES

OBJECTIVE 1: Provide information to local land use boards and property owners about how non-point source pollution can impact water quality and habitat

Strategies:

17. Develop an outreach implementation plan focused on water quality issues (identified in Objective 1) in the watershed. The plan should include partnering organizations, groups and agencies, funding sources, and evaluation criteria.
Time Frame: Short Term/Ongoing

18. Utilize existing brochures and fact sheets about how to modify practices, maintenance and management to effectively reduce and minimize point and non-point sources of pollution at home, for businesses and for municipalities.
Time Frame: Short Term/Ongoing

19. Utilize existing guidance brochures and fact sheets about planting and caring for buffers developed by UNH Cooperative Extension to educate riparian property owners about water quality. Provide this information through the IRLAC website and at presentations, workshops and other public events.
Time Frame: Intermediate/Long-Term

ACTION 2. FLOOD MANAGEMENT AND REMEDIATION

GOAL 2-1: REDUCE OR PREVENT FLOOD DAMAGE TO THE RIVER AND CORRIDOR AND THE WATERSHED

OBJECTIVE 1: Identify problem areas for erosion and sedimentation, vegetation loss, bank stability, and habitat loss associated with flood events

Strategies:

20. Present elected officials in the watershed communities with flood evaluation and stream condition data. Discuss potential causes of flooding and flood damage, and identify common goals for protection of the river and its tributaries.
Time Frame: Short Term/Ongoing

21. Continue collection of stream assessments (erosion and sedimentation vegetation loss, bank stability, and habitat loss) as part of the VRAP and VBAP programs. Produce annual report or summary of this data and provide to watershed communities.
Time Frame: Long Term

22. Review information from local hazard mitigation plans to identify flood hazard areas and flood damage areas, and the potential causes within the corridor and watershed.
Time Frame: Long Term

23. Conduct stream geomorphic assessment to identify Fluvial Erosion Hazard areas and develop a fluvial erosion hazard overlay.
Time Frame: Long Term

OBJECTIVE 2: Document road crossings over the river where water quality and habitat are impacted

Strategies:

24. Use existing data from NH Department of Transportation and Strafford Regional Planning Commission to map the location of road crossings, bridges and culverts in the river corridor.

Time Frame: Short Term

25. Use existing data from NH Department of Transportation and Strafford Regional Planning Commission to conduct corridor site assessments to document stream crossing conditions, stream morphology, and aquatic habitat effects.

Time Frame: Intermediate Term

26. Develop recommendations for management practices and a priority list of improvements for road crossings in the river corridor and watershed. Provide recommendations to elected officials in the watershed to inform decisions regarding allocation of funds in the local Capital Improvement Plan and annual budget.

Time Frame: Intermediate Term

GOAL 2-2: PRESERVE FLOOD STORAGE AREAS WITHIN THE RIVER CORRIDOR

OBJECTIVE 1: Identify flood storage areas within the river corridor and watershed

Strategies:

27. Gather information from annual FEMA reports from the watershed communities about key wetlands and uplands that provide flood storage within the river corridor and watershed. Identify areas where new flooding occurred during large storm events in the past few years.

Time Frame: Short-Term (annual)

28. Present information to elected officials about the importance of preserving these areas within the river corridor and watershed to protect property and reduce costly repair to infrastructure.

Time Frame: Long-Term

OBJECTIVE 2: Preserve key wetlands that provide flood storage in the river corridor and watershed

Strategies:

29. Conduct outreach to property owners in watershed communities about the importance of preserving these wetlands and uplands to protect property and reduce costly repair to infrastructure.

Time Frame: Short Term/Ongoing

30. Develop maps for watershed communities that display the key wetland and uplands that provide flood storage. Provide these maps to the communities.

Time Frame: Long-Term

31. Support local regulations to preserve key wetlands and uplands that provide flood storage in the river corridor and watershed.

Time Frame: Long-Term

ACTION 3. LAND PROTECTION, RESOURCE AND HABITAT CONSERVATION

GOAL 3-1: PRIORITIZE LAND PROTECTION AND RESOURCE CONSERVATION EFFORTS IN THE RIVER CORRIDOR AND WATERSHED

OBJECTIVE 1: Inventory natural resources in the river corridor and watershed

Strategies:

32. Using existing technical studies (The Land Conservation Plan for New Hampshire's Coastal Watersheds and the New Hampshire Wildlife Action Plan) and the map set for this plan, identify significant resources in the river corridor and watershed, including agricultural lands, unfragmented forest blocks, wildlife habitat, and water resources.

Time Frame: Short Term

33. Using the inventory of natural resources, evaluate their relationship with existing conserved lands, current land use, and resource regulations. Identify specific parcels and/or resources for protection using conservation measures aimed at protecting the specific values of the resources.

Time Frame: Intermediate Term

GOAL 3-2: PRESERVE LANDS AND NATURAL RESOURCES IN THE RIVER CORRIDOR AND WATERSHED

OBJECTIVE 1: Support implementation of conservation easements, land acquisition and land protection measures in the river corridor and watershed

Strategies:

34. Identify land conservation efforts of local open space committees and conservation commissions that are actively pursuing land conservation in the watershed.

Time Frame: Short Term

35. Partner with local land trusts and other groups conducting land conservation in the watershed to help them develop working relationships with local land owners and implement potential land conservation measures.

Time Frame: Intermediate Term

36. Partner with regional land conservation groups and land trusts to conduct annual estate planning and land conservation workshops to encourage land preservation.

Time Frame: Intermediate Term

37. Coordinate watershed communities to identify shared land and natural resource protection goals, strategies, and information. The Strafford Regional Planning Commission, land conservation groups and land trusts may have available resources to provide overall coordination for this effort.

Time Frame: Long Term

ACTION 4. RIVER CORRIDOR AND WATERSHED PLANNING

GOAL 4-1: ENCOURAGE PROTECTIVE LAND USE PLANNING AND REGULATION IN THE RIVER CORRIDOR AND WATERSHED

OBJECTIVE 1: Support state and local regulations that protect water quality, habitat and natural resources

Strategies:

38. Meet annually with local land use boards to discuss important issues and strategies designed at balancing uses and preserving river quality.

