CONTOOCOOK AND NORTH BRANCH RIVERS CORRIDOR MANAGEMENT PLAN

Including the Towns of:
Antrim, Bennington, Boscawen, Concord, Deering, Greenfield, Hancock, Henniker, Hillsborough, Hopkinton, Jaffrey, Peterborough, Rindge, and Stoddard, NH

CONTOOCOOK AND NORTH BRANCH RIVERS LOCAL ADVISORY COMMITTEE

February 2011

With Assistance from:

Central New Hampshire Regional Planning Commission
Southwest Region Planning Commission

ACKNOWLEDGMENTS

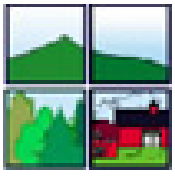
The following members of the Contoocook and North Branch Rivers Local Advisory Committee (CNBRLAC) participated in the development of this plan:

Beth Alpaugh-Cote, Peterborough	**Louise Malcolm**, Peterborough
Marian Baker, Hillsborough	**Jon Manley**, Bennington
Dick Bell, Hancock	**Eric Poor**, Rindge
Ed Cherian, Boscawen	**Bill Preston**, Rindge
Ken Cloutier, Antrim	**Denise Rico**, Henniker
Michelle Hamm, Henniker (Chair)	**Warren Sponsler**, Hancock
Phil Harvey, Hillsborough	**Jill Winton**, Deering
Ted Hillson, Penacook	**Rod Zwirner**, Antrim
Joe MacGregor, Bennington	

The Committee would also like to acknowledge the assistance of the following people:

Evan Aird, Central New Hampshire Regional Planning Commission
Vanessa Goold, Central New Hampshire Regional Planning Commission
Tara Germond, Southwest Region Planning Commission
Jon Magee, New Hampshire Fish and Game Department
Amy Smagula, New Hampshire Department of Environmental Services
Laura Weit-Marcum, New Hampshire Department of Environmental Services

Funding for the update to this plan was provided by the NH Department of Environmental Services through Section 604(b) of the Clean Water Act with funds appropriated by the American Recovery and Reinvestment Act of 2009.



Southwest Region
Planning Commission
20 Central Square, 2nd Floor
Keene, NH 03431
603-357-0557
www.swrpc.org

Central New Hampshire
Regional Planning Commission

28 Commercial Street
Concord, NH 03301

603.226.6020
www.cnhrpc.org

New Hampshire
Department of
Environmental
Services
29 Hazen Drive Concord NH 03301

Cover photo by Michelle Hamm.

TABLE OF CONTENTS

MAPS

APPENDICES

ABBREVIATIONS

CNBRLAC	Contoocook and North Branch Rivers Local Advisory Committee
CNHRPC	Central New Hampshire Regional Planning Commission
CSPA	Comprehensive Shoreland Protection Act
CWA	Clean Water Act
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
LID	Low Impact Development
MPM	Monadnock Paper Mills
NFIP	National Flood Insurance Program
NHDES	New Hampshire Department of Environmental Services
NHFGD	New Hampshire Fish and Game Department
NPDES	National Pollutant Discharge Elimination System
RMPP	Rivers Management and Protection Program
SPNHF	Society for the Protection of New Hampshire Forests
SWRPC	Southwest Region Planning Commission
USACE	United States Army Corps of Engineers
VRAP	Volunteer River Assessment Program
WMA	Wildlife Management Area

EXECUTIVE SUMMARY

This plan is intended for use by the representatives on the Contoocook and North Branch Rivers Local Advisory Committee (CNBRLAC) from the fourteen riverfront communities, municipal officials and members of municipal boards and committees, and people working to protect the rivers and riverfront lands through state agencies, non-profit or volunteer groups. It is comprised of five main sections which cover regulations, watershed resources, community input to the plan, goals and objectives, and an implementation plan and schedule.

CNBRLAC has established eight goals relating to the protection and management of the Contoocook and North Branch Rivers. The goals are supplemented by 31 objectives and an implementation plan that detail the committee's strategies and timeline for achieving each goal.

Plan Goals:

Goal 1: Protect water quality and quantity for current and future uses.

Goal 2: Maintain proper stream channel integrity to ensure high water quality, stable flow patterns, and intact riparian habitat.

Goal 3: Identify, remove, minimize, and prevent the spread of invasive plant species along the rivers.

Goal 4: Preserve and enhance wildlife habitat dependent upon the river so as to support present and future wildlife populations.

Goal 5: Maintain and encourage safe and responsible public access and use of the rivers' resources.

Goal 6: Minimize impacts of development within the river corridor.

Goal 7: Protect and preserve important historical and cultural resources.

Goal 8: Implement a workable River Corridor Management Plan.

Summary of Findings

Water Quality

The rivers and riverfront lands provide valuable resources such as treated drinking water, hydroelectric power, wastewater assimilation, wildlife habitat, and recreation. The quality of the water is important for many of these uses. While the Contoocook and North Branch rivers generally enjoy high water quality, the United States Environmental Protection Agency in 2010 found impairments for dissolved oxygen, pH, Chlorophyll-a, phosphorus, and E. coli at several points along the rivers. Some impairments can be attributed to natural soil conditions and wetlands, while others are the result of human actions such as pollutant loading, erosion, and changes to water levels in impoundments. Nonetheless, water quality has significantly improved in recent decades as protection and remediation efforts have been implemented.

Water Quantity

Users of the rivers also rely on consistent water quantity with naturally varying flows. A number of dams along the Contoocook regulate the river's flow and control water levels in several impoundments. Between dams, the river flows freely and affords both slow moving meanders and world-class rapids. Floods, low flow, and peak flow events are concerns which must be addressed through limits on structures and land uses, requirements for vegetative conditions, preservation of undeveloped floodplains, and regulation of flood control dams.

Wildlife and Plant Resources

According to the New Hampshire Natural Heritage Bureau, the rivers are home to several exemplary natural communities and rare or endangered plant and animal species. Wildlife resources for the rivers and uplands include otters, mink, beaver, mallard and wood ducks, deer, Canada geese, moose, many cool water fish, and, in the rivers' tributaries, many wild brook trout which are listed as a species of greatest conservation need in the State Wildlife Action Plan. Volunteer efforts are needed in the riverfront communities to eradicate from the rivers and shorelands invasive aquatic plant species such as milfoil, purple loosestrife, and yellow iris, and invasive upland species such as Japanese knotweed and common reed, which negatively effect water quality and recreational use.

Recreational Resources

The rivers provide an abundance of recreational opportunities both in the river channels and on adjacent uplands. The Contoocook has segments of Class II and III-IV

rapids and the North Branch has sections of Class V rapids for paddlers. Fishing is a popular activity in the rivers, which New Hampshire Fish and Game stocks with trout. Motor boating and swimming are also popular warm weather activities. In the winter months, the frozen river channel is used for other activities, such as ice fishing, snowmobiling, ice sailing, and mountain biking. Land-based recreational resources include rail trails that pass through four of the riverfront Towns and many other public trails and areas where birdwatchers and nature photographers can observe riverine and other wildlife habitats. Future access to private property for land-based recreation depends on appropriate use and behavior, which can be encouraged by management strategies such as public education and signage.

Historical and Cultural Resources

Historical and cultural resources in the corridor communities include covered bridges, historic village centers, stone walls, Indian trails, mill ruins, scenic roads, and State and municipal parks. These features offer valuable learning opportunities in addition to contributing to the aesthetic beauty of the river corridor. A number of sites and structures along the rivers have achieved state or national historical recognition, and many more opportunities exist to augment recognition and appreciation.

Land Use Management and River Corridor Planning

For maximum shoreland protection, riverfront communities have the option to adopt shoreland protection districts that are more stringent than state regulations, or other overlay districts that include riverfront lands such as groundwater protection districts. Communities may enact area requirements within zoning districts to limit coverage by impervious surfaces (which carry runoff and non-point source pollution), and actively promote vegetated open space which can filter pollutants contained in runoff. Municipalities can also establish uniform setbacks from the river through general ordinances which apply along the river regardless of zoning districts.

Planning for the long-term health and usability of the river will require a combination of strategies:

- **Coordination** among CNBRLAC, local boards, regional planning commissions, NHDES, and other State agencies
- **Educational outreach efforts** to advocate for improved stewardship of the river with regard to issues such as habitat protection, stormwater runoff, litter, invasive species, and impacts of various land uses on water quality
- **Engagement with riverfront and other watershed communities** to involve as many stakeholders as possible in protection and management efforts

The Planning Process and Community Input

Community input, primarily through a stakeholder survey and public meetings, was vital to the production of this plan. Public input has been sought through posting the survey online, and advertising and organizing the public visioning forum and public meeting to solicit public comment for the final draft. The goals and objectives for each resource category were formulated by CNBRLAC members and reviewed during subsequent meetings. The objectives under each resource category are also included in the implementation plan and schedule which shows the responsible parties and an approximate timeline for each objective.

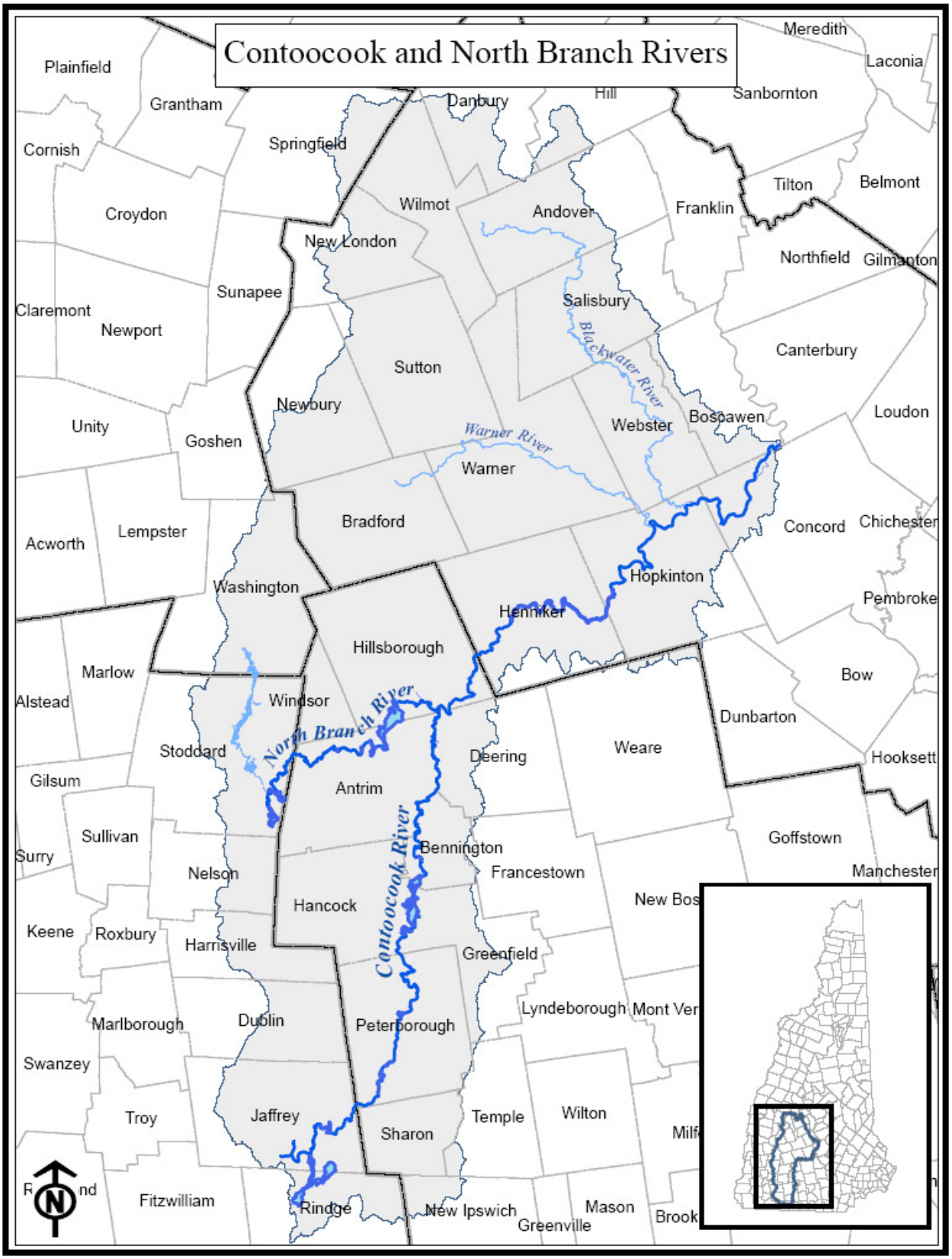
1 Introduction

The Contoocook River begins at Pool Pond in Rindge and flows north for 71 miles to its confluence with the Merrimack River in Concord. The river serves as the drainage basin for a 757 square mile watershed (which includes parts of at least 37 municipalities). The more natural and free-flowing North Branch River flows for 16 miles east from its headwaters in Stoddard, its confluence with Highland Lake in Stoddard which supplies most of the river's water, to Hillsborough, where it joins the Contoocook. The rivers were created as the result of the drainage of a glacial lake. Together the river corridors pass through fourteen communities in Cheshire, Hillsborough and Merrimack Counties. It is from these communities, which include Antrim, Bennington, Boscawen, Concord, Deering, Greenfield, Hancock, Henniker, Hillsborough, Hopkinton, Jaffrey, Peterborough, Rindge, and Stoddard, that members of the Contoocook and North Branch Rivers Local Advisory Committee (CNBRLAC) are drawn. See **Map 1** for an overview of the watershed.

The landscape of the river corridors includes urban town centers, wetlands, forests, residential and agricultural areas. Most of the land along the North Branch is undeveloped and the river contains several sections of rapids. Both Rivers are often used recreational resources that provide opportunities for all kinds of water sports, wildlife and nature observation, and recreation along nearby multi-use trails. The rivers are also a water source for municipal and agricultural purposes, a power source harnessed by hydropower facilities, and the locale for many historically valuable sites.

The Contoocook and North Branch Rivers were designated for protection under the New Hampshire Rivers Management and Protection Program (RMPP) in 1991. This designation ensures greater protection of water quantity, quality and channel integrity, and guards against construction of new dams and siting of solid and hazardous waste facilities. However, invasive species, recreational abuses such as litter and bank erosion, land development, and lack of public awareness about proper stewardship practices all pose threats to the health of the rivers. Without appropriate care the rivers will become less useable for recreational pursuits and cease to meet water quality standards as defined by state statutes, which could result in the rivers no longer being designated fishable or swimmable.

Map 1. Watershed Overview



The goal of drafting 2010 Contoocook and North Branch Rivers Management Plan, and presenting it to the municipalities, is to promote the adoption of volunteer and

regulatory measures to preserve the ecological conditions and opportunities along the rivers for present and future generations. The Plan was developed through the efforts of the CNBRLAC volunteers and input from local residents, with assistance from the Central New Hampshire Regional Planning Commission (CNHRPC) and the Southwest Region Planning Commission (SWRPC). CNBRLAC advised each step of the plan update process, which spanned from the fall of 2009 to the spring of 2010. A survey and public meeting were used to solicit public input for the drafting of the plan, and an additional public meeting was used to provide comments on the draft plan document. For the preparation of this plan, valuable technical assistance was provided by the New Hampshire Department of Environmental Services (NHDES), New Hampshire Fish and Game Department (NHFGD), and SWRPC. Financial assistance was provided through a water quality planning grant authorized under section 604(b) of the Clean Water Act.

This plan includes an explanation of local, state, and federal regulations protecting rivers, descriptions of various categories of resources located within the river corridors and Contoocook River Watershed, a section describing community input, and a goals and objectives section to serve as a guide for CNBRLAC and for any efforts made to better protect the river. The purpose of this plan is to identify key areas of concern, formulate management strategies for addressing them, prioritize the importance of these strategies, and create an action plan and preliminary timeline for implementing these. The management plan includes recommendations for short-term, intermediate, and long-term measures to protect the rivers. Concerns addressed by recommendations in the plan include water quality and quantity, stream channel integrity, wildlife and plant habitat, invasive species and other contamination hot spots, recreation, land use and development, stormwater management and floodplains, and river corridor and watershed planning.

This plan is intended for several different audiences. First, it is a tool that CNBRLAC can use to guide and focus its work in the coming years. Second, municipal boards and committees may refer to the plan or adopt it as an element in an open space or master plan. Third, it fulfills state requirements pursuant to RSA 483:10. Finally, the plan may be referenced by residents of the Contoocook River watershed or other concerned citizens seeking information about the Contoocook and North Branch Rivers. For those wishing to gain a brief overview of the plan, the Executive

Summary may be all that is necessary to read. Others looking for more detailed information are invited to read on through the plan and its appendices.

2 Regulatory Framework

Protections for the Contoocook and North Branch Rivers fall into a three-tier framework, including local, state, and federal regulations. Basic land use regulations guiding development and allowed uses are prescribed by local zoning ordinances and regulations. State regulations apply to permitting, siting various types of facilities, and buffer protections for the rivers themselves. Federal law governs major impacts and alterations to navigable rivers and mandates impact mitigation for any federally sponsored projects. A brief synopsis of applicable regulations is below; for more detailed information, consult individual municipal governments or the NHDES Water Division at http://des.nh.gov/organization/divisions/water/index.htm.

2.1 Local Regulations

Local communities have a wide variety of regulatory tools at their disposal for protecting river and watershed resources. Overlay zoning districts allow communities to designate geographic areas for protecting the river and other water resources, while deferring to the underlying base zoning district for regulations not covered by the overlay. Many communities have either Shoreland Protection or Groundwater Protection districts, or both, which protect land along the rivers. Communities may also establish other location requirements such as setback or area requirements, and prohibit certain uses, such as excavation. Area requirements as part of zoning are typically enacted by the Planning Board while general ordinances for buffer setbacks or prohibited uses might be established by other boards or at Town Meeting. A more detailed discussion of local regulations currently in effect in Towns along the river corridors can be found in Section 3.4.

2.2 Rivers Management and Protection Program

NH RSA 483 establishes New Hampshire's Rivers Management and Protection Program (RMPP). The purpose of the RMPP is to ensure the continued viability of the state's rivers as valued assets for the benefit of

present and future generations. Designated rivers are classified in one of four categories: natural, rural, rural-community, or community rivers. Each classification carries different criteria and management objectives, based on water quality and existing development. A river may be split into segments with various designations along its length. The Contoocook and North Branch Rivers carry both "rural" and "community" classifications (see **Appendix A**). Rural segments are characterized by lands used for agriculture, forestry, and dispersed or clustered residential areas. Community segments are those that flow through developed areas with mixed land uses and are readily accessible by road. RSA 483 includes the following articles:

- 483:7-a, which states that rivers must meet Class B water quality standards, standards that both rivers currently meet. Class B is defined as water that is suitable for fishing, swimming, and other recreational uses, and for use as a drinking water supply after adequate treatment, pursuant to RSA 485-A:8.

- 483:8-a III, which requires the establishment and regular meeting of a local advisory committee for each State designated river. CNBRLAC is charged with developing and updating a local river corridor management plan. CNBRLAC meets monthly to review development applications within the river corridor, dredge and fill permits from the New Hampshire Department of Environmental Services (NHDES), and other projects. The committee also has the following roles and responsibilities:

    1. To advise NHDES, the state Rivers Management Advisory Committee (RMAC) and the municipalities through which the rivers flow on river-related matters.

    2. Reports biennially to the RMAC and NHDES and annually to the riverfront communities on the status of compliance with federal and state laws and regulations, local ordinances, and plans relevant to the river, its corridor and tributary drainage areas.

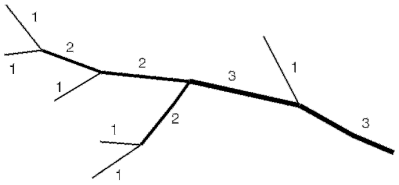
- 483:9-a (for rural river segments) and 483:9-b (for community river segments), which set out protections for rivers under these classifications. Protection measures govern dam construction, hydroelectric power facilities, interbasin transfers, channel alteration, the establishment of protected instream flow levels, water quality, solid waste facilities, and speed limits for motorized watercraft. The statute prohibits the construction

of new dams in "rural" sections of designated rivers, limiting new dam construction in the rivers only to the "community" sections of the rivers. Regulations for solid waste facilities, including location, setbacks, and buffers, are also more restrictive for "rural" segments than for the "community" segments.

About Stream Order

Stream order is a way of describing the hierarchy of stream size (for perennial streams only):

- **1st Order:** smallest, unforked stream
- **2nd Order:** Formed where two 1st order streams meet
- **3rd Order:** Formed where two 2nd order streams meet
- **4th Order:** Formed where two 3rd order streams meet:



Where a lower order stream meets one of a higher order, no increase in hierarchy results.

2.3 Comprehensive Shoreland Protection Act

The NH RSA 483-B Comprehensive Shoreland Protection Act (CSPA) regulates land uses within established setbacks of fourth order or greater streams or rivers. Both the Contoocook and North Branch Rivers meet this threshold. In total, the CSPA is aimed at protecting water quality from non-point source pollution, by requiring shoreland vegetation and limiting impervious surface area. Agricultural uses are exempt from these provisions but must conform to best management practices established by the NH Department of Agriculture, Markets, and Food.

The protected shoreland is divided into three tiers of buffers, for 250', 150', and 50' from the river. The entire 250' shoreland area prohibits solid waste and hazardous waste facilities and requires that NH DES approve the subdivision of land. A state CSPA permit is required in addition to, or as a condition of, local planning board approval. The maximum amount of impervious surface area allowed on a lot within the protected shoreland is 30%. If a property owner or developer wished to exceed 20%, adequate tree coverage must be present within the waterfront buffer and a stormwater management plan must be implemented. Also, new lots created within the protected shoreland must have at least 150 feet of shoreline frontage. Within the area between 50 and 150 feet from the reference line, based on lot size, a percentage of vegetation must remain in an unaltered state.

The minimum setback for all new primary structures (new homes) is 50 feet from the reference line. Trees and saplings within the waterfront buffer, 50 feet from the reference line, can be removed in accordance with a grid and point system, but all natural ground cover including stumps, roots, and rocks must remain intact on and within the ground. The only exception in which ground cover can be removed is for a six foot wide footpath to the water. No fertilizer application except limestone is allowed within 25' of the water and only low phosphorus, slow release nitrogen fertilizer may be used for the area that is between 25 and 250 feet from the river.

2.4 Additional State Regulations

There are a number of additional state regulations that affect land use and development along the Contoocook and North Branch Rivers. These regulations include:

- NH RSA 155-E prohibits excavation within 75' of the Contoocook, North Branch, and other designated rivers.
- NH RSA 482-A:3 requires a permit from NH DES for structures adjacent to wetlands. Much of the land along these rivers is adjacent to wetlands. This RSA also requires a DES Wetlands permit for any excavation, dredge and fill activities, or dock construction in or adjacent to any waters of the state.
- NH RSA 485 prohibits within wellhead protection areas the siting or operating of a hazardous waste disposal facility, snow dump, junk or salvage yard or wastewater septage lagoon, or outdoor storage area for road salt or other deicing chemicals in bulk.
- NH RSA 485:13, I(a) prohibits discharging of sewage or wastes into surface waters without a permit.
- NH RSA 485-A:15 prohibits the disposal of any litter or refuse in, on the ice over, or on the banks of surface waters.
- NH RSA 485-A:17 requires a permit for any terrain alteration in or on the border of surface waters in such a way that will alter natural runoff.
- NH RSA 485-A:29 requires a permit from NH DES to construct a septic system and an inspection before the system is used.

- NH RSA 430 states that all pesticide applications at agricultural sites must comply with rules adopted by the Pesticides Control Board of the NH Department of Agriculture.
- RSA 431:33-35 requires that manure and chemical fertilizer handling must be done in accordance with Best Management Practices as published by the NH Commissioner of Agriculture, Markets and Food.

2.5 NHDES Departmental Rules

Many rules not included as part of the Revised Statutes are also established and enforced by NH DES. These DES rules include:

- Env-Wq 1400 - Shoreland Protection Rules, which outline tree harvesting guidelines and other specifics relating to the CSPA
- Env-Wq 1700 - Surface Water Quality Regulations, which affect water quality protection, road and building construction, erosion and sedimentation, lumber harvesting practices, pesticide application, dredge and fill activities, pollution and runoff, and road salt use.
- Env-Wt 100-800 NH Wetlands Program Rules relate to water quality protection, road and building construction, dredge and fill activities, and water sports.
- Env-Wq 1400 Shoreland Protection Standards relate to protection of water quality, pollution and runoff, lumber harvesting practices, pesticide and fertilizer application, and underground storage facilities and aboveground petroleum storage facilities.
- Env-Wq 1500 Alteration of Terrain Rules govern permitting for construction and excavation activities that change the shape of the land and interfere with natural runoff processes.

NH DES also issues discharge permits for state surface waters (under Env-Ws 401) and Groundwater Management and Groundwater Release Detection Permits (Env-Wm 1403), and enforces regulations for the removal, transportation, and disposal of sludge (Env-Ws 800) and septage management (Env-Ws 1600).

2.6 Federal Clean Water Act

Enacted in 1972, the federal Clean Water Act (CWA) (3 USC 1251-1376) requires that state and local governments restore and maintain the chemical, biological, and physical integrity of U.S. waters. The Clean Water Act (33 USC 1342) requires a National Pollutant Discharge Elimination System (NPDES) permit for point discharge of pollutants and also (33 USC 1329) regulates nonpoint source pollution. The CWA (33 USC 1344) requires a federal permit to construct dams, bridges, piers, etc., in any navigable water. In addition, in terms of water withdrawals and dam regulation, the CWA states (33 USC 404) that permits for dams may be conditioned both to assure sufficient flows and restrict withdrawals for the protection of fish and wildlife. The CWA (33 USC 1345) also regulates the disposal or use of sewage sludge. The CWA (33 USC 1344) also establishes a permit system for dredge and fill activities in navigable waterways, and the CWA (33 USC 1342) regulates municipal and industrial storm water discharges.

2.7 National Environmental Policy Act (NEPA)

The National Environmental Policy Act (NEPA) requires federal agencies to consider environmental impacts when making project planning decisions. Projects receiving federal funds must undergo environmental review and provide environmental assessments or environmental impact statements describing the impacts associated with proposed actions and project alternatives.

2.8 Wild and Scenic Rivers Act

The Wild and Scenic Rivers Act mandates Federal agencies to make all reasonable efforts to avoid negative impacts to rivers designated as Wild and Scenic, as well as those listed in the Nationwide Rivers Inventory as potential Wild and Scenic Rivers. This legislation relates to water quality, as well as any construction along the river and any dredge and fill activities. The Act also has a bearing on water quantity, including water withdrawals. The Contoocook and North Branch Rivers are not currently designated as Wild and Scenic.

2.9 Rivers and Harbors Act

The Rivers and Harbors Act makes it a misdemeanor to alter the course, condition or capacity of any river regulated by the Act. It also makes it a misdemeanor to discharge refuse matter of any kind into navigable waters of the U.S. or their tributaries without a permit, or to conduct dredge and fill activities in a regulated river without a permit. The Act is administered by the U.S. Army Corps of Engineers.

2.10 Federal Power Act

According to the Federal Power Act, every hydroelectric project on a navigable stream requires a Federal Energy Regulatory Commission permit.

2.11 Department of Transportation Act

Enacted in 1966, the Department of Transportation Act established the USDOT and articulated the department's overall mission. It is important for the regulation of both wildlife and fish habitat and historical and cultural resources. The Act states that no U.S. Dept of Transportation projects are allowed on public land that is important for wildlife, waterfowl refuge of national, state or local significance, recreation, or historic properties unless there is no prudent and feasible alternative and there has been all possible planning to minimize harm.

3 Watershed Resources

The Contoocook River watershed provides a host of resources for its human and non-human inhabitants. The Contoocook and North Branch rivers have been recognized for their outstanding natural and cultural resources under the New Hampshire Department of Environmental Services' (NHDES) Rivers Management and Protection Program (RMPP). These rivers provide water resources for the communities they pass through, aquatic and riparian habitat for numerous plant and animal species, recreational opportunities, and a variety of river-oriented land uses. Because the rivers have been important travel and settlement corridors over the centuries, many historic and cultural resources can also be found along their banks.

3.1 Water Resources

The headwaters of the Contoocook River originate in Pool Pond in Rindge. Unlike many rivers in the region, the Contoocook flows north, passing through fourteen communities on its 71-mile path to Concord, where it empties into the Merrimack River (see **Map 1**). The North Branch River rises in the town of Stoddard and flows east for sixteen miles through Antrim to Hillsborough, where it joins the Contoocook mainstem. The rivers are used for water and hydroelectric power supply, wastewater assimilation, wildlife habitat, and recreation. Water quality, quantity, and stream channel integrity all play important roles in supporting river uses.

3.1.1 Water Quality

As designated rivers under RMPP, the Contoocook and North Branch rivers must meet Class B water quality standards as defined in RSA 485:A-8. A Class B designation indicates that the water is suitable for fishing, swimming, and other recreational uses, and for use as drinking water if adequately treated. A variety of factors can influence water quality, including pollutant loading (point source and non-point source), the presence or absence of naturally vegetated riparian buffers, channel erosion, water quantity, invasive plant and animal species, and litter.

NHDES reports to the US Environmental Protection Agency every two years on impairments to water quality for the state's surface waters as part of the requirements of the Clean Water Act. This report, known as the 303(d) list, identifies impairments based on a variety of parameters relating to pollutants, nutrients, oxygen content, and other factors. The 2010 303(d) list identifies sections of the Contoocook and North Branch rivers, as well as several associated water bodies as being impaired for dissolved oxygen, pH, Chlorophyll-a, phosphorus, and E. coli. One stretch of the Contoocook in Hopkinton is also listed as impaired for copper, mercury, lead, and zinc. Sources are listed as either unknown, municipal point sources, or industrial point sources (see **Appendix B**).

In 2006, NHDES published a draft Total Maximum Daily Load (TMDL) study for the Upper Contoocook between Jaffrey and Peterborough to address dissolved oxygen and nutrient-related chlorophyll impairments associated with the Jaffrey wastewater treatment facility. This draft study recommended revisions to the National Pollutant Discharge Elimination System (NPDES) permit levels and upgrades to the facility to reduce pollutant loading and improve river water quality.[1]

Since 2005, the Contoocook and North Branch Rivers Local Advisory Committee (CNBRLAC) has been conducting annual water quality monitoring studies through the Volunteer River Assessment Program (VRAP). The most recent report summarizes the findings of the 2009 monitoring season, when river monitors sampled sixteen sites for five different water quality indicators: temperature, dissolved oxygen, pH, turbidity, and specific conductance (see **Appendix C**). Among these indicators, only pH levels did not meet Class B water quality standards. According to the 2009 report, low pH levels are likely the result of natural conditions such as soils, geology, or the presence of wetlands; although, acid precipitation may also contribute.

[1] NHDES, 2006. DRAFT Total Maximum Daily Load (TMDL) Study for Dissolved Oxygen and Nutrients in the Contoocook River (Jaffrey to Peterborough). Available online at http://des.nh.gov/organization/divisions/water/wmb/tmdl/reports_appendices.htm#contoocook.

CNBRLAC members identified a number of areas along the rivers where bank erosion and litter have become a problem (see **Map 2**). Bank erosion can cause sedimentation and turbidity, as well as the danger of catastrophic stream channel changes during floods. Litter is not only a visual nuisance but also introduces substances into the aquatic environment that may interfere with normal ecological functions. Committee members also noted some areas along tributaries, particularly in Henniker, where runoff is causing pollution and sedimentation that affect the mainstem.

Stormwater runoff is one of the most significant threats to surface water quality in New Hampshire. Sediments and pollutants are carried into streams and rivers following rainfall events, particularly in developed areas where impervious surfaces (concrete, pavement) prevent the infiltration of stormwater into the ground. Vegetated areas along river banks, called riparian buffers, help to slow and filter runoff as it drains into the river. The Comprehensive Shoreland Protection Act (CSPA), codified in RSA 483-B, regulates development within a 250-foot buffer around all major rivers and lakes or impoundments greater than ten acres in size. However, stormwater runoff is a threat in all areas, not only in immediate riparian zones. Low impact development (LID) techniques, such as rain gardens, swales, and reduction and separation of impervious areas, and post-construction stormwater management standards can significantly reduce the amount of runoff from building sites.

Other possible causes of non-point source pollution include septic systems, road salt and sand application, fuel storage tanks, agriculture, and timber harvesting. While state-mandated best management practices (BMPs) are either recommended or required when constructing or undertaking these activities, existing sites may not be following such BMPs and are not often regularly inspected.

Taken as a whole, the water quality of the Contoocook and North Branch Rivers has improved substantially in recent decades as wastewater and solid waste facilities have been upgraded or removed.[2] For example, the Town of Jaffrey received $13.4 million

[2] CNBRLAC, 1994. Contoocook and North Branch Rivers Corridor Management Plan. Available online at http://des.nh.gov/organization/divisions/water/wmb/rivers/documents/management_plan_contoocook.pdf.

through a state revolving fund in 2006-2007 to upgrade its wastewater treatment facility and improve discharge water quality into the Contoocook, as recommended by the 2006 TMDL study.[3] Impairments for several pollutants are identified on the 303(d) list, mostly due to municipal point sources where sources are known. VRAP monitoring efforts demonstrate that, despite these impairments, the river generally meets its required water quality standards under the RMPP. Additional monitoring, ongoing facility improvements, and landowner education are key to ensuring that water quality continues to improve.

3.1.2 Water Quantity

Instream flow is important for maintaining ecological balance and human water use needs for a river. Flow characteristics can vary by season and by area in a river. There are 28 active dams along the Contoocook and North Branch rivers controlling stream flow for various purposes, including flood control, hydropower generation, recreation, and conservation (see **Appendix D**). The West Henniker Dam on the Contoocook was removed in 2004 under a statewide river restoration program. Between dams, the rivers generally have natural flow characteristics that fluctuate seasonally and with precipitation levels.

Major water users can also have significant flow impacts. Under the RMPP, instream flows are protected for the Contoocook and North Branch rivers; however, specific flows have not yet been established. Entities that use more than 20,000 gallons of water per day are required to register with NHDES and report usage (see **Appendix E**). Hydroelectric facilities must also be licensed by the Federal Energy Regulatory Commission (FERC).

For example, at the time of this writing, Monadnock Paper Mills (MPM) in Bennington is undergoing a relicensing process with FERC. As part of the relicensing process, MPM has initiated a series of studies in the Powder Mill Pond vicinity on recreation, instream flow, and macroinvertebrates.

[3] NHDES, 2008. New Hampshire 2008 Section 305(b) and 303(d) Surface Water Quality Report. Available online at http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/r-wd-08-5.pdf.

The United States Geological Survey (USGS) monitors stream flow at four gage locations along the Contoocook in Peterborough, Henniker, Hopkinton, and Penacook (Concord), as well as on the North Branch River in Antrim.[4] NHDES releases annual reports on water use by registered users versus stream flow. The most recent report at the time of writing is for 2006. Because protected flows have not yet been established for the Contoocook and North Branch rivers, NHDES uses a general standard. In 2006, a small portion of the North Branch River near its mouth was not in compliance with the general standard only during the month of September. A short section of the Contoocook near its confluence with the Merrimack was not in compliance for much of the year, and during September a larger portion (7.6 miles) of the river was not in compliance. These results were generally consistent with prior years since the annual study began in 2003.[5] Instream flow studies to establish protected flows have begun to be established on designated rivers throughout New Hampshire (the Souhegan and Lamprey rivers have been completed to date), and it is hoped that such levels will soon be established for the Contoocook to better assess use versus stream flows.

3.1.3 Stream Channel Integrity

Stream channel integrity fluctuates naturally in rivers, depending on soil types, topography, and stream flow characteristics. Stable stream channels help to minimize sedimentation caused by erosion as well as reducing impacts to riparian land uses. Peak flows and flood events represent the most significant threats to channel integrity. River banks can be quickly eroded or even breached during these events causing a change in the river's course.

CNBRLAC members reported recent river bank erosion at several sites along the Contoocook and North Branch rivers, including near Henniker's Azalea Park, Grimes Field in Hillsborough, downstream of Steele Pond on the North Branch in Antrim, off of US 202 in north Bennington, and downstream of Powder Mill Pond in Bennington

[4] Real-time data is available at the USGS Water Information System website: http://waterdata.usgs.gov/nwis.
[5] NHDES, 2006. Contoocook Annual Water Uses versus Stream Flow. Available online at http://des.nh.gov/organization/divisions/water/wmb/rivers/instream/studies.htm.

(see **Map 2**). The best ways to prevent erosion and promote stream channel integrity are to maintain vegetated riparian buffers, practice proper erosion control methods during alteration of terrain, and protect floodplains to manage water flow and storage during storm events.

NHDES has begun to conduct fluvial erosion hazard studies along the state's rivers to identify areas prone to erosion or channel relocation during storm events. The purpose of these studies is to provide municipal planners with information on erosion-prone areas so that fluvial erosion hazard overlay districts can be established where appropriate. In such districts, underlying zoning would not change; however, limits on structures, land use activities, or even vegetative conditions could be employed to mitigate erosion hazards. NHDES has limited resources to conduct such hazard assessments and may not be able to study the Contoocook until 2014 or later.[6]

Floodplains provide a storage area for water when it exceeds the river's banks, allowing the river to gradually return to its normal levels. Along the Contoocook, the Hopkinton Dam and other smaller structures have been erected for flood control. Major flood control areas occur upstream of the Hopkinton Dam through west Hopkinton and Henniker, and natural floodplains are present along much of the river's length (see town-specific maps in **Appendix F**). The North Branch has fewer floodplains except in the area of Robb Reservoir at its headwaters in Stoddard.

A study of recent major flood events in New Hampshire was commissioned by NHDES and released in 2008.[7] The study focused on south central and southeastern parts of the state. Among its major recommendations were to improve floodplain protection through local ordinances, to implement BMPs for stormwater management, and to implement fluvial erosion hazard overlay districts. Thirteen of the fourteen communities along the Contoocook and North Branch rivers have adopted floodplain ordinances that meet Federal Emergency Management Association (FEMA) guidelines. Local

[6] Shane Csiki, NHDES New Hampshire Geological Survey, personal communication, May 6, 2010.
[7] FEMA, 2008. Independent Evaluation of Recent Flooding in New Hampshire. Available online at http://www.fema.gov/library/viewRecord.do?id=3374.

ordinances can place even more stringent requirements on development to protect both property owners and the floodplain.

The complexity of interactions among water quality, quantity, and stream channel integrity must be taken into consideration when tackling resource protection for the Contoocook and North Branch rivers. Because the river system supports such a wide variety of uses and natural services, a systematic, watershed-level approach is recommended to address issues affecting the rivers' elemental water resources.

3.2 Plant and Wildlife Resources

The Contoocook River straddles two ecoregions, rising in the Hillsboro Inland Hills and Plains subsection of the Vermont-New Hampshire Uplands and, nearer to its confluence with the Merrimack, the Gulf of Maine Coastal Plain of the Lower New England ecoregion.[8] The North Branch lies solely in the Vermont-New Hampshire Uplands. The uplands topography is marked by low mountains, numerous small lakes and narrow valley streams, while the coastal plain area is less mountainous and characterized by rolling glacial drumlins. Soils in the uplands are mostly shallow and stony, while those in the coastal plain region tend toward deeper glacial till. A wide variety of plant and animal species characteristic of these ecoregions are found along the rivers. According to committee members, the composition of the forest in the river corridors and the watershed has shifted with pines decreasing and hardwoods increasing, which could be the result of natural succession or timber harvesting.

The New Hampshire Natural Heritage Bureau (NHNHB) tracks exemplary natural communities as well as rare plants and animals. In the Contoocook and North Branch watershed, NHNHB lists five exemplary ecological systems, seventeen exemplary natural communities, one endangered invertebrate species, 23 rare and endangered plant species, and 19 rare and endangered vertebrates (see **Appendix G**). While some documented occurrences are years or even decades old, species and natural communities may still be present.

[8] Sperduto, Daniel, and William Nichols, 2004. Natural Communities of New Hampshire. NH Natural Heritage Bureau. Available online at http://www.nhdfl.org/library/pdf/Natural_Communities2ndweb.pdf.

3.2.1 Invasive Plant Species

Invasive aquatic and upland plant species have become increasingly problematic along the Contoocook and North Branch Rivers. These plants proliferate and crowd out native species, often dominating large areas of impoundments, flowing water, and shore banks. The rivers have not been comprehensively surveyed to date, although NHDES has documented the occurrence of several species along the Contoocook, including the aquatic species variable milfoil, purple loosestrife, and yellow iris. Common reed, also known as phragmites, is an upland species that NHDES has documented. To date, no documented occurrence of invasive species has been reported to NHDES along the North Branch River. CNBRLAC members have done their own survey of the rivers and identified areas affected by the species mentioned above, as well as Japanese knotweed and pickerel weed, in several areas (see **Map 2**).

NHDES and the US Army Corps of Engineers (USACE) have both used aquatic herbicides to control invasive species in certain areas along the rivers. NHDES has been applying herbicide to control milfoil on Contoocook Lake at the river's headwaters for fifteen years. The agency has treated other water bodies such as Powder Mill Pond and Cheshire Pond at various times. USACE has made applications on the Hopkinton Everett reservoir to control milfoil. These applications may be affecting water quality and recreational use. In 2008, there was a serious cyanobacteria bloom in the Hopkinton Reservoir following herbicide use, which caused USACE to shut down recreational use for several months.[9]

Because NHDES has limited resources to survey, monitor, and mitigate the effects of invasive species, the department has established a volunteer program called Weed Watchers for that purpose. Volunteers are trained in the identification, documentation, and removal of invasive species. It is recommended that CNBRLAC seek volunteers from riverfront communities to establish local Weed Watcher groups.

[9] John Magee, NHFGD Fish Habitat Biologist, personal communication, 1/25/10.

3.2.2 Wildlife Resources

Wildlife in the Contoocook and North Branch river corridor is generally representative of that seen in central and southern areas of New Hampshire. According to the NH Fish and Game Department (NHFGD), otters, mink, beaver, mallard and wood ducks, and deer are common sightings along the rivers. Large numbers of Canada geese are often seen in the vicinity of Monadnock Paper Mill and upstream to Bennington Bog. Moose have been reported recently north of the paper mill in Antrim along US 202.

Most of the same species are seen along the North Branch River, although fewer geese congregate along it. Recent bobcat sightings have been reported near NH Route 9 in Antrim, and NHFGD biologists have been tracking a bobcat in this area using a radio collar. Moose are more common along NH Route 9 in Stoddard and Antrim near the North Branch as well.[10]

A list of wildlife and bird sightings on Powder Mill Pond in Hancock is available in **Appendix H1 and H2**. This list is based on sightings over the past ten years by bird and nature authors Don and Lillian Stokes. Some of the species sighted were passing through during migratory periods, while others inhabit the area year-round.

The Contoocook provides mainly coolwater fish habitat for species such as yellow perch, white sucker, blacknose and longnose dace, tessellated darter, common shiner, sunfish, and fallfish. Walleye and smallmouth bass are two common non-native species, and NHFGD stocks the river upstream of the Hopkinton Dam with brown trout, a favorite of anglers. The North Branch has less slow-moving water than the Contoocook, and is therefore dominated more by fluvial species (blacknose and longnose dace and fallfish). It is also important to note that many of the tributaries to both the Contoocook and the North Branch are home to wild brook trout, a species of greatest conservation need according to the NH Wildlife Action Plan.

[10] John Magee, NHFGD Fish Habitat Biologist, personal communication, 1/25/10.

3.3 Recreational Resources

Residents and visitors enjoy diverse recreational activities on and along the rivers during all four seasons. Much of the rivers are navigable, if not by powerboat, then by canoe or kayak. Recreational activities reported by survey respondents include boating, swimming, fishing, bird or wildlife watching, canoeing/kayaking, walking, hunting, skiing, nature photography, and in the winter season, snowmobiling, ice sailing, and even mountain biking and motor vehicle racing on ice. Over 86% of survey respondents reported recreational activities on or along the rivers, suggesting the importance of protecting and enhancing recreational resources. The provision of adequate recreational access and responsible use of the river corridor will involve ongoing management and public outreach efforts in order to maintain the rivers' valuable amenities. Existing recreational access points are shown on **Map 2**.

3.3.1 Water-Based Recreation

The Contoocook boasts whitewater areas that draw paddlers from all over the state and region. Between Jaffrey and Peterborough Class II rapids can be found. The well known "Freight Train" section between Hillsborough and West Henniker offers Class III-IV rapids. Following the removal of the West Henniker Dam in 2004, the stretch was extended by three-quarters of a mile with two additional rapids for paddlers to traverse. Farther downstream in Henniker, paddlers can find more Class II rapids. The North Branch has sections of Class V rapids in Hillsborough between NH Route 9 and the fire station, and in Antrim between Liberty Farm Road and the fire station.

Canoeing and quiet water kayaking are other popular recreational uses of the river and its impoundments. CNBRLAC members and community members have identified the need to remove fallen trees in some sections that are preventing boat passage. Where fallen trees are likely to detach from the bank and create hazards as they are carried downstream, removal may be the best action to take. However, fallen trees play an important role for many aquatic species, providing shade and structure for fish, frogs, waterfowl, and

other organisms. Ecological needs must be balanced with recreational needs to ensure ongoing support for all uses.

Fishing is a very popular activity along the rivers' entire length, drawing anglers from across the state and the region. Many areas that do not have easy boat access support shorebank fishing and wading, both on public lands and informally on privately owned land. The rivers provide many opportunities for fly fishermen, trollers, and casters aiming for trout, walleye and smallmouth bass. Water bodies such as Contoocook Lake, Cheshire Pond and Powdermill Pond are also popular for catching largemouth bass, perch, bluegill, and black crappie. The NHFGD stocks the rivers with brown trout, eastern brook trout, and rainbow trout.

In summer months, many residents and visitors also use the rivers and impoundments for motor boating and swimming. Contoocook Lake, Elm Brook State Park on Hopkinton Lake, and Manahan Park on Franklin Pierce Lake all have public beaches as well as boat ramps. Other boat launches can be found in Peterborough, Hancock, Bennington, Hillsborough, Henniker, and Concord along the river, as shown on **Map 2**. Freezing temperatures do not suspend recreation on the rivers. In winter, the rivers are used for ice fishing, snowmobiling, ice sailing, and even mountain bike and motor vehicle racing on the lakes.

3.3.2 Land-Based Recreation

Numerous public, semi-public, and private sites along the Contoocook and North Branch rivers offer recreational opportunities year-round. Walking was the most common land-based activity reported by survey respondents, followed by birding and wildlife watching, nature photography, cross-country skiing, and hunting. Many landowners generously allow access on or through their property for various uses, if permission is requested. This is a wonderful practice because it opens up much larger areas for recreation beyond publicly owned facilities. However, the extent to which people are able to use private lands for recreation in the future will depend on respectful use and behavior. While most survey respondents who allow access on their property reported no

problems, a number cited litter, noise, inconsiderate motorboat operation, and unauthorized uses such as motor vehicles or hunting. Management strategies such as public education and clear signage can help to minimize problematic behavior.