Time Frame: Short Term/Ongoing

39. Encourage adoption of erosion and sedimentation control and stormwater management standards for development within the watershed.

Time Frame: Intermediate Term

40. Form partnerships to coordinate and conduct training, and encourage attendance at regional and state workshops, focused on land and resource protection regulations.

Time Frame: Long Term

41. Support and participate in training opportunities to educate local land use boards, elected officials and community staff about low impact development, better site design and smart growth policies.

Time Frame: Long Term

42. Partner with the NH Department of Environmental Services, UNH Stormwater Center, UNH Cooperative Extension, and others to provide information and presentations about emerging science and technology aimed at improving land use regulations that help meet the goals of the River Management Plan.

Time Frame: Long Term/Ongoing

OBJECTIVE 2: Identify innovative methods and planning strategies that have been successfully implemented in the Isinglass and/or other watersheds to protect river resources.

Strategies:

43. Encourage adoption of innovative land use controls (such as multi-density zoning, environmental characteristics zoning, and site level design requirements) by watershed communities. [Refer to NHDES *Innovative Land Use Planning Techniques: A Handbook for Sustainable Development* at http://www.des.state.nh.us/repp/index.asp?go=ilupth.]

Time Frame: Intermediate/Long Term

44. Identify potential sites to implement emerging science and technology for stormwater and sediment and erosion control. Partner with local communities or seek funding sources for these projects.

Time Frame: Intermediate Term

GOAL 4-2: DEVELOP NEW AND EXPAND EXISTING WATERSHED PROTECTION ACTIVITIES

OBJECTIVE 1: Develop a prioritize list of implementation strategies and plans that protect river resources.

Strategies:

45. The IRLAC will review the Implementation Strategies and set action-based priorities. Based on the priorities identified, IRLAC will develop an implementation plan including time frames and a schedule for completion.

Time Frame: Short Term

OBJECTIVE 2: Facilitate coordination of watershed planning activities among the river corridor communities.

Strategies:

46. Employ a river and watershed coordinator to assist with implementation of priority strategies from the River Management Plan.

Time Frame: Short Term

47. Identify stakeholders in each watershed community and among other interested parties (land preservation groups, land trusts, non-profits, educational, etc.). Identify their important issues, geographic areas of concern/interest, and partnership capability toward implementing the goals and strategies of the Plan.

Time Frame: Short Term

48. Expand coordination of IRLAC's review of development projects in the river corridor by notifying land conservation groups, non-profit and other voluntary groups and interested parties in the watershed of projects under review (timeframes, meeting dates, site visits) and by making project review information, such as letters of recommendation and site

plans/applications accessible. Make this information accessible by developing a projects database and website.
Time Frame: Short Term

49. Conduct annual audits of regulatory changes in the watershed communities and the state that affect resources and land use in the river corridor and watershed.
Time Frame: Long Term/Ongoing

50. Meet annually with Conservation Commissions and local land protection groups and land trusts to discuss important issues and to support revision of land protection goals and strategies (as outlined in Goals 3-1 and 3-2).
Time Frame: Long Term/Ongoing

51. Meet annually with local land use boards to discuss important issues and strategies designed for balancing uses and preserving river quality (as outlined in Goal 6-1).
Time Frame: Long Term/Ongoing

GOAL 4-3: CONTINUE THE COLLECTION AND COMPILATION OF DATA ON RIVER CORRIDOR AND WATERSHED CONDITIONS

OBJECTIVE 1: Continue using data on river corridor and watershed conditions to enhance understanding of river resources and to implement goals of the River Management Plan

Strategies:
52. Encourage the completion of Natural Resource Inventories in all the watershed communities. Assist communities in sourcing and applying for grants to fund these studies.
Time Frame: Short Term

53. Identify agencies, groups and educational institutions conducting research, evaluation or planning activities within the watershed, and obtain results and data.
Time Frame: Short Term

54. Continue to compile and inventory data and resource-based information on river corridor and watershed resources. Make this information available to all watershed communities including on the IRLAC website (when developed).
Time Frame: Long Term/Ongoing

GOAL 4-4: RAISE AWARENESS OF THE RIVER MANAGEMENT PLAN

OBJECTIVE 1: Encourage adoption of all or part of the River Management Plan as part of the Master Plans of each watershed community

Strategies:
55. Provide copies of the River Management Plan to the Land Use Boards and elected officials.
Time Frame: Short Term

56. Make presentations to the Land Use Boards of the corridor and watershed communities to encourage the adoption of the River Management Plan as part of their Master Plans.

Time Frame: Intermediate Term/Ongoing

OBJECTIVE 2: Organize a long-term publicity campaign to promote the River Management Plan

Strategies:

57. Develop a publicity plan to advertise and get the word out about specific outings and events, important meetings of local land use boards, and other IRLAC initiatives.

Time Frame: Short Term

58. Develop a database of newspaper, television, radio and local publications, including contact information, rates, publication dates, and distribution area. Include these contacts in email lists and IRLAC website notices to publicize events.

Time Frame: Short Term

59. Solicit volunteers to develop and maintain the publicity database and to implement the publicity plan.

Time Frame: Short Term

ACTION 5. STEWARDSHIP, EDUCATION AND OUTREACH

GOAL 5-1: RAISE AWARENESS OF STEWARDSHIP IN THE RIVER CORRIDOR AND WATERSHED

OBJECTIVE 1: Develop an outreach campaign to raise awareness of stewardship within the watershed

Strategies:

60. Develop IRLAC website to facilitate outreach and education, dissemination of information, and promote river related events and projects.

Time Frame: Intermediate Term

61. Acquire funding to develop and implement education and outreach strategies such as a "What Can Property Owners Do" campaign aimed at improving household and business practices that benefit water quality and resource protection.

Time Frame: Long Term

OBJECTIVE 2: Encourage stewardship by river users and riparian property owners in the watershed

Strategies:

62. Organize bi-annual "Volunteer River Clean-Up Days" events in each corridor and watershed community with focus on reinforcing goals and implementation actions in the River Management Plan.

Time Frame: Long Term/Ongoing

63. Establish a sponsorship program for river and tributary segments where local volunteer and civic groups would be responsible for providing on going clean up.

Time Frame: Long Term/Ongoing

OBJECTIVE 3: Increase public awareness of the importance of buffers.

Strategies:

64. Utilize existing outreach materials about developing planting plans that integrate native species and shade trees, and provide riparian habitat. Provide this information through the IRLAC website and at presentations, workshops and other public events.

Time Frame: Short Term

65. Make presentations to owners of riparian and shoreland property to raise awareness of the functions and values of buffers. Provide this information through the IRLAC website and at presentations, workshops and other public events.

Time Frame: Intermediate Term

66. Through the IRLAC website and presentations, promote methods and techniques to maintain healthy functioning buffers.

Time Frame: Long Term/Ongoing

67. Develop demonstration projects and/or hold instructional workshops at municipal parks on the river or hosted by a riparian property owner. Enlist the help of local gardening clubs and nurseries to assist with these events.

Time Frame: Long Term/Ongoing

CHAPTER VIII: IMPLEMENTATION PROCESS AND PLAN

A. Implementation Process

Prioritization of Strategies

Strategies are specific tasks, products or actions, which can be implemented in order to meet the specific objective. Potential lead contacts and organizations and partners describe the persons or groups who are likely to take the lead or be involved in implementing a specific strategy. Potential funding sources are listed where potential sources for financial support could be identified. Identifying all options for funding will be a primary responsibility of those taking the lead in implementing a specific strategy.

Recommended Strategies are identified as Short Term/Ongoing, Intermediate Term, and Long Term. Short Term Strategies are estimated for completion within the next year; Intermediate Term Strategies are within three years; and Long Term Strategies within five years or ongoing. These time frames have been provided as general guidelines and are based on several variables including time commitment from lead contacts, volunteer participation, and available resources and funding. While initiation of a strategy may include short-term action, completion will depend on many other factors.

Note: In Section B following, strategies are grouped in separate tables by Short Term, Intermediate Term and Long Term time frames, and numbered using the sequential numbering system from Chapter VII.

Lead/Partners

Following is a partial list of communities, agencies and groups that can provide assistance and partnerships for implementation of the River Management Plan.

Category	Partners
Watershed Communities	Barrington, Dover, Farmington, Northwood, Rochester and Strafford
Local Land Trusts	Strafford Rivers Conservancy, Bear Paw Regional Greenways
State	Department of Environmental Services NH Coastal Program Natural Heritage Bureau (DRED) NH Fish and Game Department UNH Cooperative Extension Service UNH Stormwater Center Strafford Regional Planning Commission NH Department of Transportation
Federal	Natural Resource Conservation Service Strafford Soil Conservation District Rockingham Soil Conservation District New Hampshire Estuaries Project NH Sea Grant
Other Stakeholders	Cocheco River Watershed Coalition Society for Protection of NH Forests, Trout Unlimited

Evaluation of Progress

To measure success and evaluate if steps are being taken to reach desired management priorities and goals, an annual audit of strategy actions taken by IRLAC and/or the lead contact, organization, and partners assigned to complete a strategy or action item is suggested. Benchmarks will need to be established by the person(s), organizations and partnerships that will be responsible for implementing each strategy based on dedicated resources, funding availability, time frames of grants, availability of volunteers, and other commitments from partnerships.

Funding Needs

Funding is available annually from a variety of local, state, federal and nonprofit sources. It is recommended that IRLAC develop a database of these funding sources. A work plan should be developed for each Implementation Action including a budget. Implementation Actions can be grouped according to topic, goals and products for inclusion in a single grant proposal (i.e. stormwater, ordinance and regulation development, outreach and education, land conservation).

B. Management Approaches

Management approaches for the Implementation Actions and Implementation Plan will focus on:

- √ Public Education, Outreach and Training
- √ Local Land Use Regulations and Policies
- √ State and Local Enforcement of Regulations
- √ Collection and Use of Data
- √ Capacity and Consensus Building with Stakeholders
- √ Collaboration with local, regional and state agencies/groups
- √ River Management Plan Implementation

C. Implementation Plan

Note: In this Section, strategies are grouped in separate tables by Short Term, Intermediate Term and Long Term time frames, and numbered using the sequential numbering system from Chapter VII.

ID	SHORT TERM/ONGOING STRATEGIES	Management Approach
	Action 1. Water Quality and Quantity Protection	
	Action 1 Strategies:	
1	Obtain funding to support and expand the existing water quality monitoring program and purchase additional testing equipment as needed.	Data Collection and Use
2	Coordinate with state and non-profit partners to provide training for new volunteers for the water quality monitoring and stream assessment programs.	Public Education, Outreach, Training
3	Recruit new volunteers for the water quality monitoring and stream assessment programs by developing outreach materials and opportunities.	Public Education, Outreach, Training
4	Identify additional sampling sites and data needs of constituents in the watershed for targeting water quality monitoring and stream assessment programs.	Data Collection and Use
5	Document the existing implementation plan for comprehensive water quality monitoring and stream assessment programs (refer to Chapter IV for recommendations to incorporate results from the NHDES VRAP annual reports in the plan).	Data Collection and Use
8	Develop a detailed drainage network map of the watershed, including but not limited to subwatersheds, tributaries, soils, slopes, vegetative cover, land cover, and infrastructure.	Data Collection and Use
11	Support state enforcement of Comprehensive Shoreland Protection Act and enforcement of local requirements relating to buffers and setbacks for development in the river corridor (and watershed where applicable).	State and Local Enforcement of Regulations
12	Meet annually with local land use boards to encourage adoption or strengthening of buffer requirements in subdivision and site plan regulations that pertain to the Isinglass River and its tributaries.	Local Land Use Regulations and Policies
13	Include local land use boards, elected officials and municipal staff in all education, outreach and publicity initiatives relating to buffers and buffer protection as outlined in this Plan.	Public Education, Outreach, Training
17	Develop an outreach implementation plan focused on water quality issues (identified in Objective 1) in the watershed. The plan should include partnering organizations, groups and agencies, funding sources, and evaluation criteria.	Public Education, Outreach, Training
18	Utilize existing brochures and fact sheets about how to modify practices, maintenance and management to effectively reduce and minimize point and non-point sources of pollution at home, for businesses and for municipalities.	Public Education, Outreach, Training
	Action 2. Flood Management and Remediation	
	Action 2 Strategies:	