Public trails parallel or cross the rivers in several locations. For example, rail trails in Rindge, Jaffrey, Peterborough, Bennington and Deering are open to non-motorized travel (see **Map 3**). An abandoned rail line in West Henniker near the Contoocook Valley Paper Mill site may soon be developed into a rail trail as well. Additional trails adjacent to the rivers are located in Hillsborough (Contoocook Riverwalk), Henniker (Azalea Park and near Amey Brook), Hopkinton (Mast Yard State Forest) and Concord (Lehtinen Park, Jim Hill River Walk, and O'Reilly-Fleetham Trail).

For birdwatchers, nature photographers and hunters, the Powder Mill Pond Wildlife Management Area (WMA) owned by NHFG in Greenfield, provides forest, field, and riverine wildlife habitat. The tract contains 126.5 acres and includes a boat ramp and parking. Several properties along the river are protected by the Society for the Protection of New Hampshire Forests (SPNHF) and are open to the public for passive recreation day use. These include the McCabe Forest in Antrim, Dawson Memorial Forest in Hillsborough, and Nature Conservancy-owned land along the North Branch in Antrim. The US Army Corps of Engineers also owns significant acreage that is open to the public at sites such as Stumpfield Marsh in Hopkinton and Old Concord Road Trails in Henniker.

The access points and trails displayed on **Maps 2 and 3** suggest the range and distribution of recreational opportunities along the entire length of the Contoocook and North Branch Rivers. They are not meant to be exhaustive datasets, but rather a starting point in the cataloguing of recreational resources. Although efforts were made to depict only sites that are open to the public, some sites on the maps may be informal or privately owned. Recreational users should check with landowners before using an access point if unsure about permitted uses.

Additional access points or improvements to existing facilities are planned in several locations. The Monadnock Paper Mill recently improved its canoe put-in and installed picnic tables near the company's parking lot in

Bennington. The Town of Bennington is also planning to install granite steps at a site on the Contoocook north of the Paper Mill. In Peterborough, improvements are planned at the old thermometer factory to enlarge parking and cartop boat access. There are two potential access points along the river in Hillsborough, including one at the Wood Woolen Mills site. This site was a former brownfield that has recently been rehabilitated and will eventually include parking and boating access.

3.4 Land Use and Development

The level of development and distribution of land uses along the rivers directly affects all aspects of the rivers' resources. Impervious surface area associated with development affects the land's ability to absorb and filter stormwater. The closer development is to the river's edge or to a tributary, the greater the impact on water quality. Developed areas pressure or eliminate habitat for plants and animals and can disrupt wildlife from their natural life cycles, impeding movement. Land uses involving hazardous materials or extensive excavation pose a threat to water quality as well.

CNHRPC and SWRPC conducted an audit of local regulations to assess the types and levels of protection provided to the Contoocook and North Branch Rivers. This section summarizes the findings of the regulatory audit. Full results can be found in **Appendix I**.

3.4.1 Local Land Use Controls

Allowed and Prohibited Uses

Many communities have Shoreland Protection Districts which protect the land abutting the river with greater restrictions than the state restrictions (see **Appendix I** for a summary table and descriptions of local land use controls). These districts are overlay districts which still use the regulations from the underlying or base districts but apply the overlay district standards where they are stricter. Antrim, Boscawen, Concord, Deering, Jaffrey, and Peterborough all have their own Shoreland Protection Districts. Common uses prohibited in these districts are automobile repair shops or junkyards, underground petroleum tanks, excavation of sand, gravel or other earth materials, the use of common fertilizers on lawns, landfills and other solid and hazardous waste facilities,

and various industrial uses. Not all local Shoreland Protection overlay districts are stricter than State standards. Even where local standards are stricter, enforcement plays a critical role in the effectiveness of the regulations.

Other overlay districts, namely aquifer protection zones and other types of zones protecting groundwater resources are also in place in many communities in the river corridor. Like other overlay districts, these districts have stricter standards which apply in areas along the rivers. Antrim, Bennington, Boscawen, Deering, Greenfield, Hancock, Hopkinton, Peterborough, and Rindge all have this type of district. The areas under protection are commonly land overlaying stratified drift aquifers and/or public wellheads. The districts typically ban the same types of facilities as Shoreland Protection Districts: automobile repair shops or junkyards, underground petroleum tanks, excavation of sand, gravel or other earth materials, landfills and other solid and hazardous waste facilities, and other industrial uses.

Similar uses can be prohibited in underlying base zoning districts such as residential or agricultural districts. Industrial and other uses are prohibited in many of the other zoning districts located along the river, common among which are residential districts and agricultural districts. For example, in Jaffrey storage of hazardous materials is prohibited in all base districts along the river which may extend the contiguous restricted land area adjacent to the river beyond the 250' buffer for hazardous materials storage required in the State CSPA statute. Most of the residential districts along the river have minimum lots sizes of half-an-acre or greater, which reduces the number of units that can be built and is one means of limiting development.

In spite of state designated river restrictions and local overlay zoning restrictions, many uses are allowed at least in some quantities by-right in riverfront communities. In Concord single-family homes, agriculture and forestry, low-impact outdoor recreation, and parking lots and garages are allowed by-right along some stretches of the river. In Jaffrey, single-family and multi-family dwellings, agriculture and forestry, recreational facilities, commercial uses and light industrial uses are allowed along the river. Although industrial

uses are sometimes allowed in residential districts such as Greenfield's General Residential district, industrial uses are typically only allowed within commercial or industrial districts. Industrial districts are located along the river only in Bennington, Boscawen, Concord, Hopkinton, Jaffrey, Peterborough and Stoddard, and not in the other seven communities.

Location Requirements

Many of the corridor communities, whether through Shoreland Protection Districts, other zoning overlay districts, or general ordinances, have location requirements in the form of mandated setbacks from the river. The most common location requirements are the setback requirements for buildings and septic systems, and the minimum buffer required for natural vegetation. Concord, which has the most extensive local Shoreland Protection District of the communities, requires a minimum natural vegetative buffer along the river of 75'compared with the state standard of 50'. Nine of the other communities either have stricter building setbacks or septic setbacks than the state standards. Some of the Towns require greater setbacks than the State, such as Deering, which has a 150' building setback and 125' septic setback, and Jaffrey which has a 200' septic setback. Communities can also use general ordinances as opposed to zoning districts to establish setbacks, such as Henniker which has a general ordinance requiring a 75' building setback from the river.

Communities may also establish minimum requirements for the amount of impervious surface which developers can build or the amount of open space which developers must provide. Rindge requires 30% of open space coverage within lots in the Shoreland Protection District (the CSPA does not require open space). Bennington, Concord, Deering, and Rindge limit the amount of impervious surface in zoning districts that include lots abutting the river to less than the State maximum of 30%. Bennington and Rindge have the requirement in aquifer protection districts not Shoreland Protection Districts. The location of these districts may be more scattered along the river corridor and may be narrower or wider in areas depending on aquifer boundaries.

Excavation

Most of the communities only allow excavation in zoning districts abutting the river by special exception or conditional use permit. Many local Shoreland Protection districts ban excavation. Bennington requires a special permit for excavation in agricultural zones, which abut much of the river. Hancock prohibits excavation in all districts unless it is for Town purposes.

3.4.2 Identified Development Patterns and Trends

Several communities have directly addressed land use as it relates to the Contoocook or North Branch rivers. Their master plans identify growth and development trends and may establish policy goals relating to river protection.

The Concord Master Plan (2008) has as one of its land use goals to conserve important open space outside the Urban Growth Boundary to which it hopes to limit urban growth. Concord has in its future land use plan commercial and high density residential use in Penacook, and a small area of industrial use at the Boscawen border. Flooding in Concord has historically occurred along the Merrimack River and not the Contoocook.

The Boscawen Master Plan (2002) identifies the need to require post-construction storm water management systems on site plans for sites near rivers, streams or brooks, or groundwater resources. The Boscawen Master Plan also describes the objective of the Mill Redevelopment District to accommodate a variety of commercial and industrial uses along the Contoocook River near the Concord border. The Master Plan recognizes the drawback of having industrially-zoned land on the floodplain in terms of water quality and flood attenuation. Like many of the communities in the river corridors, the Deering Master Plan (2004) recognizes the protection of its aquifer and wildlife habitats as important priorities. Also like many other communities in the river corridors, Deering has experienced significant growth in the number of developed residential units and population. Deering identifies the obtainment of a public access point along the Contoocook as a goal in its Master Plan.

The Jaffrey Natural Resource Inventory (2009) identifies the Jaffrey downtown from Contoocook Lake to Cheshire Pond and to the Mountain Brook Reservoir as one of the top five conservation priorities. The 2003 Peterborough Master Plan has an Open Spaces chapter that identifies land along the Contoocook River as a priority for protection and the "Contoocook River Project" in 2001 conserved over 80 acres along the River that were slated for 12 house lots. The Natural Resource section of the 2006 Rindge Master Plan identifies pursuing easements for buffers along the Contoocook River and updating this management plan.

3.4.3 Open Space

Open space provides scenic beauty and recreational opportunities for residents, and habitat for wildlife. Within river corridors, open space also provides natural vegetation that helps to remove pollutants. All of the corridor communities currently include conservation land along the rivers (see **Map 2**). Protected land can be owned in fee by local, state or federal government agencies. Public or private entities can hold conservation easements that prevent development without affecting ownership status. Deed restrictions can prohibit development as well, and are carried over when ownership changes. For example, Stoddard recently received a grant through the U.S. Forest Service Forest Legacy program to protect a large tract of land and provide public recreational access. To date there has been no established plan for the tract and access points have not yet been established.

Riverfront communities recognize the importance of setting aside open space as a way to protect river resources, wildlife, water quality, and recreational areas. Recent achievements of open space protection along the rivers include a section on Cheshire Pond in Jaffrey, a stretch of the North Branch River from Stoddard to Antrim, land along the Freight Train rapids in West Henniker, and riverfront farmland in Contoocook. CNBRLAC will continue to encourage municipalities to conserve open space along the rivers, and will help conservation commissions to identify particularly valuable or threatened parcels desirable for acquisition.

A cluster subdivision overlay district is one way in which communities can promote the protection of open space while accommodating new development. Cluster developments allow developers to build residential developments using a lot size smaller than the minimum lot size allowed while preserving another portion of a property as open space. Developers are generally granted permission to build the same number of lots under the new configuration as under a traditional subdivision layout for that property. All of the communities, with the exception of Hancock, have either a zone where cluster residential development is allowed by-right or another residential zone with a requirement for the minimum amount of open space. Many of the communities allow cluster developments by-right in any residential district. Deering requires cluster development for subdivisions over a certain number of lots, and Hopkinton requires that all subdivisions be developed as cluster developments unless receiving a special use permit. Communities may also identify conservation of land along the river as a community goal in planning documents such as Master Plans and Natural Resource Inventories (see section 3.42 above for examples).

3.4.4 Stormwater and Floodplain Management

Regulating development within floodplains assists in protecting property from flood damage. Maintaining undeveloped floodplains also offers benefits for the health of the river and its ecosystem, as well as for the total watershed, as floodplains absorb and store runoff. The land regulated by floodplain ordinances typically includes land with a likelihood of flooding once in every 100 years. Minimum flood regulation standards under the National Flood Insurance Program (NFIP) do not prohibit new buildings, wells, or septic systems within the floodplain, but require that they be developed to certain standards to reduce flood damage.

All of the communities except for Stoddard have a floodplain development ordinance in effect. The Federal Emergency Management Agency (FEMA) oversees the NFIP program, to which local ordinances must conform. These requirements were designed primarily to protect property, rather than to protect the environment.

However, floodplain development ordinances can help to encourage conservation in flood storage areas. Local floodplain ordinances can require development to be set back further from the 100-year flood line and can require additional flood protection measures. For example, a local floodplain ordinance may require that new buildings are constructed at a certain elevation above the 100-year flood line. This ordinance may also require setting buildings on stilts or, for manufactured houses, anchoring buildings to the ground.

3.5 Historical and Cultural Resources

3.5.1 Historical Resources

The Contoocook River historically has been an important travel corridor and communications channel. As a result, settlements, road and railway networks, and industrial development have been sited along the river corridor. Many historic villages and structures remain today, a reminder of the rivers' significance over the centuries. Covered bridges, white church steeples, stone walls, Indian trails, mill ruins, and scenic roads are dotted along the rivers' paths. These historic sites represent valuable learning opportunities and in some cases, living examples of commerce and industry from times past.

One indicator of historical significance may be a site's listing in a historic register. Contrary to popular belief, listing in the National or State Register of Historic Places confers no direct protections to a site or structure. Listing provides an honorific recognition of the historic value of the property, special consideration and advocacy during the planning process for state and federally funded projects, and certain tax benefits associated with upgrades. A listing in the State or National Register also makes properties eligible for various historic preservation grants from both public and private sources. Properties in the State Register are also offered special consideration for compliance with state building and safety codes and can work with regulatory agencies that meet these standards as well as meet preservation needs.

The following properties are on the State Register and within one mile of the Contoocook River: Penacook Academy in Boscawen; Daloz/Johnson/Bradford Mill Complex in Hancock; New England College Covered Bridge in Henniker over the Contoocook; and Peterborough Town Library in Peterborough (within an eighth-of-a-mile from the river). The Town of Bennington has several properties on the State Register within a mile of the Contoocook. Other state registered properties near the rivers' corridor are Union Chapel in Hillsborough within an eighth-of-a-mile north of the North Branch River, Greenfield Elementary School in Greenfield within a mile east of Powder Mill Pond, and Thomas Farm in Rindge within a mile south of Pool Pond. Additional historic sites include the Henniker Paper Mill and Hillsborough Woolen Mills. These sites may be suitable for conversion to museums or parks. The Franklin Pierce Homestead in Hillsborough is also historically significant, and is operated by the Hillsborough Historical Society with daily open hours during most of the summer. Hillsborough is also in the process of acquiring and restoring the historic Pierce Oven site and truck museum along the Contoocook, to be known as Kemp Park. The oven was used for a barbecue celebration for President Franklin Pierce that drew 25,000 people. The neighboring truck museum was owned by Dick Kemp, who collected Mack trucks. Two of his trucks have been donated to the town and will be featured in the new park.

Bennington village was recently listed in the National Historic Register as an historic district. The town also designates its village as a local historic district, as allowed under RSA 675:6. To establish a local historic district, a Town must adopt a local preservation ordinance and have a local historical commission to administer the district (Towns can also establish historical or heritage commissions without a historic district). Towns can create design guidelines for local historic districts to encourage more uniform and authentic standards for building design within the district.

In 2008, CNBRLAC members developed a digital presentation on the History of the Contoocook River that is available for use by town groups, civic clubs, libraries, schools, or other interested parties. The presentation tells the story of the river and provides information about key historic sites.

3.5.2 Cultural Resources

The Contoocook and North Branch rivers are an outstanding community and cultural resource, offering beautiful scenery, wildlife viewing opportunities, and recreational activities throughout the corridor. Recreation areas in particular constitute important community resources. The river corridor communities contain many state parks which offer opportunities for hiking, canoeing and wildlife viewing, including:

- Annett Wayside Park, Rindge
- Franklin Pierce Homestead, Hillsborough
- Greenfield State Park, Greenfield
- Hannah Dustin Memorial, Boscawen
- Miller State Park, Peterborough
- Monadnock State Park, Jaffrey

Residents and visitors also enjoy access to town owned parks and recreation areas along the riverfront, such as Contoocook Lake Park in Jaffrey, the Contoocook Riverwalk and Grimes Field in Hillsborough, Azalea Park in Henniker, the Contoocook River Forest in Hopkinton, and Contoocook Park in Concord.

Many cultural and historic resources have been documented by local historical societies, parks committees, and recreation departments. Local groups can provide interpretive pamphlets or brochures for certain sites. For example, the Town of Hopkinton has published a recreation guide that lists all community facilities, locations, directions, hours, and permitted uses.[11] The City of Concord has individual trail maps posted on its website as well.[12] Many town websites contain a host of resources on community and recreational opportunities as well.

[11] Available online at http://www.hopkinton-nh.gov/Pages/HopkintonNH_Recreation/guide.pdf.
[12] Available online at http://www.ci.concord.nh.us/trails/default.asp?footer=nolink.

3.6 River Corridor and Watershed Planning

The Contoocook and North Branch rivers run through fourteen communities, but the Contoocook watershed extends even wider, encompassing all or part of 38 municipalities. What happens in one area of the watershed can affect the rest of the river system, especially in the headwaters and on major tributaries. Concerns about water quality, open space conservation, habitat preservation, and recreational access ideally should be addressed at the watershed level. While this is practical for certain efforts, other management strategies may need to start in riverfront communities and work outward as momentum builds. CNBRLAC members, who act as liaisons between the local advisory committee and their local boards, are invaluable actors in management planning efforts. Informed about statewide and regional river management issues, they report back to conservation commissions, planning boards, and boards of selectmen or municipal councils. It should be remembered that CNBRLAC representatives are all volunteers. While they may spark local interest and spur action, dedicated community engagement will be the key to implementing the outreach and education recommendations made in this plan.

3.6.1 Outreach and Education

CNBRLAC has identified the need for greater public outreach and education about a range of issues relating to river management. It is the accumulated effects of many individual actions that impact the condition of the rivers, and therefore, responsible individual behavior must be encouraged. Additionally, individual communities can greatly enhance protection for river resources through local regulatory, educational, and volunteer actions. Outreach efforts should focus on topics such as invasive species, habitat protection, stormwater runoff, responsible septic system management, litter, local and state regulations, and impacts of various land uses on water quality.

Several proposals for community engagement and public outreach have been suggested. Elementary and secondary school students could help identify and map some of the invasive species. Another

possible partner is the Harris Center for Conservation in Hancock. Education can also be tied into public events like river clean-ups, as well as targeted at those using the rivers for forms of recreation that pose the greatest potential danger to the rivers' health, such as anglers and boaters. Information could be included with purchase of fishing licenses and motor boat registrations. Educational materials such as brochures and signs for boaters, including motorboat users, can also be available at boat launches.

3.6.2 Expanded Planning Efforts Throughout the Watershed

A watershed-scale approach to planning can help to protect the rivers' tributary streams and ponds which replenish the river. This approach requires coordination within each watershed community with Planning Boards, Boards of Selectmen, and especially Conservation Commissions. It also requires intermunicipal communication and cooperation to achieve goals set for the entire watershed. Because they provide regional services, CNBRLAC and the two regional planning commissions are the logical entities to launch such efforts.

Planned and potential activities include:

- CNHRPC and SWRPC assist CNBRLAC in initiating coordination with local boards and committees by giving presentations of the Plan and its goals to each community, and by providing print copies of the plan and a general summary of the plan.

- CNHRPC distributes maps to each municipality showing hydrological features, recreational access points, zoning, and important wildlife habitat. CNBRLAC may also develop maps with delineated watersheds, aquifers, wellhead protection areas, and historic and cultural sites. With such maps, communities can use an integrated approach to planning for water-related resources, which may include management of public access points and cultural resources, as well as protecting water quality and quantity.

- CNBRLAC distributes current VRAP and other river data in a timely and consistent manner to all riverfront and/or watershed communities.

- CNBRLAC representatives coordinate educational events and develop informative material (flyers, brochures, posters) to be distributed at community festivals, fairs, and other gatherings. Cooperation with local committees and groups should be maximized to reach the widest possible audience and share resources.

- CNBRLAC members coordinate intermunicipal efforts such as an organized river clean-up day, a river-wide paddling day, bike race, bird count, or historical site tour, where river protection efforts can be highlighted.

- CNBRLAC coordinates with NHDES and NHFGD to hold educational public workshops on low-impact development (LID) techniques, responsible septic system management, CSPA regulations, and invasive species.

- CNBRLAC consults with NHFGD and NHDES about the possibility of distributing educational information pertaining to habitat preservation, litter, and invasive species mitigation with all fishing and hunting licenses.

- CNBRLAC consults with riverfront community conservation commissions to identify and prioritize parcels for conservation, based on importance to river protection, overall natural resource value, and threat of development.

- CNBRLAC establishes an archive or data clearinghouse to hold all of the data and information that has been collected over the years and makes it available to the public at a single site.

- CNBRLAC coordinates with NHDES to post recent and historical river data on the state's website, to continue reporting current data, and to make it available to the public.

These efforts are to be undertaken as time and resources permit. When conducting outreach efforts, the focus should be on riverfront communities first, and then on additional watershed municipalities when and where possible. The implementation of these efforts is described in more detail in Section 6 below.

4 Community Input

4.1 Stakeholder Survey

CNBRLAC mailed a survey to riverfront landowners and posted a stakeholder survey on the website Survey Monkey from October 2009 through December 2009. Public officials in the fourteen communities were also asked to complete the survey. The total number of respondents was 106. Most of the respondents came from the towns of Peterborough (22 respondents), Henniker (22 respondents), Antrim (14 respondents), Hillsborough (14 respondents), and Hopkinton (14 respondents). Other towns with significant numbers of people completing the survey were Bennington (11 respondents), Hancock (8 respondents), and Greenfield (7 respondents). Only one response was received from Concord. Most of the survey respondents (76%) own land that abuts the Contoocook or North Branch Rivers. Complete survey results can be found in **Appendix J**.

Recreational Activities and Other Enjoyed Values

The values most cited by survey respondents as things they enjoy about the river are:

- Aesthetic qualities such as views and sounds (69%);
- Wildlife/fishing (49%); and,
- Canoeing/kayaking/boating (29%).

Other important values are listed were quietness/privacy (19%); other recreation such as hunting/hiking/biking (18%); cleanliness (16%); and, undeveloped space/greenspace (12%).

When asked about recreational activities performed by households on or along the river, walking was the most cited (79%), followed by

canoeing/kayaking (70%), birding/wildlife watching (63%), fishing (60%), nature photography (39%), swimming (37%), and cross-country skiing (26%).

Public Access

Close to half of survey respondents allow some public access to their land for recreational purposes. Of those allowing some access, the most popular responses for what activities they allow for were:

- Fishing (15%);
- All activities listed in the survey (11%);
- Walking (10%); and,
- Canoeing/kayaking (9%).

A majority of respondents said that they had experienced no problems related to public use of the river on or near their property. Some respondents reported problems with litter (7%), noise (7%), trespassing (4%), and problems with motorized boats such as noise, wake, invasive species, and oil/gas residues (3%).

Concerns and Protection Strategies

Those surveyed noted the following trends along the river:

- Excessive erosion and/or bank destabilization (43%);
- Recreational abuses such as excessive noise and litter (43%);
- Stormwater runoff /non-point source pollution (31%);
- Exotic species (29%);
- Illegal dumping (23%);
- Lack of enforcement (22%); and,
- Sedimentation (21%).

The top-ranked strategies identified in the survey for protecting the rivers include:

- More incentives for landowners to voluntarily manage land appropriately (16%);
- Wetland conservation and protection (15%);
- Water quality monitoring with local volunteers (15%);
- No additional protection needed (15%);
- Limit shoreline development through land use zoning (14%);
- Conservation easements to protect sensitive areas (13%);

- Landowner education (13%); and,
- Community education (11%).

4.2 Public Meetings

CNHRPC and CNBRLAC held a public meeting on January 25th, 2010 to invite public comment on the Contoocook and North Branch Rivers existing resources and how best to manage and protect these resources. At the meeting the participants were divided into three breakout groups, and asked to discuss recreational activities and other valued resources of the river, concerns relating to the river, and visions for the future of the river and ideas for how it should be protected. Each breakout group had a chance to answer all three sets of questions. To garner the widest array of participation possible, facilitators in each group documented all ideas and thoughts produced by group members.

For recreational activities, participants named activities they enjoyed, those which they have seen others enjoying, and which non-recreational resources they associated with the rivers. Recreational activities cited were water sports (canoeing, kayaking, boating, and tubing), winter sports (skiing, snowmobiling, and car racing, sailing, and mountain biking on ice), hunting and fishing, wildlife watching and photography, and walking. For non-recreational resources, participants mentioned personal enjoyment - such as the rivers' quiet and other aesthetic values, wildlife and plant community habitat, economic development – such as tourism from trails and other recreational attractions and increased property values, and historic or cultural resources such as former mill sites.

On the subject of concerns, participants talked about the most pressing threats to the rivers, any recent land use trends noticed along the river, and recommendations for protecting the river through better coordination among the State, the Local Advisory Committee, the regional planning commissions, and the communities. The concerns mentioned were related to the number or quality of access points, trespassing or unauthorized use of property, invasive aquatic species such as milfoil and purple loosestrife, contamination such as road salt and gravel pit sediment, regulation being either excessive or not enforced enough, land development, litter, and erosion. Participants were also asked to place the location of any sites along the rivers that were seriously degraded in one of various ways on provided maps.

Regarding the vision for and future management of the river, participants were asked about their ideas for making the river healthy, vibrant, and inviting and ensuring that natural and recreational resources flourish over the next fifteen years. Participants were also asked about specific project ideas or opportunities for improving the rivers. Many participants talked about the need for more comprehensive education on invasive species and other threats to water quality, and habitat needs, including outreach in schools, signs, and brochures for the public. Participants also mentioned the need for more town involvement, to educate the public, conduct clean-ups, and move landfills further from the rivers. Other ideas discussed were removal of inactive dams and refurbishment of former mill and industrial buildings. Specific project ideas included converting either the Henniker Paper Mill or Hillsborough Woolen Mills to parks/museums, upgrading the rail trail in Henniker for recreational use, and establishing local historic districts like the one in Bennington.

CNHRPC and SWRPC have incorporated public input in this plan and publicized it throughout the riverfront communities by posting the stakeholder survey online, advertising and organizing the public visioning session, collecting public comments on the draft, and assisting CNBRLAC in publicizing and presenting the final plan to each community.

5 Goals and Objectives

Based on survey results, comments from the public meeting, and local knowledge, CNBRLAC members generated the following goals and objectives for the management and protection of the Contoocook and North Branch Rivers. An implementation schedule for each objective follows this section, suggesting responsible parties and an expected timeframe for completion.

Water Resources: Quality, Quantity, and Stream Channel Integrity

Goal 1: Protect water quality and quantity for current and future uses.

Objectives:

1. **VRAP data collection:** Continue to gather water quality data as part of the Volunteer River Assessment Program (VRAP). Additionally:
   - Increase the number of VRAP monitoring sites
   - Increase the measurement period
   - Recruit more volunteers
   - Expand VRAP efforts to study macroinvertebrates

2. **Communication:** Improve education and information sharing with local organizations. For example:
   - Distribute VRAP and other data consistently to each municipality

3. **Water quality protection efforts:** Develop and distribute to municipalities and private landowners material on responsible practices to protect water quality, including:
   - Prevention of non-point source pollution
   - Responsible septic system management

4. **Stormwater prevention education:** Conduct educational and outreach efforts on low impact development (LID) practices to increase permeability and prevent excessive Stormwater runoff.

Goal 2: Maintain proper stream channel integrity to ensure high water quality, stable flow patterns, and intact riparian habitat.

Objectives:

5. **Vegetation maintenance:** Work with property owners and the New Hampshire Department of Environmental Services (NHDES) to clear major tree and brush obstructions to allow passage of anglers and small watercraft.

6. **Assess Fluvial Erosion Hazards:** Advocate for the Contoocook and North Branch Rivers to be part of NHDES's Fluvial Erosion Hazard study program.

7. **Permit Review:** Continue efforts to support NHDES through review of dredge and fill permits and erosion restoration efforts.

Plant and Wildlife Resources

Goal 3: Identify, remove, minimize, and prevent the spread of invasive plant species along the rivers.

Objectives:

8. **Control and mitigation:** Work with NHDES and others to better control and mitigate invasive species and nuisance plants in and along the rivers.

9. **Invasive species education:** Invite NHDES staff to attend CNBRLAC meetings and/or other events to provide education on invasive species and control methods.

10. **Data storage and dissemination:** Create a database for plant data collection. Additionally:
    - Place database online for public use
    - Contact NHDES about storing data on the state website
    - Identify a physical site for a data archive that could hold both electronic and hard copy data

Goal 4: Preserve and enhance wildlife habitat dependent upon the river so as to support present and future wildlife populations.

Objectives:

11. **Public events:** Organize public forums and clean-ups involving participation of municipal officials, riparian landowners, and river users to raise awareness about habitat protection.

12. **Litter prevention:** Work with New Hampshire Fish and Game and licensing outlets to include with all fishing licenses educational materials on the need to remove litter from the river

13. **Landowner guide:** Provide information on threatened and endangered species, and their habitat requirements, in a guide for landowners.

14. **Target preservation efforts:** Identify areas along the rivers that contain particularly valuable and/or fragile habitat to target for preservation.

15. **Data storage and dissemination:** Create a database for wildlife data collection. Additionally:
    - Place database online for public use
    - Contact NHDES about storing data on the state website
    - Identify a physical site for a data archive that could hold both electronic and hard copy data

Recreational Resources

Goal 5: Maintain and encourage safe and responsible public access and use of the rivers' resources.

Objectives:

16. **Access points:** Distribute information on recreational access points to the public.

17. **Signage:** Post signs relating to litter, invasive species, and boat speed.

18. **Events:** Develop and distribute information at related recreational events.

19. **Coordinate with local recreational groups:** Work with town recreational departments or committees to coordinate events and identify information-sharing opportunities.

Land Use and Development

Goal 6: Minimize impacts of development within the river corridor.

Objectives:

20. **Project Review:** Work with local Planning Boards, Conservation Commissions, and regulatory agencies in the continued review of projects relating to development within the river corridor.

21. **Identify conservation opportunities:** Identify parcels in current use and encourage municipalities to target key parcels for conservation.

22. **Advocate for conservation:** Encourage municipalities to devote more resources to conservation acquisitions and easements, maximizing both public and private resources.

23. **Maximize resources:** Work with municipalities to take advantage of state and other funding opportunities to protect and preserve ecologically significant land and habitat.

24. **Education on land use impacts:** Educate municipal officials and landowners on impacts of land use on the river corridor.

Historical and Cultural Resources

Goal 7: Protect and preserve important historical and cultural resources.

Objectives:

25. **Inventory resources:** Identify existing historical and cultural resources within the river corridor.

26. **Target preservation efforts:** Work with historical societies in each municipality to identify opportunities for inclusion of sites in local, state, and federal preservation programs.

27. **Coordination of preservation efforts:** Visit individual historical societies to share information and seek collaboration on historical and cultural preservation efforts.

River Corridor and Watershed Planning

Goal 8: Implement a workable River Corridor Management Plan.

Objectives:

28. **Maps:** Create maps to be distributed to each municipality showing delineated watersheds, aquifers, wellhead protection areas, recreational access points, and historic sites.

29. **Expand planning efforts:** Widen planning efforts throughout the Contoocoook River Watershed to include tributary areas.

30. **Communicate the Plan:** Present the Management Plan in each municipality to ensure that Planning Boards, Conservation Commissions, and Boards of Selectmen are aware of the Plan and its goals.

31. **Plan Dissemination:** Provide a general informational summary of the Plan to each town.

6 Implementation Plan and Schedule

The following Implementation Plan and Schedule starts with objectives listed in Section 5 above, assigns a responsible party or parties, and suggests a timeframe to undertake the action. Timeframes listed are either short term (immediately to within one year), medium term (1-3 years), or long term (4+ years). CNBRLAC will review this plan and schedule on a regular basis (quarterly or annually) to prioritize its work plan and will revise or update the schedule as required.

	Objective	Responsible Parties/Estimated Costs	Timeline
Water Resources: Quality, Quantity, and Stream Channel Integrity Goals			
Goal 1: Protect water quality and quantity for current and future uses.			
	VRAP data collection: Continue to gather water quality data as part of the Volunteer River Assessment Program (VRAP). Additionally: increase the number of VRAP monitoring sites; increase the measurement period; recruit more volunteers; and expand VRAP efforts to study macroinvertebrates.	CNBRLAC/ $2000 To purchase VRAP Testing Kit	Ongoing
	Communication: Improve education and information sharing with local organizations. For example: distribute VRAP and other data consistently to each municipality.	CNBRLAC/ $500 to Generate and Distribute Summaries	Start Summer 2011 – then annual summaries
	Water quality protection efforts: Develop and distribute to municipalities and private landowners material on responsible practices to protect water quality, including: prevention of non-point source pollution; and responsible septic system management.	CNBRLAC with NHDES & NHFGD $2000 to generate and distribute materials	May 2011 to Sept 2011

Goal 2: Maintain proper stream channel integrity to ensure high water quality, stable flow patterns, and intact riparian habitat.		Responsible Parties/Estimated Costs	Timeline
	Permit Review: Continue efforts to support NHDES through review of dredge and fill permits and erosion restoration efforts.	CNBRLAC and NHDES Cost 40+ in-kind hours to review permits per year	Ongoing

Plant and Wildlife Resources Goals

Goal 3: Identify, remove, minimize, and prevent the spread of invasive plant species along the rivers.		Responsible Parties/Estimated Costs	Timeline
	Control and mitigation: Work with NHDES and others to better control and mitigate invasive species and nuisance plants in and along the rivers.	CNBRLAC, NHDES, local groups/ 30 in-kind hours	Summer 2011
	Invasive species education: Invite NHDES staff to attend CNBRLAC meetings and/or other events to provide education on invasive species and control methods. Distribute pamphlets to municipalities	CNBRLAC and NHDES/ $750 to generate and distribute education pamphlets	Summer 2011
	Data storage and dissemination: Create inventory and a database for plant data collection. Additionally: place database online for public use; contact NHDES about storing data on the state website; and identify a physical site for a data archive that could hold both electronic and hard copy data.	CNBRLAC, NHDES, and municipalities/ $1500 for boat/equipment rental to conduct inventory. 40+ in-kind hours to set up and maintain database	Fall 2011
Goal 4: Preserve and enhance wildlife habitat dependent upon the river so as to support present and future wildlife populations.		**Responsible Parties/Estimated Costs**	**Timeline**
	Public events: Organize public forums and clean-ups involving participation of municipal officials, riparian landowners, and river users to raise awareness about habitat protection.	CNBRLAC, municipalities, and local groups $2000 to market and organize public events, including cleanups	fall 2011 and spring 2012
	Litter prevention: Work with New Hampshire Fish and Game and licensing outlets to include with all fishing licenses educational materials on the need to prevent/remove litter from the river.	CNBRLAC and NHFGD 25 in-kind hours to collect information, $500 to distribute information	Spring 2012

	Landowner guide: Provide information on threatened and endangered species, and their habitat requirements, in a guide for landowners.	CNBRLAC, NHFGD, and municipalities/ $250 to distribute information to abutters	
	Target preservation efforts: Identify areas along the rivers that contain particularly valuable and/or fragile habitat to target for preservation.	CNBRLAC and conservation commissions $500 to conduct inventories/maps	
	Data storage and dissemination: Create a database for wildlife data collection. Additionally: place database online for public use; contact NHDES about storing data on the state website; and identify a physical site for a data archive that could hold both electronic and hard copy data.	CNBRLAC and NHDES Tie into other database	

Recreational Resources Goals			
Goal 5: Maintain and encourage safe and responsible public access and use of the rivers' resources.		**Responsible Parties/Estimated Costs**	**Timeline**
	Access points: Distribute information on recreational access points to the public.	CNHRPC, SWRPC, CNBRLAC, and municipalities $250 to distribute current maps	Fall/winter 2011
	Signage: Post signs relating to protection designation, litter, invasive species, and boat speed.	Municipalities, landowners, and CNBRLAC/ $2500 to purchase signs	Spring 2012
	Events: Develop and distribute information at related recreational events.	CNBRLAC and local groups/ In-kind hours	Ongoing
	Coordinate with local recreational groups: Work with town recreational departments or committees to coordinate events and identify information-sharing opportunities.	CNBRLAC and local groups/ in-kind Hours	Ongoing

Land Use and Development Goals			
Goal 6: Minimize impacts of development within the river corridor.		**Responsible Parties/Estimated Costs**	**Timeline**
	Project Review: Work with local Planning Boards, Conservation Commissions, and regulatory agencies in the continued review of projects relating to development within the river corridor.	CNBRLAC, local boards and commissions, and NHDES/ In-kind Hours	ongoing
	Identify conservation opportunities: Identify parcels in current use and encourage municipalities to target key parcels for conservation.	CNBRLAC, conservation commissions, and municipalities/ In-kind hours	ongoing
	Advocate for conservation: Encourage municipalities to devote more resources to conservation acquisitions and easements, maximizing both public and private resources.	CNBRLAC, CNHRPC, and SWRPC	Ongoing
	Education on land use impacts: Educate municipal officials and landowners on impacts of land use on the river corridor.	CNBRLAC and municipalities/ In-kind hours	Ongoing

Historical and Cultural Resources Goals			
Goal 7: Protect and preserve important historical and cultural resources.		**Responsible Parties/Estimated Costs**	**Timeline**
	Inventory resources: Identify existing historical and cultural resources within the river corridor.	CNBRLAC and local groups/ In-kind hours +$250 research materials from NH Heritage Bureau	Fall/winter 2011
	Coordination of preservation efforts: Visit individual historical societies to share information and seek collaboration on historical and cultural preservation efforts.	CNBRLAC and historical societies/ In-kind hours	Start spring 2012

River Corridor and Watershed Planning Goals			
Goal 8: Implement a workable River Corridor Management Plan.		**Responsible Parties/Estimated Costs**	**Timeline**
	Maps: Create maps to be distributed to each municipality showing delineated watersheds, aquifers, wellhead protection areas, recreational access points, and historic sites.	CNBRLAC, CNHRPC, and SWRPC $2500 for map generation and distribution	Fall 2010- to fall 2011
	Communicate the Plan: Present the Management Plan in each municipality to ensure that Planning Boards, Conservation Commissions, and Boards of Selectmen are aware of the Plan and its goals.	CNBRLAC, CNHRPC, and SWRPC/ $1500 to make copies and distribute copies of the new river corridor management plan	Ongoing beginning 2010
	Plan Dissemination: Provide a general informational summary of the Plan to each town.	CNBRLAC, CNHRPC, and SWRPC	

Appendix A
River Segment Designations, RSA 483:15

Contoocook River

Segment	Designation
From the outlet of Pool Pond in Rindge to Old Sharon Road bridge in Jaffrey.	Community
From the Old Sharon Road bridge in Jaffrey to Noone Falls dam in Peterborough.	Rural
From the Noone Falls dam in Peterborough to North Peterborough dam.	Community
From the North Peterborough dam to the monument on the Peterborough-Hancock town line.	Rural
From the monument on the Peterborough-Hancock town line to the North Bennington Road bridge in Antrim and Bennington.	Community
From the North Bennington Road bridge in Antrim and Bennington to the confluence of the north branch of the Contoocook River in Hillsborough.	Rural
From the confluence of the north branch of the Contoocook River in Hillsborough to the Hosiery Mill dam in Hillsborough.	Community
From the Hosiery Mill dam in Hillsborough to the twin iron bridges in West Henniker.	Rural
From the twin iron bridges in West Henniker to the Henniker-Hopkinton town line.	Community
From the Henniker-Hopkinton town line to the Riverhill bridge in Penacook.	Rural
From the Riverhill bridge in Penacook to the confluence with the Merrimack River.	Community

North Branch River

Segment	Designation
From the outlet of Rye Pond in Stoddard to the outlet of Franklin Pierce Lake.	Rural
From the outlet of Franklin Pierce Lake to the confluence of the Contoocook River.	Community

Appendix B

2010 303(d) List of Impaired Waters

Water Body	Location	Impairment	Use	Source
Contoocook River	Jaffrey	DO, pH, Aluminum, Phosphorus	Aquatic Life	Municipal Point Source (DO, P), Unknown
		Chlorophyll-a, E. Coli, Phosphorus	Primary Recreation	Municipal Point Source, Unknown
	Peterborough	DO, pH, Aluminum, Phosphorus	Aquatic Life	Municipal Point Source (DO, P), Unknown
		Chlorophyll-a, E. Coli, Phosphorus	Primary Recreation	Municipal Point Source, Unknown
	Bennington	DO	Aquatic Life	Industrial Point Source, Unknown
	Deering	DO, pH	Aquatic Life	Municipal Point Source (DO), Unknown
	Hillsborough	pH	Aquatic Life	Unknown
	Henniker	pH	Aquatic Life	Unknown
	Hopkinton	pH, Copper, Lead, Mercury, Zinc	Aquatic Life	Unknown
	Boscawen	pH	Aquatic Life	Unknown
	Concord	pH	Aquatic Life	Unknown
North Branch River	Antrim	pH	Aquatic Life	Unknown
	Hillsborough	pH	Aquatic Life	Unknown
Pool Pond	Rindge	DO	Aquatic Life	Unknown
Contoocook Lake	Jaffrey	pH	Aquatic Life	Unknown
		E. Coli	Primary Recreation	Wet Weather Discharge (Point Source, stormwater)
	Rindge	pH	Aquatic Life	Unknown
Powder Mill Pond	Hancock	DO, Aluminum	Aquatic Life	Municipal Point Source (DO), Unknown
		Chlorophyll-a	Primary Recreation	Municipal Point Source, Unknown

Source: http://des.nh.gov/organization/divisions/water/wmb/swqa/2010/documents/2010_final_sub_303d.pdf

New Hampshire Volunteer River Assessment Program
2009 Contoocook River Watershed
Water Quality Report

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

January 2010

NHDES R-WD-10-1J

New Hampshire Volunteer River Assessment Program
2009 Contoocook River Watershed Water Quality Report

State of New Hampshire
Department of Environmental Services
Water Division
Watershed Management Bureau
P.O. Box 95
29 Hazen Drive
Concord, New Hampshire 03302-0095
www.des.nh.gov

Thomas S. Burack
Commissioner

Harry T. Stewart
Water Division Director

Prepared By:

Ted Walsh, VRAP Program Manager

Jen Drociak, VRAP Coordinator

Sabrina Kliman, VRAP Assistant

Cover Photo: Contoocook River, 32M-CTC, Jaffrey

January 2010

TABLE OF CONTENTS

List of Figures and Tables

List of Appendices

ACKNOWLEDGEMENTS

The New Hampshire Department of Environmental Services Volunteer River Assessment Program extends sincere thanks to the volunteers of the Contoocook North Branch Rivers Local Advisory Committee (CNBRLAC) for their efforts during 2009. This report was created solely from the data collected by the volunteers listed below. Their time and dedication is an expression of their genuine concern for local water resources and has significantly contributed to our knowledge of river and stream water quality in New Hampshire.

2009 Contoocook River Volunteers

Marion Baker

Beth Alpaugh-Cote

Stan Ballard

Ken Cloutier

Alex Cutrer

Joe MacGregor

Jon Manley

Denise Rico

Keith Wolsiefer

1.0 INTRODUCTION

1.1. Purpose of Report

Each year the New Hampshire Volunteer River Assessment Program prepares and distributes a water quality report for each volunteer river monitoring group that is based solely on the water quality data collected by that group during a specific year. The reports summarize and interpret the data, particularly as they relate to New Hampshire's surface water quality standards, and serve as a teaching tool and guidance document for future monitoring activities by the individual volunteer groups.

1.2. Report Format

Each report includes the following:

- **Volunteer River Assessment Program Overview**

  This section includes a description of the history of VRAP, the technical support, training and guidance provided by NHDES, and how data is transmitted to the volunteers and used in surface water quality assessments.

- **Monitoring Program Description**

  This section provides a description of the volunteer group's monitoring program including monitoring objectives as well as a table and map showing sample station locations.

- **Results and Recommendations**

  Water quality data collected during the year are summarized on a parameter-by-parameter basis using: (1) a data summary table, which includes the number of samples collected, data ranges, the number of samples meeting New Hampshire water quality standards, and the number of samples adequate for water quality assessments at each station; (2) a discussion of the data; (3) a river graph showing the range of measured values at each station; and (4) a list of applicable recommendations.

  Sample results reported as less than the detection limit were assumed equal to one-half the detection limit on the river graphs. This approach simplifies the understanding of the parameter of interest, and specifically helps one to visualize how the river or watershed is functioning from upstream to downstream. In addition, this format allows the reader to better understand potential pollution areas and target those areas for additional sampling or environmental enhancements. Where applicable, the river graph also shows New Hampshire surface water quality standards or levels of concern for comparison purposes.

- **Appendix A – Water Quality Data**

  This appendix includes a spreadsheet detailing the data results and additional information such as data results which do not meet New Hampshire surface water quality standards, and data that is unusable for assessment purposes due to quality control requirements.

- **Appendix B – Interpreting VRAP Water Quality Parameters**

  This appendix provides a brief description of water quality parameters typically sampled by VRAP volunteers and their importance, as well as applicable state water quality criteria or levels of concern.

- **Appendix C – VRAP Volunteer Monitor Field Sampling Procedures Assessment *(Field Audits)***

  This appendix provides an overview of the VRAP Volunteer Monitor Field Sampling Procedures Assessment (field audit) process with respect to programmatic quality assurance/quality control (QA/QC) guidelines.

PROGRAM OVERVIEW

2.1 What is VRAP?

In 1998, the New Hampshire Volunteer River Assessment Program was established to promote awareness and education of the importance of maintaining water quality in New Hampshire's rivers and streams. VRAP aims to educate people about river and stream water quality and ecology and to improve water quality monitoring coverage for the protection of water resources.

Today, VRAP loans water quality monitoring equipment, provides technical support, and facilitates educational programs to volunteer groups on numerous rivers and watersheds throughout the state. VRAP volunteers conduct water quality monitoring on an ongoing basis and increase the amount of river water quality information available to local, state and federal governments, which allows for better watershed planning.

2.2 Why is VRAP Important?

VRAP establishes a regular volunteer-driven water sampling program to assist NHDES in evaluating water quality throughout the state. VRAP empowers volunteers with information about the health of New Hampshire's rivers and streams. Regular collection of water quality data allows for early detection of water quality changes allowing NHDES to trace potential problems to their source. Data collected by VRAP volunteers are directly contributing to New Hampshire's obligations under the Clean Water Act. Measurements taken by volunteers are used in assessing the water quality of New Hampshire's river and streams, and are included in reporting to the US Environmental Protection Agency.

2.3 How Does VRAP Work?

VRAP is a cooperative program between NHDES, river groups, local advisory committees, watershed associations, and individuals working to protect New Hampshire's rivers and streams. Volunteers are trained by VRAP staff in the use of water quality monitoring equipment at an annual training workshop. VRAP works with each group to establish monitoring stations and develop a sampling plan.

During the summer months, VRAP receives water quality data from trained volunteers. The data are reviewed for quality assurance, and are entered into the environmental monitoring database at NHDES. During the off-season, VRAP interprets the data and compiles the results into an annual report for each river. VRAP volunteers can use the data as a means of understanding the details of water quality, as well as guide future sampling efforts. NHDES can use the data for making surface water quality assessments, provided that the data met certain quality assurance/quality control guidelines.