20	Present elected officials in the watershed communities with flood evaluation and stream condition data. Discuss potential causes of flooding and flood damage, and identify common goals for protection of the river and its tributaries.	Collection and Use of Data Consensus Building
24	Use existing data from NH Department of Transportation and Strafford Regional Planning Commission to map the location of road crossings, bridges and culverts in the river corridor.	Data Collection and Use
27	Gather information from annual FEMA reports from the watershed communities about key wetlands and uplands that provide flood storage within the river corridor and watershed. Identify areas where new flooding occurred during large storm events in the past few years.	Data Collection and Use
29	Conduct outreach to property owners in watershed communities about the importance of preserving these wetlands and uplands to protect property and reduce costly repair to infrastructure.	Public Education, Outreach, Training
	Action 3. Land Protection, Resource and Habitat Conservation	
	Action 3 Strategies:	
32	Using existing technical studies (The Land Conservation Plan for New Hampshire's Coastal Watersheds and the New Hampshire Wildlife Action Plan) and the map set for this plan, identify significant resources in the river corridor and watershed, including agricultural lands, unfragmented forest blocks, wildlife habitat, and water resources.	Data Collection and Use
34	Identify land conservation efforts of local open space committees and conservation commissions that are actively pursuing land conservation in the watershed.	Consensus Building
	Action 4. River Corridor and Watershed Planning	
	Action 4 Strategies:	
38	Meet annually with local land use boards to discuss important issues and strategies designed at balancing uses and preserving river quality.	Local Land Use Regulations and Policies
45	The IRLAC will review the Implementation Strategies and set action-based priorities. Based on the priorities identified, IRLAC will develop an implementation plan including time frames and a schedule for completion.	River Management Plan Implementation
46	Employ a river and watershed coordinator to assist with implementation of priority strategies from the River Management Plan.	River Management Plan Implementation
47	Identify stakeholders in each watershed community and among other interested parties (land preservation groups, land trusts, non-profits, educational, etc.). Identify their important issues, geographic areas of concern/interest, and partnership capability toward implementing the goals and strategies of the Plan.	Collaboration - local, regional, state
48	Expand coordination of IRLAC's review of development projects in the river corridor by notifying land conservation groups, non-profit and other voluntary groups and interested parties in the watershed of projects under review (timeframes, meeting dates, site visits) and by making project review information, such as letters of recommendation and site plans/applications accessible. Make this information accessible by developing a projects database and website.	Collaboration - local, regional and state
52	Encourage the completion of Natural Resource Inventories in all the watershed communities. Assist communities in sourcing and applying for grants to fund these studies.	Data Collection and Use

53	Identify agencies, groups and educational institutions conducting research, evaluation or planning activities within the watershed, and obtain results and data.	Public Education, Outreach, Training
55	Provide copies of the River Management Plan to the Land Use Boards and elected officials.	River Management Plan Implementation
57	Develop a publicity plan to advertise and get the word out about Plan Implementation, and specific outings and events, important meetings of local land use boards, and other IRLAC initiatives.	Plan Implementation
58	Develop a database of newspaper, television, radio and local publications, including contact information, rates, publication dates, and distribution area. Include these contacts in email lists and IRLAC website notices to publicize events.	Plan Implementation
59	Solicit volunteers to develop and maintain the publicity database and to implement the publicity plan.	Plan Implementation
	Action 5. Stewardship, Education and Outreach	
	Action 5 Strategies:	
64	Utilize existing outreach materials about developing planting plans that integrate native species and shade trees, and provide riparian habitat. Provide this information through the IRLAC website and at presentations, workshops and other public events.	Public Education, Outreach, Training

ID	INTERMEDIATE TERM STRATEGIES	Management Approach
	Action 1. Water Quality and Quantity Protection	
	Action 1 Strategies:	
9	Use the drainage network map, air photography and GIS data to analyze developing areas, unvegetated riparian areas, and locations where best management practices should be implemented to protect water quality.	Data Collection and Use
14	Using the detailed drainage map and analyses (see Goal 1-2), identify areas where riparian and shoreland buffers are degraded or do not exist.	Data Collection and Use
15	Utilize sample planting plans and guidance brochures on planting and caring for buffers developed by UNH Cooperative Extension to educate riparian property owners about water quality. Provide this information through the IRLAC website and at presentations, workshops and other public events.	Public Education, Outreach, Training
16	Participate in state and national programs that fund implementation of buffer restoration.	Collaboration - local, regional and state
19	Utilize existing guidance brochures and fact sheets about planting and caring for buffers developed by UNH Cooperative Extension to educate riparian property owners about water quality. Provide this information through the IRLAC website and at presentations, workshops and other public events.	Public Education, Outreach and Training
	Action 2. Flood Management and Remediation	
	Action 2 Strategies:	
25	Use existing data from NH Department of Transportation and Strafford Regional Planning Commission to conduct corridor site assessments to document stream crossing conditions, stream morphology, and aquatic habitat..	Data Collection and Use
26	Develop recommendations for management practices and a priority list of improvements for road crossings in the river corridor and watershed. Provide recommendations to elected officials in the watershed to inform decisions regarding allocation of funds in the local Capital Improvement Plan and annual budget.	Local Land Use Regulations and Policies
	Action 3. Land Protection, Resource and Habitat Conservation	
	Action 3 Strategies:	
33	Using the inventory of natural resources, evaluate their relationship with existing conserved lands, current land use, and resource regulations. Identify areas and/or resources for protection using conservation measures aimed at protecting the specific values of the resources.	Data Collection and Use
35	Partner with local land trusts and other groups conducting land conservation in the watershed to help them develop working relationships with local land owners and implement potential land conservation measures.	Consensus Building
36	Partner with regional land conservation groups and land trusts to conduct annual estate planning and land conservation workshops to encourage land preservation.	Public Education, Outreach, Training