2.4 Equipment and Sampling Schedule

VRAP frequently lends and maintains water quality monitoring equipment kits to VRAP groups throughout the state. The kits contain meters and supplies for routine water quality parameter measurements of turbidity, pH, dissolved oxygen, water temperature and specific conductance (conductivity). Other parameters such as nutrients, metals, and *E. coli* can also be studied, although VRAP does not always provide funds to cover laboratory analysis costs. Thus, VRAP encourages groups to pursue other fundraising activities such as association membership fees, special events, in-kind services (non-monetary contributions from individuals and organizations), and grant writing.

Each year, volunteers design and arrange a sampling schedule in cooperation with VRAP staff. Project designs are created through a review and discussion of existing water quality information, such as known and perceived problem areas or locations of exceptional water quality. The interests, priorities, and resources of the partnership determine monitoring locations, parameters, and frequency. VRAP typically recommends sampling every other week from May through September, and VRAP groups are encouraged to organize a long-term sampling program in order to begin to determine trends in river conditions.

2.5 Training and Technical Support

Each VRAP volunteer attends an annual training workshop to receive a demonstration of monitoring protocols and sampling techniques and the calibration and use of water quality monitoring equipment. During the training, volunteers have an opportunity for hands-on use of the equipment and receive instruction in the collection of samples for laboratory analysis.

VRAP groups conduct sampling according to a prearranged monitoring schedule and VRAP protocols. VRAP staff aim to visit each group annually during a scheduled sampling event to verify that volunteers successfully follow the VRAP protocols. If necessary, volunteers are re-trained during the visit, and the group's monitoring coordinator is notified of the result of the verification visit. VRAP groups forward water quality results to NHDES for incorporation into an annual report and state water quality assessment activities.

2.6 Data Usage

Annual Water Quality Reports

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. All data collected by volunteers are summarized in water quality reports that are prepared and distributed after the conclusion of the sampling period. VRAP groups can use the reports and data as a means of understanding the details of water quality, guiding future sampling efforts, or determining restoration activities.

New Hampshire Surface Water Quality Assessments

Along with data collected from other water quality programs, specifically the State Ambient River Monitoring Program, applicable volunteer data are used to support periodic NHDES surface water quality assessments. VRAP data are entered into NHDES's environmental monitoring database and are ultimately uploaded to the EPA database. Assessment results and the methodology used to assess surface waters are published by NHDES every two years (i.e., Section 305(b) Water Quality Reports) as required by the federal Clean Water Act. The reader is encouraged to log on to the NHDES web page to review the assessment methodology and list of impaired waters http://des.nh.gov/organization/divisions/water/wmb/swqa/index.htm/.

2.7 Quality Assurance/Quality Control

In order for VRAP data to be used in the assessment of New Hampshire's surface waters, the data must meet quality control guidelines as outlined in the VRAP Quality Assurance Project Plan (QAPP). The VRAP QAPP was approved by NHDES and reviewed by EPA in the summer of 2003. The QAPP is reviewed annually and is officially updated and approved every five years. The VRAP quality assurance/quality control measures include a six-step approach to ensuring the accuracy of the equipment and consistency in sampling efforts.

- **Calibration:** Prior to each measurement, the pH and DO meters must be calibrated. Conductivity and turbidity meters are checked against a known standard before the first measurement and after the last one.
- **Replicate Analysis:** A second measurement by each meter is taken from the original sample at one of the stations during the sampling day. If the same sampling schedule is used throughout the monitoring season, the replicate analysis should be conducted at different stations. Replicates should be measured within 15 minutes of the original measurements.
- **6.0 pH Standard:** A reading of the pH 6.0 buffer is recorded at one of the stations during the sampling day. If the same sampling schedule is used throughout the monitoring season, the 6.0 pH standard check should be conducted at different stations.
- **Zero Oxygen Solution:** A reading of a zero oxygen solution is recorded at one of the stations during the sampling day. If the same sampling schedule is used throughout the monitoring season, the zero oxygen standard check should be conducted at different stations.
- **DI (De-Ionized) Turbidity Blank**: A reading of the DI blank is recorded at one of the stations during the sampling day. If the same sampling schedule is used throughout the monitoring season, the blank check should be conducted at different stations.
- **End of the Day Conductivity and Turbidity Meter Check:** At the conclusion of each sampling day, the conductivity and turbidity meters are re-checked against a known standard.

2.7.1 Measurement Performance Criteria

Precision is calculated for field and laboratory measurements through measurement replicates (instrumental variability) and is calculated for each sampling day. The use of VRAP data for assessment purposes is contingent on compliance with a parameter-specific relative percent difference (RPD) as derived from equation 1, below. Any data exceeding the limits of the individual measures are disqualified from surface water quality assessments. All data that exceeds the limits defined by the VRAP QAPP are acknowledged in the data tables with an explanation of why the data was unusable. Table 1 shows typical parameters studied under VRAP and the associated quality control procedures.

(Equation 1. Relative Percent Difference)

$$RPD = \frac{|x_1 - x_2|}{\frac{x_1 + x_2}{2}} \times 100 \ \%$$

where x_1 is the original sample and x_2 is the replicate sample

Table 1. Field Analytical Quality Controls

Water Quality Parameter	QC Check	QC Acceptance Limit	Corrective Action	Person Responsible for Corrective Action	Data Quality Indicator
Temperature	Measurement Replicate	RPD < 10% or Absolute Difference <0.8 C.	Repeat Measurement	Volunteer Monitors	Precision
Dissolved Oxygen	Measurement Replicate	RPD < 10%	Recalibrate Instrument, Repeat Measurement	Volunteer Monitors	Precision
	Known Buffer (Zero O_2 Sol.)	RPD < 10% or Absolute Difference <0.4 mg/L	Recalibrate Instrument, Repeat Measurement	Volunteer Monitors	Relative Accuracy
pH	Measurement Replicate	Absolute Difference <0.3 pH units	Recalibrate Instrument, Repeat Measurement	Volunteer Monitors	Precision
	Known Buffer (pH = 6.0)	± 0.1 std units	Recalibrate Instrument, Repeat Measurement	Volunteer Monitors	Accuracy
Specific Conductance	Measurement Replicate	RPD < 10% or Absolute Difference <5µS/cm	Recalibrate Instrument, Repeat Measurement	Volunteer Monitors	Precision
	Method Blank (Zero Air Reading)	± 5.0 µS/cm	Recalibrate Instrument, Repeat Measurement	Volunteer Monitors	Accuracy
Turbidity	Measurement Replicate	RPD < 10% or Absolute Difference <1.0 NTU	Recalibrate Instrument, Repeat Measurement	Volunteer Monitors	Precision
	Method Blank (DI Water)	± 0.1 NTU	Recalibrate Instrument, Repeat Measurement	Volunteer Monitors	Accuracy
Laboratory Parameters	Measurement Replicate	RPD < 20% or Absolute Difference less than ½ the mean value of the parameter in NHDES's Environmental Monitoring Database	Repeat Measurement	Volunteer Monitors	Precision

3.0 METHODS

During the summer of 2005, volunteers from the Contoocook North Branch Rivers Local Advisory Committee (CNBRLAC) began water quality monitoring on the Contoocook River and the North Branch Contoocook River. The goal of this effort was to provide water quality data from the Contoocook River watershed relative to surface water quality standards and to allow for the assessment of the rivers for support of aquatic life. The establishment of a long-term monitoring program will allow for an understanding of the river's dynamics, or variations on a station-by-station and year-to-year basis. The data can also serve as a baseline from which to determine any water pollution problems in the river and/or watershed. The Volunteer River Assessment Program has provided field training, equipment, and technical assistance.

During 2009, trained volunteers from the Contoocook North Branch Rivers Local Advisory Committee monitored water quality at 16 stations in the Contoocook River watershed (Table 3).

Stations IDs are designated using a number indicating the relative position of the station and a three-letter code to identify the waterbody name. The higher the station number the more upstream the station is in the watershed. All stations monitored in 2009 are designated as Class B waters. This classification is used to apply the appropriate water quality standard.

Water quality monitoring was conducted from June through August. In-situ measurements of water temperature, dissolved oxygen, pH, turbidity and specific conductance were taken using handheld meters provided by NHDES. Table 2 summarizes the parameters measured, laboratory standard methods, and equipment used.

Table 2. Sampling and Analysis Methods

Parameter	Sample Type	Standard Method	Equipment Used	Laboratory
Temperature	In-Situ	SM 2550	YSI 85	------
Dissolved Oxygen	In-Situ	SM 4500 O G	YSI 85	------
pH	In-Situ	SM 4500 H+	Oakton pH 11	------
Turbidity	In-Situ	EPA 180.1	LaMotte 2020e	
Specific Conductance	In-Situ	SM 2510	YSI 85	------

Table 3. Sampling Stations for the Contoocook River Watershed, NHDES VRAP, 2009

Station ID & AUID	Class	Waterbody Name	Location	Town	Elevation *(Rounded to the Nearest 100 Feet)*
37-CTC NHRIV700030101-11	**B**	**Contoocook River**	Contoocook Lake Dam/Red Dam	Jaffrey	1000
35-CTC NHIMP700030101-03	**B**	**Contoocook River**	Nutting Road Bridge	Jaffrey	1000
30-CTC NHIMP700030104-04	**B**	**Contoocook River**	Noone Falls Dam	Peterborough	700
26-CTC NHRIV700030104-17	**B**	**Contoocook River**	Route 202/136 Bridge	Peterborough	700
20-CTC NHRIV700030108-23	**B**	**North Branch Contoocook River**	Second NH Turnpike	Deering	600
01-NBC NHRIV700030204-16	**B**	**Contoocook River**	North Branch Contoocook Stone Arch Bridge	Hillsborough	600
17-CTC NHRIV700030504-10	**B**	**Contoocook River**	Grimes Field Boat Launch	Hillsborough	600
16-CTC NHRIV700030504-10	**B**	**Contoocook River**	Contoocook Falls Road Bridge	Hillsborough	600
14-CTC NHRIV70030504-11	**B**	**Contoocook River**	Western Ave Bridge	Henniker	400
13C-CTC NHRIV700030504-11	**B**	**Contoocook River**	Covered Bridge at New England College	Henniker	400
10-CTC NHRIV700030505-05	**B**	**Contoocook River**	Downstream of Route 127 Bridge & Hopkinton Dam	Henniker	400
09-CTC NHRIV70030505-09	**B**	**Contoocook River**	Route 103 Bridge	Hopkinton	400
07-CTC NHRIV700030505-10	**B**	**Contoocook River**	Penacook Road Bridge	Contoocook	400
03-CTC NHIMP700030507-06	**B**	**Contoocook River**	Route 3 Bridge	Penacook	300
02-CTC NHIMP700030507-07	**B**	**Contoocook River**	East Street Bridge	Penacook	300

RESULTS AND RECOMMENDATIONS

Results and recommendations for each monitored parameter are presented in the following sections. For a description of the importance of each parameter and pertinent water quality criteria for these and other parameters, please see Appendix B, *"Interpreting VRAP Water Quality Parameters."*

4.1 Dissolved Oxygen

Between one and six measurements were taken in the field for dissolved oxygen concentration at 15 stations in the in the Contoocook River watershed from Jaffrey to Penacook (Table 4). Of the 38 measurements taken, 32 met quality assurance/quality control requirements and are usable for New Hampshire's 2010 surface water quality report to the US Environmental Protection Agency.

The Class B New Hampshire surface water quality standard for dissolved oxygen includes a minimum concentration of 5.0 mg/L **and** a minimum daily average of 75 percent of saturation. In other words, there are criteria for both concentration and saturation that must be met before the river can be assessed as meeting dissolved oxygen standards. Table 4 reports only dissolved oxygen concentration as more detailed analysis is required to determine if instantaneous dissolved oxygen saturation measurements are above or below water quality standards.

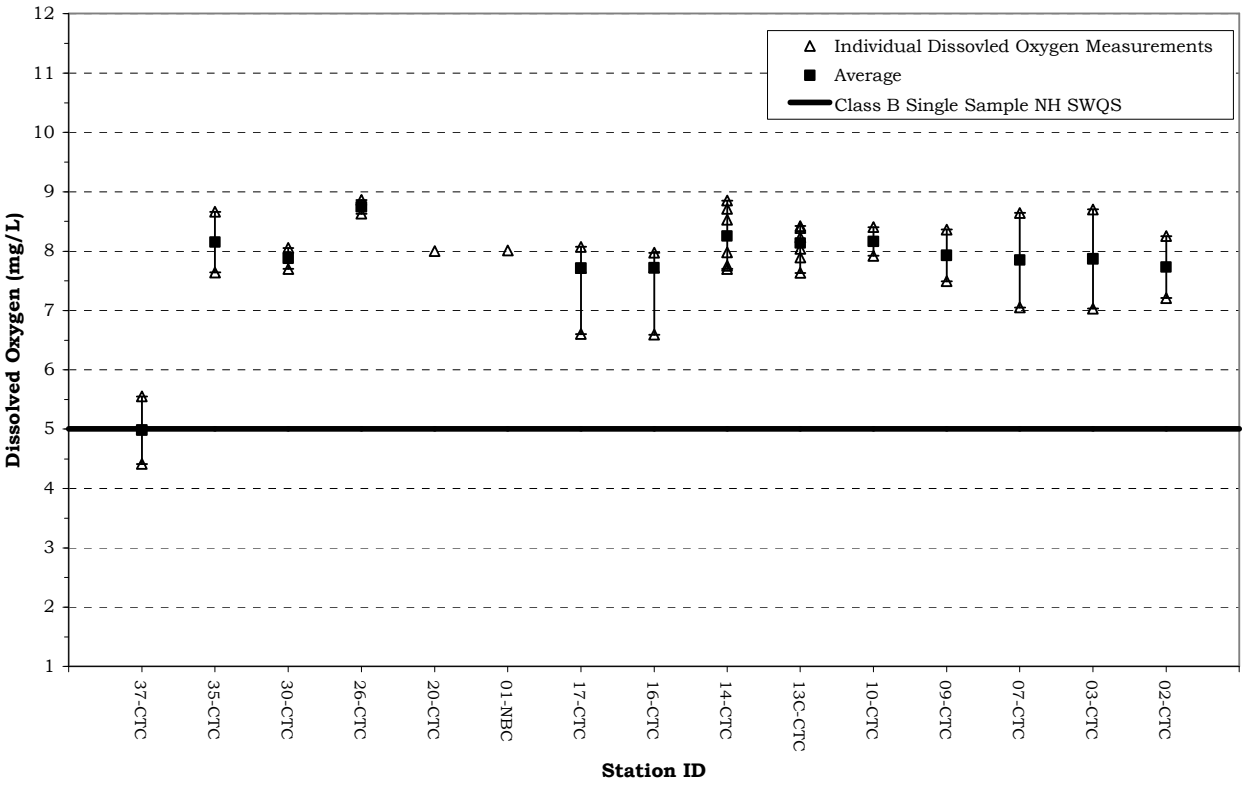
Table 4. Dissolved Oxygen Concentration (mg/L) Summary – Contoocook River Watershed, 2009

Station ID	Samples Collected	Data Range (mg/l)	Acceptable Samples Not Meeting NH Class B Standards	Number of Usable Samples for 2010 NH Surface Water Quality Assessment
37-CTC	2	4.41 - 5.55	1	2
35-CTC	2	7.64 - 8.66	0	2
30-CTC	2	7.70 - 8.05	0	2
26-CTC	2	8.63 - 8.86	0	2
20-CTC	1	8.00	0	0
01-NBC	1	8.01	0	0
17-CTC	3	6.60 - 8.07	0	2
16-CTC	3	6.59 - 7.97	0	2
14-CTC	6	7.07 - 8.85	0	5
13C-CTC	6	7.63 - 8.42	0	5
10-CTC	2	7.92 - 8.40	0	2
09-CTC	2	7.49 - 8.36	0	2
07-CTC	2	7.05 - 8.64	0	2
03-CTC	2	7.03 - 8.70	0	2
02-CTC	2	7.21 - 8.25	0	2
Total	**38**	_____	**1**	**32**

All but one station (37-CTC) had dissolved oxygen concentration levels that were above the New Hampshire Class B surface water quality standard on all occasions (Figure 1). The average dissolved oxygen concentration levels ranged from 4.98 mg/L to 8.26 mg/L. Levels of dissolved oxygen sustained above the standards are considered adequate for the support of aquatic life and other desirable water quality conditions.

Stations where the instantaneous dissolved oxygen standard was not met could potentially have a dissolved oxygen problem and further investigation is warranted. It should be noted however, that low dissolved oxygen levels may be the result of natural conditions (e.g., the presence of wetlands or stagnant water caused by a beaver dam).

Figure 1. Dissolved Oxygen Concentration Statistics for the Contoocook River Watershed June 13 - August 15, 2009, NHDES VRAP



Recommendations

- Continue sampling at all stations in order to develop a long-term data set to better understand trends as time goes on.
- If possible, take measurements between 5 a.m. and 10 a.m., which is when dissolved oxygen is usually the lowest, and between 2 p.m. and 7 p.m. when dissolved oxygen is usually the highest. In general, dissolved oxygen levels are lowest in the early morning when there is low photosynthetic activity and a peak in respiration from organisms throughout the water column. This is the time of least oxygen production and greatest carbon dioxide emission. Peak dissolved oxygen levels occur when photosynthetic activity is at its peak. The greater the amount of photosynthetic activity the greater the production of oxygen as a byproduct of photosynthesis.
- Consider incorporating the use of in-situ dataloggers to automatically record dissolved oxygen saturation levels during a period of several days. The use of these instruments is dependent upon availability, and requires coordination with NHDES.

4.2 pH

Between one and six measurements were taken in the field for pH at 15 stations in the Contoocook River watershed from Jaffrey to Penacook [Table 5]. Of the 38 measurements taken, all met quality assurance/quality control requirements and are usable for New Hampshire's 2010 surface water quality report to the US Environmental Protection Agency.

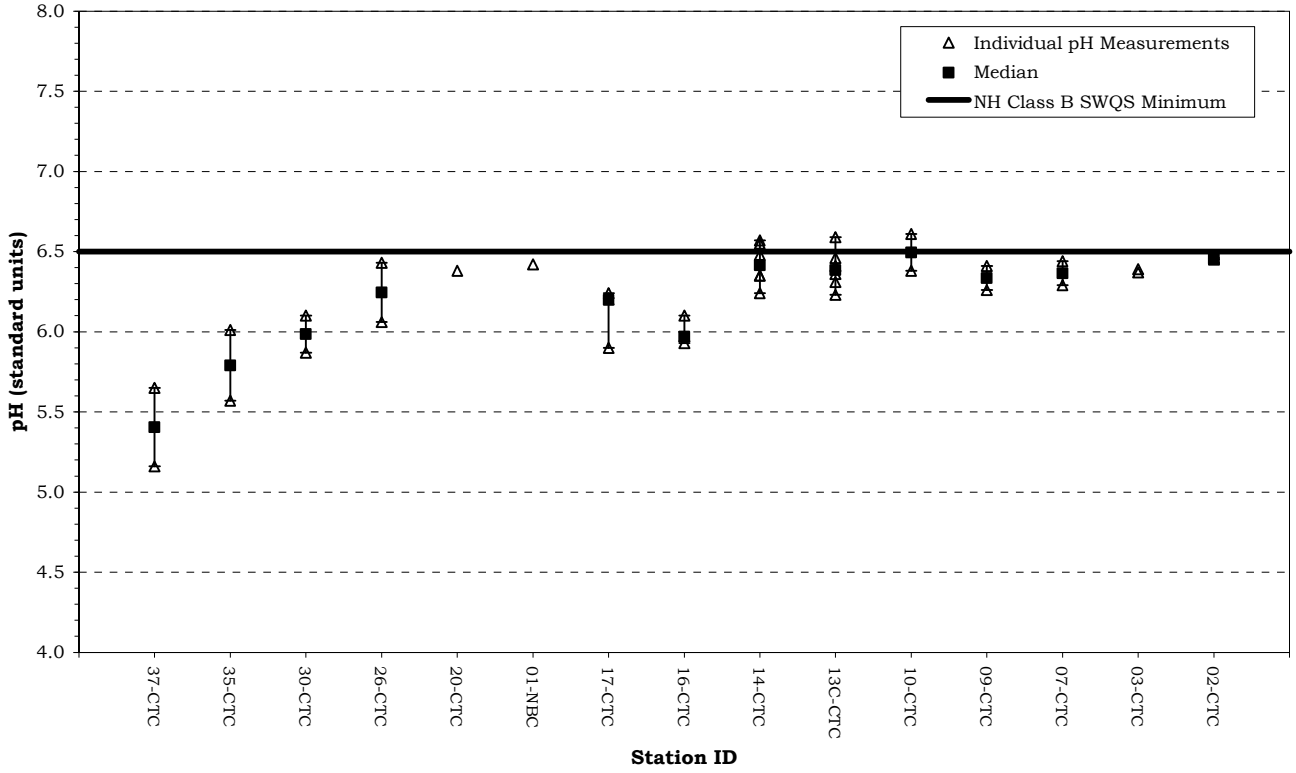
The Class B New Hampshire surface water quality standard is 6.5 - 8.0, unless naturally occurring.

Table 5. pH Data Summary – Contoocook River Watershed, 2009

Station ID	Samples Collected	Data Range (standard units)	Acceptable Samples Not Meeting NH Class B Standards	Number of Usable Samples for 2010 NH Surface Water Quality Assessment
37-CTC	2	5.16 - 5.65	2	2
35-CTC	2	5.57 - 6.01	2	2
30-CTC	2	5.87 - 6.10	2	2
26-CTC	2	6.06 - 6.43	2	2
20-CTC	1	6.38	1	1
01-NBC	1	6.42	1	1
17-CTC	3	5.90 - 6.24	3	3
16-CTC	3	5.93 - 6.10	3	3
14-CTC	6	6.24 - 6.57	4	6
13C-CTC	6	6.23 - 6.59	5	6
10-CTC	2	6.38 - 6.61	1	2
09-CTC	2	6.26 - 6.41	1	2
07-CTC	2	6.29 - 6.44	2	2
03-CTC	2	6.37 - 6.39	2	2
02-CTC	2	6.45 - 6.46	2	2
Total	**38**	_____	**33**	**38**

A majority of the pH measurements taken throughout the watershed were below the New Hampshire Class B surface water quality standard minimum (Figure 2). Lower pH measurements are likely the result of natural conditions such as the soils, geology, or the presence of wetlands in the area. Rain and snow falling in New Hampshire is relatively acidic, which can also affect pH levels; after the spring melt or significant rain events, surface waters will generally have a lower pH.

Figure 2. pH Statistics for the Contoocook River Watershed
June 13 - August 15, 2009, NHDES VRAP



Recommendations

- Continue sampling at all stations in order to develop a long-term data set to better understand trends as time goes on.
- Consider sampling for pH in some of the tributaries and wetland areas that are influencing the pH of stations with measurements below state standards. Site conditions are considered along with pH measurements because of the narrative portion of the pH standard. RSA 485-A:8 states that pH of Class B waters *shall be between 6.5 and 8.0, except when due to natural causes*. 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.

4.3 Turbidity

Between one and six measurements were taken in the field for turbidity at 15 stations in the Contoocook River watershed from Jaffrey to Penacook [Table 6]. Of the 38 measurements taken, 35 met quality assurance/quality control requirements and are usable for New Hampshire's 2010 surface water quality report to the US Environmental Protection Agency.

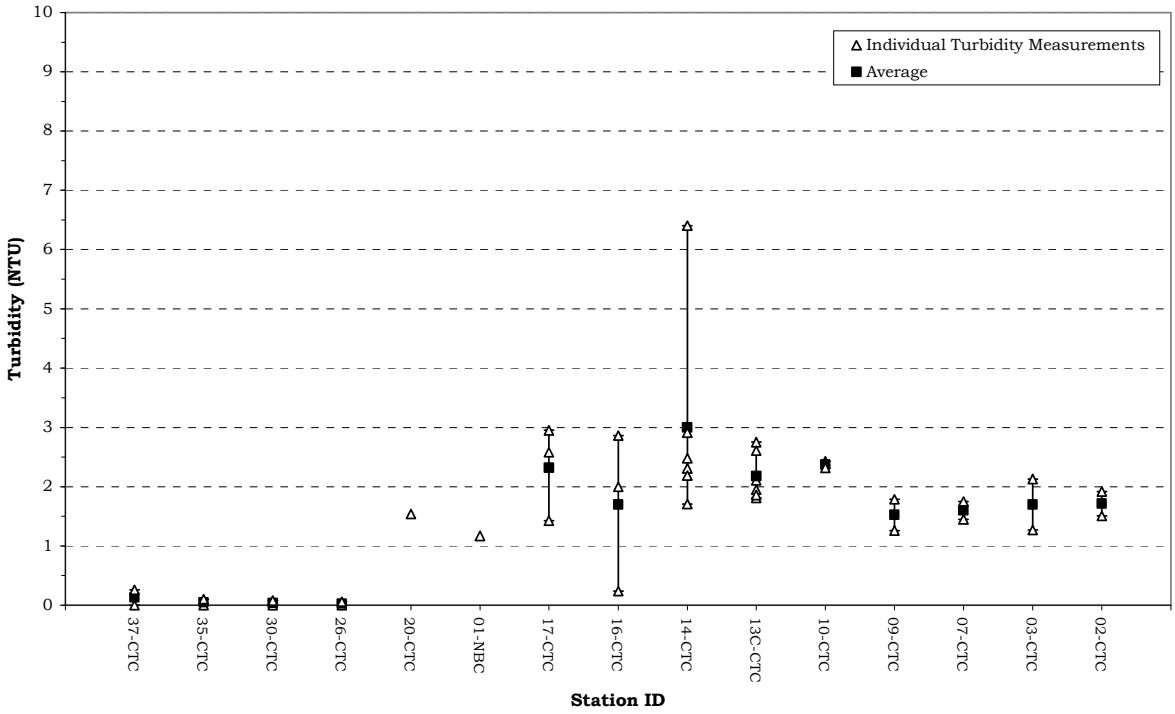
The Class B New Hampshire surface water quality standard for turbidity is less than 10 NTU above natural background.

Table 6. Turbidity Data Summary – Contoocook River Watershed, 2009

Station ID	Samples Collected	Data Range (NTU)	Acceptable Samples Potentially Not Meeting NH Class B Standards	Number of Usable Samples for 2010 NH Surface Water Quality Assessment
37-CTC	2	0.00 - 0.26	0	2
35-CTC	2	0.00 - 0.1	0	2
30-CTC	2	0.00 - 0.08	0	2
26-CTC	2	0.00 - 0.06	0	2
20-CTC	1	1.54	0	1
01-NBC	1	1.17	0	1
17-CTC	3	1.43 - 2.95	0	3
16-CTC	3	0.24 - 2.86	0	3
14-CTC	6	1.71 - 6.40	0	5
13C-CTC	6	1.81 - 2.75	0	5
10-CTC	2	2.32 - 2.43	0	1
09-CTC	2	1.26 - 1.79	0	2
07-CTC	2	1.45 - 1.75	0	2
03-CTC	2	1.27 - 2.13	0	2
02-CTC	2	1.51 - 1.92	0	2
Total	**38**	_____	**0**	**35**

Turbidity levels were low with the average ranging from 0.03 NTU to 3.00 NTU (Figure 3). Although clean waters are associated with low turbidity there is a high degree of natural variability involved. Precipitation often contributes to increased turbidity by flushing sediment, organic matter and other materials from the surrounding landscape into surface waters. However, human activities such as removal of vegetation near surface waters and disruption of nearby soils can lead to dramatic increases in turbidity levels. In general it is typical to see a rise in turbidity in more developed areas due to increased runoff.

Figure 3. Turbidity Statistics for the Contoocook River Watershed
June 13 - August 15, 2009, NHDES VRAP



Recommendations

- Continue sampling at all stations in order to develop a long-term data set to better understand trends as time goes on.
- Collect samples during wet weather. This will help us to understand how the river responds to runoff and sedimentation.
- If a higher than normal turbidity measurement occurs, volunteers can investigate further by moving upstream and taking additional measurements. This will facilitate isolating the location of the cause of the elevated turbidity levels. In addition, take good field notes and photographs. If human activity is suspected or verified as the source of elevated turbidity levels, volunteers should contact NHDES.
- Consider incorporating the use of in-situ dataloggers to automatically determine specific conductance levels during rain events, snowmelt, and baseline dry weather conditions. The use of these instruments is dependent upon availability, and requires coordination with NHDES.

4.4 Specific Conductance

Between one and six measurements were taken in the field for specific conductance at 15 stations in the Contoocook River watershed from Jaffrey to Penacook [Table 7]. Of the 38 measurements taken, 30 met quality assurance/quality control requirements and are usable for New Hampshire's 2010 surface water quality report to the US Environmental Protection Agency.

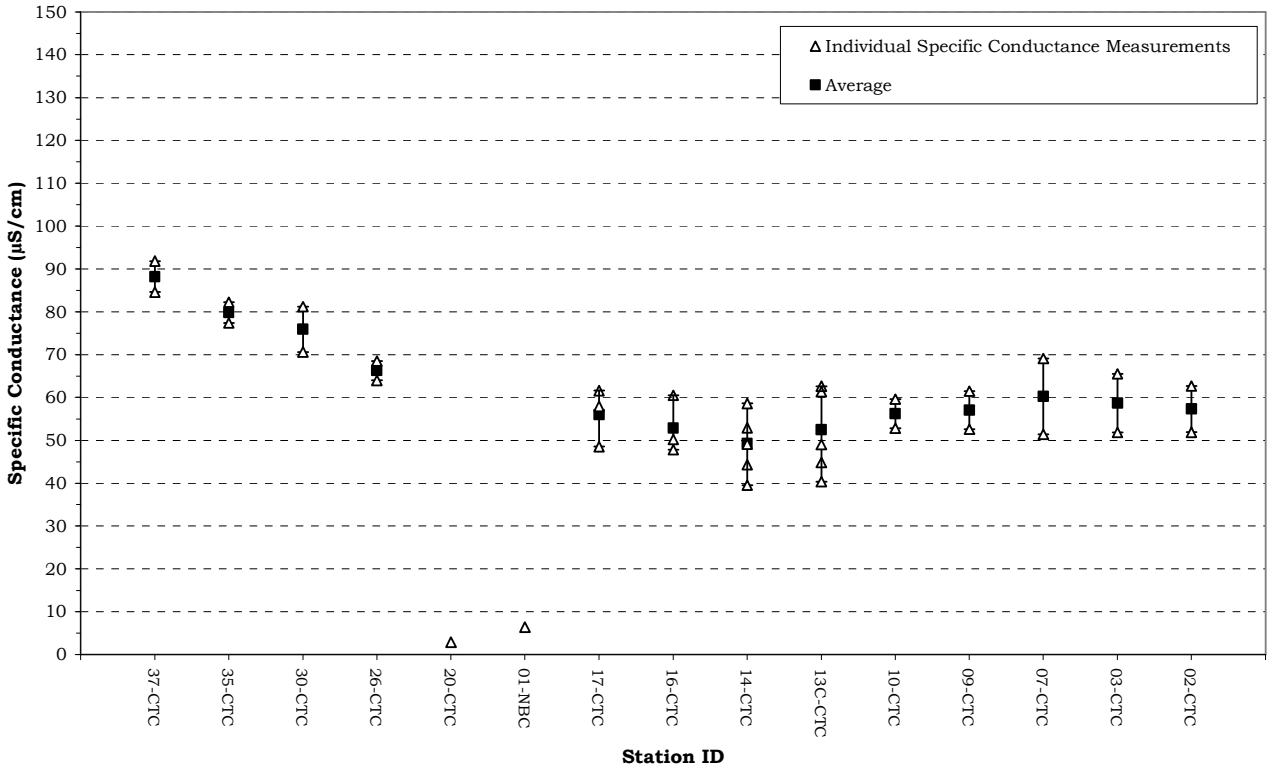
New Hampshire surface water quality standards do not contain numeric criteria for specific conductance although in many fresh surface waters, specific conductance can be used as a surrogate to predict compliance with numeric water quality criteria for chloride.

Table 7. Specific Conductance Data Summary – Contoocook River Watershed, 2009

Station ID	Samples Collected	Data Range (µS/cm)	Acceptable Samples Not Meeting NH Class B Standards (µS/cm as chloride surrogate)	Number of Usable Samples for 2010 NH Surface Water Quality Assessment
37-CTC	2	84.6 - 91.8	0	1
35-CTC	2	77.4 - 82.2	0	1
30-CTC	2	70.6 - 81.2	0	1
26-CTC	2	64.0 - 68.5	0	1
20-CTC	1	2.9	0	0
01-NBC	1	6.4	0	0
17-CTC	3	48.5 - 61.6	0	3
16-CTC	3	47.8 - 60.5	0	3
14-CTC	6	39.5 - 58.6	0	5
13C-CTC	6	40.3 - 62.6	0	5
10-CTC	2	52.8 - 59.6	0	2
09-CTC	2	52.6 - 61.5	0	2
07-CTC	2	51.4 - 69.1	0	2
03-CTC	2	51.8 - 65.5	0	2
02-CTC	2	51.9 - 62.7	0	2
Total	**38**	_____	**0**	**30**

Specific conductance levels were low along the entire reach of the river with the average ranging from 49.3 µS/cm to 88.2 µS/cm (Figure 4). Higher specific conductance levels can be indicative of pollution from sources such as urban/agricultural runoff, road salt, failed septic systems, or groundwater pollution. Thus, the low specific conductance levels generally indicate generally low pollutant levels at the stations monitoring in 2009.

Figure 4. Specific Conductance Statistics for the Contoocook River Watershed June 13 - August 15, 2009, NHDES VRAP



Recommendations

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

- Continue collecting chloride samples at the same time that specific conductance is measured. During the late winter/early spring snowmelt, higher specific conductance levels are often seen due to elevated concentrations of chloride in the runoff. Specific conductance levels are very closely correlated to chloride levels. Simultaneously measuring chloride and specific conductance will allow for a better understanding of their relationship.

- Consider incorporating the use of in-situ dataloggers to automatically determine specific conductance levels during rain events, snowmelt, and baseline dry weather conditions. The use of these instruments is dependent upon availability, and requires coordination with NHDES.

4.5 Water Temperature

Between one and six measurements were taken in the field for water temperature at 15 stations in the Contoocook River watershed from Jaffrey to Penacook [Table 8]. Of the 38 measurements taken, all met quality assurance/quality control requirements and are usable for New Hampshire's 2010 surface water quality report to the US Environmental Protection Agency.

Although there is currently no numerical water quality criteria for water temperature, NHDES is in the process of collecting biological and water temperature data that will contribute to the development of a procedure for assessing rivers and stream based on water temperature and its corresponding impact to the biological integrity of the waterbody.

Table 8. Water Temperature Data Summary – Contoocook River, 2009

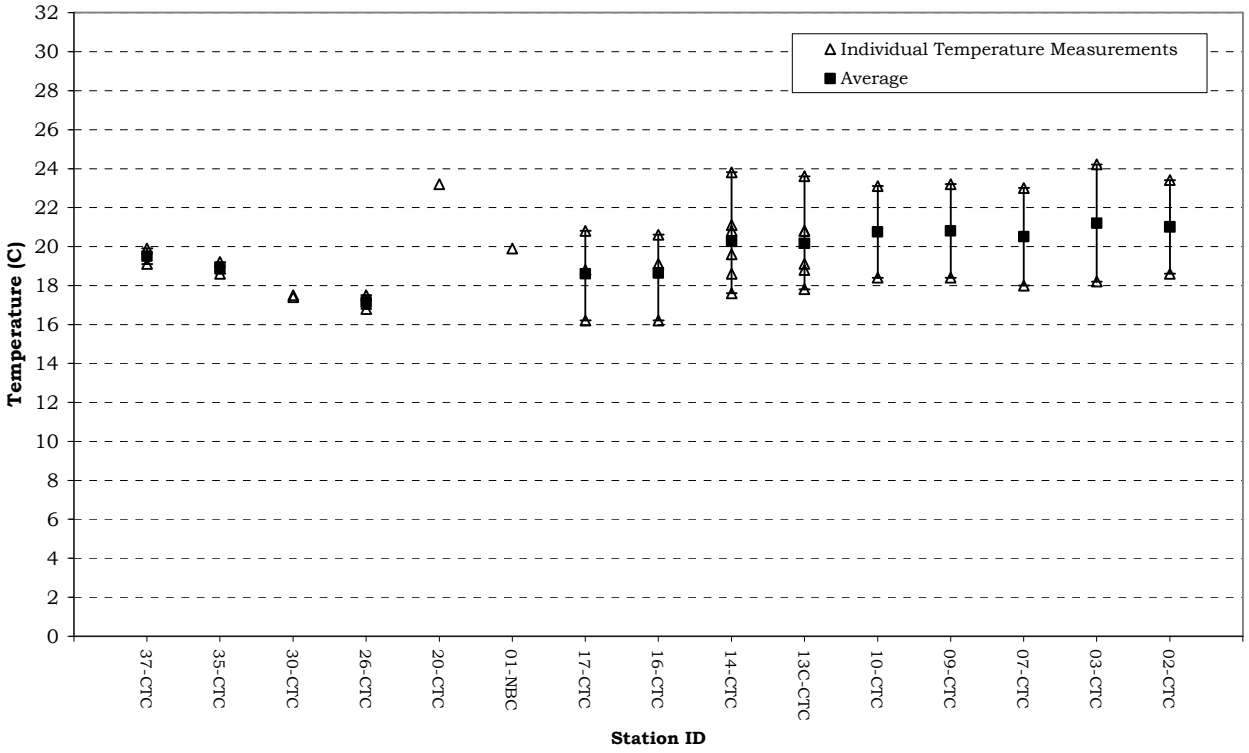
Station ID	Samples Collected	Data Range (°C)	Acceptable Samples Not Meeting NH Class B Standards	Number of Usable Samples for 2010 NH Surface Water Quality Assessment
37-CTC	2	19.1 - 19.9	Not Applicable	2
35-CTC	2	18.6 - 19.2	N/A	2
30-CTC	2	17.4 - 17.5	N/A	2
26-CTC	2	16.8 - 17.5	N/A	2
20-CTC	1	23.2	N/A	1
01-NBC	1	19.9	N/A	1
17-CTC	3	16.2 - 20.8	N/A	3
16-CTC	3	16.2 - 20.6	N/A	3
14-CTC	6	17.6 - 23.8	N/A	6
13C-CTC	6	17.8 - 23.6	N/A	6
10-CTC	2	18.4 - 23.1	N/A	2
09-CTC	2	18.4 - 23.2	N/A	2
07-CTC	2	18.0 - 23.0	N/A	2
03-CTC	2	18.2 - 24.2	N/A	2
02-CTC	2	18.6 - 23.4	N/A	2
Total	**38**	_____	**N/A**	**38**

Figure 5 shows the results of instantaneous water temperature measurements taken at 16 stations in the Contoocook River watershed. The average water temperature varied from 17.2 °C. to 20.8 °C.

Water temperature is a critical parameter for aquatic life and has an impact on other water quality parameters such as dissolved oxygen concentrations, and the activity of bacteria in the water. Water temperature controls the metabolic and reproductive processes of aquatic species and can determine which fish and macroinvertabrate species can survive in a given river or stream.

A number of factors can have an impact on water temperature including the quantity and maturity of riparian vegetation along the shoreline, the rate of flow, the percent of impervious surfaces contributing stormwater, thermal discharges, impoundments and the influence of groundwater.

Figure 5. Water Temperature Statistics for the Contoocook River Watershed June 13 - August 15, 2009, NHDES VRAP



Recommendations

- Continue collecting water temperature data via both instantaneous reading and long-term deployment of dataloggers.

APPENDIX A: 2009 CONTOOCOOK RIVER WATERSHED VRAP DATA

Measurements not meeting New Hampshire surface water quality standards

Measurements not meeting NHDES quality assurance/quality control standards

37-CTC, Contoocook Lake Dam/Red Dam, Jaffrey

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	**NA**	**>5.0**	**>75% Daily Average**	**6.5-8.0**	**<10 NTU above backgrd**	**(µS/cm as chloride surrogate)**	**Narrative**
06/23/2009	10:45	5.55	60.3	5.65	0.00	~~84.6~~	19.1
07/09/2009	11:10	4.41	51.3	5.16	0.26	91.8	19.9

35-CTC, Nutting Road Bridge, Jaffrey

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	**NA**	**>5.0**	**>75% Daily Average**	**6.5-8.0**	**<10 NTU above backgrd**	**(µS/cm as chloride surrogate)**	**Narrative**
06/23/2009	10:12	7.64	81.8	6.01	0.00	~~77.4~~	18.6
07/07/2009	10:15	8.66	89.6	5.57	0.10	82.2	19.2

30-CTC, Noone Falls Dam, Peterborough

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	**NA**	**>5.0**	**>75% Daily Average**	**6.5-8.0**	**<10 NTU above backgrd**	**(µS/cm as chloride surrogate)**	**Narrative**
06/23/2009	09:38	8.05	84.9	6.10	0.00	~~70.6~~	17.5
07/07/2009	09:00	7.70	84.5	5.87	0.08	81.2	17.4

26-CTC, Contoocook River, Route 202/136 Bridge, Peterborough

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	**NA**	**>5.0**	**>75% Daily Average**	**6.5-8.0**	**<10 NTU above backgrd**	**(µS/cm as chloride surrogate)**	**Narrative**
06/23/2009	08:28	8.86	92.0	6.43	0.00	~~64.0~~	17.5
07/07/2009	08:15	8.63	86.3	6.06	0.06	68.5	16.8

20-CTC, Contoocook River, 2nd NH Turnpike, Deering

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	**NA**	**>5.0**	**>75% Daily Average**	**6.5-8.0**	**<10 NTU above backgrd**	**(µS/cm as chloride surrogate)**	**Narrative**
06/13/2009	08:30	~~8.00~~	86.0	6.38	1.54	~~2.9~~	23.2

01-NBC, North Branch Contoocook, Stone Arch Bridge, Hillsborough

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative
06/13/2009	09:38	~~8.01~~	89.5	6.42	1.17	~~6.4~~	19.9

17-CTC, Grimes Field Boat Launch, Hillsborough

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative
06/18/2009	06:40	7.71	79.4	5.90	1.43	48.5	16.2
07/16/2009	06:45	~~8.07~~	86.6	6.20	2.95	57.9	18.8
08/13/2009	07:25	6.60	72.7	6.24	2.58	61.6	20.8

16-CTC, Contoocook Falls Road Bridge, Hillsborough

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative
06/18/2009	07:45	7.97	81.7	5.93	2.00	47.8	16.2
07/16/2009	07:50	~~7.72~~	82.9	6.10	2.86	50.2	19.1
08/13/2009	06:25	6.59	72.3	5.97	0.24	60.5	20.6

14-CTC, Western Ave Bridge, Henniker

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative
06/13/2009	09:20	~~8.71~~	90.2	6.48	2.31	~~58.6~~	17.6
06/20/2009	08:59	8.53	91.0	6.35	2.48	49.1	18.6
07/04/2009	09:55	8.85	96.4	6.35	2.19	44.3	19.6
07/18/2009	09:01	7.98	89.6	6.57	~~6.40~~	52.9	21.1
08/01/2009	07:43	7.70	85.2	6.24	2.91	39.5	20.8
08/15/2009	11:08	7.75	91.1	6.55	1.71	51.4	23.8

13C-CTC, Covered Bridge at New England College, Henniker

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	(µS/cm as chloride surrogate)	Narrative
06/13/2009	09:56	~~8.23~~	86.4	6.41	2.11	~~61.3~~	17.8
06/20/2009	09:53	8.42	90.0	6.36	1.81	49.0	18.8
07/04/2009	09:33	8.39	90.3	6.31	1.95	44.8	19.1
07/18/2009	08:15	7.63	85.2	6.46	~~2.75~~	62.6	20.8
08/01/2009	08:35	7.89	88.4	6.23	2.61	40.3	20.8
08/15/2009	11:48	8.04	94.7	6.59	1.86	57.0	23.6

10-CTC, Downstream of Route 127 Bridge & Hopkinton Dam, Hopkinton

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	**NA**	**>5.0**	**>75% Daily Average**	**6.5-8.0**	**<10 NTU above backgrd**	**(µS/cm as chloride surrogate)**	**Narrative**
06/20/2009	11:45	8.40	90.0	6.38	2.43	52.8	18.4
07/18/2009	10:03	7.92	90.3	6.61	~~2.32~~	59.6	23.1

09-CTC, Route 103 Bridge, Hopkinton

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	**NA**	**>5.0**	**>75% Daily Average**	**6.5-8.0**	**<10 NTU above backgrd**	**(µS/cm as chloride surrogate)**	**Narrative**
06/20/2009	12:21	8.36	89.1	6.41	1.79	52.6	18.4
07/19/2009	11:50	7.49	87.5	6.26	1.26	61.5	23.2

07-CTC, Penacook Road Bridge, Contoocook

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	**NA**	**>5.0**	**>75% Daily Average**	**6.5-8.0**	**<10 NTU above backgrd**	**(µS/cm as chloride surrogate)**	**Narrative**
06/20/2009	13:14	8.64	91.2	6.44	1.75	51.4	18.0
07/19/2009	12:07	7.05	80.5	6.29	1.45	69.1	23.0

03-CTC, Route 3 Bridge, Penacook

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	**NA**	**>5.0**	**>75% Daily Average**	**6.5-8.0**	**<10 NTU above backgrd**	**(µS/cm as chloride surrogate)**	**Narrative**
06/20/2009	13:54	8.70	91.2	6.37	2.13	51.8	18.2
07/19/2009	12:40	7.03	84.5	6.39	1.27	65.5	24.2

02-CTC, East Street Bridge, Penacook

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (µS/cm)	Water Temp. (°C)
Standard	**NA**	**>5.0**	**>75% Daily Average**	**6.5-8.0**	**<10 NTU above backgrd**	**(µS/cm as chloride surrogate)**	**Narrative**
6/20/2009	14:11	8.25	88.2	6.46	1.92	51.9	18.6
7/19/2009	13:00	7.21	84.7	6.45	1.51	62.7	23.4

APPENDIX B:
Interpreting VRAP Water Quality Monitoring Parameters

Chemical Parameters

Dissolved Oxygen (DO)

- **Unit of Measurement:** concentration in milligrams per liter (mg/L) and percent saturation (%).
- **Description:** A measure of the amount of oxygen in the water: Concentration is a measure of the amount of oxygen in a volume of water; saturation is a measurement of the amount of oxygen in the water compared to the amount of oxygen the water can actually hold at full saturation. Both of these measurements are necessary to accurately determine whether New Hampshire surface water quality standards are met.
- **Importance**: Oxygen is dissolved into the water from the atmosphere, aided by wind and wave action, or by rocky, steep, or uneven stream beds. The presence of dissolved oxygen is vital to bottom-dwelling organisms as well as fish and amphibians. Aquatic plants and algae produce oxygen in the water during the day, and consume oxygen during the night. Bacteria utilize oxygen both day and night when they process organic matter into smaller and smaller particles.

Class A NH Surface Water Quality Standard: 6 mg/L at any place or time, or 75% minimum daily average – (unless naturally occurring).

Class B NH Surface Water Quality Standard: 5 mg/L at any place or time or 75% minimum daily average – (unless naturally occurring).

Several measurements of oxygen saturation taken in a 24-hour period must be averaged to compare to the 75 percent daily average saturation standard. The concentration of dissolved oxygen is dependent on many factors including temperature and sunlight, and tends to fluctuate throughout the day. Saturation values are averaged because a reading taken in the morning may be low due to respiration, while a measurement that afternoon may show that the saturation has recovered to acceptable levels. Water can become saturated with more than 100 percent dissolved oxygen.

pH

- **Unit of Measurement:** units (no abbreviation).
- **Description:** A measure of hydrogen ion activity in water, or, in general terms, the acidity of water. pH is measured on a logarithmic scale of 0 to 14, with 7 being neutral. A high pH indicates alkaline (or basic) conditions and a low pH indicates acidic conditions. pH is influenced by geology and soils, organic acids (decaying leaves and other matter), and human-induced acids from acid rain (which typically has a pH of 3.5 to 5.5).
- **Importance:** pH affects many chemical and biological processes in the water and this is important to the survival and reproduction of fish and other aquatic life. Different organisms flourish within different ranges of pH. Measurements outside of an organism's preferred range can limit growth and reproduction and lead to physiological stress. Low pH can also affect the toxicity of aquatic compounds such as ammonia and certain metals by making them more "available" for uptake by aquatic plants and animals. This can produce conditions that are toxic to aquatic life.

Class A NH Surface Water Quality Standard: Between 6.5 and 8.0 (unless naturally occurring).

Class B NH Surface Water Quality Standard: Between 6.5 and 8.0 (unless naturally occurring).

Sometimes, readings that fall below this range are determined to be naturally occurring. This is often a result of wetlands near the sample station. Wetlands can lower pH because the tannic and humic acids released by decaying plants can cause water to become more acidic.

pH Units	Category
<5.0	High Impact
5.0 – 5.9	Moderate to High Impact
6.0 – 6.4	Normal; Low Impact
6.5 – 8.0	Normal;
6.1 – 8.0	Satisfactory

Specific Conductance or Conductivity

- **Unit of Measurement:** micromhos per centimeter (umhos/cm) or microsiemens per centimeter (uS/cm).
- **Description:** The numerical expression of the ability of water to carry an electrical current at 25° C and a measure of free ion (charged particles) content in the water. These ions can come from natural sources such as bedrock, or human sources such as stormwater runoff. Specific conductance can be used to indicate the presence of chlorides, nitrates, sulfates, phosphates, sodium, magnesium, calcium, iron, and aluminum ions. There is a difference between conductivity and specific conductance. Specific conductance measures the free ion content of water at a *specific* water temperature, whereas conductivity measures the free ion content of water at 25° C. VRAP uses the term "specific conductance" because our conductivity measurements account for temperature. In some studies and programs, the term "conductivity" is used. This term should only be used when the measurement *does not* adjust to a specific temperature.
- **Importance:** Specific conductance readings can help locate potential pollution sources because polluted water usually has a higher specific conductance than unpolluted waters. High specific conductance values often indicate pollution from road salt, septic systems, wastewater treatment plants, or urban/agricultural runoff. Specific conductance can also be related to geology. In unpolluted rivers and streams, geology and groundwater are the primary influences on specific conductance levels.

Class A NH Surface Water Quality Standard: No numeric standard.

Class B NH Surface Water Quality Standard: No numeric standard.

Although there is no formal standard for specific conductance, data collect by VRAP groups and NHDES indicated a very close relationship between specific conductance levels and chloride. In some cases NHDES can use specific conductance measurements as a surrogate for chloride levels. The data collected by NHDES indicate that the chronic chloride standard is correlated with a specific conductance level of approximately 850 µS/cm.

Specific Conductance *(uS/cm)*	**Category**
0 – 100	Normal
101 – 200	Low Impact
201 – 500	Moderate Impact
> 501	High Impact
> 850	Likely exceeding chronic chloride standard

Turbidity

- **Unit of Measurement:** Nephelometric Turbidity Units (abbreviated at NTU).
- **Description:** A measurement of the amount of suspended material in the water. This material, which is comprised of particles such as clay, silt, algae, suspended sediment, and decaying plant material, causes light to be scattered and absorbed, rather than transmitted in straight lines through the water.
- **Importance:** Higher turbidity increases water temperatures because suspended particles absorb more heat. This, in turn, reduces dissolved oxygen (DO) concentrations because warm water holds less DO than cold water. Higher turbidity also reduces the amount of light that can penetrate the water, which reduces photosynthesis and DO production. Suspended materials can clog fish gills, reducing disease resistance, lowering growth rates, and affecting egg and larval development. As the particles settle, they can blanket the stream bottom, especially in slower waters, and smother fish eggs and benthic macroinvertebrates. Clean waters are generally associated with low turbidity, but there is a high degree of natural variability involved. Rain events can increase turbidity in surface waters by flushing sediment, organic matter and other materials into the water. Human activities such as vegetation removal and soil disruption can also lead to dramatic increases in turbidity levels.

Class A NH Surface Water Quality Standard: As naturally occurs.

Class B NH Surface Water Quality Standard: Shall not exceed naturally occurring conditions by more than 10 NTU.

Physical Parameters

Temperature

- **Unit of Measurement:** Degrees Celsius (° C)
- **Importance:** Water temperature is a critical parameter for aquatic life and has an impact on other water quality parameters such as dissolved oxygen concentrations, and bacteria activity in water. Water temperature controls the metabolic and reproductive processes of aquatic species and can determine which fish and macroinvertabrate species can survive in a given river or stream.

  A number of factors can have an impact on water temperature including the quantity and maturity of riparian vegetation, the rate of flow, the percent of impervious surfaces contributing stormwater, thermal discharges, impoundments and groundwater.

Class A NH Surface Water Quality Standard: No numeric standard; as naturally occurs.

Class B NH Surface Water Quality Standard: No numeric standard

Although there is currently no numerical water quality criteria for water temperature, NHDES is in the process of collecting biological and water temperature data that will contribute to the development of a procedure for assessing rivers and stream based on water temperature and its corresponding impact to the biological integrity of the waterbody.

Chlorophyll-a (Chlor a)

- **Unit of Measurement:** Milligrams per liter (mg/L).
- **Description:** An indicator of the biomass, or abundance, of planktonic algae in the river. The technical term "biomass" is used to represent "amount by weight." Chlorophyll-a can be strongly influenced by phosphorus, which is derived by natural and human activities.

Importance: Because algae is a plant and contains the green pigment chlorophyll-a, the concentration of chlorophyll-a found in the water gives an estimation of the concentration of algae. If the chlorophyll-a concentration increases, this indicates an increase in the algal population.

Class A NH Surface Water Quality Standard: No numeric standard.

Class B NH Surface Water Quality Standard: No numeric standard.

Chlorophyll-a *(mg/L)*	**Category**
< 3	Excellent
3 – 7	Good
7 – 15	Less than desirable
> 15	Nuisance

Total Phosphorus (TP)

- **Unit of Measurement:** Milligrams per liter (mg/L).
- **Description:** A measure of all forms of phosphorus in the water, including inorganic and organic forms. There are many sources of phosphorus, both natural and human. These include soil and rocks, sewage, animal manure, fertilizer, erosion, and other types of contamination.
- **Importance:** Phosphorus is a nutrient that is essential to plants and animals. However, excess amounts can cause rapid increases in the biological activity in water. Phosphorus is usually the "limiting nutrient" in freshwater streams, which means relatively small amounts can increase algae and chlorophyll-a levels. Algal blooms and/or excessive aquatic plant growth can decrease oxygen levels and make water unattractive. Phosphorus can indicate the presence of septic systems, sewage, animal waste, lawn fertilizer, road and construction erosion, other types of pollution, or natural wetlands and atmospheric deposition.

Class A NH Surface Water Quality Standard: No numeric standard; as naturally occurs.

Class B NH Surface Water Quality Standard: No numeric standard; as naturally occurring, shall contain no phosphorus in such concentrations that would impair any existing or designated uses.

Total Phosphorus *(mg/L)*	**Category**
< 0.010	Ideal
0.011 – 0.025	Average
0.026 – 0.050	More than desirable
> 0.051	Excessive (potential nuisance concentration)

Total Kjeldahl Nitrogen (TKN)

- **Unit of Measurement:** Milligrams per liter (mg/L).
- **Description:** A measure of the amount of ammonia and organic nitrogen in the water.
- **Importance:** High nitrogen levels can increase algae and chlorophyll-a levels in the river, but is generally less of a concern in fresh water than phosphorus. Nitrogen can indicate the presence of sewage, animal waste, fertilizer, erosion, or other types of pollution.

Class A NH Surface Water Quality Standard: No numeric standard; as naturally occurs.

Class B NH Surface Water Quality Standard: No numeric standard; as naturally occurring, shall contain no nitrogen in such concentrations that would impair any existing or designated uses.

TKN *(mg/L)*	**Category**
< 0.25	Ideal
0.26 – 0.40	Average
0.41 – 0.50	More than desirable
> 0.51	Excessive (potential nuisance concentration)

Other Parameters

Chloride

- **Unit of Measurement:** Milligrams per liter (mg/L).
- **Description:** The chloride ion (Cl-) is found naturally in some surface waters and groundwater. It is also found in high concentrations in seawater. Higher-than-normal chloride concentrations in freshwater is detrimental to water quality. In New Hampshire, applying road salt for winter accident prevention is a large source of chloride to the environment. Unfortunately, this has increased over time due to road expansion and increased vehicle traffic. Road salt (most often sodium chloride) readily dissolves and enters aquatic environments in ionic forms. Although chloride can originate from natural sources, most of the chloride that enters the environment is associated with the storage and application of road salt. As such, chloride-containing compounds commonly enter surface water, soil, and groundwater during late-spring snowmelt (since the ground is frozen during much of the late winter and early spring). Sodium chloride is also used on foods as table salt, and consequently is present in human waste. Thus, sometimes chloride in water can indicate sewage pollution. Saltwater intrusion can also elevate groundwater chlorides in drinking water wells near coastlines. Chloride ions are conservative, which means they are not degraded in the environment and tend to remain in solution, once dissolved. Chloride ions that enter ground water can ultimately be expected to reach surface water and, therefore, influence aquatic environments and humans.
- **Importance:** Research shows elevated chloride levels can be toxic to freshwater aquatic life. Among the species tested, freshwater aquatic plants and invertebrates tend to be the most sensitive to chloride. In order to protect freshwater aquatic life in New Hampshire, the state has adopted acute and chronic chloride criteria.

Acute Standard: 860 mg/L.

Chronic Standard: 230 mg/L.

Escherichia Coliform Bacteria *(E. coli)*

- **Unit of Measurement:** Counts per 100 milliliter (cts/100 mL).
- **Description:** An indicator of the potential presence of pathogens in fresh water. *E. coli* bacteria is a normal component in the large intestines of humans and other warm-blooded animals, and can be excreted in their fecal material. Organisms causing infections or disease (pathogens) are often excreted in the fecal material of humans and other warm-blooded animals.
- **Importance:** *E.coli* bacteria is a good indicator of fecal pollution and the possible presence of pathogenic organisms. In freshwater, *E. coli* concentrations help determine if the water is safe for recreational uses such as swimming.

  Several factors can contribute to elevated *E. coli* levels, including, but not limited to rain storms, low river flows, the presence of wildlife, and the presence of septic systems along the river.

Class A NH Surface Water Quality Standard: Unless naturally occurring, shall contain not more than either a geometric mean of 47 *E.coli* cts/100 mL based on at least three samples obtained over a sixty-day period, or greater than 153 *E.coli* cts/100 mL in any one sample.

Class B NH Surface Water Quality Standard: Unless naturally occurring, shall contain not more than either a geometric mean of 126 *E.coli* cts/100 mL based on at least three samples obtained over a sixty-day period, or greater than 406 *E.coli* cts/100 mL in any one sample.

Metals

Depending on the metal concentration, its form (dissolved or particulate), and the hardness of the water, trace metals can be toxic to aquatic life. Metals in dissolved form are generally more toxic than metals in the particulate form. The dissolved metal concentration is dependent on pH, as well as the presence of solids and organic matter that can bind with the metal to render it less toxic.

Hardness is primarily a measure of the calcium and magnesium ion concentrations in water, expressed as calcium carbonate. The hardness concentration affects the toxicity of certain metals. New Hampshire water quality regulations include numeric criteria for a variety of metals. Since dissolved metals are typically found in extremely low concentrations, the potential contamination of samples collected for trace metals analyses has become a primary concern of water quality managers. To prevent such contamination and to ensure reliable results, the use of "clean techniques" is becoming more and more frequent when sampling for dissolved metals. Because of this, sampling for metals may be more costly and require additional effort than in the past.

New Hampshire Volunteer River Assessment Program

29 Hazen Drive – PO Box 95
Concord, NH 03302-0095
p (603) 271-0699 – f (603) 271-7894
www.des.nh.gov

2008

APPENDIX C:

2009 VRAP Field Audit

VRAP staff aim to visit each group annually during a scheduled sampling event to verify that volunteers successfully follow the VRAP protocols. If necessary, volunteers are re-trained during the visit, and the group is notified of the result of the verification visit. During the visit, volunteers were assessed in the following five categories:

1) **Overall Sampling Procedures**

   Appropriate storage of meters, sample collection, laboratory sample collection and transportation, beginning and end of day meter checks, collecting a field replicate, performing QA/QC Meter Checks, and ensuring that all calibration and sampling data are properly documented on the VRAP Field Data Sheet and the Laboratory Services Login & Custody Sheet.

2) **Turbidity**

   Inspecting and cleaning of glass turbidity vials prior to measurement of standards and samples, performing the *Initial Turbidity Meter Check,* calibrating the meter to a known standard at the beginning of the sampling day, recording the value of the DI turbidity blank *(QA/QC Meter Check)* once during the sampling day, and performing the *"End of the Day Meter Check"* at the conclusion of the sampling day.

3) **pH**

   Inspecting the pH electrode prior to sampling, calibrating to both pH 7.0 and 4.0 buffers prior to each measurement, rinsing and wiping the pH electrode probe prior to and after the measurement of standards and samples, allowing the pH measurement to stabilize prior to recording the measurement, and recording the value of the 6.0 buffer *(QA/QC Meter Check)* once during the sampling day.

4) **Water Temperature/Dissolved Oxygen**

   Ensuring that the meter is allowed an adequate time to stabilize prior to the first calibration, the meter is calibrated prior to each measurement, the calibration value is properly recorded, the chamber reading is properly recorded, that sufficient time is allowed for readings to stabilize, and that a zero oxygen check (*QA/QC Meter Check)* is completed during the sampling day.

5) **Specific Conductance**

   Performing the *Initial Conductivity Meter Check* using a known standard, allowing for the meter to properly stabilize before recording measurements, properly cleaning the probe between stations, and performing the *End of the Day Meter Check* at the conclusion of the sampling day.

During the field audit, VRAP staff offer important reminders and suggestions to ensure proper sampling techniques and re-trained volunteers in the areas needing improvement. It is important to ensure that all volunteers attend an annual VRAP training workshop prior to the sampling season to familiarize themselves with proper sampling techniques. Please remember to schedule an annual field audit in 2010.

Appendix D

Active Dams on the Contoocook and North Branch Rivers

Source: NH Department of Environmental Services GIS Dataset

TOWN	NAME	RIVER	TYPE	USE	HAZARD CLASS	OWNERSHIP	OWNER
BENNINGTON	MONADNOCK POWER DAM	CONTOOCOOK	CONCRETE	Hydro	Low Hazard	Private	MONADNOCK PAPER MILLS INC
BENNINGTON	PAPER MILL DAM	CONTOOCOOK	CONCRETE	Hydro	Low Hazard	Private	MONADNOCK PAPER MILLS INC
BENNINGTON	PIERCE POWER DAM	CONTOOCOOK	CONCRETE	Hydro	Low Hazard	Private	MONADNOCK PAPER MILLS INC
BENNINGTON	POWDER MILL POND DAM	CONTOOCOOK	CONCRETE	Hydro	High Hazard	Private	MONADNOCK PAPER MILLS INC
BOSCAWEN	PENACOOK LOWER FALLS DAM	CONTOOCOOK	CONCRETE	Hydro	Significant Hazard	Private	BRIAR HYDRO ASSOCIATES
CONCORD	PENACOOK UPPER FALLS DAM	CONTOOCOOK	CONCRETE	Hydro	Significant Hazard	Private	BRIAR HYDRO ASSOCIATES
CONCORD	YORK DAM CONTOOCOOK RIVER	CONTOOCOOK	CONCRETE	Hydro	Significant Hazard	State	NH WATER RESOURCES COUNCIL
HILLSBOROUGH	HOSIERY MILL DAM	CONTOOCOOK	CONCRETE	Hydro	Low Hazard	Local	TOWN OF HILLSBOROUGH
HOPKINTON	CONTOOCOOK VILLAGE DAM	CONTOOCOOK	CONCRETE	Hydro	Low Hazard	Local	TOWN OF HOPKINTON
HOPKINTON	HOAGUE SPRAGUE DAM	CONTOOCOOK	TIMBERCOMB	Hydro	Non-Menace	Private	ENEL NORTH AMERICA INC
HOPKINTON	HOPKINTON FLOOD CONTROL SPILLWAY	CONTOOCOOK	CONCRETE	Flood Control	High Hazard	Federal	US ARMY CORP OF ENGINEERS
HOPKINTON	HOPKINTON FLOOD CTRL DAM	CONTOOCOOK	EARTH	Flood Control	High Hazard	Federal	US ARMY CORP OF ENGINEERS
JAFFREY	CHESHIRE POND DAM	CONTOOCOOK	EARTH	Hydro	Low Hazard	Private	D D BEAN & SONS CO
JAFFREY	CONTOOCOOK LAKE DAM	CONTOOCOOK	EARTH	Recreation	Low Hazard	Local	TOWN OF JAFFREY
JAFFREY	CONTOOCOOK RIVER	CONTOOCOOK	TIMBERCOMB	Recreation	Non-Menace	Private	MS HATTIE LATERNEAU
JAFFREY	CONTOOCOOK RIVER DAM	CONTOOCOOK	CONCRETE	Recreation	Significant Hazard	Local	TOWN OF JAFFREY
PETERBOROUGH	NOONE MILL DAM	CONTOOCOOK	CONCRETE	Hydro	Low Hazard	Private	MS DUDLEY COBB
PETERBOROUGH	NORTH VILLAGE DAM	CONTOOCOOK	STONE/CONC	Recreation	Low Hazard	Local	TOWN OF PETERBOROUGH
PETERBOROUGH	TRANSCRIPT PRINTING CO DAM	CONTOOCOOK	CONCRETE	Conservation/Agriculture	Non-Menace	Local	TOWN OF PETERBOROUGH
RINDGE	CONTOOCOOK RIVER IV	CONTOOCOOK	EARTH	Recreation	Non-Menace	Private	MR FRAN BERGER
ANTRIM	CONTOOCOOK RIVER LOVERIN DAM	NORTH BRANCH	CONCRETE	Conservation/Agriculture	Non-Menace	Private	MR STANLEY C OLSON
ANTRIM	INTERLOCKEN DAM	NORTH BRANCH	STONE/EARTH	Recreation	Non-Menace	Private	INTERLOCKEN CAMP
ANTRIM	STEELS POND DAM	NORTH BRANCH	CONCRETE	Hydro	Low Hazard	State	NH WATER RESOURCES COUNCIL
HILLSBOROUGH	JACKMAN RESERVOIR DAM	NORTH BRANCH	EARTH/CONCRETE	Hydro	High Hazard	Public Utility	PSNH
STODDARD	HIGHLAND LAKE DAM/DIKE	NORTH BRANCH	CONCRETE	Recreation	Significant Hazard	State	NH WATER RESOURCES COUNCIL
STODDARD	ISLAND POND DAM	NORTH BRANCH	CONCRETE	Recreation	Low Hazard	State	NH WATER RESOURCES COUNCIL
STODDARD	ROBB RESERVOIR DAM	NORTH BRANCH	CONCRETE	Recreation	Low Hazard	Private	THE TRUST FOR PUBLIC LAND
STODDARD	WILLIAMS DAM	NORTH BRANCH	EARTH	Recreation	Non-Menace	Private	STODDARD MAIN COMPANY

Appendix E

Registered Water Users Along the Contoocook and North Branch Rivers

Source: NH Department of Environmental Services GIS Dataset

Town	Action	Water User Name	Facility	User Type	Source/Destination	Source/Destination Type	Subtype
ANTRIM	Withdrawal	ANTRIM WATER WORKS	ANTRIM WATER WORKS	Water Supplier	ANTRIM GRAVEL PACK WELL	Groundwater	Gravel Well
ANTRIM	Withdrawal	STEELS POND HYDRO	STEELS POND DAM	Hydropower	NO. BRANCH CONTOOCOOK RVR	Surface Water	River
BENNINGTON	Withdrawal	MONADNOCK PAPER MILLS INC	HI GATE DAM	Hydropower	CONTOOCOOK RIVER	Surface Water	River
BENNINGTON	Withdrawal	MONADNOCK PAPER MILLS INC	MONADNOCK POWER STATION	Hydropower	CONTOOCOOK RIVER	Surface Water	River
BENNINGTON	Withdrawal	MONADNOCK PAPER MILLS INC	PAPER MILL	Industrial	CONTOOCOOK RIVER	Surface Water	River
BENNINGTON	Withdrawal	MONADNOCK PAPER MILLS INC	PAPER MILL	Industrial	NEW GRAVEL-PACK WELL	Groundwater	Gravel Well
BENNINGTON	Withdrawal	MONADNOCK PAPER MILLS INC	PIERCE POWER STATION	Hydropower	CONTOOCOOK RIVER	Surface Water	River
BENNINGTON	Withdrawal	BENNINGTON WATER DEPT	WATER WORKS	Water Supplier	BENNINGTON WELL	Groundwater	Gravel Well
BOSCAWEN	Withdrawal	ESSEX HYDRO ASSOCIATION	PENACOOK LOWER FALLS	Hydropower	CONTOOCOOK RIVER	Surface Water	River
CONCORD	Withdrawal	ESSEX HYDRO ASSOCIATION	PENACOOK UPPER FALLS	Hydropower	CONTOOCOOK RIVER	Surface Water	River
CONCORD	Withdrawal	CONCORD CITY	WATER WORKS	Water Supplier	CONTOOCOOK RIVER	Surface Water	River
HILLSBOROUGH	Withdrawal	ANGUS LEA GOLF COURSE	GOLF COURSE	Irrigation	CONTOOCOOK RIVER	Surface Water	River
HILLSBOROUGH	Withdrawal	SILVER STREET HYDRO, LLC	HILLSBOROUGH HYDRO PROJEC	Hydropower	CONTOOCOOK RIVER	Surface Water	River
HILLSBOROUGH	Withdrawal	PUBLIC SERVICE CO OF NH	JACKMAN HYDRO	Hydropower	CONTOOCOOK RIVER	Surface Water	River
HOPKINTON	Withdrawal	DUSTON COUNTRY CLUB	DUSTON COUNTRY CLUB	Irrigation	CONTOOCOOK RIVER	Surface Water	River
HOPKINTON	Withdrawal	CHI OPERATIONS INC	EHC HOAGUE SPRAUGE HYDRO	Hydropower	CONTOOCOOK RIVER	Surface Water	River
HOPKINTON	Withdrawal	CONTOOCOOK HYDRO LLC	HOPKINTON GENERATING STATION	Hydropower	CONTOOCOOK RIVER	Surface Water	River
HOPKINTON	Withdrawal	BIO ENERGY LLC		Biomass Powe	CONTOOCOOK RIVER	Surface Water	River
HOPKINTON	Withdrawal	PAPERTECH CORPORATION		Industrial	C0NTOOCOOK RIVER	Surface Water	River
JAFFREY	Withdrawal	BEAN DD & SONS CO INC	HYDROPOWER FACILITY	Hydropower	CONTOOCOOK RIVER	Surface Water	River
PETERBOROUGH	Withdrawal	RIVER STREET ASSOCIATES	BELL MILL DAM	Hydropower	NUBANUSIT BROOK	Surface Water	Brook
PETERBOROUGH	Withdrawal	THE COBBS LLC	NOONE FALLS HYDRO	Hydropower	CONTOOCOOK RIVER	Surface Water	River
PETERBOROUGH	Withdrawal	PETERBOROUGH WATER WORKS	PETERBOROUGH WATER WORKS	Water Supplier	SUMMER STREET WELL	Groundwater	Gravel Well
PETERBOROUGH	Withdrawal	PETERBOROUGH WATER WORKS	PETERBOROUGH WATER WORKS	Water Supplier	SOUTH WELL	Groundwater	Gravel Well
PETERBOROUGH	Withdrawal	MACMILLIN COMPANY INC	RIVERMEAD RETIREMENT COMM	Industrial	CONTOOCOOK RIVER	Surface Water	River
PETERBOROUGH	Withdrawal	UPLAND FARM SPRING WATER	UPLAND FARM SPRING	Bottled Water	UPLAND FARM SPRING	Groundwater	Spring
PETERBOROUGH	Withdrawal	HARRIS CONSTRUCTION CO		Mining	TOWN LINE BROOK	Surface Water	River
ANTRIM	Return	STEELS POND HYDRO	STEELS POND DAM	Hydropower	NO. BRANCH CONTOOCOOK RVR	Surface Water	River
ANTRIM	Return	ANTRIM WWTF	WASTE WATER TREAT PLANT	Sewage Treatr	CONTOOCOOK RIVER	Surface Water	River
BENNINGTON	Return	MONADNOCK PAPER MILLS INC	HI GATE DAM	Hydropower	CONTOOCOOK RIVER	Surface Water	River
BENNINGTON	Return	MONADNOCK PAPER MILLS INC	MONADNOCK POWER STATION	Hydropower	CONTOOCOOK RIVER	Surface Water	River
BENNINGTON	Return	MONADNOCK PAPER MILLS INC	PAPER MILL	Industrial	CONTOOCOOK RIVER	Surface Water	River
BENNINGTON	Return	MONADNOCK PAPER MILLS INC	PIERCE POWER STATION	Hydropower	CONTOOCOOK RIVER	Surface Water	River
BOSCAWEN	Return	ESSEX HYDRO ASSOCIATION	PENACOOK LOWER FALLS	Hydropower	CONTOOCOOK RIVER	Surface Water	River
CONCORD	Return	ESSEX HYDRO ASSOCIATION	PENACOOK UPPER FALLS	Hydropower	CONTOOCOOK RIVER	Surface Water	River
CONCORD	Return	ESSEX HYDRO ASSOCIATES	ROLFE CANAL HYDRO	Hydropower	CONTOOCOOK RIVER	Surface Water	River
HENNIKER	Return	HENNIKER WWTF	WASTE WATER TREAT PLANT	Sewage Treatr	CONTOOCOOK RIVER	Surface Water	River
HILLSBOROUGH	Return	ANGUS LEA GOLF COURSE	GOLF COURSE	Irrigation	IRRIGATION	Groundwater	Irrigation
HILLSBOROUGH	Return	OSRAM/SYLVANIA INC	HILLSBORO	Industrial	NORTH BRANCH RIVER	Surface Water	River
HILLSBOROUGH	Return	SILVER STREET HYDRO, LLC	HILLSBOROUGH HYDRO PROJEC	Hydropower	CONTOOCOOK RIVER	Surface Water	River
HILLSBOROUGH	Return	PUBLIC SERVICE CO OF NH	JACKMAN HYDRO	Hydropower	CONTOOCOOK RIVER	Surface Water	River
HOPKINTON	Return	HOPKINTON VILLAGE PREC	CONTOOCOOK WWTP	Sewage Treatr	CONTOOCOOK RIVER	Surface Water	River
HOPKINTON	Return	DUSTON COUNTRY CLUB	DUSTON COUNTRY CLUB	Irrigation	IRRIGATION	Groundwater	Irrigation
HOPKINTON	Return	CHI OPERATIONS INC	EHC HOAGUE SPRAUGE HYDRO	Hydropower	CONTOOCOOK RIVER	Surface Water	River
HOPKINTON	Return	CONTOOCOOK HYDRO LLC	HOPKINTON GENERATING STATION	Hydropower	CONTOOCOOK RIVER	Surface Water	River
HOPKINTON	Return	BIO ENERGY LLC		Biomass Powe	CONTOOCOOK RIVER	Surface Water	River
HOPKINTON	Return	PAPERTECH CORPORATION		Industrial	CONTOOCOOK RIVER	Surface Water	River
JAFFREY	Return	BEAN DD & SONS CO INC	HYDROPOWER FACILITY	Hydropower	CONTOOCOOK RIVER	Surface Water	River
JAFFREY	Return	JAFFREY WWTF	WASTE WATER TREAT PLANT	Sewage Treatr	CONTOOCOOK RIVER	Surface Water	River
PETERBOROUGH	Return	RIVER STREET ASSOCIATES	BELL MILL DAM	Hydropower	NUBANUSIT BROOK	Surface Water	Brook
PETERBOROUGH	Return	THE COBBS LLC	NOONE FALLS HYDRO	Hydropower	CONTOOCOOK RIVER	Surface Water	River
PETERBOROUGH	Return	NH BALL BEARINGS INC	PETERBOROUGH	Industrial	CONTOOCOOK RIVER	Surface Water	River
PETERBOROUGH	Return	MACMILLIN COMPANY INC	RIVERMEAD RETIREMENT COMM	Industrial	RIVERMEAD RETIRE COMM	Atmosphere	Dust Control
PETERBOROUGH	Return	PETERBOROUGH WWTF	WASTE WATER TREAT PLANT	Sewage Treatr	CONTOOCOOK RIVER	Surface Water	River
PETERBOROUGH	Return	HARRIS CONSTRUCTION CO		Mining	CONTOOCOOK RIVER	Surface Water	River

Dataset query: location <= 0.25 mi. from Contoocook/North Branch Rivers

Appendix F. Town Map Sets

For each community, the following maps include:

1. Base Map with Hydrological Features
2. Wildlife Action Plan Map
3. Zoning Map

Contoocook & North Branch Rivers Management Plan

Antrim

- County Boundary
- Town Boundary
- Community Center Areas
- Lakes and Ponds
- Rivers and Streams
- Wetlands
- Active Dams
- Bridges
- Conservation Lands

Floodplains

- Floodway
- 1% Annual Flood Risk
- 0.2% Annual Flood Risk

Data sources: 1:24,000 source data from NH GRANIT; flood data from FEMA through NH GRANIT; Road and bridge data from NH Dept. of Transportation; Dams data from NH Dept. of Environmental Services.

This map is for planning purposes only. Neither CNHRPC nor CNBRLAC make any representations as to the accuracy or validity of these data, and this map should not be used for regulatory or site specific determinations. Map created in November 2009 by CNHRPC.

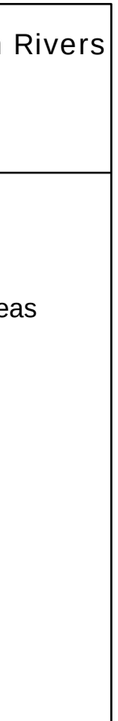
N

0 0.25 0.5 1 Mile

Funding provided by the NH Department of Environmental Services through Section 604(b) of the Clean Water Act with funds appropriated by the American Recovery and Reinvestment Act of 2009.

New Hampshire Department of Environmental Services
29 Hazen Drive Concord NH 03301

Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org



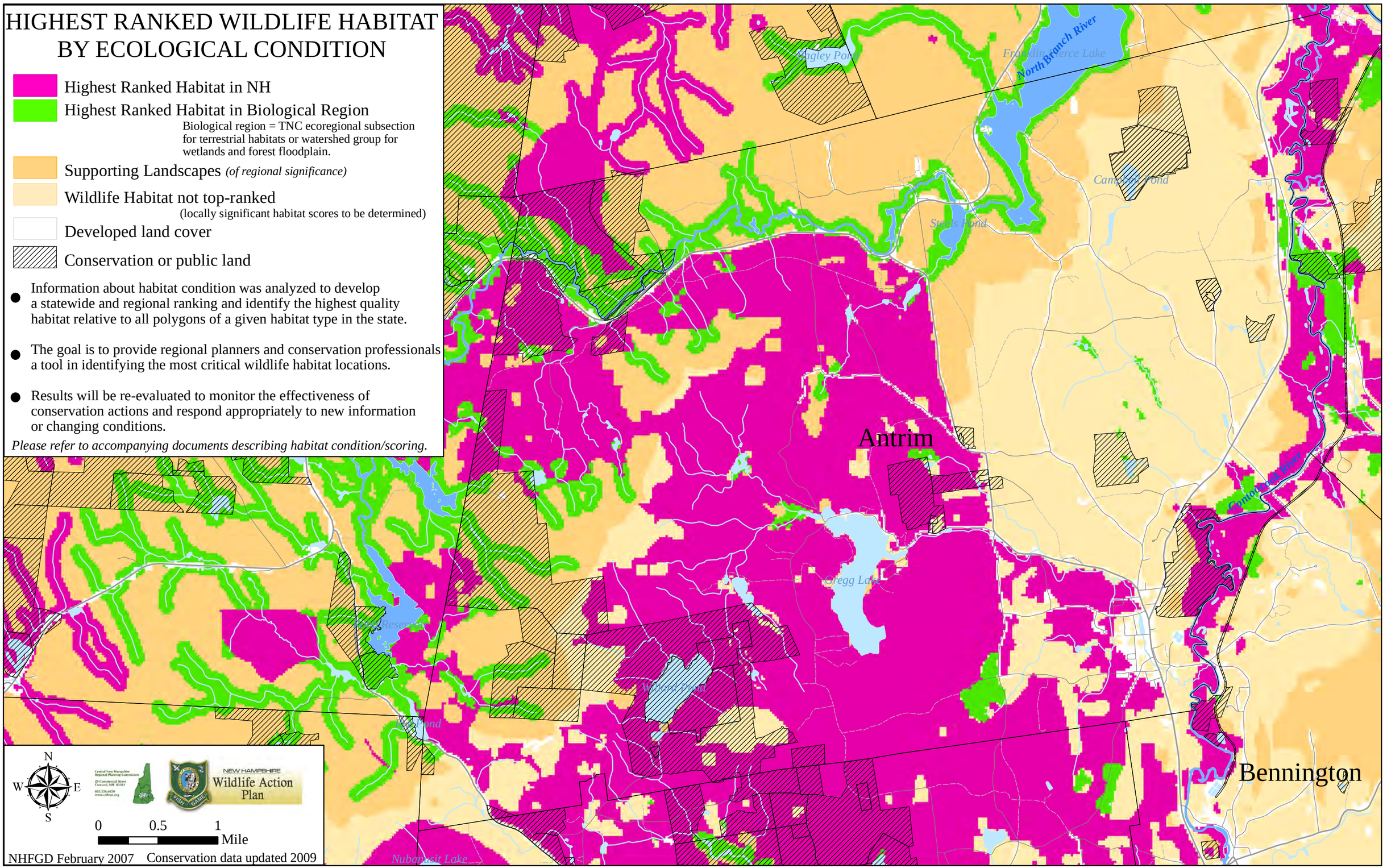
Trout Pond
Bagley Pond
Hillsborough
Franklin Pierce Lake
Barden Hill Rd
Old 2nd NH Turnpike Rd
Long Woods Rd
Union St
Windsor
Carr Brook
Loveren Mill Rd
Loveren's Mill Rd
Stacey Hill Rd
North Branch River
River Rd
Park Pl
N. Branch Rd
Steeds Pond
Pierce Lake Rd
Campbell Pond
Whitney Rd
Hedgehog Mtn Rd
Old Concord Rd
Old Antrim Rd
Barrett Pond Rd
Barrett Pond
Brackett Rd
Ashley Rd
Elm Av
Turner Hill Rd
Old Milk Rd
Smith Rd
Deeri
Second NH Tpk
Morse Brook
9
Reed Carr Rd
Old Carr Rd
Bridal Path Rd
31
Craig Rd
Old Pound Rd
Holt Hill Rd
Cross Rd
Coehran Brook
Salmon Brook
Stoddard
Antrim
Miltmore Rd
Whitten Rd
Matteson Rd
Goodell St
Contoocook River
Pennington Depot Rd
Gregg Lake Rd
Great Brook
202
Main St.
N Bennington Rd
Durgin Rd
Gregg Lake
Old Hancock Rd
Elm St
West St
Hilton Rd
Bennington
No Bennington Rd
Depot St
Highland St
High St
Pleasant St
Boutman Rd
Old Boutman Rd
Old Brimstone Rd
Greystone Lodge Rd
Blue Hill Rd
123
Robb Reservoir
Willard Pond
Rye Pond
Moose Brook
Willard Pond Rd
Weston Rd
Depot Rd
Hancock
Old Antrium Rd
Un-Named
Un-Named
Antrium Rd
Birch Rd
Verney Rd
Antrim Rd
Old Stagecoach Rd
Dodge Hill Rd
Reservoir Rd
47

HIGHEST RANKED WILDLIFE HABITAT BY ECOLOGICAL CONDITION

- Highest Ranked Habitat in NH
- Highest Ranked Habitat in Biological Region
  Biological region = TNC ecoregional subsection for terrestrial habitats or watershed group for wetlands and forest floodplain.
- Supporting Landscapes *(of regional significance)*
- Wildlife Habitat not top-ranked
  (locally significant habitat scores to be determined)
- Developed land cover
- Conservation or public land

- Information about habitat condition was analyzed to develop a statewide and regional ranking and identify the highest quality habitat relative to all polygons of a given habitat type in the state.
- The goal is to provide regional planners and conservation professionals a tool in identifying the most critical wildlife habitat locations.
- Results will be re-evaluated to monitor the effectiveness of conservation actions and respond appropriately to new information or changing conditions.

Please refer to accompanying documents describing habitat condition/scoring.



NHFGD February 2007 Conservation data updated 2009

Contoocook & North Branch Rivers Management Plan

Zoning in Antrim

Legend

Antrim Zoning

- Highway Business
- Lakefront Residential
- Residential
- Rural Conservation Area
- Rural Residential
- Village Business; Town

Data sources: Hydrography 1:24,000 source data from NH GRANIT; Roads data from NH Dept. of Transportation; Zoning layers from CNHRPC, SWRPC, and towns.

This map is for planning purposes only. Neither CNHRPC nor CNBRLAC make any representations as to the accuracy or validity of these data, and this map should not be used for regulatory or site specific determinations. Map created in November 2009 by CNHRPC.

0 0.5 1 2 Miles

Funding provided by the NH Department of Environmental Services through Section 604(b) of the Clean Water Act with funds appropriated by the American Recovery and Reinvestment Act of 2009.

New Hampshire Department of Environmental Services
29 Hazen Drive Concord NH 03301

Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org

Windsor
Hillsborough
Stoddard
Antrim
Deering
Nelson
Hancock
Bennington
North Branch River
Contoocook River
Loveren Mill Rd
Loveren's Mill Rd
Stacey Hill Rd
River Rd
Park Rd
N Bunker Rd
Barden Hill Rd
Old 2nd NH Turnpike Rd
Long Woods Rd
Hedgehog Mtn Rd
Pierce Lake Rd
Whitney Rd
Old Concord Rd
Union St
Old Antrim Rd
Barrett Pond Rd
Brackett Rd
Reed Carr Rd
Old Carr Rd
Craig Rd
Old Pound Rd
Holt Hill Rd
Ashley Rd
Elm Av
Turner Hill Rd
Old Milk Rd
Smith Rd
Bridal Path Rd
Second Nh Tpk
Cross Rd
Bennington Depot Rd
Miltmore Rd
Whitten Rd
Mattheson Rd
Long Lake Rd
Davison Dr.
Old Hancock Rd
N Main St
Goodell St
Elm St
West St
Hilton Rd
Durgin Rd
N Bennington Rd
No Bennington Rd
Spot St
Bible Hill Rd
Pleasant St
Boutman Rd
Old Boutman Rd
Old Brimstone Rd
Greystone Lodge Rd
Bailey Brook Rd
Willard Pond Rd
Weston Rd
Brimstone Corner Rd
Brimstone Corner
Depot Rd
Un-Named
Antrim Rd
High St
Birch Rd
Verney Rd
Pierce Hill Rd
Old Stagecoach Rd
Dodge Hill Rd
Reservoir Rd
31
9
123
202
47

Contoocook & North Branch Rivers Management Plan

Bennington

- County Boundary
- Town Boundary
- Community Center Areas
- Lakes and Ponds
- Rivers and Streams
- Wetlands
- Active Dams
- Bridges
- Conservation Lands

Floodplains

- Floodway
- 1% Annual Flood Risk
- 0.2% Annual Flood Risk

Data sources: 1:24,000 source data from NH GRANIT; flood data from FEMA through NH GRANIT; Road and bridge data from NH Dept. of Transportation; Dams data from NH Dept. of Environmental Services.

This map is for planning purposes only. Neither CNHRPC nor CNBRLAC make any representations as to the accuracy or validity of these data, and this map should not be used for regulatory or site specific determinations. Map created in November 2009 by CNHRPC.

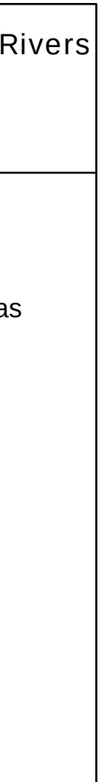
N

0 0.25 0.5 1 Mile

Funding provided by the NH Department of Environmental Services through Section 604(b) of the Clean Water Act with funds appropriated by the American Recovery and Reinvestment Act of 2009.

New Hampshire Department of Environmental Services
29 Hazen Drive Concord NH 03301

Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org



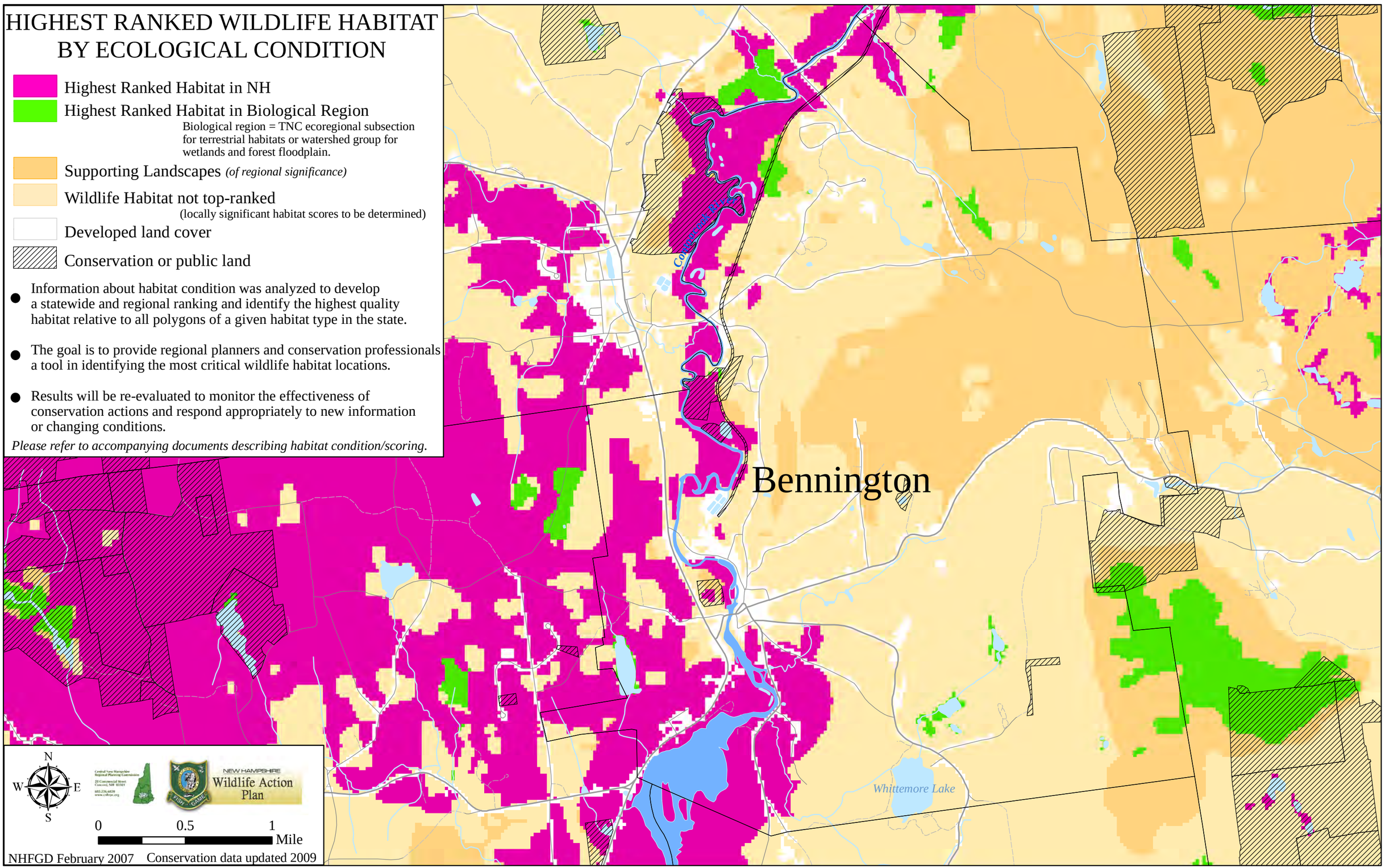
Antrim
Bennington
Hancock
Greenfield
Franc
Miltmore Rd
Congreve Rd
Whitten Rd
Smith Rd
Matthewson Rd
Goodell Rd
Goodell St
Gregg Lake Rd
Davison Dr.
Great Brook
N. Main St.
Elm St
Grove St
West St
Old Hancock Rd
Buttercup Ln
Summer St
Highland St
Water St
Depot St
Pleasant St
Boutman Rd
Contoocook River
Codman Brook
Thompson Crossing Rd
Bennington Depot Rd
Falls Rd
Second Nh Tpke
Codman Hill Rd
Old County Rd
Sky Farm Rd
Pine Meadows
N Bennington Rd
Merrill Dr
Durgin Rd
Switzer Rd
Old Bennington Rd
Collins Brook
No Bennington Rd
Gillis Hill Rd
Wilson Hill Rd
2nd Nh Tpke North
Bible Hill Rd
Birch Glen Dr
Birch Dr
Dinsmore Brook
Black Mountain Rd
Mountain Rd
East Rd
Abbott Ln
Onset Rd
Mountain Rd
Dodge Hill Rd
Reservoir Rd
Old Stagecoach Rd
Antrim Rd
Eaton Av
S Bennington Rd
Old Greenfield Rd
Pierce Hill Rd
Antrim Rd
Un-Named
Un-Named
High St
Birch Rd
North Rd
Bitter Sweet Ln
Brimstone Corner
Ross Rd
Moose Brook
Knight Farm Rd
Powder Mill Pond
Whittemore Lake
Dodge Rd
Cooper Brook Rd
Rogers Rd
31
202
47
137

HIGHEST RANKED WILDLIFE HABITAT BY ECOLOGICAL CONDITION

- Highest Ranked Habitat in NH
- Highest Ranked Habitat in Biological Region
  Biological region = TNC ecoregional subsection for terrestrial habitats or watershed group for wetlands and forest floodplain.
- Supporting Landscapes *(of regional significance)*
- Wildlife Habitat not top-ranked
  (locally significant habitat scores to be determined)
- Developed land cover
- Conservation or public land

- Information about habitat condition was analyzed to develop a statewide and regional ranking and identify the highest quality habitat relative to all polygons of a given habitat type in the state.
- The goal is to provide regional planners and conservation professionals a tool in identifying the most critical wildlife habitat locations.
- Results will be re-evaluated to monitor the effectiveness of conservation actions and respond appropriately to new information or changing conditions.