	Action 4. River Corridor and Watershed Planning	
	Action 4 Strategies:	
39	Encourage adoption of erosion and sedimentation control and stormwater management standards for development within the watershed.	Local Land Use Regulations and Policies
43	Encourage adoption of innovative land use controls (such as multi-density zoning, environmental characteristics zoning, and site level design requirements) by watershed communities.	Local Land Use Regulations and Policies
44	Identify potential sites to implement emerging science and technology for stormwater and sediment and erosion control. Partner with local communities or seek funding sources for these projects.	Collaboration - local, regional, state
56	Make presentations to the Land Use Boards of the corridor and watershed communities to encourage the adoption of the River Management Plan as part of their Master Plans.	Plan Implementation
	Action 5. Stewardship, Education and Outreach	
	Action 5 Strategies:	
60	Develop IRLAC website to facilitate Plan Implementation through outreach and education, dissemination of information, and promote river related events and projects.	Plan Implementation
65	Make presentations to owners of riparian and shoreland property to raise awareness of the functions and values of buffers. Provide this information through the IRLAC website and at presentations, workshops and other public events.	Public Education, Outreach, Training

	LONG TERM STRATEGIES	Management Approach
	Action 1. Water Quality and Quantity Protection	
	Action 1 Strategies:	
	Implement the recommendations from the NHDES VRAP annual reports to improve the water quality monitoring program.	Data Collection and Use
	Continue collecting data to support adherence to water quality standards for designated uses and to support fisheries and habitat protection within the watershed.	Data Collection and Use
	Utilize the detailed drainage map and analysis to identify water quality issues in the river corridor and watershed.	Data Collection and Use
	Action 2. Flood Management and Remediation	
	Action 2 Strategies:	
	Continue collection of stream assessments (erosion and sedimentation vegetation loss, bank stability, and habitat loss) as part of the VRAP and VBAP programs. Produce annual report or summary of this data and provide to watershed communities.	Data Collection and Use
	Review information from local hazard mitigation plans to identify flood hazard areas and flood damage areas, and the potential causes within the corridor and watershed.	Data Collection and Use
	Conduct stream geomorphic assessment to identify Fluvial Erosion Hazard areas and develop a fluvial erosion hazard overlay.	Data Collection and Use
	Present information to elected officials about the importance of preserving these areas within the river corridor and watershed to protect property and reduce costly repair to infrastructure.	Public Education, Outreach, Training
	Develop maps for watershed communities that display the key wetland and uplands that provide flood storage. Provide these maps to the communities.	Data Collection and Use
	Support local regulations to preserve key wetlands and uplands that provide flood storage in the river corridor and watershed.	Local Land Use Regulations and Policies
	Action 3. Land Protection, Resource and Habitat Conservation	
	Action 3 Strategies:	
	Coordinate watershed communities to identify shared land and natural resource protection goals, strategies, and information. The Strafford Regional Planning Commission, land conservation groups and land trusts may have available resources to provide overall coordination for this effort.	Consensus Building
	Action 4. River Corridor and Watershed Planning	
	Action 4 Strategies:	
	Form partnerships to coordinate and conduct training and encourage attendance at regional/state workshops focused on land and resource protection regulations..	Consensus Building
	Support and participate in training opportunities to educate local land use boards, elected officials and community staff about low impact development, better site design and smart growth policies.	Public Education, Outreach, Training

	Partner with the NH Department of Environmental Services, UNH Stormwater Center, UNH Cooperative Extension, and others to provide information and presentations about emerging science and technology aimed at improving land use regulations that help meet the goals of the River Management Plan.	Collaboration - local, regional, state
	Conduct annual audits of local and state regulatory changes that affect resources and land use in the river corridor and watershed.	Collaboration - local, regional, state
	Meet annually with Conservation Commissions and local land protection groups and land trusts to discuss important issues and to support revision of land protection goals and strategies (as outlined in Goals 3-1 and 3-2).	Capacity/Consensus Building
	Meet annually with local land use boards to discuss Plan Implementation and important issues and strategies designed for balancing uses and preserving river quality (outlined in Goal 6-1).	Plan Implementation
	Continue to compile and inventory data and resource-based information on river corridor and watershed resources. Make this information available to all watershed communities including on the IRLAC website (when developed).	Data Collection and Use
	Action 5. Stewardship, Education and Outreach	
	Action 5 Strategies:	
	Acquire funding to develop and implement education and outreach strategies such as a "What Can Property Owners Do" campaign aimed at improving household and business practices that benefit water quality and resource protection.	Public Education, Outreach, Training
	Organize bi-annual "Volunteer River Clean-Up Days" events in each corridor and watershed community with focus on reinforcing goals and implementation actions in the River Management Plan.	Plan Implementation
	Establish a sponsorship program for river and tributary segments where local volunteer and civic groups would be responsible for providing on going clean up.	Public Education, Outreach, Training
64.	Through the IRLAC website and presentations, promote methods and techniques to maintain healthy functioning buffers.	Public Education, Outreach, Training
	Develop demonstration projects and/or hold instructional workshops at municipal parks on the river or hosted by a riparian property owner. Enlist the help of local gardening clubs and nurseries to assist with these events.	Public Education, Outreach, Training

CHAPTER IX: SUMMARY

A. Goals and Vision of the Plan

The Isinglass River Management Plan has been developed with the goals of protecting and conserving the rivers many resources; protecting riparian and aquatic habitat; advocating for water quality and quantity to sustain aquatic and recreational uses; and balancing the development of land and water uses for recreation with other public needs within the river corridor and watershed.

The Isinglass River Local Advisory Committee (IRLAC) will advocate for implementation of the Plan within the watershed and supports integration of its goals and strategies by communities in the Isinglass watershed in their planning initiatives and land use decisions.