Please refer to accompanying documents describing habitat condition/scoring.



NEW HAMPSHIRE Wildlife Action Plan

NHFGD February 2007 Conservation data updated 2009

Contoocook & North Branch Rivers Management Plan

Zoning in Bennington

- County Boundary
- Town Boundary
- Lakes, Ponds, and Reservoirs
- Rivers and Streams

Bennington Zoning

- Commercial/Recreational
- Industrial
- Rural/Agricultural
- Village

Data sources: Hydrography 1:24,000 source data from NH GRANIT; Roads data from NH Dept. of Transportation; Zoning layers from CNHRPC, SWRPC, and towns.

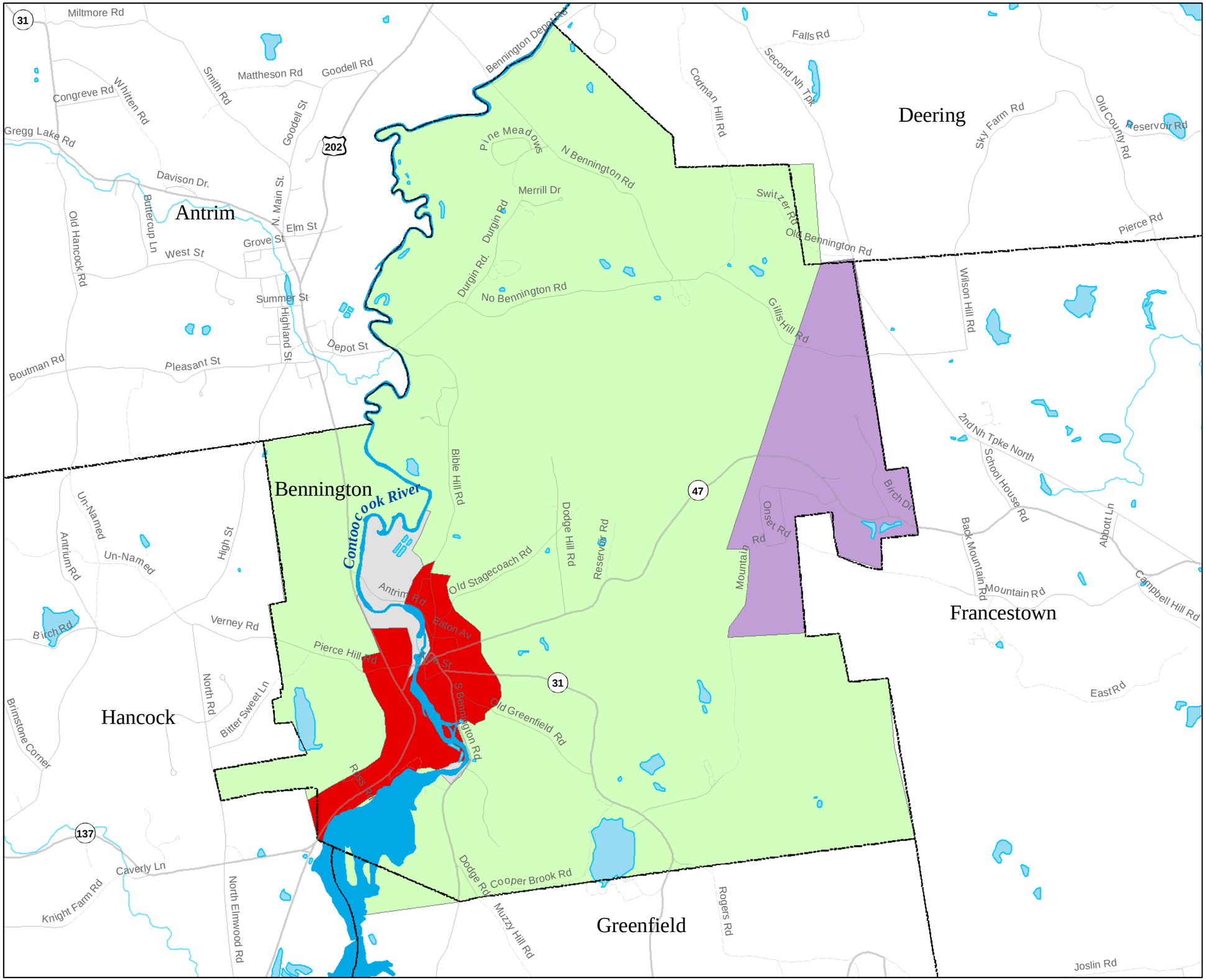
This map is for planning purposes only. Neither CNHRPC nor CNBRLAC make any representations as to the accuracy or validity of these data, and this map should not be used for regulatory or site specific determinations. Map created in November 2009 by CNHRPC.

0 0.25 0.5 1 Mile

Funding provided by the NH Department of Environmental Services through Section 604(b) of the Clean Water Act with funds appropriated by the American Recovery and Reinvestment Act of 2009.

New Hampshire Department of Environmental Services
29 Hazen Drive Concord NH 03301

Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org



Contoocook & North Branch Rivers Management Plan

Boscawen

- County Boundary
- Town Boundary
- Community Center Areas
- Lakes and Ponds
- Rivers and Streams
- Wetlands
- Active Dams
- Bridges
- Conservation Lands

Floodplains

- Floodway
- 1% Annual Flood Risk
- 0.2% Annual Flood Risk

Data sources: 1:24,000 source data from NH GRANIT; flood data from FEMA through NH GRANIT; Road and bridge data from NH Dept. of Transportation; Dams data from NH Dept. of Environmental Services.

This map is for planning purposes only. Neither CNHRPC nor CNBRLAC make any representations as to the accuracy or validity of these data, and this map should not be used for regulatory or site specific determinations. Map created in November 2009 by CNHRPC.

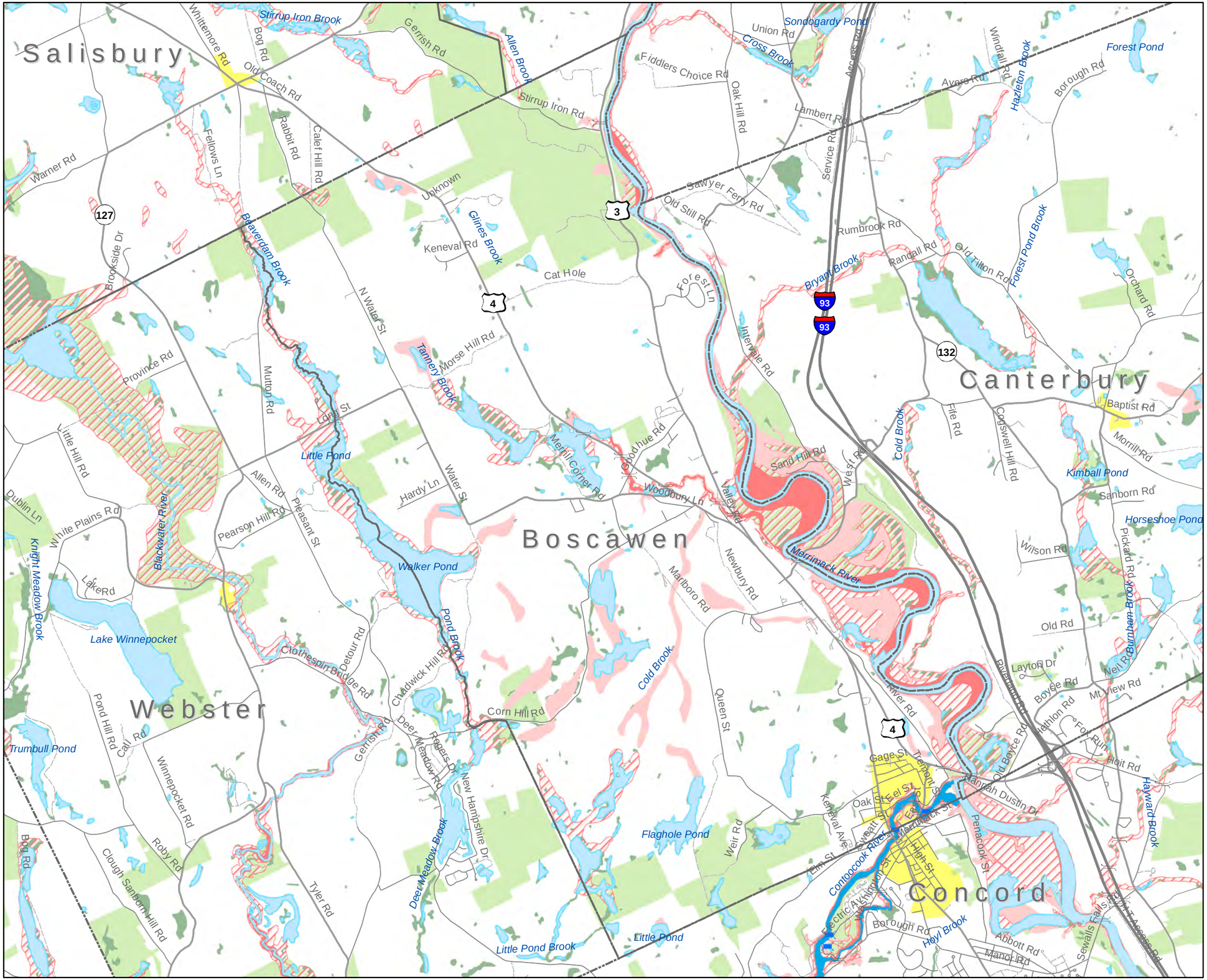
N

0 0.5 1 2 Miles

Funding provided by the NH Department of Environmental Services through Section 604(b) of the Clean Water Act with funds appropriated by the American Recovery and Reinvestment Act of 2009.

New Hampshire Department of Environmental Services
29 Hazen Drive Concord NH 03301

Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org

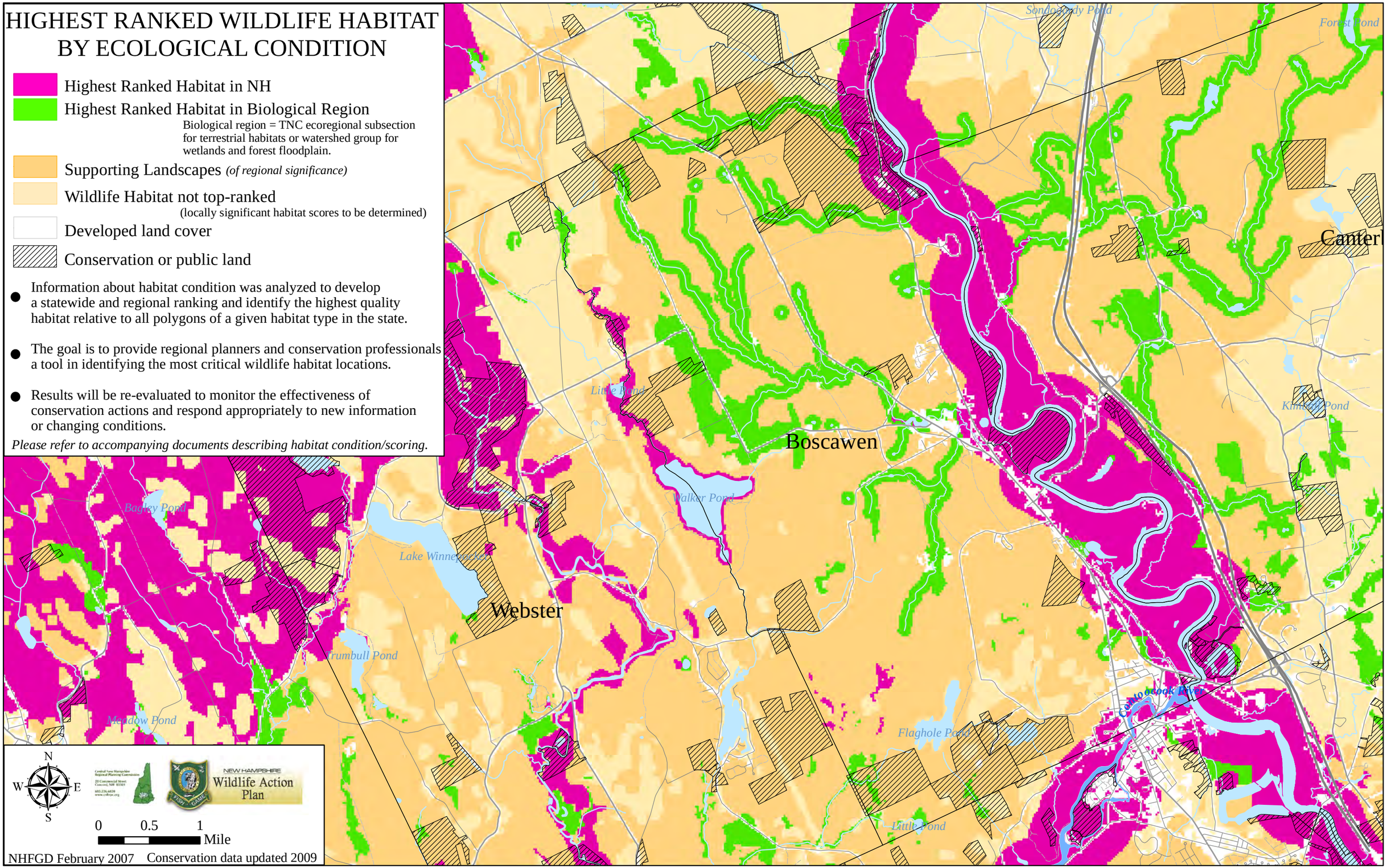


HIGHEST RANKED WILDLIFE HABITAT BY ECOLOGICAL CONDITION

- Highest Ranked Habitat in NH
- Highest Ranked Habitat in Biological Region
  Biological region = TNC ecoregional subsection for terrestrial habitats or watershed group for wetlands and forest floodplain.
- Supporting Landscapes *(of regional significance)*
- Wildlife Habitat not top-ranked
  (locally significant habitat scores to be determined)
- Developed land cover
- Conservation or public land

- Information about habitat condition was analyzed to develop a statewide and regional ranking and identify the highest quality habitat relative to all polygons of a given habitat type in the state.
- The goal is to provide regional planners and conservation professionals a tool in identifying the most critical wildlife habitat locations.
- Results will be re-evaluated to monitor the effectiveness of conservation actions and respond appropriately to new information or changing conditions.

Please refer to accompanying documents describing habitat condition/scoring.



Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org

NEW HAMPSHIRE Wildlife Action Plan

NHFGD February 2007 Conservation data updated 2009

Contoocook & North Branch Rivers Management Plan

Zoning in Boscawen

Legend

Boscawen Zoning

- C - Commercial
- I - Industrial
- M - Mill Redevelopment District
- R-2 - Medium Density Residential
- R-1 - Low Density Residential
- A-R - Agricultural-Residential

Data sources: Hydrography 1:24,000 source data from NH GRANIT; Roads data from NH Dept. of Transportation; Zoning layers from CNHRPC, SWRPC, and towns.

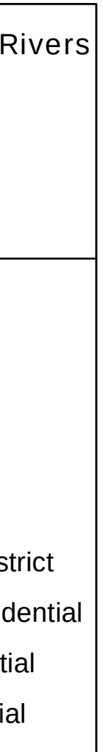
This map is for planning purposes only. Neither CNHRPC nor CNBRLAC make any representations as to the accuracy or validity of these data, and this map should not be used for regulatory or site specific determinations. Map created in November 2009 by CNHRPC.

0 0.5 1 2 Miles

Funding provided by the NH Department of Environmental Services through Section 604(b) of the Clean Water Act with funds appropriated by the American Recovery and Reinvestment Act of 2009.

New Hampshire Department of Environmental Services
29 Hazen Drive Concord NH 03301

Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org



Contoocook & North Branch Rivers Management Plan

Concord

- County Boundary
- Town Boundary
- Community Center Areas
- Lakes and Ponds
- Rivers and Streams
- Wetlands
- Active Dams
- Bridges
- Conservation Lands

Floodplains

- Floodway
- 1% Annual Flood Risk
- 0.2% Annual Flood Risk

Data sources: 1:24,000 source data from NH GRANIT; flood data from FEMA through NH GRANIT; Road and bridge data from NH Dept. of Transportation; Dams data from NH Dept. of Environmental Services.

This map is for planning purposes only. Neither CNHRPC nor CNBRLAC make any representations as to the accuracy or validity of these data, and this map should not be used for regulatory or site specific determinations. Map created in November 2009 by CNHRPC.

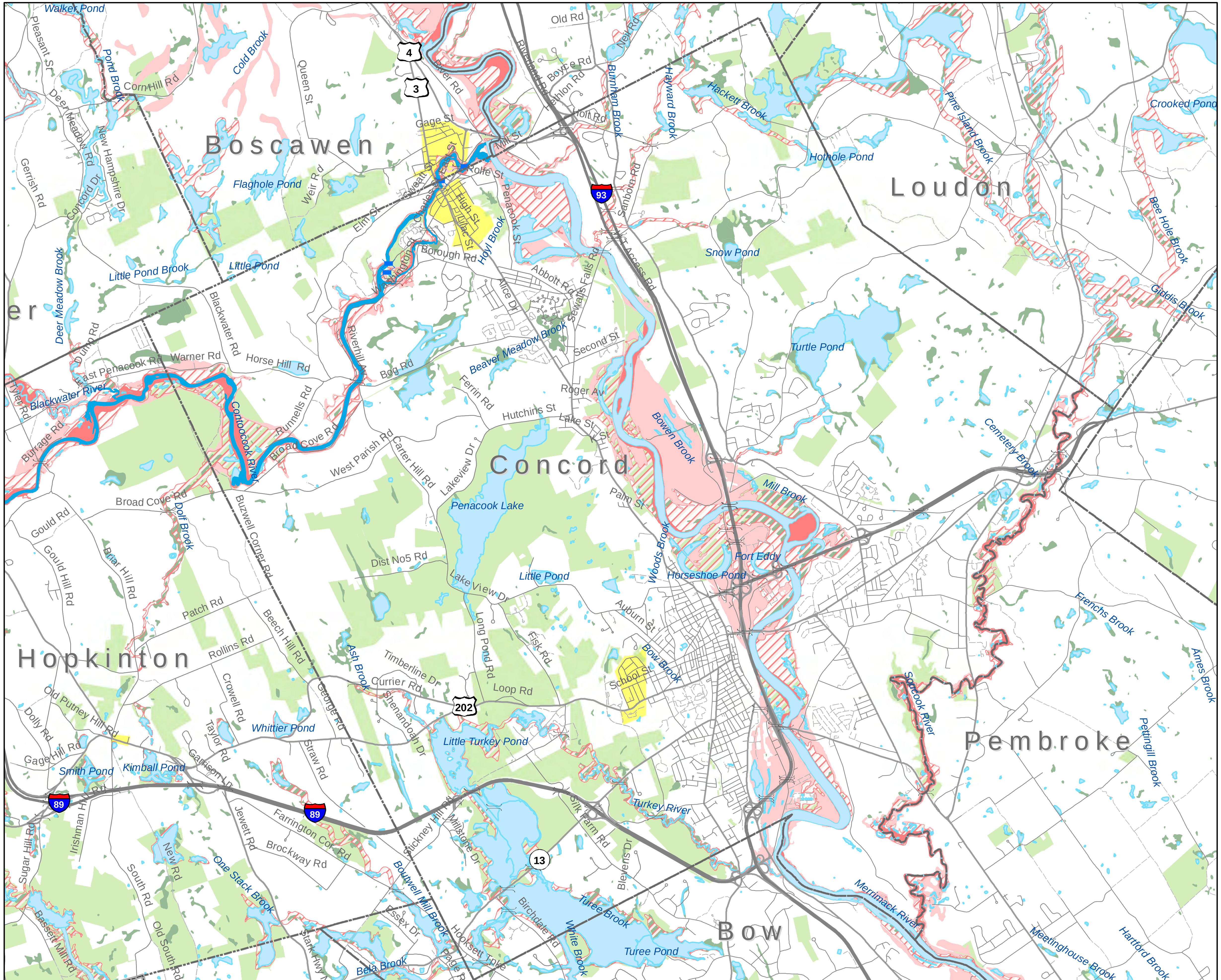
N

0 0.5 1 2 Miles

Funding provided by the NH Department of Environmental Services through Section 604(b) of the Clean Water Act with funds appropriated by the American Recovery and Reinvestment Act of 2009.

New Hampshire Department of Environmental Services
29 Hazen Drive Concord NH 03301

Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org

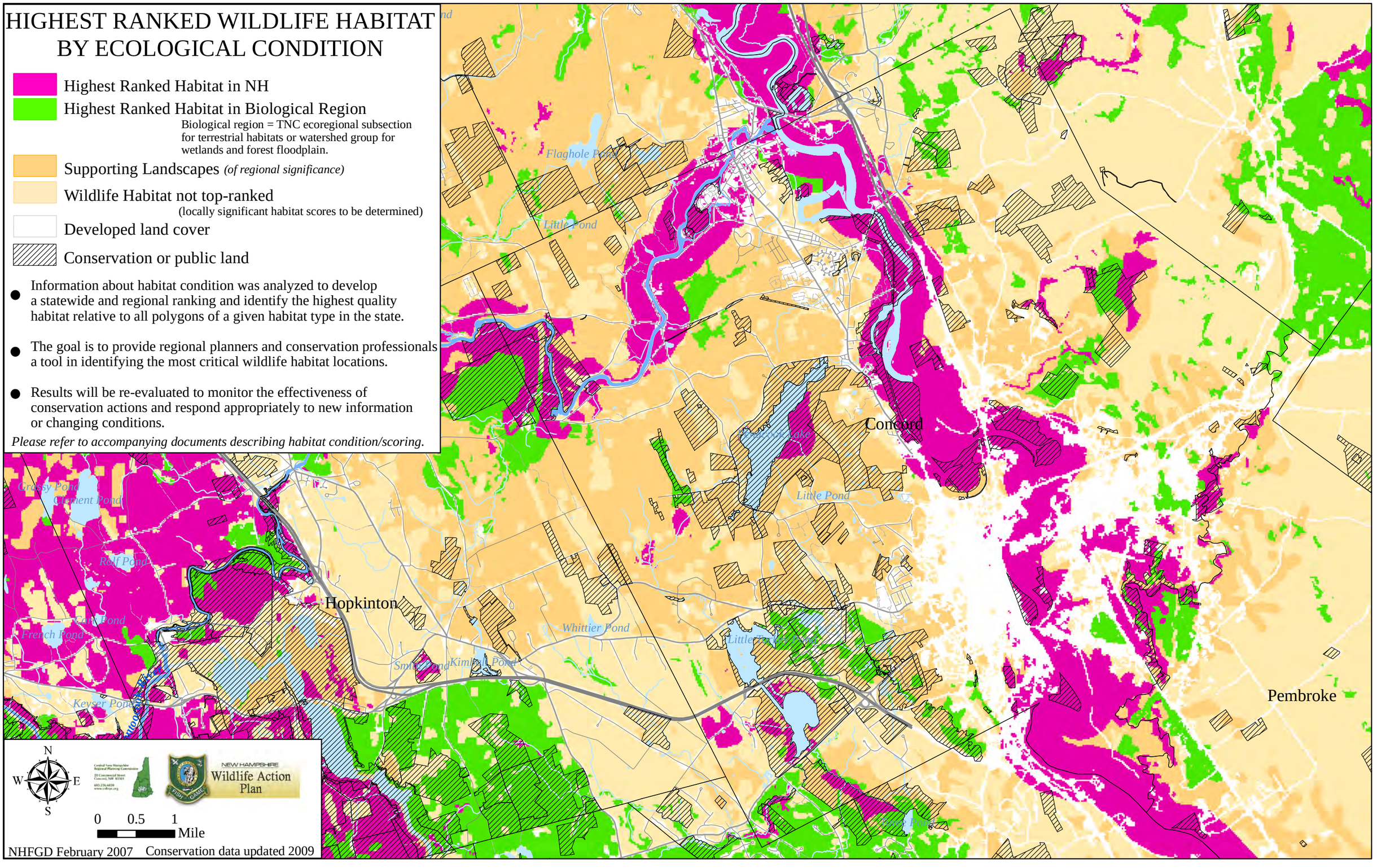


HIGHEST RANKED WILDLIFE HABITAT BY ECOLOGICAL CONDITION

- Highest Ranked Habitat in NH
- Highest Ranked Habitat in Biological Region
  Biological region = TNC ecoregional subsection for terrestrial habitats or watershed group for wetlands and forest floodplain.
- Supporting Landscapes *(of regional significance)*
- Wildlife Habitat not top-ranked
  (locally significant habitat scores to be determined)
- Developed land cover
- Conservation or public land

- Information about habitat condition was analyzed to develop a statewide and regional ranking and identify the highest quality habitat relative to all polygons of a given habitat type in the state.
- The goal is to provide regional planners and conservation professionals a tool in identifying the most critical wildlife habitat locations.
- Results will be re-evaluated to monitor the effectiveness of conservation actions and respond appropriately to new information or changing conditions.

Please refer to accompanying documents describing habitat condition/scoring.



NHFGD February 2007 Conservation data updated 2009

Contoocook & North Branch Rivers Management Plan

Zoning in Concord

Legend

Concord Zoning

- Central Business Performance
- General Commercial
- Neighborhood Commercial
- Urban Commercial
- Civic Performance
- Gateway Performance
- Industrial District
- Institutional District
- Opportunity Corridor Performance
- Office Park Performance
- Downtown Residential
- High Density Residential
- Medium Density Residential
- Neighborhood Residential
- Open Space Residential
- Single Family Residential
- Urban Transitional
- Concord Shoreland Protection Overlay

Data sources: Hydrography 1:24,000 source data from NH GRANIT; Roads data from NH Dept. of Transportation; Zoning layers from CNHRPC, SWRPC, and towns.

This map is for planning purposes only. Neither CNHRPC nor CNBRLAC make any representations as to the accuracy or validity of these data, and this map should not be used for regulatory or site specific determinations. Map created in November 2009 by CNHRPC.

0 0.5 1 2 Miles

Funding provided by the NH Department of Environmental Services through Section 604(b) of the Clean Water Act with funds appropriated by the American Recovery and Reinvestment Act of 2009.

New Hampshire Department of Environmental Services
29 Hazen Drive Concord NH 03301

Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org

Canterbury
Boscawen
Webster
Contoocook River
Loudon
Chichester
Concord
Hopkinton
Pembroke
Bow
Dunbarton
Weare

Contoocook & North Branch Rivers Management Plan

Deering

- County Boundary
- Town Boundary
- Community Center Areas
- Lakes and Ponds
- Rivers and Streams
- Wetlands
- Active Dams
- Bridges
- Conservation Lands

Floodplains

- Floodway
- 1% Annual Flood Risk
- 0.2% Annual Flood Risk

Data sources: 1:24,000 source data from NH GRANIT; flood data from FEMA through NH GRANIT; Road and bridge data from NH Dept. of Transportation; Dams data from NH Dept. of Environmental Services.

This map is for planning purposes only. Neither CNHRPC nor CNBRLAC make any representations as to the accuracy or validity of these data, and this map should not be used for regulatory or site specific determinations. Map created in November 2009 by CNHRPC.

N

0 0.25 0.5 1 Mile

Funding provided by the NH Department of Environmental Services through Section 604(b) of the Clean Water Act with funds appropriated by the American Recovery and Reinvestment Act of 2009.

New Hampshire Department of Environmental Services
29 Hazen Drive Concord NH 03301

Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org

HIGHEST RANKED WILDLIFE HABITAT BY ECOLOGICAL CONDITION

- Highest Ranked Habitat in NH
- Highest Ranked Habitat in Biological Region
  Biological region = TNC ecoregional subsection for terrestrial habitats or watershed group for wetlands and forest floodplain.
- Supporting Landscapes *(of regional significance)*
- Wildlife Habitat not top-ranked
  (locally significant habitat scores to be determined)
- Developed land cover
- Conservation or public land

- Information about habitat condition was analyzed to develop a statewide and regional ranking and identify the highest quality habitat relative to all polygons of a given habitat type in the state.
- The goal is to provide regional planners and conservation professionals a tool in identifying the most critical wildlife habitat locations.
- Results will be re-evaluated to monitor the effectiveness of conservation actions and respond appropriately to new information or changing conditions.

Please refer to accompanying documents describing habitat condition/scoring.

Contoocook River
Dudley Pond
Weare Reservoir
Deering
Deering Reservoir
Fulton Pond
Ferrin Pond
Pleasant Pond
Shattuck Pond
Antrim

N
W E
S

0 0.5 1 Mile

NEW HAMPSHIRE Wildlife Action Plan

NHFGD February 2007 Conservation data updated 2009

Contoocook & North Branch Rivers Management Plan

Zoning in Deering

Legend

Deering Zoning

- Agricultural/Residential
- Aquifer Protection Overlay
- Wetlands Conservation District

Data sources: Hydrography 1:24,000 source data from NH GRANIT; Roads data from NH Dept. of Transportation; Zoning layers from CNHRPC, SWRPC, and towns.

This map is for planning purposes only. Neither CNHRPC nor CNBRLAC make any representations as to the accuracy or validity of these data, and this map should not be used for regulatory or site specific determinations. Map created in November 2009 by CNHRPC.

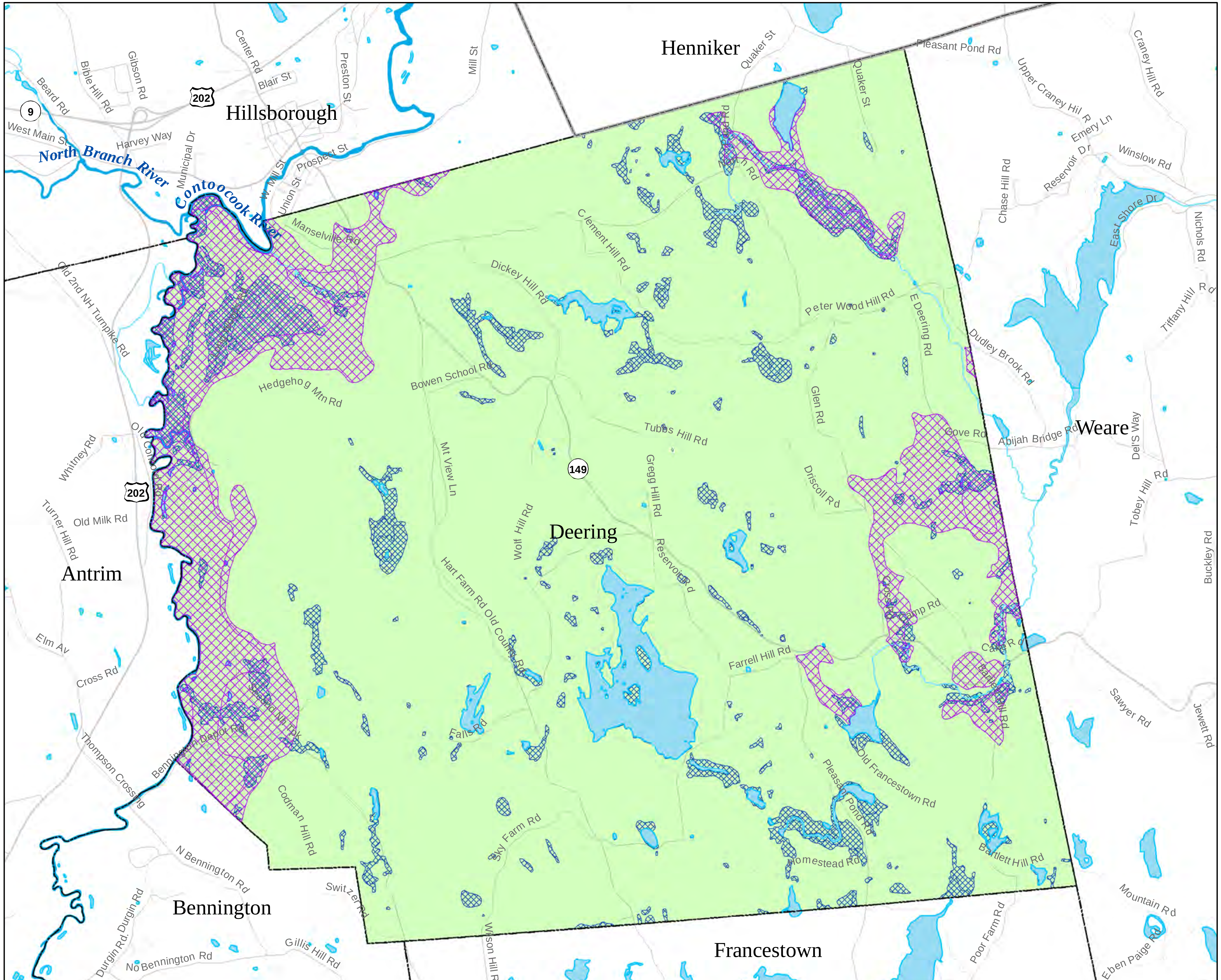
N

0 0.25 0.5 1 Miles

Funding provided by the NH Department of Environmental Services through Section 604(b) of the Clean Water Act with funds appropriated by the American Recovery and Reinvestment Act of 2009.

New Hampshire Department of Environmental Services
29 Hazen Drive Concord NH 03301

Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org



Contoocook & North Branch Rivers Management Plan

Greenfield

- County Boundary
- Town Boundary
- Community Center Areas
- Lakes and Ponds
- Rivers and Streams
- Wetlands
- Active Dams
- Bridges
- Conservation Lands

Floodplains

- Floodway
- 1% Annual Flood Risk
- 0.2% Annual Flood Risk

Data sources: 1:24,000 source data from NH GRANIT; flood data from FEMA through NH GRANIT; Road and bridge data from NH Dept. of Transportation; Dams data from NH Dept. of Environmental Services.

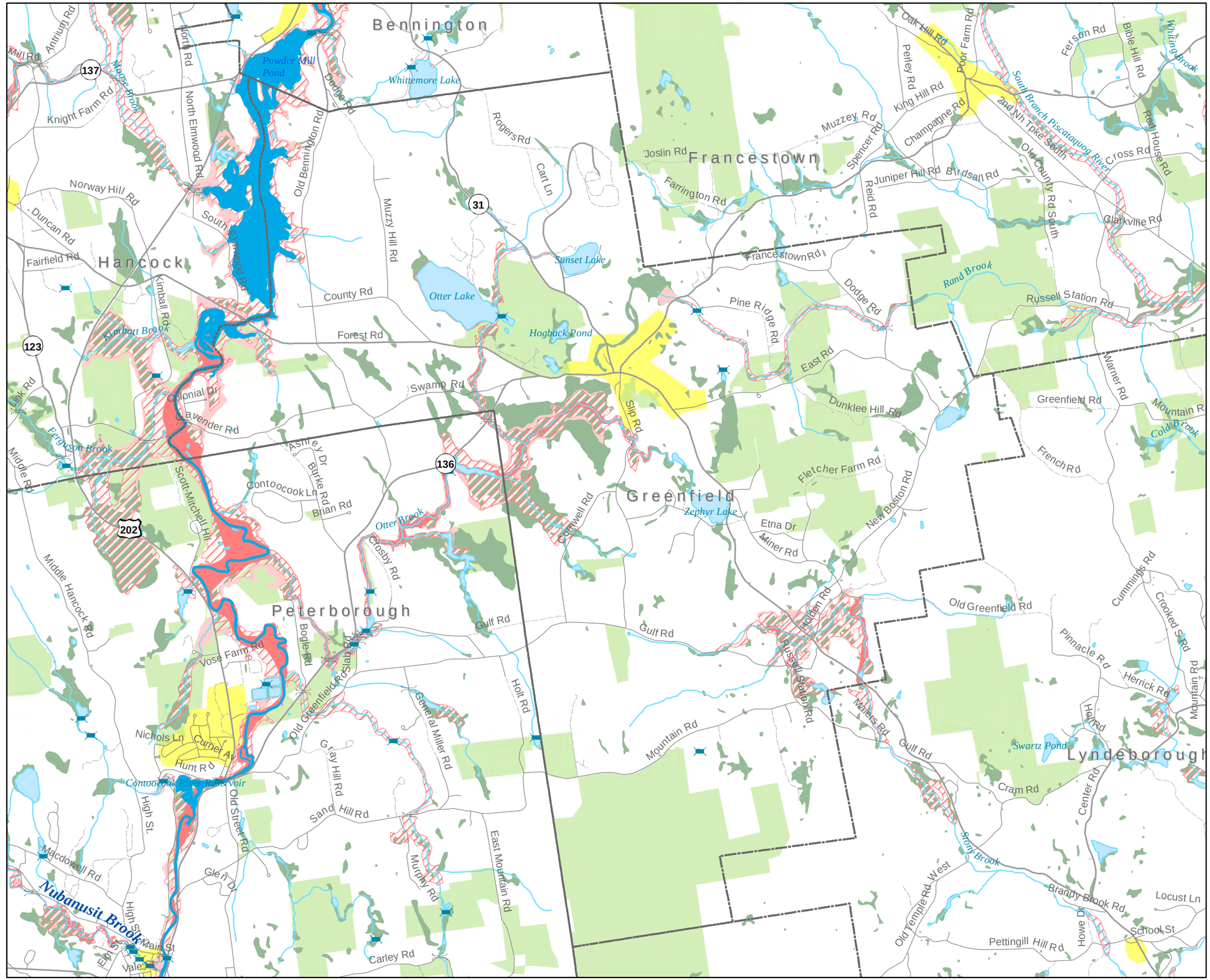
This map is for planning purposes only. Neither CNHRPC nor CNBRLAC make any representations as to the accuracy or validity of these data, and this map should not be used for regulatory or site specific determinations. Map created in November 2009 by CNHRPC.

0 0.5 1 2 Miles

Funding provided by the NH Department of Environmental Services through Section 604(b) of the Clean Water Act with funds appropriated by the American Recovery and Reinvestment Act of 2009.

New Hampshire Department of Environmental Services
29 Hazen Drive Concord NH 03301

Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org

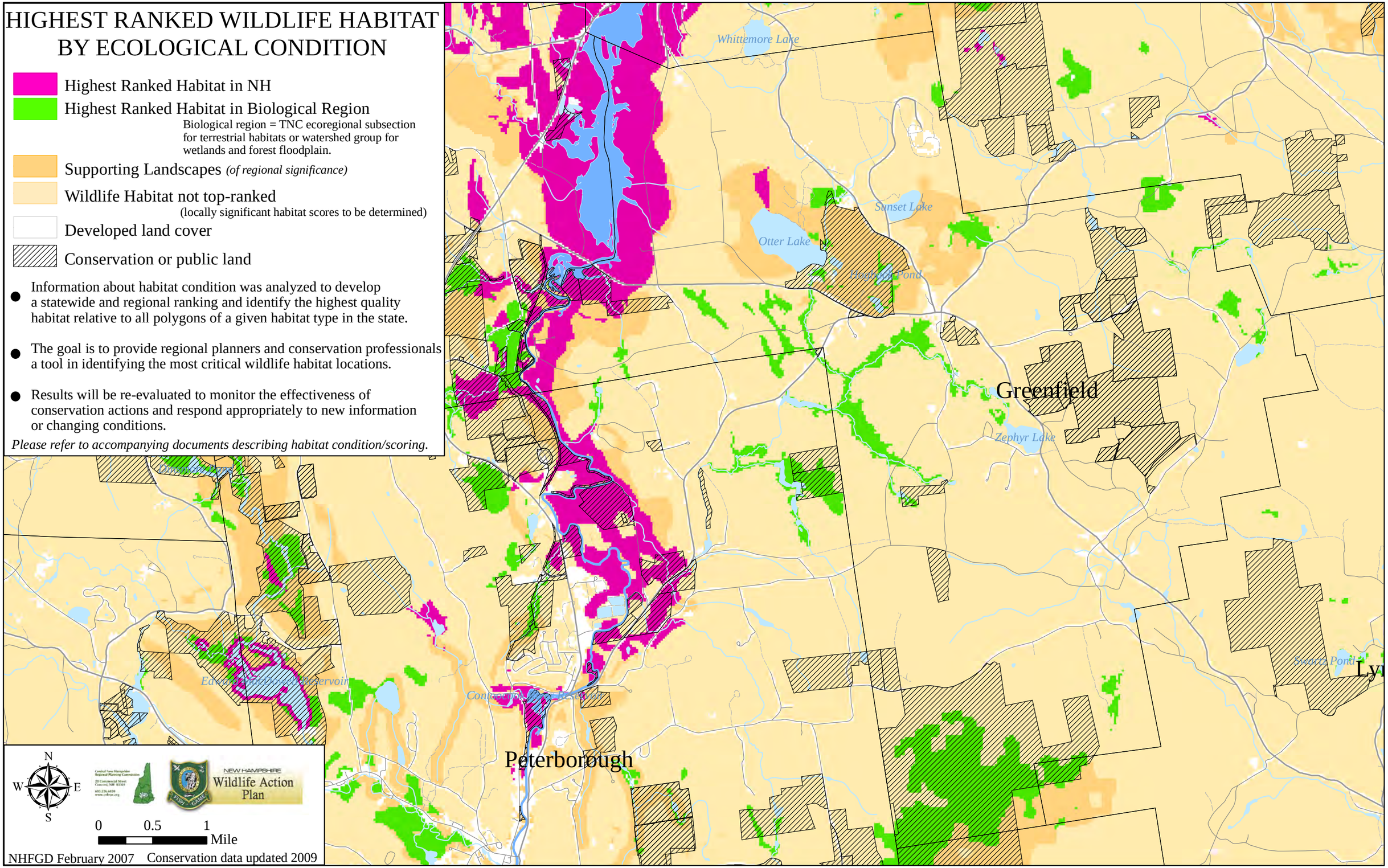


HIGHEST RANKED WILDLIFE HABITAT BY ECOLOGICAL CONDITION

- Highest Ranked Habitat in NH
- Highest Ranked Habitat in Biological Region
  Biological region = TNC ecoregional subsection for terrestrial habitats or watershed group for wetlands and forest floodplain.
- Supporting Landscapes *(of regional significance)*
- Wildlife Habitat not top-ranked
  (locally significant habitat scores to be determined)
- Developed land cover
- Conservation or public land

- Information about habitat condition was analyzed to develop a statewide and regional ranking and identify the highest quality habitat relative to all polygons of a given habitat type in the state.
- The goal is to provide regional planners and conservation professionals a tool in identifying the most critical wildlife habitat locations.
- Results will be re-evaluated to monitor the effectiveness of conservation actions and respond appropriately to new information or changing conditions.

Please refer to accompanying documents describing habitat condition/scoring.



NHFGD February 2007 Conservation data updated 2009

Contoocook & North Branch Rivers Management Plan

Zoning in Greenfield

Legend

Greenfield Zoning

- Business District
- General Residence
- Industrial Areas
- Rural/Agriculture
- Village District

Data sources: Hydrography 1:24,000 source data from NH GRANIT; Roads data from NH Dept. of Transportation; Zoning layers from CNHRPC, SWRPC, and towns.

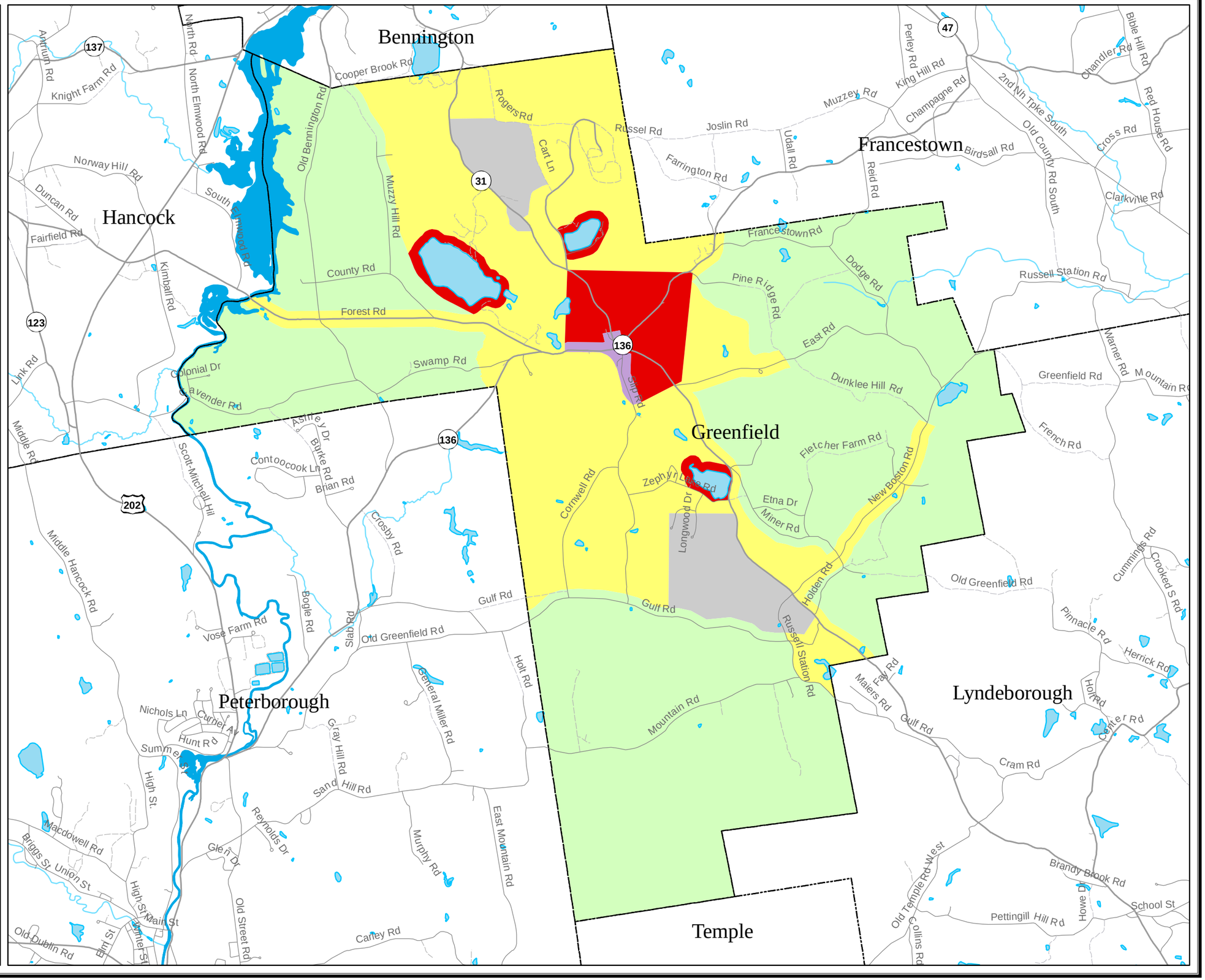
This map is for planning purposes only. Neither CNHRPC nor CNBRLAC make any representations as to the accuracy or validity of these data, and this map should not be used for regulatory or site specific determinations. Map created in November 2009 by CNHRPC.

0 0.5 1 2 Mile

Funding provided by the NH Department of Environmental Services through Section 604(b) of the Clean Water Act with funds appropriated by the American Recovery and Reinvestment Act of 2009.

New Hampshire Department of Environmental Services
29Hazen Drive Concord NH 03301

Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org



Contoocook & North Branch Rivers Management Plan

Hancock

- County Boundary
- Town Boundary
- Community Center Areas
- Lakes and Ponds
- Rivers and Streams
- Wetlands
- Active Dams
- Bridges
- Conservation Lands

Floodplains

- Floodway
- 1% Annual Flood Risk
- 0.2% Annual Flood Risk

Data sources: 1:24,000 source data from NH GRANIT; flood data from FEMA through NH GRANIT; Road and bridge data from NH Dept. of Transportation; Dams data from NH Dept. of Environmental Services.

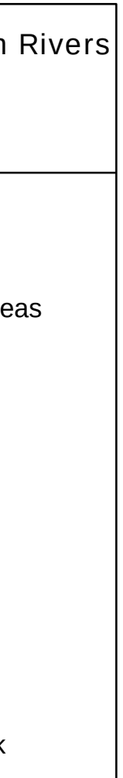
This map is for planning purposes only. Neither CNHRPC nor CNBRLAC make any representations as to the accuracy or validity of these data, and this map should not be used for regulatory or site specific determinations. Map created in November 2009 by CNHRPC.

0 0.25 0.5 1 Mile

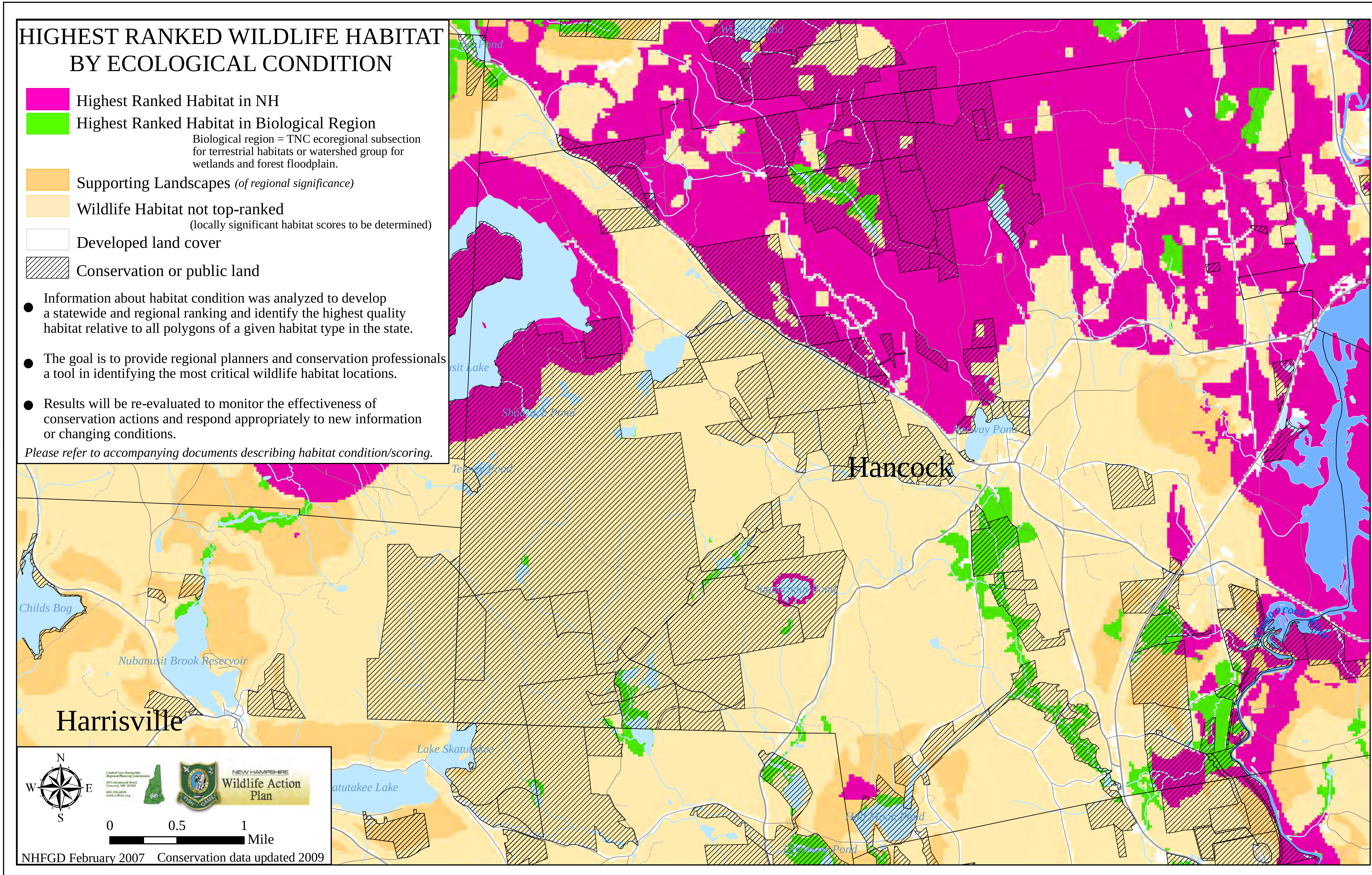
Funding provided by the NH Department of Environmental Services through Section 604(b) of the Clean Water Act with funds appropriated by the American Recovery and Reinvestment Act of 2009.

New Hampshire Department of Environmental Services
29Hazen Drive Concord NH 03301

Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org



Antrim
Hancock
Harrisville
Bennington
Greenfield
Rye Pond
Willard Pond
Spoonwood Pond
Nubanusit Lake
Shadrach Pond
Tenney Pond
Juggernaut Pond
Lake Skatutakee
Skatutakee Lake
Norway Pond
Half Moon Pond
Dinsmore Pond
Powder Mill Pond
Contoocook River
Moose Brook
Hosley Brook
Davis Brook
Nubanusit Brook
Kimbott Brook
Ferguson Brook
Weston Rd
Willard Pond Rd
Davenport Rd
Un-Named
Brimstone Corner Rd
Old Antrium Rd
Antrium Rd
Un-Named
Un-Named
High St
Bible Hill Rd
Antrim Rd
Verney Rd
Birch Rd
Brimstone Corner
Shady Ln
Prospect Hill Ext
Prospect Hill Rd
Depot Rd
Longview Rd
Mill Rd
North Rd
Bitter Sweet Ln
Old Town Rd
Kings Hunts Pond Rd
Welch Rd
Knight Farm Rd
Evergreen Hill Rd
North Elmwood Rd
Robinson Rd
Old Bennington Rd
Dodge Rd
Wilder Rd
Norway Hill Rd
Cross Rd
Old Hancock Rd
Duncan Rd
Fairfield Rd
Old Dublin Rd
Eaton Rd
Middle Rd
Kimball Rd
Forest Rd
County Rd
Jacquith Rd
Jacquith Rd
Jacquith Rd
Jaquith Rd
Washburn Rd
Vatcher Rd
Link Rd
Tannery Hill Rd
Middle Hancock Rd
Scott-Mitchell Rd
Scott-Mitchell Hl
Colonial Dr
Cavender Rd
Ashley Dr
Burke Rd
Contoocook Ln
Monadnock Ln
Brian Rd
Windy Row Rd
Sargent Camp Rd
Bonds Corner Rd
Hancock Rd
Wilder Rd
137
123
202


HIGHEST RANKED WILDLIFE HABITAT BY ECOLOGICAL CONDITION
Highest Ranked Habitat in NH
Highest Ranked Habitat in Biological Region
Biological region = TNC ecoregional subsection for terrestrial habitats or watershed group for wetlands and forest floodplain.
Supporting Landscapes (of regional significance)
Wildlife Habitat not top-ranked (locally significant habitat scores to be determined)
Developed land cover
Conservation or public land
Information about habitat condition was analyzed to develop a statewide and regional ranking and identify the highest quality habitat relative to all polygons of a given habitat type in the state.
The goal is to provide regional planners and conservation professionals a tool in identifying the most critical wildlife habitat locations.
Results will be re-evaluated to monitor the effectiveness of conservation actions and respond appropriately to new information or changing conditions.
Please refer to accompanying documents describing habitat condition/scoring.
Hancock
Harrisville
Childs Bog
Nubanusit Brook Reservoir
Lake Skatutakee
N
S
E
W
0
0.5
1
Mile
NEW HAMPSHIRE Wildlife Action Plan
NHFGD February 2007
Conservation data updated 2009

Contoocook & North Branch Rivers Management Plan

Zoning in Hancock

Legend

Hancock Zoning

- Agricultural & Rural District
- Commercial District
- Residential District

Data sources: Hydrography 1:24,000 source data from NH GRANIT; Roads data from NH Dept. of Transportation; Zoning layers from CNHRPC, SWRPC, and towns.

This map is for planning purposes only. Neither CNHRPC nor CNBRLAC make any representations as to the accuracy or validity of these data, and this map should not be used for regulatory or site specific determinations. Map created in November 2009 by CNHRPC.

N

0 0.25 0.5 1 Mile

Funding provided by the NH Department of Environmental Services through Section 604(b) of the Clean Water Act with funds appropriated by the American Recovery and Reinvestment Act of 2009.

New Hampshire Department of Environmental Services
29 Hazen Drive Concord NH 03301

Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org

Contoocook & North Branch Rivers Management Plan

Henniker

- County Boundary
- Town Boundary
- Community Center Areas
- Lakes and Ponds
- Rivers and Streams
- Wetlands
- Active Dams
- Bridges
- Conservation Lands

Floodplains

- Floodway
- 1% Annual Flood Risk
- 0.2% Annual Flood Risk

Data sources: 1:24,000 source data from NH GRANIT; flood data from FEMA through NH GRANIT; Road and bridge data from NH Dept. of Transportation; Dams data from NH Dept. of Environmental Services.

This map is for planning purposes only. Neither CNHRPC nor CNBRLAC make any representations as to the accuracy or validity of these data, and this map should not be used for regulatory or site specific determinations. Map created in November 2009 by CNHRPC.

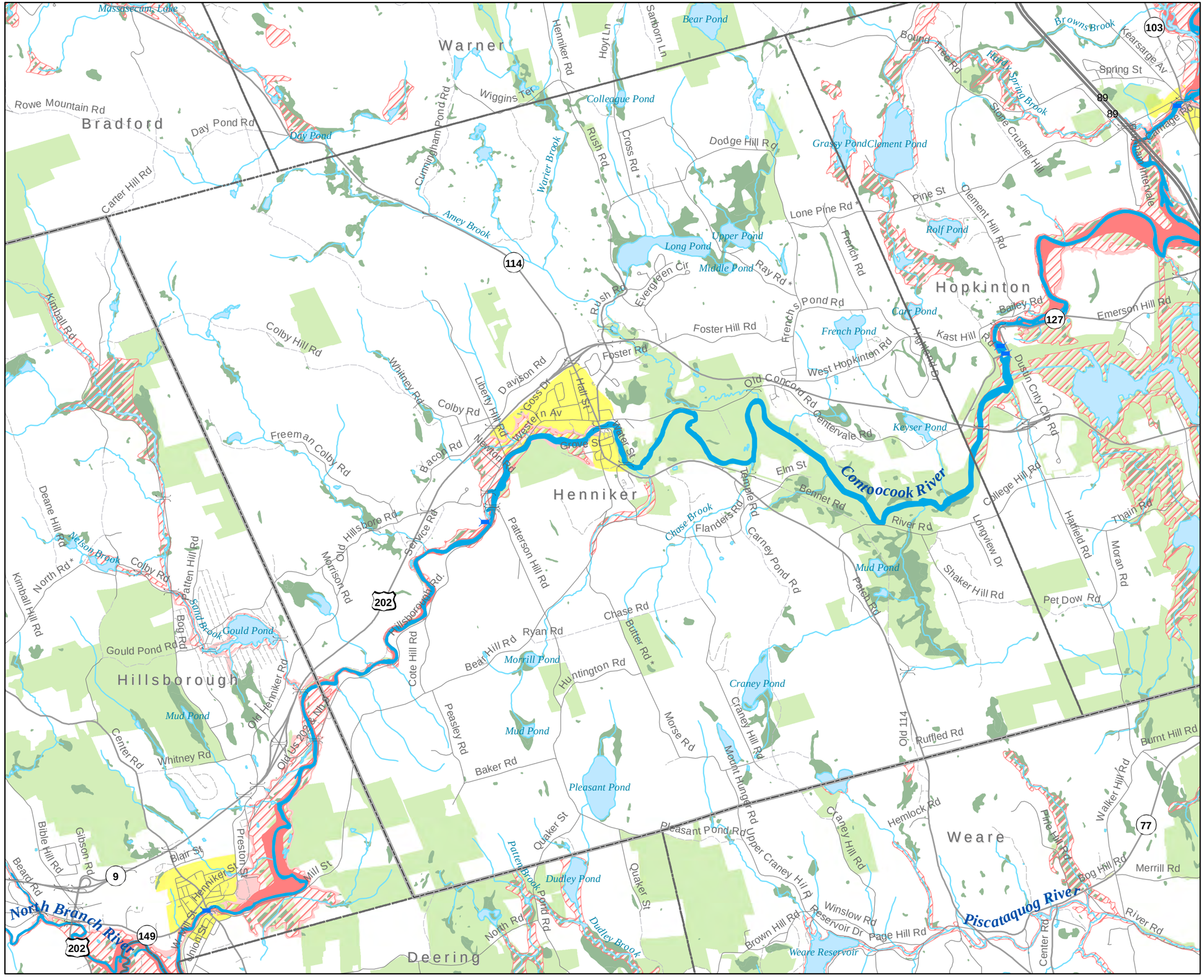
N

0 0.5 1 2 Miles

Funding provided by the NH Department of Environmental Services through Section 604(b) of the Clean Water Act with funds appropriated by the American Recovery and Reinvestment Act of 2009.

New Hampshire Department of Environmental Services
29 Hazen Drive Concord NH 03301

Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org



HIGHEST RANKED WILDLIFE HABITAT BY ECOLOGICAL CONDITION

- Highest Ranked Habitat in NH
- Highest Ranked Habitat in Biological Region
  Biological region = TNC ecoregional subsection for terrestrial habitats or watershed group for wetlands and forest floodplain.
- Supporting Landscapes *(of regional significance)*
- Wildlife Habitat not top-ranked
  (locally significant habitat scores to be determined)
- Developed land cover
- Conservation or public land

- Information about habitat condition was analyzed to develop a statewide and regional ranking and identify the highest quality habitat relative to all polygons of a given habitat type in the state.
- The goal is to provide regional planners and conservation professionals a tool in identifying the most critical wildlife habitat locations.
- Results will be re-evaluated to monitor the effectiveness of conservation actions and respond appropriately to new information or changing conditions.

Please refer to accompanying documents describing habitat condition/scoring.

Hillsborough

Henniker

Colleague Pond
Grassy Pond
Clement Pond
Upper Pond
Long Pond
Middle Pond
Relf Pond
Carr Pond
French Pond
Keyser Pond
Contoocook River
Intention Pond
Loon Pond
Gould Pond
Mud Pond
Morrill Pond
Craney Pond
Mud Pond
Pleasant Pond
Hadley Pond

N
W E
S

0 0.5 1
Mile

NEW HAMPSHIRE Wildlife Action Plan

NHFGD February 2007 Conservation data updated 2009

Contoocook & North Branch Rivers Management Plan

Zoning in Henniker

Legend

Henniker Zoning

- CH - Heavy Commercial
- CM - Medium Commercial
- CR - Commercial Recreational
- CV - Village Commerce; CU
- ED - Educational District
- FD - Federal Land
- RN - Residential Neighborhood
- RR - Rural Residential
- RV - Village Proper

Data sources: Hydrography 1:24,000 source data from NH GRANIT; Roads data from NH Dept. of Transportation; Zoning layers from CNHRPC, SWRPC, and towns.

This map is for planning purposes only. Neither CNHRPC nor CNBRLAC make any representations as to the accuracy or validity of these data, and this map should not be used for regulatory or site specific determinations. Map created in November 2009 by CNHRPC.

0 0.5 1 2 Miles

Funding provided by the NH Department of Environmental Services through Section 604(b) of the Clean Water Act with funds appropriated by the American Recovery and Reinvestment Act of 2009.

New Hampshire Department of Environmental Services
29 Hazen Drive Concord NH 03301

Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org

Warner
Bradford
Hopkinton
Henniker
Hillsborough
Weare
Deering
Contoocook River

Contoocook & North Branch Rivers Management Plan

Hillsborough

- County Boundary
- Town Boundary
- Community Center Areas
- Lakes and Ponds
- Rivers and Streams
- Wetlands
- Active Dams
- Bridges
- Conservation Lands

Floodplains

- Floodway
- 1% Annual Flood Risk
- 0.2% Annual Flood Risk

Data sources: 1:24,000 source data from NH GRANIT; flood data from FEMA through NH GRANIT; Road and bridge data from NH Dept. of Transportation; Dams data from NH Dept. of Environmental Services.

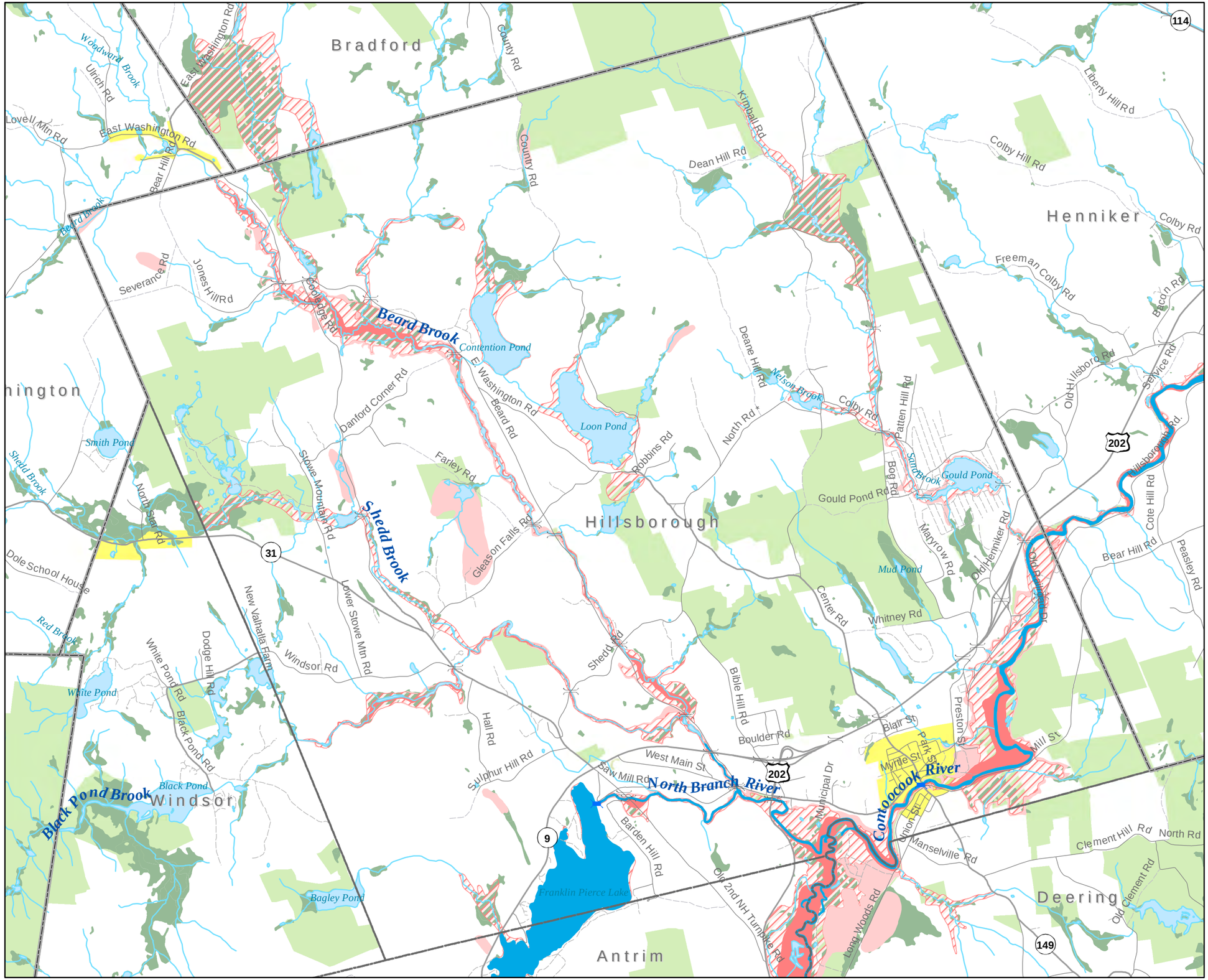
This map is for planning purposes only. Neither CNHRPC nor CNBRLAC make any representations as to the accuracy or validity of these data, and this map should not be used for regulatory or site specific determinations. Map created in November 2009 by CNHRPC.

0 0.5 1 2 Miles

Funding provided by the NH Department of Environmental Services through Section 604(b) of the Clean Water Act with funds appropriated by the American Recovery and Reinvestment Act of 2009.

New Hampshire Department of Environmental Services
29 Hazen Drive Concord NH 03301

Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org



HIGHEST RANKED WILDLIFE HABITAT BY ECOLOGICAL CONDITION

- Highest Ranked Habitat in NH
- Highest Ranked Habitat in Biological Region
  Biological region = TNC ecoregional subsection for terrestrial habitats or watershed group for wetlands and forest floodplain.
- Supporting Landscapes *(of regional significance)*
- Wildlife Habitat not top-ranked
  (locally significant habitat scores to be determined)
- Developed land cover
- Conservation or public land

- Information about habitat condition was analyzed to develop a statewide and regional ranking and identify the highest quality habitat relative to all polygons of a given habitat type in the state.
- The goal is to provide regional planners and conservation professionals a tool in identifying the most critical wildlife habitat locations.
- Results will be re-evaluated to monitor the effectiveness of conservation actions and respond appropriately to new information or changing conditions.

Please refer to accompanying documents describing habitat condition/scoring.

Hillsborough

Windsor

Smith Pond

Loon Pond

Mud Pond

Barden Pond

White Pond

Black Pond

Eagley Pond

Franklin Pierce Lake

Campbell Pond

North Branch River

Contoocook River

N W E S

0 0.5 1 Mile

NEW HAMPSHIRE Wildlife Action Plan

NHFGD February 2007 Conservation data updated 2009

Contoocook & North Branch Rivers Management Plan

Zoning in Hillsborough

Legend

Hillsborough Zoning

- Central Business
- Commercial
- Historical
- Residential
- Rural
- Village Residential

Data sources: Hydrography 1:24,000 source data from NH GRANIT; Roads data from NH Dept. of Transportation; Zoning layers from CNHRPC, SWRPC, and towns.

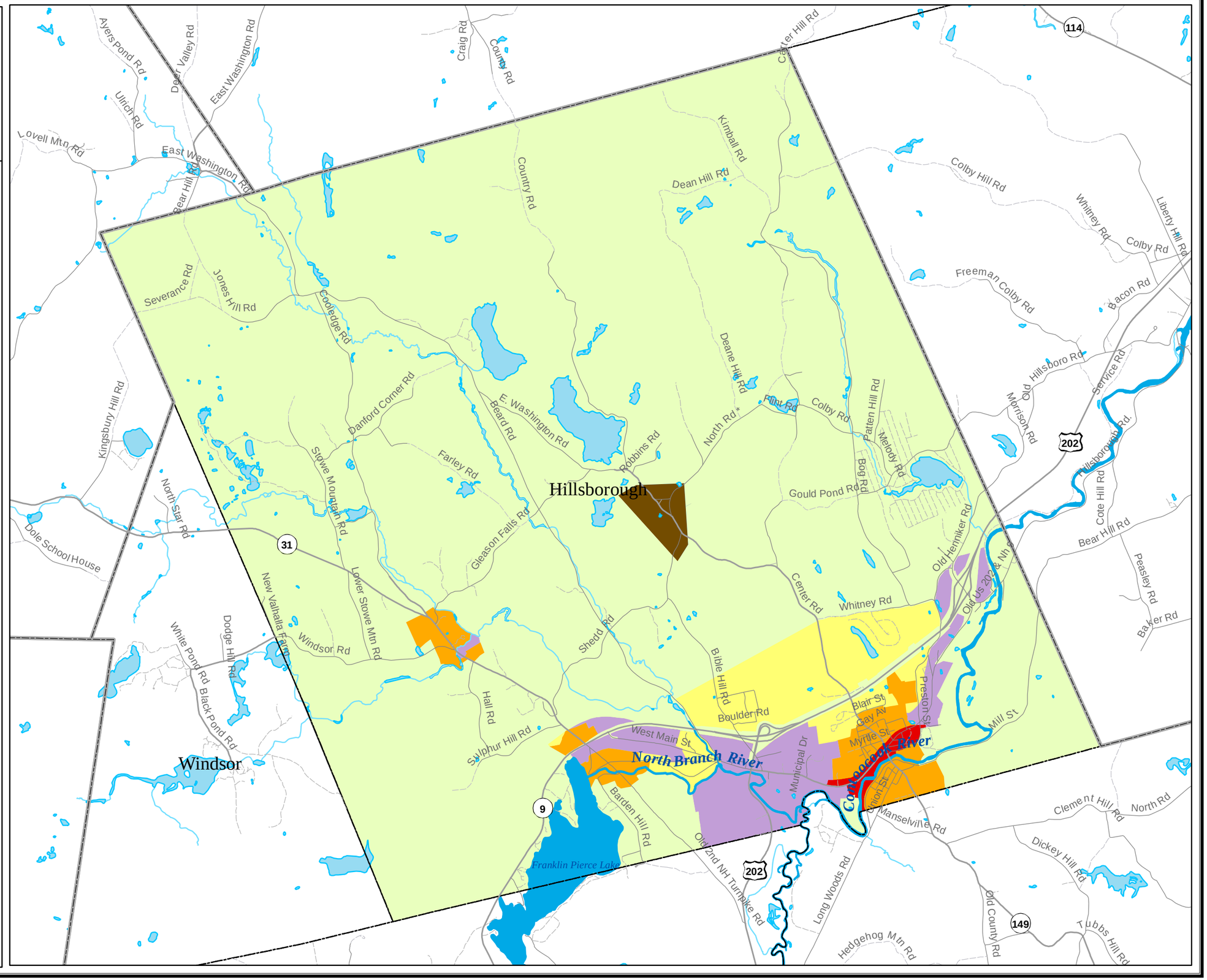
This map is for planning purposes only. Neither CNHRPC nor CNBRLAC make any representations as to the accuracy or validity of these data, and this map should not be used for regulatory or site specific determinations. Map created in November 2009 by CNHRPC.

0 0.5 1 2 Miles

Funding provided by the NH Department of Environmental Services through Section 604(b) of the Clean Water Act with funds appropriated by the American Recovery and Reinvestment Act of 2009.

New Hampshire Department of Environmental Services
29Hazen Drive Concord NH 03301

Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org



Contoocook & North Branch Rivers Management Plan

Hopkinton

- County Boundary
- Town Boundary
- Community Center Areas
- Lakes and Ponds
- Rivers and Streams
- Wetlands
- Active Dams
- Bridges
- Conservation Lands

Floodplains

- Floodway
- 1% Annual Flood Risk
- 0.2% Annual Flood Risk

Data sources: 1:24,000 source data from NH GRANIT; flood data from FEMA through NH GRANIT; Road and bridge data from NH Dept. of Transportation; Dams data from NH Dept. of Environmental Services.

This map is for planning purposes only. Neither CNHRPC nor CNBRLAC make any representations as to the accuracy or validity of these data, and this map should not be used for regulatory or site specific determinations. Map created in November 2009 by CNHRPC.

0 0.5 1 2 Miles

Funding provided by the NH Department of Environmental Services through Section 604(b) of the Clean Water Act with funds appropriated by the American Recovery and Reinvestment Act of 2009.

New Hampshire Department of Environmental Services
29 Hazen Drive Concord NH 03301

Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org

HIGHEST RANKED WILDLIFE HABITAT BY ECOLOGICAL CONDITION

- Highest Ranked Habitat in NH
- Highest Ranked Habitat in Biological Region
  Biological region = TNC ecoregional subsection for terrestrial habitats or watershed group for wetlands and forest floodplain.
- Supporting Landscapes *(of regional significance)*
- Wildlife Habitat not top-ranked
  (locally significant habitat scores to be determined)
- Developed land cover
- Conservation or public land

- Information about habitat condition was analyzed to develop a statewide and regional ranking and identify the highest quality habitat relative to all polygons of a given habitat type in the state.
- The goal is to provide regional planners and conservation professionals a tool in identifying the most critical wildlife habitat locations.
- Results will be re-evaluated to monitor the effectiveness of conservation actions and respond appropriately to new information or changing conditions.

Please refer to accompanying documents describing habitat condition/scoring.

Hopkinton

Henniker

Ox Pond
Joan Pond
Pleasant Pond
Grassy Pond/Clement Pond
Rolf Pond
Cass Pond
French Pond
Keyser Pond
Contoocook River
Craney Pond
Whittier Pond
Smith Pond
Kimball Pond

N W E S

Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org

NEW HAMPSHIRE Wildlife Action Plan

0 0.5 1 Mile

NHFGD February 2007 Conservation data updated 2009

Contoocook & North Branch Rivers Management Plan

Zoning in Hopkinton

Legend

Hopkinton Zoning

- B-1 - Commercial
- HVP - Hopkinton Village Precinct
- M-1 - Industrial
- R-1 - High Density Residential
- R-2 - Medium Density Residential
- R-3 - Low Density Residentia
- R-4 - Residential/Agricultural
- VB-1 - Village Commercial
- VM-1 - Village Industrial
- VR-1 - Village High Density Residential

Data sources: Hydrography 1:24,000 source data from NH GRANIT; Roads data from NH Dept. of Transportation; Zoning layers from CNHRPC, SWRPC, and towns.

This map is for planning purposes only. Neither CNHRPC nor CNBRLAC make any representations as to the accuracy or validity of these data, and this map should not be used for regulatory or site specific determinations. Map created in November 2009 by CNHRPC.

0 0.5 1 2 Miles

Funding provided by the NH Department of Environmental Services through Section 604(b) of the Clean Water Act with funds appropriated by the American Recovery and Reinvestment Act of 2009.

New Hampshire Department of Environmental Services
29 Hazen Drive Concord NH 03301

Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org

Hopkinton

Contoocook River

Contoocook & North Branch Rivers Management Plan

Jaffrey

- County Boundary
- Town Boundary
- Community Center Areas
- Lakes and Ponds
- Rivers and Streams
- Wetlands
- Active Dams
- Bridges
- Conservation Lands

Floodplains

- Floodway
- 1% Annual Flood Risk
- 0.2% Annual Flood Risk

Data sources: 1:24,000 source data from NH GRANIT; flood data from FEMA through NH GRANIT; Road and bridge data from NH Dept. of Transportation; Dams data from NH Dept. of Environmental Services.

This map is for planning purposes only. Neither CNHRPC nor CNBRLAC make any representations as to the accuracy or validity of these data, and this map should not be used for regulatory or site specific determinations. Map created in November 2009 by CNHRPC.

0 0.5 1 2 Miles

Funding provided by the NH Department of Environmental Services through Section 604(b) of the Clean Water Act with funds appropriated by the American Recovery and Reinvestment Act of 2009.

New Hampshire Department of Environmental Services
29 Hazen Drive Concord NH 03301

Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org

HIGHEST RANKED WILDLIFE HABITAT BY ECOLOGICAL CONDITION

- Highest Ranked Habitat in NH
- Highest Ranked Habitat in Biological Region
  Biological region = TNC ecoregional subsection for terrestrial habitats or watershed group for wetlands and forest floodplain.
- Supporting Landscapes *(of regional significance)*
- Wildlife Habitat not top-ranked
  (locally significant habitat scores to be determined)
- Developed land cover
- Conservation or public land

- Information about habitat condition was analyzed to develop a statewide and regional ranking and identify the highest quality habitat relative to all polygons of a given habitat type in the state.
- The goal is to provide regional planners and conservation professionals a tool in identifying the most critical wildlife habitat locations.
- Results will be re-evaluated to monitor the effectiveness of conservation actions and respond appropriately to new information or changing conditions.

Please refer to accompanying documents describing habitat condition/scoring.

Troy

Jaffrey

Gibson Pond
Frost Pond
Parker Pond
Gerfield Pond
Cummings Meadow Reservoir
Contoocook River
Cheshire Pond
Gilmore Pond
Mountain Brook Reservoir
Scott Pond
Contoocook Lake
Grassy Pond

N W E S

0 0.5 1 Mile

NEW HAMPSHIRE Wildlife Action Plan

NHFGD February 2007 Conservation data updated 2009

Contoocook & North Branch Rivers Management Plan

Zoning in Jaffrey

Legend

Jaffrey Zoning

- General Business
- Historic District
- Industrial
- Lake
- Mountain
- Residential A
- Residential B
- Rural

Data sources: Hydrography 1:24,000 source data from NH GRANIT; Roads data from NH Dept. of Transportation; Zoning layers from CNHRPC, SWRPC, and towns.

This map is for planning purposes only. Neither CNHRPC nor CNBRLAC make any representations as to the accuracy or validity of these data, and this map should not be used for regulatory or site specific determinations. Map created in November 2009 by CNHRPC.

0 0.5 1 2 Mile

Funding provided by the NH Department of Environmental Services through Section 604(b) of the Clean Water Act with funds appropriated by the American Recovery and Reinvestment Act of 2009.

New Hampshire Department of Environmental Services
29 Hazen Drive Concord NH 03301

Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org

Dublin
Marlborough
Peterborough
Troy
Jaffrey
Sharon
Fitzwilliam
Rindge
Contoocook River
Hunt Rd
Old Troy Rd
Upper Jaffrey Rd
Oxbow Rd
Burpee Rd
Page Rd
Craig Rd
Dooe Rd
Valley Rd
Old Dublin Rd
Four Winds Farm Rd
Cornish Rd
Korpi Rd
Thorndike Pond Rd
Shaker Rd
Dublin Rd
Gilson Rd
Fiske Rd
Parker Rd
Turner Rd
Old Town Farm Rd
Old Jaffrey Rd
Johanson Dr
Poole Rd
Mccoy Rd
Gibbs Rd
Woodbury Hill Rd
Emery Rd
Town Farm Rd
Lehtinen Rd
Old T.L.
Monadnock St
Bullard Rd
Bryant Rd
Crestview Dr
Proctor Rd
Nutting Rd
Colman Rd
Harkness Rd
First Tavern
Sawtelle Rd
Prospect St
Hadley Rd
Spring Hill Rd
Gap Mountain Rd
Fitzwilliam Rd
Milliken Rd
Old Fitzwilliam Rd
Red Gate Ln
Heath Rd
Sandy Ln
Spaulding Rd
Cobleigh Hill Rd
Gap Mtn Rd
Brigham Rd
Red Gate Rd
Ingalls Rd
Gilmore Pond
Lacy Rd
Jaquith Rd
Stratton Rd
Howard Hill Rd
Fitzgerald Dr
Witt Hill Rd
Old Sharon Rd
Hillcrest Rd
Erin Ln
Scott Pond Rd
Jock Page Rd
Peabody Hill Rd
Michigan Rd
Squantum Rd
Prescott Rd
Jaffrey Rd
Lower Troy Rd
Ingalls Rd.
Old Jaffrey Rd
County Rd
Mountain Rd
College Rd
Bowers Hill Rd
Fish Run Ln
Blakeville Rd
Woodbound Rd
Drag Hill Rd
Sherwin Hill Rd
Cathedral Rd
Abbott Rd
101
124
137
202
12
119

Contoocook & North Branch Rivers Management Plan

Peterborough

- County Boundary
- Town Boundary
- Community Center Areas
- Lakes and Ponds
- Rivers and Streams
- Wetlands
- Active Dams
- Bridges
- Conservation Lands

Floodplains

- Floodway
- 1% Annual Flood Risk
- 0.2% Annual Flood Risk

Data sources: 1:24,000 source data from NH GRANIT; flood data from FEMA through NH GRANIT; Road and bridge data from NH Dept. of Transportation; Dams data from NH Dept. of Environmental Services.

This map is for planning purposes only. Neither CNHRPC nor CNBRLAC make any representations as to the accuracy or validity of these data, and this map should not be used for regulatory or site specific determinations. Map created in November 2009 by CNHRPC.

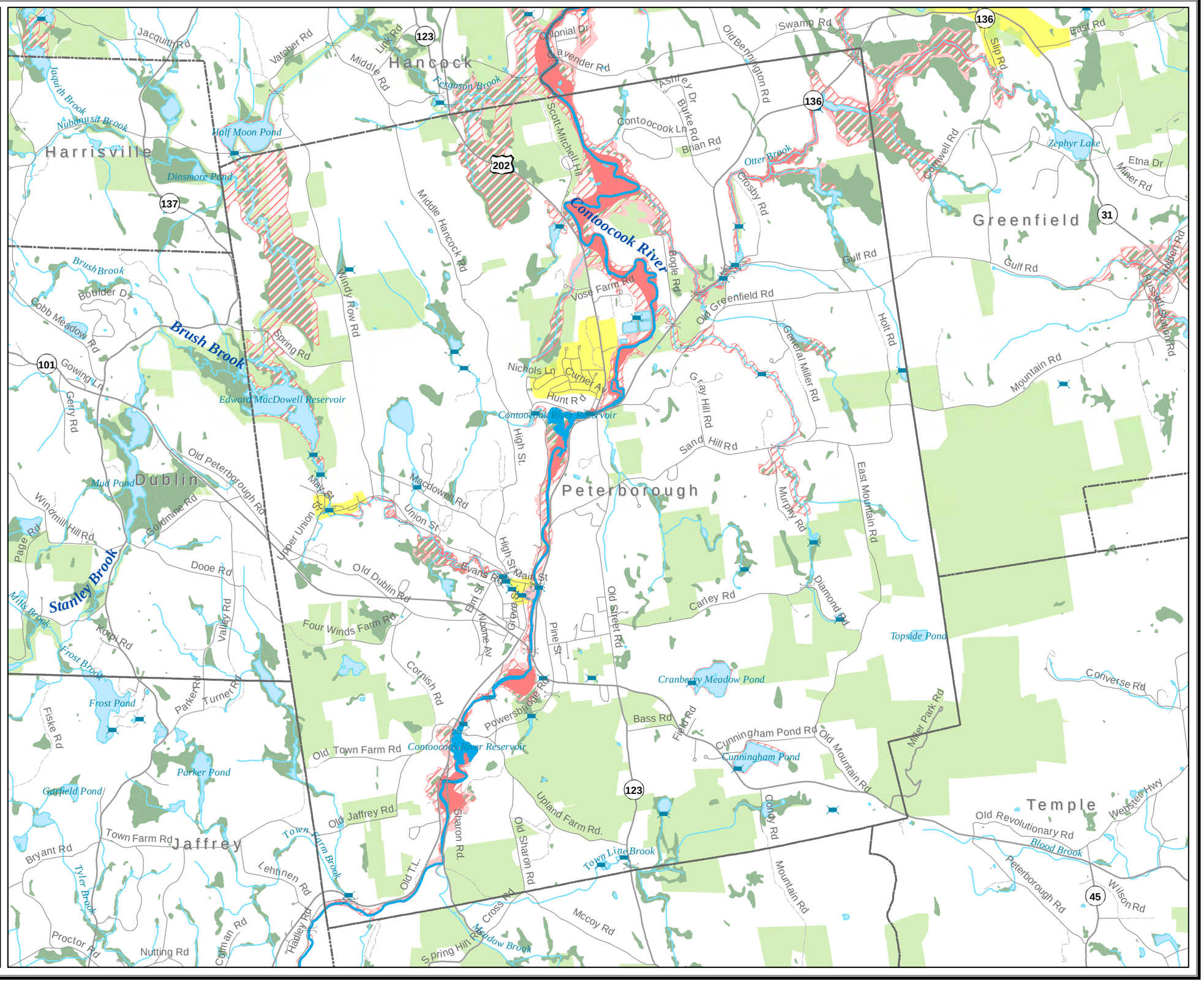
N

0 0.5 1 2 Miles

Funding provided by the NH Department of Environmental Services through Section 604(b) of the Clean Water Act with funds appropriated by the American Recovery and Reinvestment Act of 2009.

New Hampshire Department of Environmental Services
29Hazen Drive Concord NH 03301

Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org

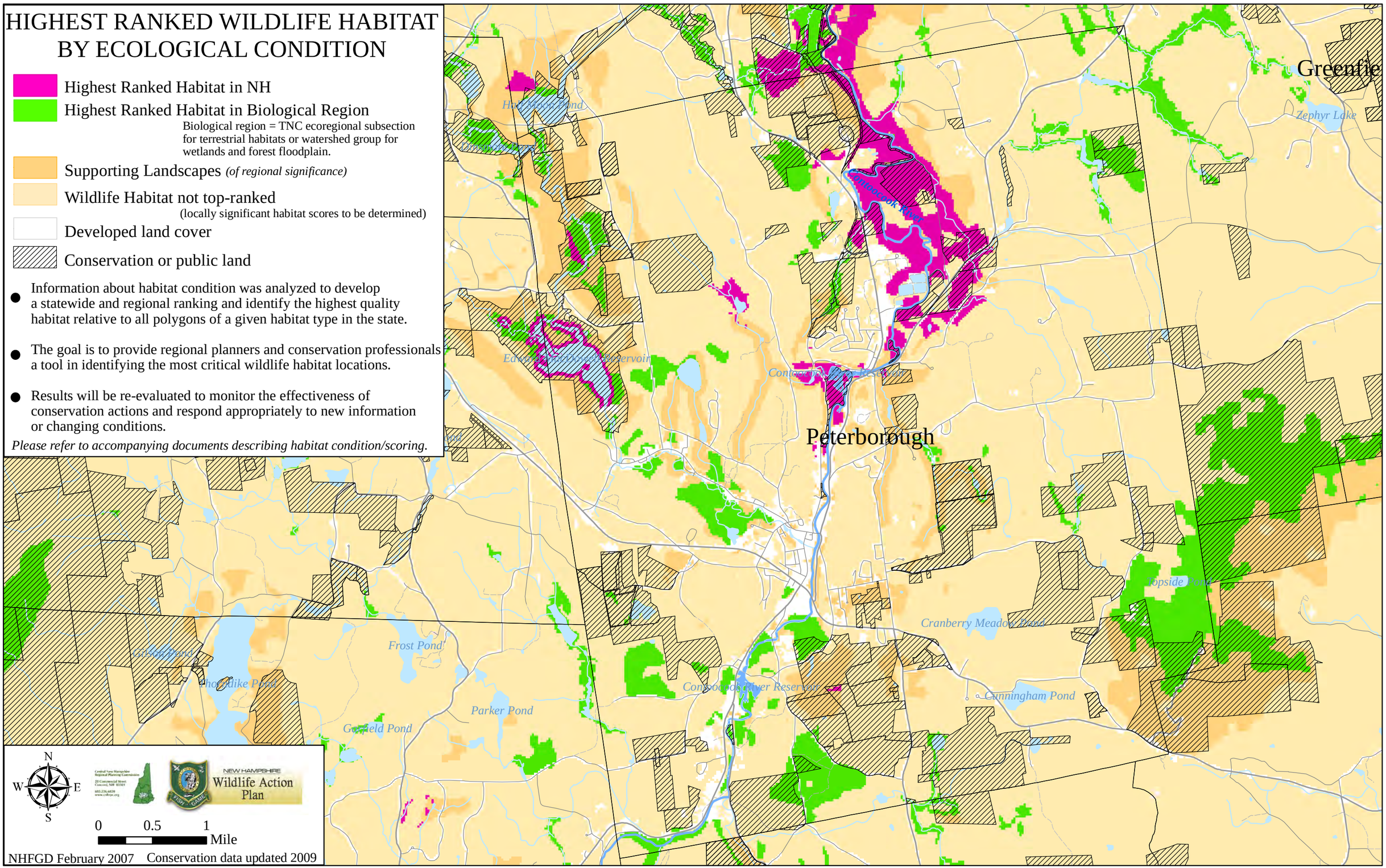


HIGHEST RANKED WILDLIFE HABITAT BY ECOLOGICAL CONDITION

- Highest Ranked Habitat in NH
- Highest Ranked Habitat in Biological Region
  Biological region = TNC ecoregional subsection for terrestrial habitats or watershed group for wetlands and forest floodplain.
- Supporting Landscapes *(of regional significance)*
- Wildlife Habitat not top-ranked
  (locally significant habitat scores to be determined)
- Developed land cover
- Conservation or public land

- Information about habitat condition was analyzed to develop a statewide and regional ranking and identify the highest quality habitat relative to all polygons of a given habitat type in the state.
- The goal is to provide regional planners and conservation professionals a tool in identifying the most critical wildlife habitat locations.
- Results will be re-evaluated to monitor the effectiveness of conservation actions and respond appropriately to new information or changing conditions.

Please refer to accompanying documents describing habitat condition/scoring.



NHFGD February 2007 Conservation data updated 2009

Contoocook & North Branch Rivers Management Plan

Zoning in Peterborough

Legend

Peterborough Zoning

- Business/Industrial District
- Commercial District
- Downtown Commercial District
- Commerce Park District
- Office District
- Village Commercial District
- West Peterborough District
- General Residence District
- Family District
- Retirement Community District
- Monadnock Community Healthcare District
- Rural District

Data sources: Hydrography 1:24,000 source data from NH GRANIT; Roads data from NH Dept. of Transportation; Zoning layers from CNHRPC, SWRPC, and towns.

This map is for planning purposes only. Neither CNHRPC nor CNBRLAC make any representations as to the accuracy or validity of these data, and this map should not be used for regulatory or site specific determinations. Map created in November 2009 by CNHRPC.