B. Review of Findings

Chapter VII Implementation Actions proposes specific strategies to address preservation, conservation and sustainability of natural resources in the river corridor and watershed. These strategies address the challenges of land use change and growth in the watershed by: conducting evaluations to help identify land use change, analyze trends, and determine the ecological impacts and cumulative effects of land use change; supporting technology and research and information gathering; coordinating with watershed partners, local officials, and land use boards to implement and enforce effective protection measures; and reaching out to the public for their support and stewardship in the watershed.

C. Summary of Plan Actions

The following priority management issues were identified during development of the Isinglass River Management Plan. These issues are the focus of the Implementation Actions and Implementation Plan, described in detail in Chapters VII and VIII.

1. Water Quality and Quantity Protection
2. Flood Management and Remediation
3. Land Protection, Resource and Habitat Conservation
4. River Corridor and Watershed Planning
5. Stewardship, Education and Outreach

D. Review and Updating of the Plan

The Isinglass River Management Plan will be reviewed annually and updated every 3-5 years depending upon need and subsequent recommended changes in the Action Plan, and changes in local and state regulatory requirements and development trends.

CHAPTER X: APPENDICES

APPENDIX A. Survey Results of 2005 and 2007

APPENDIX B. Key Person Interviews Results 2008

APPENDIX C. Summary of Comprehensive Shoreland Protection Act Standards

APPENDIX D. Summary of Discussion from June 2, 2008 Community Meeting

APPENDIX E. Map Set

APPENDIX F. Stream Assessment Data Sheet

APPENDIX A. SURVEY RESULTS of 2005 and 2007

2005 Isinglass River Riparian Landowner Survey Results

Of the 171 surveys mailed, 30 responses were received (18%). Survey responses indicated that the majority of landowners are residents of one of the three riparian communities and have owned property for a number of years. Relatively few have purchased during the most recent real estate boom.

The majority of respondents indicated that the values associated with the preservation of wildlife habitat are most important, with the majority of respondents indicating that wildlife and/or scenic values are what they like best about the river. Recreation is also a priority value, with the majority of respondents stating that passive recreational opportunities (fishing, hunting, bird watching, walking/hiking, canoeing, etc.) are of key importance. Potential habitat loss from development and related problems such as erosion and sedimentation were the most frequently listed concerns.

Half of the respondents allow public access, with only about one-third of the respondents citing problems with public use. However, nearly half of the respondents indicated that litter and overuse are concerns that they have. This response would indicate that additional public access points would alleviate problems for riparian communities, particularly as population density increases with new housing developments encroaching on the corridor area.

Finally, it should be noted that although the survey did not include any response item relating directly to water levels, five responses (totaling 16.6%) included low water levels (seasonal declines in stream flow associated with maintaining water levels in Bow Lake) in the river as a significant concern.

2007 Isinglass River Corridor Property Owner Survey Results

Of the 769 surveys mailed, 77 surveys were completed (10 percent return), and 19 were returned as undeliverable.

Primary Issue of Concern: As identified by 82% of respondents in the survey, the most significant issue that negatively impacts or could negatively impact natural resources in the watershed is **development pressure and associated impacts**.

The following issues consistently ranked high throughout the survey and were considered important for protection of the Isinglass River, overall water quality and the watershed.

- √ Water Use and Consumption – drinking (72%), habitat (49%) and agriculture (39%).
- √ Water Quality – improve regulations and standards (60%), improve monitoring (57%), preserve and restore buffers for rivers, streams and wetlands (57%), and improving municipal practices of water and natural resource management (62%).
- √ Surface Water Quality - 26% reported the quality of surface waters in their community is "Good or Excellent", and 26 % responded "No Opinion/Don't Know".
- √ Pollution Sources - the following factors were identified as the most responsible for existing pollution problems: erosion from roads and construction sites (81%), road salt and domestic water softeners (65%), and stormwater runoff from developed lands (55%).
- √ Regulations and Standards – strengthen or improve regulations and standards for development; improve enforcement of existing regulations designed to protect natural resources.
- √ Public Information, Education, Awareness –The general deficit in public knowledge is illustrated in the property owners responses about: the quality of surface waters where they live; whether they know or suspect certain pollutants are affecting water quality in their area; and their ability to identify specific groups that contribute to protecting water quality in their community. Many property owners simply did not know about the status of local water quality and who acts to protect it in their community from a regulatory perspective. On a positive note, more than 50% of property owners reported altering specific behaviors to conserve water or preserve water quality, which demonstrates willingness to take personal responsibility and to adapt lifestyle changes to respond to these issues.
- √ Stormwater Management – reduce volume and improve methods and treatment by using innovative practices.
- √ Preservation – permanent land protection, preserve and restore buffers for rivers.

Additional Survey Results

Practices at Home: 47% of respondents consider improving home and garden practices "very important or extremely important" for protecting water resources (see General Survey question #4). Confirmation of this opinion is found in responses relative to changing behavior to conserve water or preserve water quality: 85% pumped septic systems or repaired/replaced failing systems; 61% tested their drinking water; and 49% changed their water use practices and application of pesticides, herbicides, fertilizers and chemicals to preserve water quality.

Information. respondents were most interested in learning more about issues on their properties such as private well protection and septic systems (see General Survey question #13).

2007 Isinglass River Corridor Municipal Officials Survey Results

Of the 125 surveys mailed to municipal officers in the three Isinglass River Corridor communities, 19 surveys were completed (15 percent return rate).

Primary Issue of Concern: As identified by 89% of respondents in the survey (17 responses), the most significant issue that negatively impacts or could negatively impact natural resources in the watershed is **development pressure and associated impacts**.

The following issues consistently ranked high throughout the survey and were considered important for protection of the Isinglass River, overall water quality and the watershed.