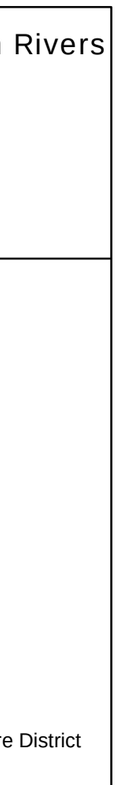
N

0 0.5 1 2 Miles

Funding provided by the NH Department of Environmental Services through Section 604(b) of the Clean Water Act with funds appropriated by the American Recovery and Reinvestment Act of 2009.

New Hampshire Department of Environmental Services
29 Hazen Drive Concord NH 03301

Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org



Greenfield

Peterborough

Contoocook River

Contoocook River Reservoir

Contoocook River Reservoir

Hancock Rd
Sargent Camp Rd
Middle Rd
Lavender Rd
Ashley Dr
Burke Rd
Brian Rd
Contoocook Ln
Scott-Mitchell Hill
Middle Hancock Rd
Hadley Rd
Windy Row Rd
Spring Rd
Vose Farm Rd
Bogle Rd
Crosby Rd
Gulf Rd
Old Greenfield Rd
Holt Rd
General Miller Rd
Gray Hill Rd
Sand Hill Rd
East Mountain Rd
Murphy Rd
Mountain Rd
Slip Rd
Cornwell Rd
Zephyr Lake Rd
Longwood Dr
Miner Rd
Boulder Dr
Greenwood Rd
Cobb Meadow Rd
Gowing Ln
Gerry Rd
Old Peterborough Rd
Goldmine Rd
Windmill Hill Rd
Dooe Rd
Craig Rd
Korpi Rd
Valley Rd
Fiske Rd
Parker Rd
Turner Rd
Johanson Dr
Emery Rd
Bryant Rd
Town Farm Rd
Lehtinen Rd
Community Lane
Gresview Dr
Proctor Rd
Beth Cir
Nichols Ln
Curnel Av
Hunt Rd
High St
Waddowell Rd
Union St
Upper Dublin Rd
Old Dublin Rd
Evans Rd
Elm St
Main St
Summer St
Glen Dr
Noone Av
Four Winds Farm Rd
Cornish Rd
Pine St
Old Street Rd
Cheney Av
Carley Rd
Diamond Rd
Converse Rd
Miner Park Rd
Bass Rd
Field Rd
Cunningham Pond Rd
Old Mountain Rd
Old Town Farm Rd
Old Jaffrey Rd.
Long Hill Rd
Old T.L.
Sharon Rd.
Old Sharon Rd
Upland Farm Rd.
Condy Rd
Cross Rd
Mccoy Rd
Old Revolutionary Rd
Webster Hwy
Peterborough Rd
Wilson Rd
136
123
202
137
101
31
45

Contoocook & North Branch Rivers Management Plan

Rindge

- County Boundary
- Town Boundary
- Community Center Areas
- Lakes and Ponds
- Rivers and Streams
- Wetlands
- Active Dams
- Bridges
- Conservation Lands

Floodplains

- Floodway
- 1% Annual Flood Risk
- 0.2% Annual Flood Risk

Data sources: 1:24,000 source data from NH GRANIT; flood data from FEMA through NH GRANIT; Road and bridge data from NH Dept. of Transportation; Dams data from NH Dept. of Environmental Services.

This map is for planning purposes only. Neither CNHRPC nor CNBRLAC make any representations as to the accuracy or validity of these data, and this map should not be used for regulatory or site specific determinations. Map created in November 2009 by CNHRPC.

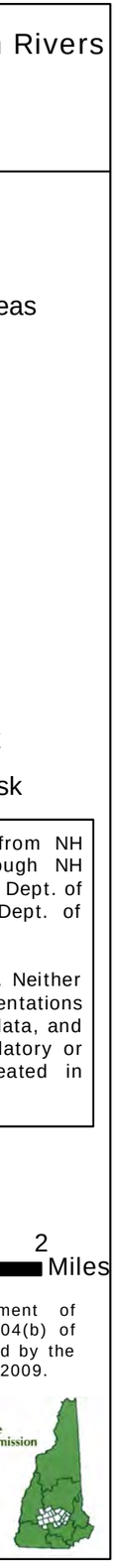
N

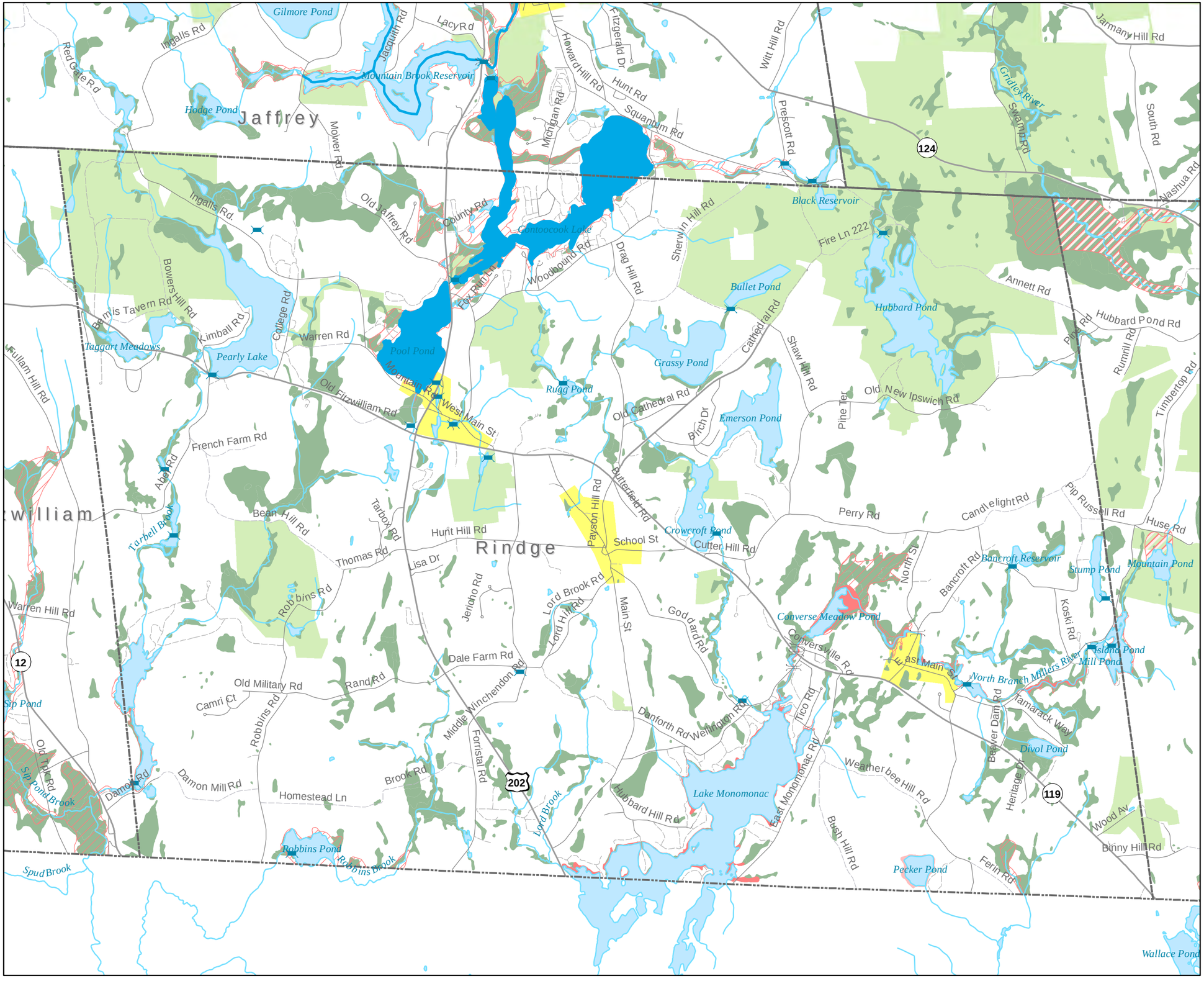
0 0.5 1 2 Miles

Funding provided by the NH Department of Environmental Services through Section 604(b) of the Clean Water Act with funds appropriated by the American Recovery and Reinvestment Act of 2009.

New Hampshire Department of Environmental Services
29 Hazen Drive Concord NH 03301

Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org





HIGHEST RANKED WILDLIFE HABITAT BY ECOLOGICAL CONDITION

- Highest Ranked Habitat in NH
- Highest Ranked Habitat in Biological Region
  Biological region = TNC ecoregional subsection for terrestrial habitats or watershed group for wetlands and forest floodplain.
- Supporting Landscapes *(of regional significance)*
- Wildlife Habitat not top-ranked
  (locally significant habitat scores to be determined)
- Developed land cover
- Conservation or public land

- Information about habitat condition was analyzed to develop a statewide and regional ranking and identify the highest quality habitat relative to all polygons of a given habitat type in the state.
- The goal is to provide regional planners and conservation professionals a tool in identifying the most critical wildlife habitat locations.
- Results will be re-evaluated to monitor the effectiveness of conservation actions and respond appropriately to new information or changing conditions.

Please refer to accompanying documents describing habitat condition/scoring.

Sharon

Gilmore Pond
Contoocook River
Mountain Brook Reservoir
Hodge Pond
Black Reservoir
Contoocook Lake
Bixby Lake
Taggart Meadows
Pool Pond
Rugg Pond
Grassy Pond
Emerson Pond
Rindge
Crowcroft Pond
Bancroft Reservoir
Stump Pond
Converse Meadow Pond
Laurel Lake
Sip Pond
Divol Pond
Robbins Pond
Lake Monomonac
Pecker Pond
Wallace Pond

N W E S

0 0.5 1 Mile

NEW HAMPSHIRE Wildlife Action Plan

NHFGD February 2007 Conservation data updated 2009

Contoocook & North Branch Rivers Management Plan

Zoning in Rindge

Legend

Rindge Zoning

- General Commercial
- Business/Light Industry
- Gateway Central
- Gateway East
- Village
- College
- Residential
- Residential/Agriculture

Data sources: Hydrography 1:24,000 source data from NH GRANIT; Roads data from NH Dept. of Transportation; Zoning layers from CNHRPC, SWRPC, and towns.

This map is for planning purposes only. Neither CNHRPC nor CNBRLAC make any representations as to the accuracy or validity of these data, and this map should not be used for regulatory or site specific determinations. Map created in November 2009 by CNHRPC.

N

0 0.25 0.5 1 Mile

Funding provided by the NH Department of Environmental Services through Section 604(b) of the Clean Water Act with funds appropriated by the American Recovery and Reinvestment Act of 2009.

New Hampshire Department of Environmental Services
29 Hazen Drive Concord NH 03301

Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org

Jaffrey
Sharon
New Ipswich
Rindge
Fitzwilliam
Red Gate Rd
Peabody Hill Rd
Hunt Rd
Michigan Rd
Squantum Rd
Prescott Rd
Swamp Rd
South Rd
124
Ingalls Rd
Old Jaffrey Rd
County Rd
Woodbound Rd
Blakeville Rd
Fox Run Ln
Drag Hill Rd
Sherwin Hill Rd
Cathedral Rd
Fire Ln 222
Annett Rd
Hubbard Pond Rd
Rumrill Rd
Pip Rd
Bowers Hill Rd
Kimball Rd
College Rd
Warren Rd
Mountain Rd
Meadow View Rd
Fullam Hill Rd
Owen Woods Dr
West Main St
Grassy Pond Rd
Shaw Hill Rd
Old Cathedral Rd
Birch Dr
Pine Ter
Old New Ipswich Rd
French Farm Rd
Abel Rd
Bean Hill Rd
Thomas Rd
Hunt Hill Rd
Todd Hill Rd
Turnpike Rd
School St
Cutter Hill Rd
Perry Rd
Candlelight Rd
Pip Russell Rd
Timbertop Rd
North St
Bancroft Rd
Robbins Rd
Jericho Rd
Lisa Dr
Lord Brook Rd
Lord Hill Rd
Goddard Rd
Conversville Rd
East Main St
Koski Rd
Hampshire Rd
Tamarack Way
Beaver Dam Rd
Heritage Dr
Dale Farm Rd
Old Military Rd
Rand Rd
Camri Ct
Robbins Rd
Middle Winchendon Rd
Forristal Rd
Main St
Danforth Rd
Wellington Rd
Tico Rd
East Monomonac Rd
Weatherbee Hill Rd
Damon Mill Rd
Brook Rd
Homestead Ln
Old Tpk Rd
202
Hubbard Hill Rd
Bush Hill Rd
Ferin Rd
119
Wood Av
Binny Hill Rd

Contoocook & North Branch Rivers Management Plan

Stoddard

- County Boundary
- Town Boundary
- Community Center Areas
- Lakes and Ponds
- Rivers and Streams
- Wetlands
- Active Dams
- Bridges
- Conservation Lands

Floodplains

- Floodway
- 1% Annual Flood Risk
- 0.2% Annual Flood Risk

Data sources: 1:24,000 source data from NH GRANIT; flood data from FEMA through NH GRANIT; Road and bridge data from NH Dept. of Transportation; Dams data from NH Dept. of Environmental Services.

This map is for planning purposes only. Neither CNHRPC nor CNBRLAC make any representations as to the accuracy or validity of these data, and this map should not be used for regulatory or site specific determinations. Map created in November 2009 by CNHRPC.

0 0.5 1 2 Miles

Funding provided by the NH Department of Environmental Services through Section 604(b) of the Clean Water Act with funds appropriated by the American Recovery and Reinvestment Act of 2009.

New Hampshire Department of Environmental Services
29Hazen Drive Concord NH 03301

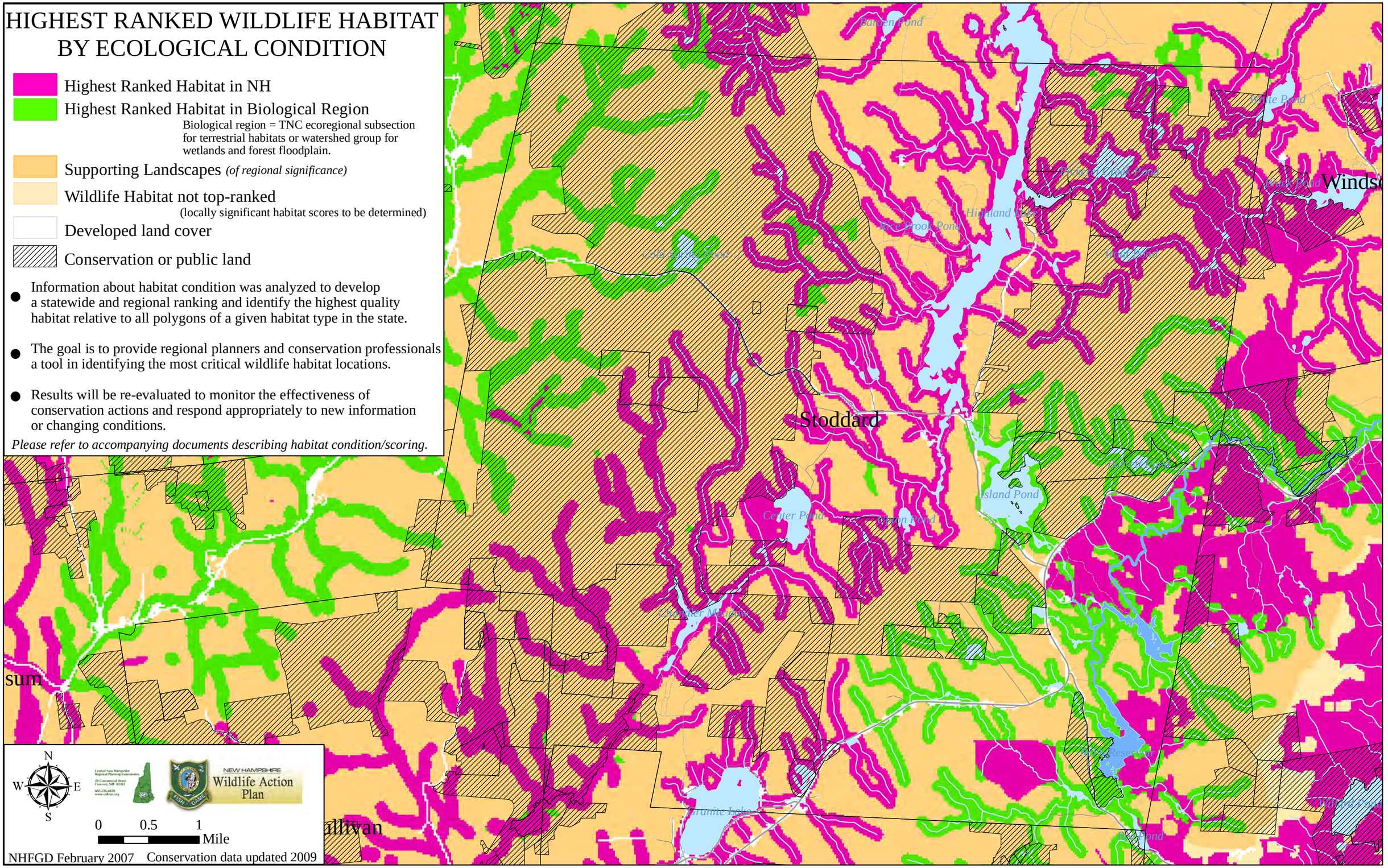
Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org

HIGHEST RANKED WILDLIFE HABITAT BY ECOLOGICAL CONDITION

- Highest Ranked Habitat in NH
- Highest Ranked Habitat in Biological Region
  Biological region = TNC ecoregional subsection for terrestrial habitats or watershed group for wetlands and forest floodplain.
- Supporting Landscapes *(of regional significance)*
- Wildlife Habitat not top-ranked
  (locally significant habitat scores to be determined)
- Developed land cover
- Conservation or public land

- Information about habitat condition was analyzed to develop a statewide and regional ranking and identify the highest quality habitat relative to all polygons of a given habitat type in the state.
- The goal is to provide regional planners and conservation professionals a tool in identifying the most critical wildlife habitat locations.
- Results will be re-evaluated to monitor the effectiveness of conservation actions and respond appropriately to new information or changing conditions.

Please refer to accompanying documents describing habitat condition/scoring.



Contoocook & North Branch Rivers Management Plan

Zoning in Stoddard

Legend

Stoddard Zoning

- Lakeside District
- Residential Disrict
- Rural District

Data sources: Hydrography 1:24,000 source data from NH GRANIT; Roads data from NH Dept. of Transportation; Zoning layers from CNHRPC, SWRPC, and towns.

This map is for planning purposes only. Neither CNHRPC nor CNBRLAC make any representations as to the accuracy or validity of these data, and this map should not be used for regulatory or site specific determinations. Map created in November 2009 by CNHRPC.

N

0 0.5 1 2 Miles

Funding provided by the NH Department of Environmental Services through Section 604(b) of the Clean Water Act with funds appropriated by the American Recovery and Reinvestment Act of 2009.

New Hampshire Department of Environmental Services
29 Hazen Drive Concord NH 03301

Central New Hampshire Regional Planning Commission
28 Commercial Street
Concord, NH 03301
603.226.6020
www.cnhrpc.org

Marlow
Stoddard
Windsor
Sullivan
Gage Rd
Symondsville Rd
Mack Hill Rd
Church St
Mill St
Mansfield Rd
Baine Rd
Queen St
Doe Rd
Miller Rd
Perry Rd
Reed Rd
Jeffs Rd
King St
Windsor Rd
Black Pond Rd
Loveren Mill Rd
School St
Forest Rd
Old Antrim Rd
Barrett Pond Rd
Pierce Rd
Kings Highway
Shedd Hill Rd
North Branch River
Tarbox Rd
Juniper Hill Rd
Richer Rd
Wendy Rd
Robb Reservoir
Bailey Brook Rd
Bowlder Rd
North Shore Rd
Nye Rd
Granite Lake Rd
Old Towne Rd
Ellis Rd
Valley Rd
Cross Rd
10
123
9
123

Appendix G

Known occurrences of rare species and exemplary natural communities in the Contoocook and North Branch watershed

Ecological System

Emergent marsh - shrub swamp system
Kettle hole bog system
Medium level fen system
Poor level fen/bog system
Temperate minor river floodplain system

Natural Community

Black gum - red maple basin swamp
Chestnut oak forest/woodland
Hemlock - beech - northern hardwood forest
Hemlock - beech - oak - pine forest
Hemlock - white pine fores
Hemlock forest
Inland Atlantic white cedar swamp
Northern hardwood - black ash - conifer swamp
Northern hardwood - spruce - fir forest
Red maple - Sphagnum basin swamp
Red maple floodplain forest
Red oak - ironwood - Pennsylvania sedge woodland
Red oak - pine rocky ridge
Rich red oak rocky woods
Silver maple - false nettle - sensitive fern floodplain
Subalpine rocky bald
Sugar maple - beech - yellow birch forest

Plant species

American Cancerroot (Conopholis americana)
Arethusa (Arethusa bulbosa)
Barren Strawberry (Waldsteinia fragarioides)
Broad-winged Sedge (Carex alata)
Common Mare's Tail (Hippuris vulgaris)
Farwell's Water Milfoil (Myriophyllum farwellii)
Flatstem Pondweed (Potamogeton zosteriformis)
Fringed Gentian (Gentianopsis crinita)
Giant Rhododendron (Rhododendron maximum)
Ginseng (Panax quinquefolius)
Goodenough's Sedge (Carex nigra)
Green Adder's Mouth (Malaxis unifolia)
Hoary Mountain Mint (Pycnanthemum incanum)
Kidney-leaved Violet (Viola nephrophylla)
Knotty Pondweed (Potamogeton nodosus)
Mountain Firmoss (Huperzia appalachiana)
Piled-up Sedge (Carex cumulata)
Rue Anemone (Thalictrum thalictroides)
Sessile-fruited Arrowhead (Sagittaria rigida)
Smooth Sandwort (Minuartia glabra)
Summer Sedge (Carex aestivalis)
Water Marigold (Megalodonta beckii)
Wedge Sand Blackberry (Rubus cuneifolius)

Invertebrate Species

Brook Floater (Alasmidonta varicosa)

Vertebrate species

American Bittern (Botaurus lentiginosus)
Bald Eagle (Haliaeetus leucocephalus)
Banded Sunfish (Enneacanthus obesus)
Blanding's Turtle (Emydoidea blandingii)
Common Loon (Gavia immer)
Common Nighthawk (Chordeiles minor)
Eastern Hognose Snake (Heterodon platirhinos)
Great Blue Heron (Rookery) (Ardea herodias)
Least Bittern (Ixobrychus exilis)
Northern Black Racer (Coluber constrictor constrictor)
Northern Long-eared Bat (Myotis septentrionalis)
Osprey (Pandion haliaetus)
Pied-billed Grebe (Podilymbus podiceps)
Purple Martin (Progne subis)
Slimy Salamander (Plethodon glutinosus)
Smooth Green Snake (Opheodrys vernalis)
Spotted Turtle (Clemmys guttata)
Vesper Sparrow (Pooecetes gramineus)
Wood Turtle (Glyptemys insculpta)

Source: NH Natural Heritage Bureau.

Appendix H1

Don and Lillian Stokes' birds seen at Powder Mill Pond, Bobolink Farm

Hancock, NH.

Common Loon
Pied-billed Grebe
Double-crested Cormorant
American Bittern
Great Blue Heron
Great Egret
Green Heron
Black-crowned Night-Heron
Mute Swan
Snow Goose
Canada Goose
Wood Duck
Green-winged Teal
American Black Duck
Mallard
Northern Pintail
Blue-winged Teal
Gadwall
American Wigeon
Ring-necked Duck
Lesser Scaup
Black Scoter
Common Goldeneye
Bufflehead
Hooded Merganser
Common Merganser
Ruddy Duck
Turkey Vulture
Osprey
Bald Eagle
Northern Harrier
Sharp-shinned Hawk
Cooper's Hawk
Northern Goshawk
Red-shouldered Hawk
Broad-winged Hawk
Red-tailed Hawk
American Kestrel
Merlin
Peregrine Falcon
Ring-necked Pheasant
Ruffed Grouse
Wild Turkey
Northern Bobwhite
Semipalmated Plover
Killdeer
Greater Yellowlegs
Lesser Yellowlegs
Solitary Sandpiper
Spotted Sandpiper
Least Sandpiper
Dunlin
Short-billed Dowitcher
Common Snipe
American Woodcock
Laughing Gull
Ring-billed Gull
Herring Gull
Great Black-backed Gull
Forster's Tern
Black Tern
Rock Pigeon
Mourning Dove
Black-billed Cuckoo
Yellow-billed Cuckoo
Barn Owl
Barred Owl
Great Horned Owl
Northern Saw-whet Owl
Long-earred Owl
Common Nighthawk
Whip-poor-will
Chimney Swift
Ruby-throated Hummingbird
Belted Kingfisher
Red-bellied Woodpecker
Yellow-bellied Sapsucker
Downy Woodpecker
Hairy Woodpecker
Northern Flicker
Pileated Woodpecker
Olive-sided Flycatcher
Eastern Wood-Pewee
Yellow-bellied Flycatcher
Alder Flycatcher
Willow Flycatcher
Least Flycatcher

Appendix H1

Eastern Phoebe
Great Crested Flycatcher
Western Kingbird
Eastern Kingbird
Horned Lark
Purple Martin
Tree Swallow
Northern Rough-winged Swallow
Bank Swallow
Cliff Swallow
Barn Swallow
Blue Jay
American Crow
Common Raven
Black-capped Chickadee
Tufted Titmouse
Red-breasted Nuthatch
White-breasted Nuthatch
Brown Creeper
Carolina Wren
House Wren
Winter Wren
Golden-crowned Kinglet
Ruby-crowned Kinglet
Eastern Bluebird
Veery
Swainson's Thrush
Hermit Thrush
Wood Thrush
American Robin
Gray Catbird
Northern Mockingbird
Brown Thrasher
American Pipit
Cedar Waxwing
Northern Shrike
Starling
Blue-headed Vireo
Yellow-throated Vireo
Warbling Vireo
Philadelphia Vireo
Red-eyed Vireo
Tennessee Warbler
Nashville Warbler
Northern Parula
Yellow Warbler
Chestnut-sided Warbler
Magnolia Warbler
Cape May Warbler
Black-throated Blue Warbler
Yellow-rumped Warbler
Black-throated Green Warbler
Blackburnian Warbler
Pine Warbler
Prairie Warbler
Palm Warbler
Bay-breasted Warbler
Blackpoll Warbler
Black-and-white Warbler
American Redstart
Ovenbird
Northern Waterthrush
Connecticut Warbler
Common Yellowthroat
Wilson's Warbler
Canada Warbler
Scarlet Tanager
Northern Cardinal
Rose-breasted Grosbeak
Indigo Bunting
EasternTowhee
American Tree Sparrow
Chipping Sparrow
Field Sparrow
Vesper Sparrow
Savannah Sparrow
Fox Sparrow
Song Sparrow
Lincoln's Sparrow
Swamp Sparrow
White-throated Sparrow
White-crowned Sparrow
Dark-eyed Junco
Snow Bunting
Bobolink
Red-winged Blackbird
Eastern Meadowlark
Rusty Blackbird
Common Grackle
Brown-headed Cowbird
Northern Oriole
Pine Grosbeak

Appendix H1

Purple Finch
House Finch
White-winged Crossbill
Red Crossbill
Common Redpoll
Pine Siskin
American Goldfinch
Evening Grosbeak
House Sparrow
Western Kingbird
Summer Tanager

Wildlife and Bird Report: Powder Mill Pond 2001-2010.

We are Don and Lillian Stokes, bird and nature authors, and have written over 32 books on birds and nature including Stokes Field Guide To Birds. We live on Powder Mill Pond on a 48 acre property, we named Bobolink farm (for the Bobolinks nesting here). We keep a frequent, sometimes daily journal of our observations of birds and wildlife that we see on our property and on Powder Mill Pond in front of us. We have lived here for 8 years.

Here is summary information on how birds use Powder Mill Pond with particular emphasis on those species that are NH state listed as threatened or endangered species. N.H. Fish and Game Dept. lists Common Nighthawk and Northern Harrier as Endangered and Common Loon, Bald Eagle and Pied-billed Grebe as Threatened.

Powder MIll Pond and is an immensely rich habitat and one of the most important for birds and wildlife in the southwestern part of the state. The Wildlife Action Plan of NH Fish and Game Dept. rates it as one of the highest ranked habitats.

Bald Eagle

Powder Mill Pond is used extensively by Bald Eagles, both adults and immatures, especially in the spring and fall, but they can be found here almost any time of year. We see them frequently, sometimes more than one at a time. They are especially active in spring when the ice breaks and in fall before full freeze and this often coincides with the peak of duck migration through the area.The eagles sometimes take fish from otters who bring fish on the ice shelf to eat. We have also seen them, on occasion, dive at the ducks. We have sen them feeding on fish at the water's edge. We have seen them chasing an Osprey who has a fish. Their preferred perch spot is in two pines at the tip of the peninsula of land (which is an island in high water, thus we have named this Eagle Island) that extends out from our field. This tip forms one side of the entrance into the cove in front of our house.

Common Loon

Use Powder Mill Pond but are not regular. Our sense is that they use it as stopovers for rest and fishing and not for nesting. We have seen a pair exploring potential nest areas but they did not stay. The fluctuating water level would be a problem for loon nest placement.

Northern Harrier

Are seen during the spring and fall migration but not in any sizeable numbers. They can be seen coursing over our large fields that abut the pond, prime hunting habitat for them. We have seen them catch voles in our field.

Common Nighthawk

Powder Mill Pond is a prime and important location for Common Nighthawk migration which occurs occurs from the end of August through the beginning of Sept. during which time they can be seen in big, sometimes record, numbers.
We participate in the Nighthawk Migration Survey (www.borobirding.net/nighthawks), which covers the lower third of NH and the upper two-thirds of MA and on several occasions Powder Mill Pond has among some of the biggest numbers of nighthawks at a location in the survey area, for the season. NIghthawks feed during their migration over the pond on insects and also ant swarms.

Pied-billed Grebe

Have been seen, infrequently, on fall migration. They feed in the pond and rest in the aquatic vegetation.

Sightings of Important Wildlife

Below are the year and dates of sightings and numbers. If more than one individual of that species was present on that date that is indicated in parenthesis.

Bald Eagle

2010
12/4 (2), 12/7, 12/8,

2009
3/25, 3/28 (2), 3/29, (2), 3/29 (2), 3/3 (2), 3/31, 4/2, 5/10, 5/15, 8/14 (2) 8/22, 8/30, 9/5, 9/8, 10/11, 11/14 12/1

2008
4/2, 4/7, 4/10, 4/17, 4/24, 4/26, 5/2, 9/8, 12/5, 12/16

2007
3/6, 3/23 (4!), 3/30, 4/1, 4/5, 4/13 (2), 4/17 (2), 4/19, 4/20, 4/24, 6/11, 9/12, 10/28, 11/18, 11/23 (3!), 11/29 (3)

2006
4/8, 4/16, 4/23 (2), 4/24 (2) 5/1, 5/26, 8/11, 8/25, 9/19, 12/11, 12/26 (2)

2005
4/5, 4/6, 4/7, 4/11, 4/19, 8/18, 9/17, 10/2

2004
4/18, 4/25, 6/13, 7/20, 7/22, 7/30, 8/1, 8/2, 8/3, 8/14, 8/26, 8/29, 8/31, 9/5, 9/10 (2), 9/24, 9/30, 10/12, 10/24, 11/28 12/2 12/3

2003
4/4, 4/47, 4/19, 9/23, 9/24, 11/5, 11/13

2002
5/10, 5/16, 6/25, 7/21, 10/15

2001 (we moved here Sept. 2001)
11/28

Common Loon

2009

5/31/09
2008

Loon 4/16/08, 11/1/08
2007
4/5 (2), 4/11,4/23, 6/2, 6/30 (2), 10/31

2006
4/14 (3), 5/17 (2), 11/11, 11/20

2005
4/9, 4/26, 4/27, 11/2, 11/13, 11/5, 11/19

2004
6/7, 8/16

2001-3
no records

Pied-billed Grebe

2009
10/11, 10/12

2008
10/11, 10/24, 10/25

2006-2007 none

2005
10/2

2004, none

2003
9/7 (2), 11/13

2002 none

2001
10/23

Northern Harrier

2008
4/10/08, 4/12, 4/13, 11/13

2007
4/11, 4/24, 4/28, 9/2, 9/25, 10/1

2006
5/17, 6/4 11/11, 11/20, 12/11

2005
4/30, 8/18, 8/23/ 9/20, 11/27, 11/28

2004
8/29

2003
10/3, 10/6, 10/21

2002
5/14, 5/17, 6/24, 8/4, 8/9, 10/27, 11/8

2001
11/11

Common Nighthawk migration through here is extensive and take place from mid-August to early Sept.ember

2009
8/28-(72 nighthawks), 8/24 (10), 8/25 (139), 8/26 (22), 8/27 (4), 9/2 (24), 9/31 (117) 9/4(5), total, **393**

2008
9/2 (170), 9/3 (82) total, **252**

2007
8/27 (332), 8/28 (401) 8/29 (2) total, **735**

2006
8/24 (8), 8/26 (106), 8/28 (516), 8/29 (5) 8/30 (416) total, **1,051**

2005
8/27 **1,058**

2004
8/26 (40), 8/29 (70) total, **70**

2002-2003 did not do survey

Powder Mill Pond is immensely important to other species of birds as well.

Ducks use it extensive on spring and fall migration. Common Mergansers, Hooded Mergansers, and Ring-necked Ducks are the most abundant species and at times, more than 100 ducks have been seen in the cove in front of our house. Buffleheads, Common Goldeneye, Green-winged Teal, Wood Ducks, Black Ducks and Mallards are regularly seen. Black Ducks and Wood Ducks nest on the pond. Hooded Mergansers nest yearly in a box on our property.

There is extensive migration of warblers, swallows, and other neotropical migrant birds in spring and fall. In spring, the warmer microclimates along the edge of the pond produce early insects that provide fuel for northward bound migrants.
We have a number of Tree Swallows who nest in boxes on our land. During cold spells in spring during breeding, when insects over the land are not available, the swallows fly low over the water, catching the insects of the pond. This can make the difference in breeding success or failure. Bank Swallows also feed extensively on insects over the pond, all summer.

Great Blue Herons use the pond extensively from spring through fall and can be seen daily, hunting in the vegetation. We had Green Herons nesting on our property this year and they hunted in the pond.

American Bitterns use the pond extensively and have nested in our hayfield almost every year. Field habitat along the pond is extremely important to nesting species such as Bobolinks. We have had a population of Bobolinks nest in our field each year. Our high count has been 75 Bobolinks seen at the end of nesting season.

Many, many birds nest in the habitat along the edge of the pond. Baltimore Orioles, Eastern Kingbirds, Yellow Warblers, Common Yellowthroats, Least Flycatchers are just a few.

Ospreys use the pond extensively during spring and fall migration. Woodcock display in the fields along the pond and nest in the woods.
We seen some very rare species on the pond, such as Black Tern 8/23/07 and Barn Owl 11/8/02, 10/18/04.

We have seen many species of mammals that use the pond and its surrounding habitat: Otters, Moose, Deer, Bobcat (we saw on on 12/12/10 on the ice), Mink, Coyotes, etc.

The habitat of the pond and along its banks will continue to provide this rich habitat for birds and wildlife as long as it continues in it's relatively undeveloped status. Fragmentation and development could drastically change things.

This is only a small part of what we have records of. For any questions contact us at:

Don and Lillian Stokes
40 south Elmwood Rd.
Hancock, NH 03449

dlstokes@aol.com
603.525.4445

Appendix I

Summary Chart of Municipal Zoning Districts Protecting the Contoocook and North Branch Rivers

		Protections Applying to the Contoocook and North Branch Rivers						
		Have Zoning District Applying to Surface Waters (Y/N)	Minimum Building Setback	Minimum Septic Setback	Minimum Natural Vegetative Buffer	Maximum Impervious Surface Coverage	Minimum Open Space Coverage	Excavation Prohibited
Statewide Protections		**N/A**	**50'**	**75'**	**50'**	**30%**	**No**	**No**
Local Protections - CNHRPC Towns	Boscawen	Yes	150'	100'				Yes
	Concord	Yes	75'	75' - 125'	75'	15%		Yes
	Deering	Yes	150'	125'		20%		Yes
	Henniker		75'**					
	Hillsborough	Yes	75'					
	Hopkinton							
Local Protections - SWRPC Towns	Antrim	Yes	100'					Yes
	Bennington	Yes				20%*		Yes
	Greenfield							
	Hancock		100'	125'				
	Jaffrey	Yes	75'	200'				Yes
	Peterborough	Yes	100'*					Yes
	Rindge	Yes		100'		20%*	30%	Yes
	Stoddard	Yes						

Local protection more stringent than statewide protection: *Contoocook River protected by an overlapping zoning district such as a district protecting groundwater; **River protected not with a zoning district but through ordinance alone.

Local protection same as statewide

Existing and Recommended Zoning Regulations for Protection of the Contoocook and North Branch Rivers

Central Region Towns

Boscawen

Existing Regulations

- Shoreland Protection District for nine tributary streams and ponds, 150' building setback from Contoocook
- 100' septic setback applying to Contoocook
- Hazardous materials are prohibited in the Shoreland Protection District. Excavation is prohibited in the SP District. Some other uses are prohibited within the SP District.
- Stormwater management systems required for lots in SP District with over 20% impervious surface (and 15% in Aquifer Protection District)
- 50' setback from wetlands , on steep grades up to 200'
- Largest residential minimum lot size 2 acres, smallest min. lot size 10,000 sq. ft.

Recommendations

- Increase the minimum natural vegetative buffer to above the 50' state level in the SP District.
- Add a maximum impervious coverage requirement below the 30% state level to the SP District.
- Add a minimum open space requirement to the SP District.
- Implement bluff setbacks.
- Require pre-construction stormwater management in site plan regulations.

Concord

Existing Regulations

- Shoreland Protection District for Great Ponds and 4th order streams or greater, up to 250' building setback from Contoocook depending upon use and part of river

- Naturally vegetated buffer required within up to 250’ of river, 75’-125’ septic setback applying to Contoocook
- Excavation is prohibited in the Shoreland Protection District. Some other uses are prohibited in the SP District.
- Maximum allowable impervious surface: 15%; Maximum Density: 1/4 a unit per buildable acre; Minimum Tract Open Space Requirements: 70%.
- 50’ setback from wetlands
- Largest residential minimum lot size 2 acres, smallest min. lot size 7,500 sq. ft.
- 50’ bluff setback

Recommendations

- Increase the minimum building setback in the SP District to above the 50’ state level.
- Establish an Aquifer Protection District.
- Require pre-construction stormwater management in site plan regulations.

Deering

Existing Regulations

- Shoreland Protection District for Deering Reservoir, Dudley Pond and 4th order streams or greater; 150’ building setback from Contoocook and 4th order streams or greater
- Sufficient tree cover required within 150’ of river and naturally vegetated buffer required within 50’, 75’-125’ septic setback applying to Contoocook
- Hazardous materials are prohibited within the Shoreland Protection District. Excavation is prohibited in the Shoreland Protection District. Some other uses are prohibited in the SP District.
- Maximum allowable impervious surface area: 20%
- 50’ setback from wetlands
- Residential minimum lot size 2 acres for entire town

Recommendations

- Increase the minimum natural vegetative buffer to above the 50’ state level in the SP District.
- Add a minimum open space requirement to the SP District.
- Implement bluff setbacks.
- Require pre-construction stormwater management in site plan regulations.

Henniker

Existing Regulations

- 75’ building setback from Contoocook
- 75’ septic setback applying to Contoocook
- Largest minimum lot size 5 acres, smallest minimum lot size 20,000 sq. ft.

Recommendations

- Implement an SP District in order to regulate septic system setbacks, natural vegetation and impervious surfaces more strictly than the state does and to add provisions requiring open space and banning excavation.
- Add a provision to the excavation special exception review process to make excavation along the river more stringent and consider banning excavation along the river.
- Augment the wetland protection ordinance with wetland buffer requirements.
- Establish an Aquifer Protection District.
- Implement bluff setbacks.
- Require pre-construction stormwater management in site plan regulations.

Hillsborough

Existing Regulations

- Shoreland Protection District for any stream with normal year-round flow, 75’ building setback from Contoocook

- Largest minimum lot size 2 acres, smallest min. lot size 10,000 sq. ft.

Recommendations

- Increase the minimum septic setback to above the 50’ state level.
- Increase the minimum natural vegetative buffer to above the 50’ state level in the SP District.
- Add a maximum impervious coverage requirement below the 30% state level to the SP District.
- Add a minimum open space requirement to the SP District.
- Add a provision to the SP District banning excavation.
- Enact a wetland protection ordinance and wetland buffer requirements.
- Establish an Aquifer Protection District.
- Implement bluff setbacks.
- Require pre-construction stormwater management in site plan regulations.

<u>Hopkinton</u>

Existing Regulations

- Largest residential minimum lot size 120,000 sq. ft., smallest min. lot size 15,000 sq. ft.

Recommendations

- Implement an SP District in order to regulate building setbacks, septic system setbacks, natural vegetation and impervious surfaces more strictly than the state does and to add provisions requiring open space and banning excavation.
- Add a provision to the excavation special exception review process to make excavation along the river more stringent and consider banning excavation along the river.
- Without having an SP District, the town can extend its hazardous materials prohibition to all types of materials not just solid waste and construction debris.
- Augment the wetland protection ordinance with wetland buffer requirements.
- Establish an Aquifer Protection District.

- Implement bluff setbacks.
- Require pre-construction stormwater management in site plan regulations.

Southwest Region Towns

Antrim

Existing Regulations

- Shoreland Protection District for 4th order streams or greater, 100' building setback for primary structures from Contoocook
- 75' septic setback applying to Contoocook
- Hazardous materials are prohibited within the Shoreland Protection District. Excavation is prohibited in the Shoreland Protection District. Some other uses are prohibited within the SP District.
- Stormwater management systems required for lots in SP District with over 20% impervious surface (and 15% in Aquifer Protection District)
- 25' setback from wetlands
- Largest minimum lot size 130,000 sq. ft., smallest min. lot size 10,000 sq. ft.
- Town has Steep Slopes ordinance

Recommendations

- Increase the minimum natural vegetative buffer to above the 50' state level in the SP District.
- Add a minimum open space requirement to the SP District.
- Implement bluff setbacks.

Bennington

Existing Regulations

- Shoreland Protection District for 4th order streams or greater with year-round flow

- Excavation is prohibited within 75’ of the Contoocook. Hazardous materials are prohibited in the Water Resources Protection Zone. Some other uses are prohibited within the Water Resources Protection Zone.
- Maximum allowable impervious surface area 15% in Water Resources Protection Zone
- Largest residential minimum lot size 5 acres, smallest min. lot size .5 acres

Recommendations

- Increase the minimum septic setback in the SP District to above the 75’ state level.
- Increase the minimum natural vegetative buffer to above the 50’ state level in the SP District.
- Add a maximum impervious coverage requirement below the 30% state level to the SP District.
- Add a minimum open space requirement to the SP District.
- Enact a wetland protection ordinance and wetland buffer requirements.
- Implement bluff setbacks.

<u>Greenfield</u>

Existing Regulations

- 25’ no construction or ground disturbance buffer from wetlands and 75’ septic setback from wetlands
- Largest minimum lot size four acres, smallest min. lot size 1.5 acres

Recommendations

- Implement an SP District in order to regulate building and septic system setbacks, natural vegetation, and impervious surfaces more strictly than the state does and to add provisions requiring open space and banning excavation.
- Add a provision to the excavation special exception review process to make excavation along the river more stringent and consider banning excavation along the river.
- Establish an Aquifer Protection District.
- Implement bluff setbacks.

Hancock

Existing Regulations

- 100’ building setback from Contoocook
- 125’ septic setback in Wetlands Conservation District
- Hazardous materials are prohibited within the Groundwater Protection District. Some other uses are prohibited in the Groundwater Protection District.
- 50’ building setback from lakes and ponds over ten acres, 25’ setback from perennial streams
- Largest residential minimum lot size 4 acres, smallest min. lot size 20,000 sq. ft.

Recommendations

- Implement an SP District in order to regulate septic system setbacks, natural vegetation and impervious surfaces more strictly than the state does and to add provisions requiring open space and banning excavation.
- Add a provision to the excavation special exception review process to make excavation along the river more stringent and consider banning excavation along the river.
- Augment the wetland protection ordinance with wetland building setbacks.
- Implement bluff setbacks.

Jaffrey

Existing Regulations

- 75’ building setback from Contoocook
- 200’ septic setback from wetlands with daily flow exceeding 2,000 gallons and 100’ septic setback from all other wetlands
- Hazardous materials are prohibited in all districts including the SP District. Excavation is prohibited within 75’ of the Contoocook.
- Largest residential minimum lot size 3 acres, smallest min. lot size .46 acres

Recommendations

- Increase the minimum natural vegetative buffer in the Wetlands Conservation District for the Contoocook to above the 50’ state level.
- Add a maximum impervious coverage requirement below the 30% state level to the SP District.
- Add a minimum open space requirement to the SP District.
- Implement bluff setbacks.

Peterborough

Existing Regulations

- Shoreland Protection District for nine tributary streams and ponds, 100’ building setback from Contoocook except in Downtown Commercial District where 50’
- Hazardous materials are prohibited within 1,000 ft. of the Contoocook. Excavation is prohibited within 100’ of the Contoocook, except in Downtown Commercial District where prohibited within 50’. Some other uses are prohibited within the SP District.
- 50’ setback from wetlands contiguous to surface water or over .5 acre
- Largest residential minimum lot size 3 acres, no residential min. lot size in some districts

Recommendations

- Increase the minimum septic setback in the SP District to above the 75’ state level.
- Add a maximum impervious coverage requirement below the 30% state level to the SP District.
- Add a minimum open space requirement to the SP District.
- Implement bluff setbacks.

Rindge

Existing Regulations

- Wetlands Conservation District includes surface waters

- 100’ septic setback applying to Contoocook
- Excavation is prohibited within 75’ of the Contoocook. Hazardous materials are prohibited in the Wetlands Conservation District.
- 20% maximum impervious surface area in the Aquifer Protection Zone, hazardous materials and some other uses prohibited in Aquifer Protection Zone
- 30% minimum open space requirement for lots located in Gateway East and Gateway Central Districts
- 50' minimum disturbance zone from vegetated wetlands over 3,000 sq. ft.
- Largest residential minimum lot size 3 acres, smallest min. lot size 2 acres

Recommendations

- Increase the building setback in the Wetlands Conservation District to above the 50’ state level.
- Increase the minimum natural vegetative buffer surface waters to above the 50’ state level in the Wetlands Conservation District.
- Add a maximum impervious coverage requirement below the 30% state level to the Wetlands Conservation District.
- Add a minimum open space requirement to the Wetlands Conservation District.
- Implement bluff setbacks.

<u>Stoddard</u>

Existing Regulations

- Wetlands Conservation District includes surface waters
- 50’ setback from wetlands
- Largest residential minimum lot size 2 acres, smallest min. lot size 1 acre

Recommendations

- Increase the building setback in the Wetlands Conservation District to above the 50’ state level.