- √ Water Use and Consumption – protect for habitat, drinking, fishing and agriculture.
- √ Water Quality – protect drinking water; land preservation; dissemination of information; improve monitoring; preserve and restore buffers for rivers, streams and wetlands; improve wastewater treatment.
- √ Surface Water Quality - 50% reported the quality of surface waters in their community is "Good or Excellent", while "Good and Improving" and "Fair" ratings each received 17%.
- √ Pollution Sources - the following factors were identified as the most responsible for existing pollution problems: erosion from roads and construction sites 67%; stormwater runoff from developed lands 67%; road salt and domestic water softeners 61%; and runoff from home landscapes 56%.
- √ Improve Regulations and Standards – improve and strengthen regulations and standards for development and improve enforcement of existing regulations designed to protect water quality and natural resources.
- √ When asked how well certain groups contribute to protecting water quality in the community, 63% considered cites and towns most effective, with individuals/citizens/ volunteers and the IRLAC at 58% ,and State government at 53%.
- √ Public information, education, and awareness – lack of information related to natural resource and watershed issues.
- √ Stormwater Management – reduce volume and improve methods and treatment by using innovative practices.
- √ Preservation – agricultural lands, open space, buffers.

Additional Survey Results

Practices at Home: Interestingly, 47% of municipal officials consider improving home and garden practices "not important or somewhat important" for protecting water resources; however, 78 % reported pumping or repairing/replacing septic systems and 45% of respondents reported changing their water use practices and application of pesticides, herbicides, fertilizers and chemicals to preserve water quality. In addition, 56% consider runoff from home landscapes most responsible for existing pollution problems in the watershed (with erosion at 67% and road salt and domestic water softeners at 61%).

APPENDIX B. Key Person Interview Results 2008

The individuals who participated in the Key Person Interviews represent a cross-section of natural resource conservation and preservation groups in the region, and land use planning professionals from the three river corridor communities. Although their opinions and views are representative of the nature of their participation at the local level, the consistency of their responses was not surprising. Each participant offered a well-informed perspective of the status of the Isinglass River as a NH protected river and valuable community and regional resource, and shared common goals and objectives with respect to environmental protection of the river and within the watershed. Key themes that were repeatedly expressed during these interviews were:

- √ Enforcement of state and local protective regulations
- √ Water quality and quantity
- √ Growth management and planning
- √ Land protection and conservation
- √ Education, outreach and training

Integration of Key Issues with the River Management Plan

The following are recommendations to integrate the key issues identified in the Key Person Interviews with the River Management Plan.

- √ Expand coordination of review of development projects in the river corridor; notify land conservation groups, non-profit and other voluntary groups and interested parties in the watershed of projects under review (timeframes, meeting dates, site visits) and by making project review information, such as letters of recommendation and site plans/applications accessible; Make this information accessible by developing a projects database and posting it on a website.

- √ Seek partners to improve management and regulation of resources in the river corridor and watershed; focus partnerships to expand IRLAC regulatory, voluntary and outreach/stewardship roles in the watershed; increase IRLAC support of land protection and conservation efforts in the river corridor and watershed.

- √ Develop specific goals and strategies to address key themes identified above, and 2) develop an implementation plan to track progress toward these goals and strategies.

- √ As part of outreach activities, meet with land conservation groups, non-profit and other voluntary groups, and interested parties in the watershed to review the goals strategies of the work plan to identify opportunities for coordination and collaboration; secure commitments and/or letters of agreement to implement specific goals and strategies of the River Management Plan.

Key Person Interviews included the following individuals:

Interview Format	Individual	Title	Town/City/Affiliation
Q	John Huckins	Chair, Planning Board	Barrington
I	Steve Conklin	Water Commissioner	Barrington
Q	Daniel Kern	Executive Director	Bear Paws Regional Greenways
Q	Douglas DePorter	District 6 Engineer	NH Dept. of Transportation
Q	Michael Behrendt	City Planner	Rochester
T	Charlie Moreno	Chair, Planning Board	Strafford
Q	Phil Auger	University of NH Cooperative Extension	Strafford
T	John Wallace	Board of Directors	Strafford Rivers Conservancy
I	Mark Seymour	President, Great Bay Chapter	Trout Unlimited

I = In-Person Interview T = Telephone Interview Q = Questionnaire via email

APPENDIX C. Summary of Comprehensive Shoreland Protection Act Standards

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

RSA 483-B
Comprehensive Shoreland Protection Act
Standards

*Subject to additional clarifications after rule making

Effective April 1, 2008, **A STATE SHORELAND PERMIT is required for any construction, excavation or filling activities.** Forest management not associated with shoreland development or land conversion and conducted in compliance with RSA 227-J:9 or under the direction of a water supplier for the purpose of managing a water supply watershed, and agriculture conducted in accordance with best management practices as required by RSA 483-B, III are exempted from the provisions of the Chapter. Projects that receive a permit under RSA 482-A, e.g., beaches, do not require a shoreland permit.

250 Ft. from Reference Line—THE PROTECTED SHORELAND:

- **Impervious Surface Area Limitations.** Impervious surface area is limited to 20%. This may be increased to:
  - 25% with 50 points of tree coverage in each 50 foot x 50 foot grid segment in the waterfront buffer (WB), and a no cut deed restriction in the waterfront buffer.
  - 30% with 50 points of tree coverage in each 50 foot x 50 foot grid segment in the waterfront buffer, a no cut deed restriction in the waterfront buffer, and a DES approved stormwater management plan.

Other Restrictions:

- No establishment/expansion of salt storage yards, auto junk yards, solid waste and hazardous waste facilities.
- All new lots, including those in excess of 5 acres are subject to subdivision approval by DES.
- Setback requirements for all new septic systems are determined by soil characteristics.
  - 75 feet for rivers and areas where the there is no restrictive layer within 18 inches and where the soil down gradient is not porous sand and gravel (perc>2 min.).
  - 100 feet for soils with a restrictive layer within 18 inches of the natural soil surface.
  - 125 feet where the soil down gradient of the leachfield is porous sand and gravel (perc>2min.).
- Minimum lot size in areas dependent on septic systems determined by soil type.
- Alteration of Terrain Permit standards reduced from 100,000 square feet to 50,000 square feet.
- The number of dwelling units per lot shall not exceed 1 unit per 150 feet of shoreland frontage.

150 ft. from Reference Line—NATURAL WOODLAND BUFFER RESTRICTIONS:

- Within the area between 50 feet and 150 feet from the reference line; 50% of the area not covered by impervious surfaces shall be maintained in an undisturbed state.

50 ft. from Reference Line—WATERFRONT BUFFER and PRIMARY BUILDING SETBACK:

- All primary and accessory structures must be set back at least 50 feet from the reference line. Towns may maintain or enact their own setback only if it is greater than 50 feet.
- Within 50 feet, a waterfront buffer must be maintained.Within the waterfront buffer, tree coverage is managed with a 50-foot x 50 foot grid and points system. Tree coverage must total 50 points in each grid. Trees and saplings may be cut as long as the sum of the scores for the remaining trees and saplings in the grid segment is at least 50 points.
- No natural ground cover shall be removed except for a footpath to the water that does not exceed 6 feet in width and does not concentrate stormwater or contribute to erosion.
- Natural ground cover, including the duff layer, shall remain intact. No cutting or removal of vegetation below 3 feet in height (excluding lawns) except for the allowable footpath.
- Within 50 feet, stumps, roots, and rocks must remain intact in and on the ground.
- Chemical applications (including but not limited to pesticides and herbicides) are prohibited. Low phosphorus, slow release nitrogen fertilizer may be used for the area that is beyond 25' from the reference line. No fertilizer, except limestone, shall be used between the reference line and 25 feet.

REFERENCE LINE: For ***coastal waters*** it is the highest observable tide line; for ***rivers*** it is the ordinary high water mark; for ***natural fresh waterbodies*** it is the natural mean high water level; and for ***artificially impounded fresh waterbodies*** it is the elevation at the spillway crest or the elevation of the state's flowage.

NON-CONFORMING STRUCTURES Are structures that, either individually or when viewed in combination with other structures on the property, do not conform to the provisions of the CSPA, including but not limited to the impervious surface limits of RSA 483-B:9V(g). They may be repaired, renovated, or replaced in kind using modern technologies, provided the result is a functionally equivalent use. Such repair or replacement may alter the interior design or existing foundation, but shall result in no expansion of the existing footprint except as authorized by the department pursuant to paragraph II of RSA 483-B.

A SITE ASSESSMENT is required prior to executing a purchase and sale agreement for any "developed waterfront property" using a septic disposal system and which is contiguous to or within 200 feet of a great pond (a public water of more than 10 acres) as defined in RSA 4:40-a and upon which stands a structure suitable for either seasonal or year-round human occupancy.

For more information, please visit the DES Shoreland Website at www.des.nh.gov/espa

APPENDIX D. Summary of Discussion from June 2, 2008 Community Meeting

MEMORANDUM

To: **Isinglass Local Advisory Committee**

From: **Julie LaBranche, Strafford Regional Planning Commission**

Date: **June 6, 2008**

Re: **Community Meeting of June 2, 2008 - Summary of Discussion**

The Isinglass River Local Advisory Committee, with the Strafford Regional Planning Commission, conducted a Community Meeting on Monday, June 2, 2008 at the Barrington Town Hall to review and discuss the Final Draft of the Isinglass River Management Plan.

Julie LaBranche, SRPC, introduced participants and provided an overview of the RMP goals, components and priority issues.

Ann Schulz provided a historical perspective of the formation of the Isinglass River Protection Project and how this group lead efforts to designate the Isinglass River under the NH Rivers Management and Protection Program.

Maryalice Fischer presented an overview of the IRLAC water quality monitoring and stream assessment programs, and presented statistical data from water quality sampling sites.

Julie LaBranche concluded the meeting with a general discussion with participants of relevant issues in the river corridor and watershed. Below is a summary of this discussion.

Attendees

Steve Conklin – Barrington Water and Sewer Committee
John Wallace – Chair, Barrington Conservation Commission
Pam Failing – Barrington Conservation Commission
Cynthia Copeland - SRPC

IRLAC Members: Wayne Donle, Pam Skeffington, Ann and Jim Schulz, Maryalice Fischer, Liz Evans

A. Discussion Points

Concerns raised by Steve Conklin on behalf of the Barrington Water and Sewer Committee:

1. Expand upon the watershed focus of the plan

2. P.8. Aquifers – review statement that "none of the aquifers are significant"
3. P. 10 Wetlands – add discussion of designated prime wetlands in Barrington
4. P. 13 Instream Flow – currently documented by NHDES that, at certain times of the year, Rochester diverts ***ALL*** water from the Berry's River to their municipal drinking water supply; request that this be noted (with references) in this section
5. Stormwater – recent policy change by FEMA states that Class VI roads can be included in assessments for federal assistance provided to towns for repair of flood damage; monetary compensation is provided directly to the "road owner(s)" and not to towns.
6. Stormwater – when replacing damaged stormwater infrastructure, must evaluate new designs and upgrades to accommodate current hydrologic regime (i.e. large storm events, generation of more runoff in the watershed due to development); refer to the proposed/ongoing Achuelot River study
7. P. 38 Management Approach – should include State enforcement and consistency issues relating to Alteration of Terrain and Wetlands permitting programs; refer to the NH Office of Legislative Budget Assistant "Alteration of Terrain and Wetlands Permitting Audit Report – August 2007". This report can be downloaded at http://www.gencourt.state.nh.us/lba/PerformanceReports/DES_2007p.html. A summary of results from the report are on page 3 of this document.
8. Need to clarify terms – storm events based on precipitation data and not on the volume of water being generated in an event in a watershed

Note: I addressed Comments #2 and #3 above by adding and revising text in the appropriate sections of the River Management Plan as noted.

B. General Comments/Issues of Concern

1. Education and outreach focused on "experiential" activities and events; bring the public to the river to engage in activities that are relevant to their daily lives and interests; buy in is important
2. Target schools to implement outreach and education about environment and natural resources in the watershed; promote attendance at "Science Camp", curriculum development, field study projects by students as part of curriculum
3. ENFORCEMENT of existing regulations on the local and state level
4. Public support for environmental regulations but lack of perception about complying
5. Need local support from the public, property owners, elected officials to make enforcement effective, accepted and an expected by everyone
6. State permitting agencies lack visibility on the local level – no "policing" of resources
7. Home Owner/Land Owner education – the public should know what environmental constraints and/or resources are on their property **before** or after they purchase

APPENDIX E. MAP SET

APPENDIX F. STREAM ASSESSMENT DATA SHEET