- Increase the minimum septic setback in the Wetlands Conservation District to above the 75’ state level.
- Increase the minimum natural vegetative buffer to above the 50’ state level in the Wetlands Conservation District.
- Add a maximum impervious coverage requirement below the 30% state level to the Wetlands Conservation District.
- Add a minimum open space requirement to the Wetlands Conservation District.
- Add a provision to the Wetlands Conservation District banning excavation along the river.
- Implement bluff setbacks.

QUESTIONS	Central New Hampshire Regional Planning Commission Towns		
	Boscawen	Concord	Deering
Dates of last update/amendment (month/yr) of each ordinance	2004	Mar-08	2008
Density and/or Minimum Lot Size Requirements (1 residential unit)	10,000 sq. ft. to 2 acres	7,500 sf to 2 Ac; 5,000 sf to 20,000 buildable	2 acres
Septic System Setbacks from Wetlands or Surface Waters?	All septic systems in the Shoreland Protection District shall be a minimum of one hundred feet from the ordinary high water mark.	75' to 125'	75' to 125'
Is there a Wetland Protection Ordinance?	Yes	Yes	Yes
Are there Wetland Buffer Requirements?	50'. On steep grades, up to 200' buffer. Town is revising its master plan and hopes to improve the buffers for wetlands and surface waters, which are now same as State.	50'	50'
Are there Shoreland Protection Zones or Districts?	Yes, nine tributary streams and ponds.	Yes, Great Ponds, 4th order streams or greater; Penacook Lake District	Yes, 4th order streams or greater, Deering Reservoir and Dudley Pond.
Are there Setbacks from Contoocook/North Branch River?	150' from high water mark	Partial (depending upon use & part of river), 75' - 250'	150' from high water mark
Are there Setbacks or Buffers for Streams Third Order or Lower?	25' for listed streams; 100 year floodplain area where present	75', depends upon use	150'
Open Space Requirements within Conservation and Watershed Districts	No, but open space requirements are part of the cluster development ordinance; cluster developments permitted by right in all districts except the R2 Zone where it is permitted by Special Exception. Cluster development ordinance conflicts as it states that all applications require a Special Exception.	Maximum Density: 1/4 a unit per buildable acre; Minimum Tract Requirements: 70% minimum open space, 5% maximum lot coverage	Sufficient tree cover required within 150' of river; open space requirements are part of the cluster development ordinance. Cluster development is required for all subdivisions of 20 acres or more, and are allowed by-right throughout town except in special districts.
Are there Impervious area restrictions for Aquifer protection or other Zones?	No	15%	20% in Shoreland Protection District
Are there Bluff Setbacks?	None	50' horizontal, uphill; entire ravine when bottom of bluff is ravine	None
Are there Naturally Vegetated Buffer Requirements?	50'	75' to 250'	50' and sufficient tree cover required within 150' of river

Are there requirements for protection of fish and wildlife habitat?	Habitat corridors identified in Master Plan	See above description of Shoreland Protection District	See above description of Shoreland Protection District
Are there protections of other significant open space and natural areas?	See above description of Cluster development ordinance.	Flood Hazard District; Penacook Lake Watershed Protection District	Aquifer Protection District; Flood Plain District
Does the town allow for Alternative Development Types (ex. Cluster)?	Yes; cluster developments	Yes; Cluster, PUD,	Yes; cluster ("open space")
Is there Hazardous Material Regulation?	Yes, prohibited in Aquifer and Shoreland Protection districts.	Not specifically, but some uses prohibited in SP; gasoline sales subject to supplementary regs	Yes, prohibited in Aquifer and Shoreland Protection districts.
Are there Town Excavation Regulations (dredging, filling, mining and earth moving)?	Yes, allowed by Special exception only throughout Town.	Yes, allowed by conditional use permit only throughout Town.	Yes, allowed by Special exception only throughout Town.
Are there Town-level excavation setback requirements from Contoocook/North Branch River?	No excavation allowed within SP district	up to 250' along portions of the river per SP overlay district requirements	No excavation allowed within SP district
Are there Town-level excavation setback requirements from Surface Water?	No excavation allowed within SP district	75' to 250' per requirements of SP overlay district	No excavation allowed within SP district
Are there Town-level excavation setback requirements from Wetlands?	Not specifically	Not specifically	Not specifically
Are there Town-level excavation setback requirements from 3rd order streams (or lower)?	25' per requirements of SP overlay district	75' per requirements of SP overlay district	150' per requirements of SP overlay district
Is there a community Open Space plan that recommends land preservation along the Contoocook/North Branch River?	There is not a specific open space plan along the river, per se, but the 2001 Master plan depicts some areas of existing protection along the river.	Yes; select locations along the river	No specific open space plan, but Master Plan advocates preservation of amenities and attainment of a public access point.
Is there an aquifer protection overlay District along the Contoocook/North Branch River?	Yes	No; there is a shoreland protection ordinance	Yes

Are there Lot Coverage Requirements?	20%-40%	10% to 85%	30% maximum
Do site plan regulations govern pre-construction stormwater management?	Yes	Yes	Yes
Do site plan regulations govern post-construction storm water management?	Yes and stormwater management systems are required for lots with over 15% impervious surface coverage.	Yes	Yes
Does community have a floodplain development ordinance?	Yes	Yes	Yes
What Innovative Land Use Techniques are being used by the community (RSA 674:21)?	Cluster Subdivision	Cluster Developments; PUDs; performance districts.	Cluster Subdivision

QUESTIONS	Central New Hampshire Regional Planning Commission Towns		
	Henniker	Hillsborough	Hopkinton
Dates of last update/amendment (month/yr) of each ordinance	Mar-09	2002	Mar-09
Density and/or Minimum Lot Size Requirements (1 residential unit)	20,000 sq. ft. to 5 acres	10,000 sq. ft. to 2 acres	15,000 sq. ft. to 120,000 sq. ft.
Septic System Setbacks from Wetlands or Surface Waters?	75' from surface waters	No	75' from wetlands
Is there a Wetland Protection Ordinance?	Yes	No	Yes
Are there Wetland Buffer Requirements?	No	No	No
Are there Shoreland Protection Zones or Districts?	No	Yes, any stream with normal year-round flow.	No
Are there Setbacks from Contoocook/North Branch River?	75'	75'	No
Are there Setbacks or Buffers for Streams Third Order or Lower?	None	75' if year-round flow	No
Open Space Requirements within Conservation and Watershed Districts	No such districts, but open space requirements are part of the cluster development ordinance. Cluster development is permitted by-right in all residential districts.	No such districts, but open space requirements are part of the cluster development ordinance. Cluster developments are allowed as a conditional use in all residential districts.	No such districts, but open space requirements are part of the cluster development ordinance. All subdivisions are to be developed as cluster subdivisions unless receive special use permit.
Are there Impervious area restrictions for Aquifer protection or other Zones?	No	No	No
Are there Bluff Setbacks?	None	None	None
Are there Naturally Vegetated Buffer Requirements?	No	No	No
Are there requirements for protection of fish and wildlife habitat?	Cited in Wetlands Conservation zoning article.	No	Cited in Conservation Subdivision ordinance.
Are there protections of other significant open space and natural areas?	Floodplain Development ordinance; Cluster ("open space") development ordinance.	Floodplain Development ordinance; Rural District created to preserve open space characteristics of town's outlying areas	Floodplain Development ordinance; low density residential districts created to provide for open space conservation.

Does the town allow for Alternative Development Types (ex. Cluster)?	Yes; cluster ("open space")	Yes; cluster ("open space")	Yes; cluster ("conservation")
Is there Hazardous Material Regulation?	Prohibited where impacts wetlands only.	None	No facilities storing solid waste or construction and demolition debris allowed within 300' of high water mark of river or streams.
Are there Town Excavation Regulations (dredging, filling, mining and earth moving)?	Excavation within 100 ft. of waterways must be filled back in within 90 days.	No	Yes, allowed by Special exception only throughout Town, except in granite quarries.
Are there Town-level excavation setback requirements from Contoocook/North Branch River?	No	No	No
Are there Town-level excavation setback requirements from Surface Water?	No	No	No
Are there Town-level excavation setback requirements from Wetlands?	No	No	No
Are there Town-level excavation setback requirements from 3rd order streams (or lower)?	No	No	No
Is there a community Open Space plan that recommends land preservation along the Contoocook/North Branch River?	Natural Resources Inventory; improving quality of river for humans and wildlife cited in conservation chapter of Master Plan.	Master Plan identifies Contoocook and tributary brook as water resource priorities and advocates preservation of aquifer near Contoocook.	Zoning ordinance identifies Contoocook as drinking water source and Master Plan identifies river as primary town asset.
Is there an aquifer protection overlay District along the Contoocook/North Branch River?	No	No; there is a shoreland protection ordinance	No
Are there Lot Coverage Requirements?	10% to 16% including all habitable floor area for multi-unit dwellings of three units or more	20% to 25%	20% to 40%
Do site plan regulations govern pre-construction stormwater management?	No	No	No

Do site plan regulations govern post-construction storm water management?	Yes	Yes	Yes, storm drainage systems are to be well-designed to avoid polluting rivers, river frontage, and other water resources.
Does community have a floodplain development ordinance?	Yes	Yes	Yes
What Innovative Land Use Techniques are being used by the community (RSA 674:21)?	Cluster Subdivision	Cluster Subdivision	Cluster Subdivision; phased development/growth management bylaw; inclusionary zoning for affordable housing.

QUESTIONS	Southwest Region Planning Commission Towns		
	Antrim	**Bennington**	**Greenfield**
Dates of last update/amendment (month/yr) of each ordinance	Mar-09	Mar-07	Mar-09
Density and/or Minimum Lot Size Requirements (1 residential unit)	10,000 sq. ft. to 90,000 sq. ft in areas served by public water and sewer; 90,000 sq. ft to 130,000 sq. ft. in areas not served by public water and sewer	0.5 acres to 5 acres	1.5 acres to 4 acres
Septic System Setbacks from Wetlands or Surface Waters?	75' from wetlands; 75' from rivers and streams; Depending on soil/slope conditions, 75' to 125' from ponds, lakes, estuaries	Does not mention specific setbacks; All systems must comply with NH State Standards	75' from wetlands
Is there a Wetland Protection Ordinance?	Yes	No	Yes
Are there Wetland Buffer Requirements?	25'	No	25' no construction or ground disturbance buffer
Are there Shoreland Protection Zones or Districts?	Yes	No	No
Are there Setbacks from Contoocook/North Branch River?	50' from reference line (high water mark); No primary structure shall be built within 100' of reference line	No	No
Are there Setbacks or Buffers for Streams Third Order or Lower?	50' setback from reference line of all year round flowing waters of 4th order or higher	No	No
Open Space Requirements within Conservation and Watershed Districts	No, but open space requirements are part of Open Space Residental Development (OSRD) ordinance; Depending on the zoning district, between 40% to 60% of the total parcel must be designated as permanent common open space in OSRD	No, but open space requirements are part of the Open Space Residential Development (OSRD) ordinance; 50% of the tract must be designated as permanent open space	No, but open space requirements are part of the Open Space Residential Development (OSRD) ordinance; 40% of the tract must be designated as permanent open space
Are there Impervious area restrictions for Aquifer protection or other Zones?	Yes; In the Shoreland Protection Zone, no > than 30% of the lot should be impervious surface (If impervious area exceeds 20% a stormwater management system shall be implemented and maintained); In the Aquifer and Wellhead Protection Zone, a stormwater management plan must be created for a lot if the total impervious surface area exceed 15% or 2500 sq. ft. (whichever is greater).	Yes, in the Water Resource Protection Zone impervious surface areas may not exceed more than 20% of the lot area.	No
Are there Bluff Setbacks?	No	No	No

Are there Naturally Vegetated Buffer Requirements?	150' natural woodland buffer from the reference line of shorelands adjacent to public waters	Yes, the Open Space Residential Development ordinance requires a 50' landscaped buffer (requires retaining natural vegetation wherever possible) to screen development where appropriate	No
Are there requirements for protection of fish and wildlife habitat?	Within the 150' natural woodland buffer required in the Shoreland Protection District, the preservation of dead/living trees that provide habitat for wildlife and planting of native species beneficial to wildlife are encouraged. Also, the ordinance stipulates that buildings should be sited to minimize impact on habitat.	No	No
Are there protections of other significant open space and natural areas?	See above description of Open Space Residential Development Ordinance	Open Space Residential Development ordinance requires 50% of tract remain permanently designated open space	Open Space Residential Development Ordinance requires
Does the town allow for Alternative Development Types (ex. Cluster)?	Yes; Cluster Developments and Open Space Residential Developments	Yes; the town allows for Open Space Residential Development	Yes; The town has an Open Space Development Ordinance
Is there Hazardous Material Regulation?	Yes, facilities that generate, treat, store or dispose of hazardous waste are prohibited in the Aquifer and Shoreland Protection districts	Yes; In the Water Resource Protection Zone all on-site handling, disposal, storage, processing or recycling of hazardous material is prohibited.	Not specifically; however, no use that emits hazardous waste is allowed in the Business District and no hazardous material may be discharged on the site of any personal wireless facility.
Are there Town Excavation Regulations (dredging, filling, mining and earth moving)?	Yes, the Town of Antrim Earth Excavation and Reclamation Regulations (last amended in 2005); Excavation of sand and gravel is prohibited in the Shoreland Protection District. Also, excavation within protected shoreland must be in accordance with RSA 541-A and RSA 485-A:17	Yes, the Town has separate regulations governing earth excavations; Excavation is prohibited in the Water Resource Protection Zone and allowed only in the Rural / Agricultural Zone by Special Permit	Yes, the Town of Greenfield Regulations Governing Earth Excavations (last amended in 1990)
Are there Town-level excavation setback requirements from Contoocook/North Branch River?	No excavation of sand or gravel in Shoreland Protection Districts	75'	No
Are there Town-level excavation setback requirements from Surface Water?	No excavation of sand or gravel in Shoreland Protection Districts	75' from any navigable river or any standing body of water > 10 acres; 25' from any naturally occuring body of water < 10 acres	No

Are there Town-level excavation setback requirements from Wetlands?	Not specifically	25' of prime wetlands or wetlands greater than 5 acres	No
Are there Town-level excavation setback requirements from 3rd order streams (or lower)?	Not specifically	25' from any stream, river, or brook that normally flows throughout the year	No
Is there a community Open Space plan that recommends land preservation along the Contoocook/North Branch River?	Yes, the Open Space Conservation Plan of 2006	No	No
Is there an aquifer protection overlay District along the Contoocook/North Branch River?	Yes	Yes; the Water Resource Protection District	Yes; the Groundwater Protection District
Are there Lot Coverage Requirements?	30-40%	30%	No
Do site plan regulations govern pre-construction stormwater management?	Yes	Yes (Subdivision Regulations)	Yes
Do site plan regulations govern post-construction storm water management?	Yes	Yes (Subdivision Regulations)	Yes
Does community have a floodplain development ordinance?	Yes	Yes	Yes
What Innovative Land Use Techniques are being used by the community (RSA 674:21)?	Open Space Residential Development Ordinance; Steep Slope Ordinance; Small Wind Energy Systems Ordinance	Open Space Residential Development Ordinance	Open Space Development Plan Ordinance

QUESTIONS	Southwest Region Planning Commission Towns		
	Hancock	Jaffrey	Peterborough
Dates of last update/amendment (month/yr) of each ordinance	Jun-09	Mar-09	May-09
Density and/or Minimum Lot Size Requirements (1 residential unit)	20,000 sq. ft. to 4 acres	1 acre to 3 acres (where there is no sewer); 0.46 acres to 3 acres (where there is sewer)	No Minimum to 3 acres (5 acres for office parks)
Septic System Setbacks from Wetlands or Surface Waters?	125' from edge of any portion of Wetlands Conservation District	100' from wetlands (200' buffer from wetlands if daily flow > 2000 gal); 175' leach field setback from shoreline	50' setback from wetlands contiguous to surface water or > 1/2 acre
Is there a Wetland Protection Ordinance?	Yes	Yes	Yes
Are there Wetland Buffer Requirements?	100' from high water line of Contoocook River; 50' from high water mark of lakes and ponds > 10 acres; 25' from stream edge of all perennial streams	No	50' setback from wetlands contiguous to surface water or > 1/2 acre
Are there Shoreland Protection Zones or Districts?	No	Yes	Yes
Are there Setbacks from Contoocook/North Branch River?	100' from High Water Line	75' from shoreline	100' from natural high water mark; 50' from natural high water mark in Downtown Commercial district
Are there Setbacks or Buffers for Streams Third Order or Lower?	25' from stream edge of perennial streams	No	100' from natural high water mark; 50' from natural high water mark in Downtown Commercial district
Open Space Requirements within Conservation and Watershed Districts	No	In Open Space Development or Village Plan Alternative there min of 40% of parcel must be designated as open space, for every 10% increase in open space the developer receives a 5% development density bonus	No, but the 25% of the area of the entire commerce park shall be retained in its natural state or be provided with landscaping, 20% of tracts in Retirement Community District shall remain common open space; A minimum of 50% of Open Space Residential Developments shall be designated permanent open space. In this district a development density bonus of 10% is given where the proposed plan shows 60% or more of the tract as open space protected as such in perpetuity, OR 20% where the proposed OSRD plan shows 70% or more of the tract as open space protected as such in perpetuity.

Are there Impervious area restrictions for Aquifer protection or other Zones?	Yes, if more than 15 % or greater than 2,500 sq. ft. of a lot in the Grounwater Protection District is impervious a stormwater management plan is required	Open Space Development or Village Plan Alternative Ordinance requires impervious areas be kept to a minimum; No impervious cover is allowed in Wetlands Conservation District.	Yes; No lot in Village Commercial, West Peterborough, Monadnock Community Health Care, Commercial, Downtown Commerical, or Business Industrial Districts may have more than 80% impervious cover
Are there Bluff Setbacks?	No	No	No
Are there Naturally Vegetated Buffer Requirements?	No	Yes, where existing a natural woodlands buffer shall be maintained within 150' of shoreline	
Are there requirements for protection of fish and wildlife habitat?	No	No	
Are there protections of other significant open space and natural areas?	No	See above description of Open Space Development Plan or Village Plan Alternative Ordinance	See description of open space requirements in districts above
Does the town allow for Alternative Development Types (ex. Cluster)?	No mention of cluster or alternative developments in Zoning Ordinance or Subdivision Regulations	Yes; Open Space Development Plan and Village Plan Alternative	Yes; Open Space Residential Developments
Is there Hazardous Material Regulation?	The siting or operation of a hazardous waste disposal facility as defined under NH RSA 147-A is prohibited in the Groundwater Protection District; Any permitted facility must provide a plan certified by a professional engineer that explains the proposed use and methods for handling and monitoring hazardous materials	The establishment or use of private or commercial facilities for the storage and/or disposal of hazardous wastes is prohibited in all districts.	Storage or handling of any volatile or hazardous materials are not allowed within 1000' of the Contoocook River
Are there Town Excavation Regulations (dredging, filling, mining and earth moving)?	Yes; Excavation is prohibited in all districts (unless by Special Exception or Building Permit); The town may excavate for purpose of highway construction and maintenance in a manner consistent with NH RSA 155-E:2, IV.	Yes; The Town of Jaffrey Regulations Governing Earth Excavation (last amended 2008)	Yes; The Town of Peterborough Excavation Regulations (Chapter 238)
Are there Town-level excavation setback requirements from Contoocook/North Branch River?	Not specifically, see above.	75'	No specific mention aside from 100' setback from high water mark (50' in Downtown Commercial district)
Are there Town-level excavation setback requirements from Surface Water?	No Specific Setback	75' from lake or pond >10 acres; 25' body of water < 10 acres	No specific mention aside from 100' setback from high water mark (50' in Downtown Commercial district)

Are there Town-level excavation setback requirements from Wetlands?	No Specific Setback	25' of prime wetland as designated in accordance with RSA 482-A:15, I, or any other wetland > 5 acres	50'
Are there Town-level excavation setback requirements from 3rd order streams (or lower)?	No Specific Setback	25' any other stream, river, or brook that normally flows through out the year	No specific mention aside from 100' setback from high water mark (50' in Downtown Commercial district)
Is there a community Open Space plan that recommends land preservation along the Contoocook/North Branch River?	No	The Jaffrey Natural Resource Inventory (2009) identifies Jaffrey downtown from Contoocook Lake to Cheshire Pond and to the Mountain Brook Reservoir as one of the top five conservation priorities	The 2003 Master Plan has an Open Spaces chapter that identifies land along the Contoocook River as priority for protection (The "Contoocook River Project" in 2001 conserved over 80 acres along the River that were slated for 12 house lots.)
Is there an aquifer protection overlay District along the Contoocook/North Branch River?	Yes; the Groundwater Protection District	No	Yes
Are there Lot Coverage Requirements?	No	No	25-75%
Do site plan regulations govern pre-construction stormwater management?	Yes (Subdivision Regulations)	Yes	Yes
Do site plan regulations govern post-construction storm water management?	Yes (Subdivision Regulations)	Yes	Yes
Does community have a floodplain development ordinance?	Yes	Yes	Yes
What Innovative Land Use Techniques are being used by the community (RSA 674:21)?	Small Wind Energy Systems Ordinance	Village Plan Alternative and Open Space Development Plan Ordinances	Open Space Residential Development Ordinance

QUESTIONS	Southwest Region Planning Commission Towns	
	Rindge	Stoddard
Dates of last update/amendment (month/yr) of each ordinance	Mar-09	2003
Density and/or Minimum Lot Size Requirements (1 residential unit)	2 acres to 3 acres	1 acre to 2 acres
Septic System Setbacks from Wetlands or Surface Waters?	100' setback from surface waters and vegetated wetlands for septic systems; 50' setback for septic system piping	No specific setback stated aside from 50' natural vegetated buffer from wetlands and surface waters
Is there a Wetland Protection Ordinance?	Yes	Yes
Are there Wetland Buffer Requirements?	Yes; 50' minimum disturbance zone from vegetated wetlands > 3,000 sq.ft.	50' natural vegetated buffer must be left along the edge of the water or wetland
Are there Shoreland Protection Zones or Districts?	No; However, surface waters are included in Wetland Conservation District	No; However, surface waters are included in Wetlands Conservation District
Are there Setbacks from Contoocook/North Branch River?	150' minimum disturbance zone from high water mark of all surface waters	50' natural vegetated buffer
Are there Setbacks or Buffers for Streams Third Order or Lower?	150' minimum disturbance zone from high water mark of all surface waters	50' natural vegetated buffer
Open Space Requirements within Conservation and Watershed Districts	30% minimum open space requirement on lots located in Gateway East and Gateway Central Districts	At least 40% of Planned Residential Development tracts must be designated as open space
Are there Impervious area restrictions for Aquifer protection or other Zones?	Land uses that will render over 20% of the parcel impervious to surface water infiltration are prohibited in Aquifer Protection District; No impervious surface is allowed within 50' of ordinary high water mark of surface waters and vegetated wetlands (if impervious roads or driveways are constructed within the Wetland Conservation District they must be constructed to collect all surface water runoff and divert it to an area at least 50' from vegetated wetland or surface water using Best Management Practices)	No
Are there Bluff Setbacks?	No	No

Are there Naturally Vegetated Buffer Requirements?	Where existing, a Natural Woodland and vegetated buffer shall be maintained within 150' of the Ordinary High Water Mark of Surface Waters and within 50' of Vegetated Wetlands	Yes, a 50' buffer of natural vegetation required along edge of water or wetland
Are there requirements for protection of fish and wildlife habitat?	No	No
Are there protections of other significant open space and natural areas?	See above description of open space requirements in Gateway East and Central Districts	See above description of Planned Residential Developments
Does the town allow for Alternative Development Types (ex. Cluster)?	Village Plan Alternative is allowed by Special Exception in Rural Agricultural District	Yes; Planned Residential Developments
Is there Hazardous Material Regulation?	No hazardous waste facilities or storage of hazardous waste within 250 feet of Surface Waters or Vegetated Wetlands; All on site handling, disposal, storage, processing or recycling and any subsurface storage of hazardous materials is prohibited in Aquifer Protection District.	No
Are there Town Excavation Regulations (dredging, filling, mining and earth moving)?	Yes; The Town of Rindge Regulations Governing Earth Excavation (adopted 1991)	Ho
Are there Town-level excavation setback requirements from Contoocook/North Branch River?	75'	No
Are there Town-level excavation setback requirements from Surface Water?	75' from lake or pond >10 acres; 25' body of water < 10 acres	No
Are there Town-level excavation setback requirements from Wetlands?	25' of prime wetland as designated in accordance with RSA 482-A:15, I, or any other wetland > 5 acres	No
Are there Town-level excavation setback requirements from 3rd order streams (or lower)?	25' any other stream, river, or brook that normally flows through out the year	No

Is there a community Open Space plan that recommends land preservation along the Contoocook/North Branch River?	The Natural Resource section of the 2006 Master Plan identifies pursuing easements for buffers along the Contoocook River and updating the River Management Plan for the Contoocook River	No
Is there an aquifer protection overlay District along the Contoocook/North Branch River?	Yes; the Aquifer Protection Ordinance	No
Are there Lot Coverage Requirements?	No	No
Do site plan regulations govern pre-construction stormwater management?	Yes	To a limited extent
Do site plan regulations govern post-construction storm water management?	Yes	To a limited extent
Does community have a floodplain development ordinance?	Yes	No
What Innovative Land Use Techniques are being used by the community (RSA 674:21)?	Village Plan Alternative allowed by Special Exception in the Rural Agricultural District	Planned Residential Development Ordinance

Appendix J

Contoocook and North Branch Rivers Landowner and Public Officials Survey
October-December 2009

1. Do you own property in any of the following towns?

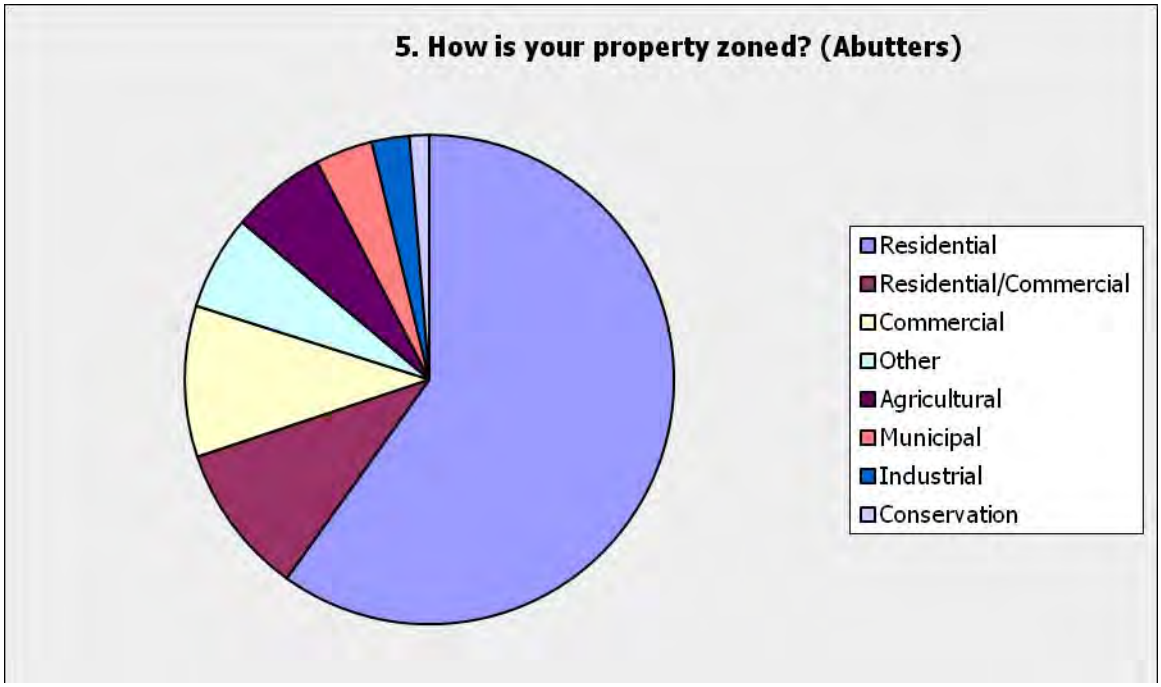
Sub-group	Abutters		Non-abutters	
Answer Options	**Response Percent**	**Response Count**	**Response Percent**	**Response Count**
Concord	1.2%	1	0.0%	0
Peterborough	27.2%	22	0.0%	0
Hillsborough	16.0%	13	4.2%	1
Hancock	9.9%	8	0.0%	0
Henniker	9.9%	8	58.3%	14
Antrim	17.3%	14	0.0%	0
Deering	3.7%	3	4.2%	1
Bennington	9.9%	8	12.5%	3
Hopkinton	3.7%	3	0.0%	0
W. Hopkinton	1.2%	1	0.0%	0
Greenfield	7.4%	6	4.2%	1
Stoddard	2.5%	2	8.3%	2
Jaffrey	2.5%	2	0.0%	0
Boscawen	1.2%	1	0.0%	0
Contoocook	12.3%	10	0.0%	0
Rindge	1.2%	1	8.3%	2
Penacook	0.0%	0	0.0%	0
		answered question		**105**
		skipped question		**1**

2. Does your land abut the Contoocook River or North Branch River?

Answer Options	Response Percent	Response Count
Yes	76.4%	81
No	23.6%	25
	answered question	**106**
	skipped question	**0**

3. Did the Contoocook or North Branch River play a role in your decision to live here?				
Sub-group	**Abutters**		**Non-abutters**	
Answer Options	**Response Percent**	**Response Count**	**Response Percent**	**Response Count**
Yes	58.8%	47	32.0%	8
No	33.8%	27	60.0%	15
N/A	7.5%	6	8.0%	2
		answered question		**105**
		skipped question		**1**

4. How many years have you or your family enjoyed living near the Contoocook or North Branch River?		
Answer Options	**Response Percent**	**Response Count**
0-10 years	38.8%	38
10-25 years	28.6%	28
25-50 years	21.4%	21
50+ years	11.2%	11
	Mean	**24 years**
	Median	**15 years**
	answered question	**98**
	skipped question	**8**



6. List three things that you like best about the river.		
Answer Options	**Response Percent**	**Response Count**
Aesthetic qualities (views and sounds)	69%	61
Wildlife/fishing	49%	44
Canoeing/kayaking/boating	29%	26
Other	29%	26
Quietness/privacy	19%	17
Other recreation (hunting, hiking, biking)	18%	16
Cleanliness	16%	14
Undeveloped space/greenspace	12%	11
Swimming	9%	8
Cultural/historical sites	2%	2
	answered question	**89**
	skipped question	**17**

Other values include: attracting visitors to the region; a place for kids to play; productive potential; and beauty in combination with other features.

7. What recreational activities do you or other members of your household enjoy on or along the Contoocook or North Branch Rivers? Please check all that apply.		
Answer Options	**Response Percent**	**Response Count**
Walking	79.3%	73
Canoeing/kayaking	69.6%	64
Birding/wildlife watching	63.0%	58
Fishing	59.8%	55
Nature photography	39.1%	36
Swimming	37.0%	34
Cross-country skiing	26.1%	24
Hunting	23.9%	22
Other	20.7%	19
	answered question	**92**
	skipped question	**14**

The other recreational activity with the most responses is biking (6). Other responses include: just looking at it, horseback riding, tubing, haying for agriculture, and boating in Powder Mill Pond.

8. How many times per year/season do you enjoy some aspect of the Contoocook or North Branch River?		
Answer Options	**Response Percent**	**Response Count**
1-3 times	6.5%	6
4-7 times	6.5%	6
8-11 times	9.7%	9
12+ times	77.4%	72
answered question		**93**
skipped question		**13**

9. Do you permit public access across your property? If yes, please list which uses you allow.		
Sub-group	**Abutters**	
Answer Options	**Response Percent**	**Response Count**
Walking	10.3%	8
Canoeing/kayaking	9.0%	7
Birding/wildlife watching	0.0%	0
Fishing	15.4%	12
Nature photography	1.3%	1
Swimming	0.0%	0
Cross-country skiing	0.0%	0
Hunting	6.4%	5
All activities listed in Question 7	11.5%	9
Motorized boating	3.8%	3
Timber harvesting	1.3%	1
Snowmobiling	1.3%	1
Camping	0.0%	0
Trapping	1.3%	1
Yes - uses not specified	6.4%	5
No	51.3%	40
N/A	6.4%	5
answered question		**93**
skipped question		**13**

10. Have you had any problems related to public use of the Contoocook or North Branch River on or near your property? If yes, what kind? Please describe briefly.		
Answer Options	**Response Percent**	**Response Count**
No	67%	61
Litter	7%	6
Noise	7%	6
Trespassing	4%	4
Problems w/ motorized boats (noise, wake, invasive species, oil/gas residues)	3%	3
Unauthorized land-based motorized vehicle use	2%	2
Unauthorized hunting	2%	2
Theft	1%	1
N/A	8%	7
answered question		**91**
skipped question		**15**

11. Have you noticed any of the following trends along the Contoocook or North Branch Rivers? Please check all that apply.		
Answer Options	**Response Percent**	**Response Count**
Excessive erosion and/or bank destabilization	42.6%	29
Recreational abuses (rowdy behavior, over-crowding, noise, littering)	42.6%	29
Stormwater runoff/non-point source pollution	30.9%	21
Exotic species	29.4%	20
Illegal dumping	23.5%	16
Lack of enforcement	22.1%	15
Other	22.1%	15
Sedimentation	20.6%	14
Land conversion (i.e. loss of farmland/forest)	17.6%	12
Disturbance to wetlands	17.6%	12
Loss of fish/wildlife habitat	14.7%	10
Inadequate public access	13.2%	9
Loss or damage to historical or cultural sites	4.4%	3
Failing septic systems	2.9%	2
Haven't noticed any trends	2.9%	2
answered question		**68**
skipped question		**38**

Other trends noticed include flooding, hydro plants not operating, increased industry in proximity to the Contoocook River, and over-regulation.

12. From the list above, please choose the ones that concern you the most, ranked from highest to lowest (1 being most concern, 3 being least concern).			
Answer Options	**1. Most concern**	**2.**	**3. Least concern**
Excessive erosion and/or bank destabilization	13	10	4
Stormwater runoff/non-point source pollution	12	4	2
Illegal dumping	8	2	4
Recreational abuses (rowdy behavior, over-crowding, noise, littering)	7	15	4
Exotic species	6	4	1
Other (please specify)	6	3	2
Land conversion (i.e. loss of farmland/forest)	5	2	4
Loss of fish/wildlife habitat	4	2	2
Failing septic systems	2	1	0
Lack of enforcement	2	1	4
Sedimentation	2	5	1
Inadequate public access	1	2	2
Disturbance to wetlands	0	3	3
Loss or damage to historical or cultural sites	0	0	1
		answered question	**68**
		skipped question	**38**

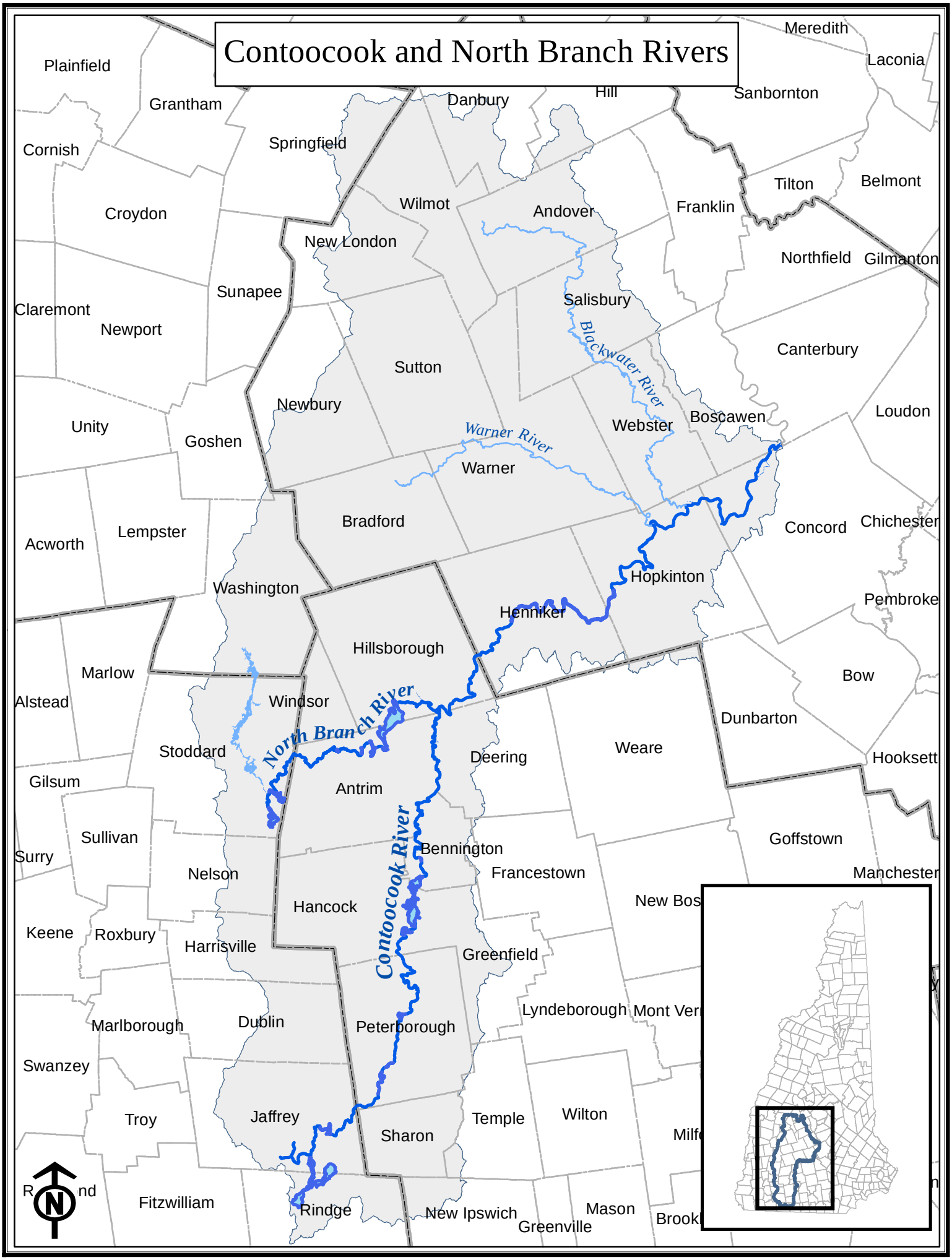
Other concerns include: under-utilization of dams to prevent flooding, increased industry and land development, over-regulation of timber harvesting and other activities, and hydro plants not operating.

13. Rank the measures (1 being the highest, 21 being lowest) needed to protect the Contoocook and North Branch Rivers.

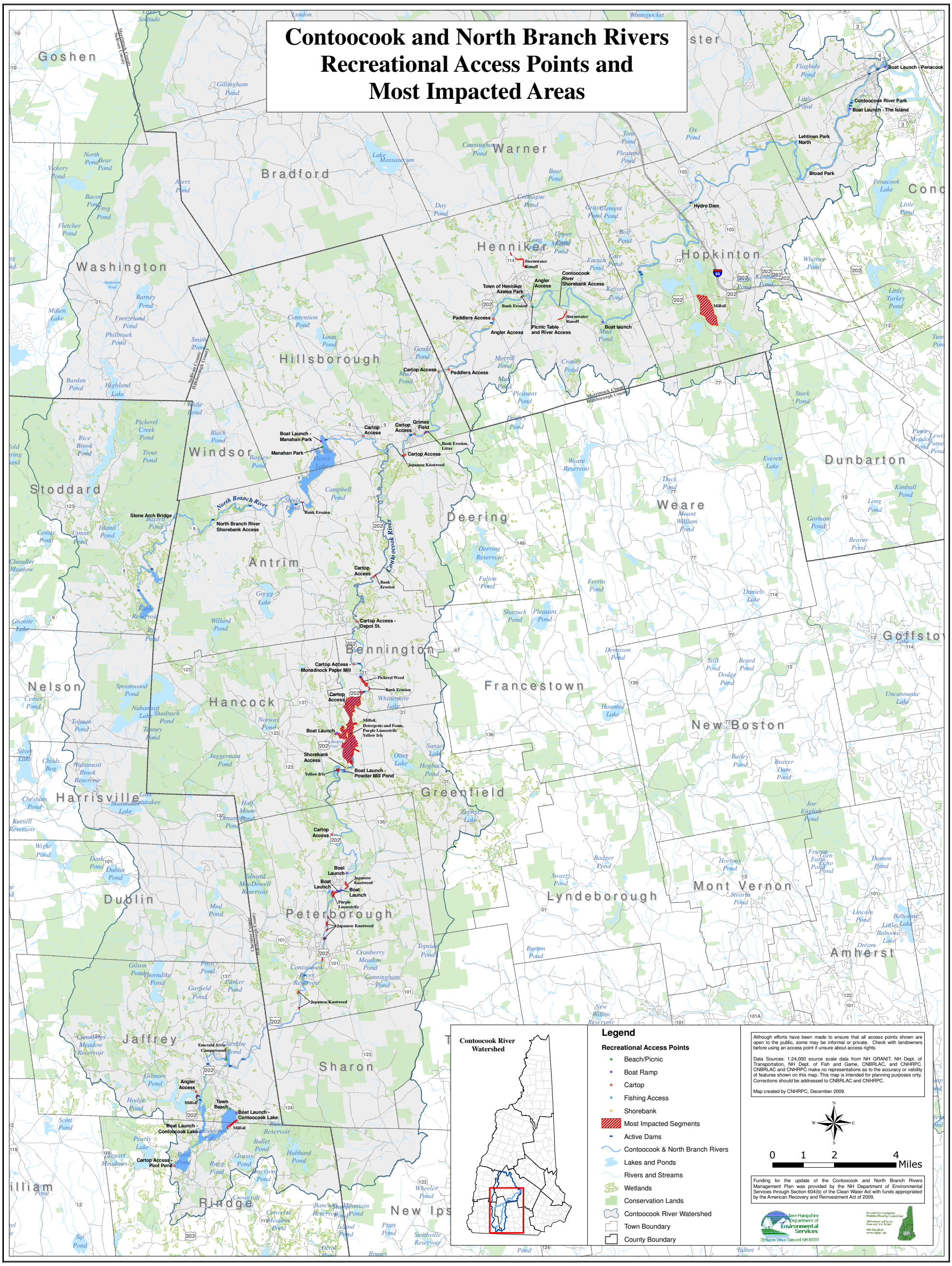
Ranking

Answer Options	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
More incentives for landowners to voluntarily manage land appropriately	14	6	5	5	1	4	0	1	2	0	1	1	2	1	5	3	2	1	0	0	1	55
Wetland conservation and protection	13	7	2	8	2	1	2	2	3	2	2	1	2	3	1	1	1	0	0	0	2	55
Water quality monitoring with local volunteers	13	3	3	4	5	2	4	5	2	3	0	1	2	2	4	1	1	2	0	0	1	58
No additional protection needed	13	3	0	2	1	0	0	0	0	0	0	0	0	0	0	2	1	2	3	11	8	46
Limit shoreline development through land use zoning	12	4	6	5	3	4	1	5	2	1	1	0	1	2	0	0	3	0	3	1	1	55
Conservation easements to protect sensitive areas	11	6	4	5	6	1	4	1	2	4	1	2	1	0	1	0	1	3	0	0	1	54
Landowner education	11	1	4	1	4	4	4	4	2	9	3	0	2	1	2	1	1	0	0	0	1	55
Community education	10	1	1	6	2	5	5	2	4	3	2	5	0	1	1	4	0	0	0	0	1	53
Open space/conservation planning in subdivision designs	8	1	10	4	2	1	1	1	1	3	5	5	2	3	1	1	1	1	0	0	2	53
Adoption of water quality goals, objectives, and recommendations into local Master Plans	8	6	5	5	1	4	6	2	3	1	5	1	2	0	2	3	1	0	0	0	1	56
Other	8	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	8	19
Conservation planning in utility and highway projects	7	9	5	3	0	3	3	1	2	6	3	5	2	2	0	1	1	0	1	0	1	55
Stricter enforcement of local and state regulations	7	3	4	1	0	2	0	0	3	0	1	2	2	1	7	2	2	4	1	1	3	46
Stronger state regulations	7	2	1	0	4	1	0	2	1	2	0	0	0	3	3	3	3	1	5	1	3	42
Academic education (elementary, middle school, high school, and college)	7	2	1	1	4	2	4	3	4	2	2	4	4	1	4	2	0	0	0	0	1	48
Establishing and maintaining riparian buffers	6	2	4	2	4	1	1	2	4	1	3	6	2	2	3	2	2	1	0	1	1	50
Fewer state regulations	6	3	3	0	1	1	1	0	1	1	1	0	1	1	0	3	1	5	7	4	4	44
Fewer local regulations	6	2	2	1	1	1	0	2	1	1	0	0	3	0	1	1	4	6	7	2	2	43
Coordination of planning among watershed towns	5	6	4	4	6	2	3	1	1	1	2	4	4	4	2	3	0	1	0	0	1	54
Stronger local regulations	4	3	5	3	1	1	1	0	2	3	1	1	1	4	2	2	4	1	2	3	2	46
Conducting outreach to residents and visitors	3	5	2	2	3	5	2	4	2	2	3	4	4	5	1	0	1	0	0	1	1	50

Other priority measures include: aggressive millfoil control/removal; improved measures to notify residents regarding dam usage or fluctuations in water quality; wetlands conservation; rezoning commercial/industrial land; establishing a hydro or other green source power facility; and posting and enforcement of speed and wake limits on power boats.


Contoocook and North Branch Rivers
Plainfield
Grantham
Springfield
Danbury
Hill
Sanbornton
Meredith
Laconia
Cornish
Croydon
Wilmot
Andover
Franklin
Tilton
Belmont
New London
Northfield
Gilmanton
Sunapee
Salisbury
Claremont
Newport
Blackwater River
Canterbury
Sutton
Newbury
Unity
Goshen
Warner River
Webster
Boscawen
Loudon
Warner
Bradford
Concord
Chichester
Acworth
Lempster
Hopkinton
Washington
Henniker
Pembroke
Hillsborough
Marlow
Bow
Alstead
Windsor
North Branch River
Dunbarton
Stoddard
Deering
Weare
Hooksett
Gilsum
Antrim
Sullivan
Goffstown
Surry
Bennington
Contoocook River
Nelson
Francestown
Manchester
Hancock
Keene
Roxbury
Harrisville
Greenfield
Lyndeborough
Marlborough
Dublin
Peterborough
Swanzey
Troy
Jaffrey
Temple
Wilton
Sharon
Fitzwilliam
Rindge
New Ipswich
Mason
Greenville
N

Map 2. Recreational Access Points and Most Impacted Areas



Map 3. Recreational Trails