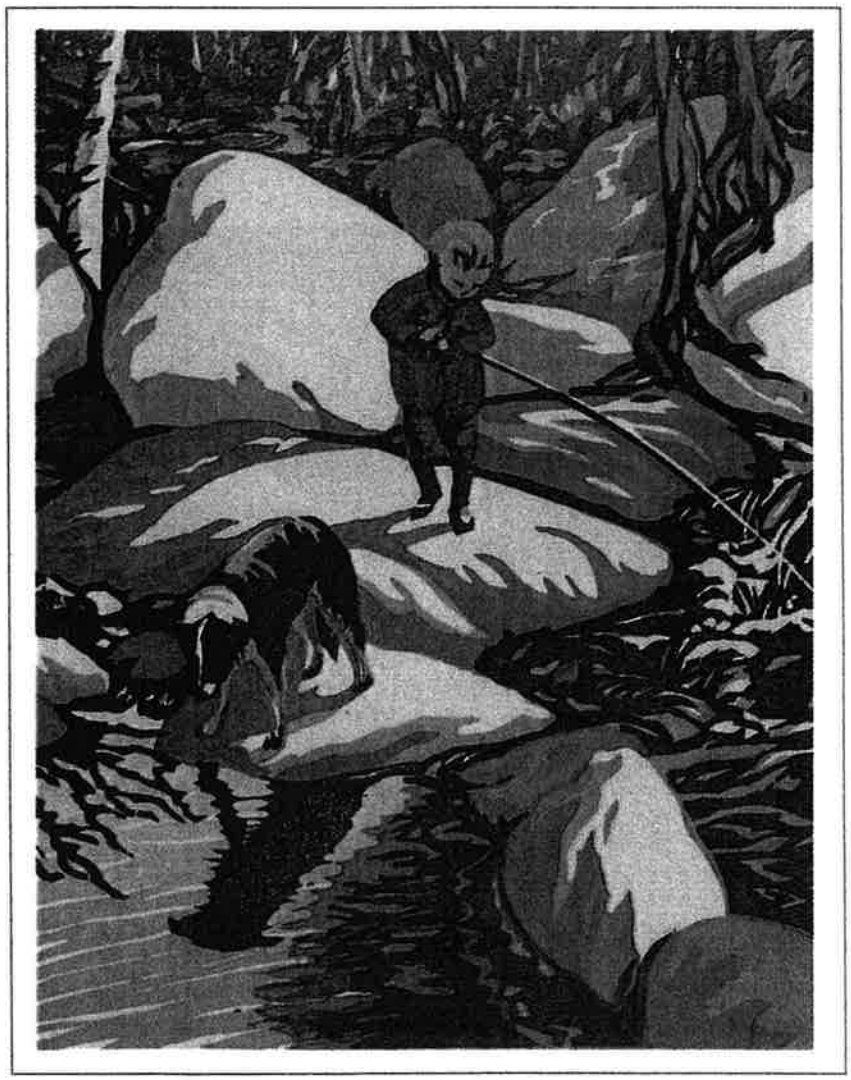
CONNECTICUT RIVER
Corridor Management Plan



Volume II

Headwaters Region

CONNECTICUT RIVER
Corridor Management Plan

CONNECTICUT
RIVER
JOINT
COMMISSIONS

Volume II
Headwaters Region

Prepared by
Headwaters Region Local River Advisory Subcommittee
Edited by
Adair D. Mulligan
of the Connecticut River Joint Commissions

Prepared for and dedicated to the Connecticut riverfront towns of:

Pittsburg, Clarksville, Stewartstown, Colebrook, Columbia, Stratford, & Northumberland,
New Hampshire

◆

Canaan, Lemington, Bloomfield, Brunswick, & Maidstone,
Vermont

VOLUME I:
Riverwide Overview
VOLUME II:
Headwaters Region
VOLUME III:
Riverbend Region
VOLUME IV:
Upper Valley Region
VOLUME V:
Mt. Ascutney Region
VOLUME VI:
Wantastiquet Region

Connecticut River Joint Commissions
P.O. Box 1182 ◆ Charlestown, New Hampshire 03603
Telephone: 603-826-4800 ◆ Fax : 603-826-3065

June 1997

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Cover illustration by
Matt Brown of Lyme, New Hampshire
"Fishing the Headwaters"

ABBREVIATIONS

AMPs	=	Vermont acceptable management practices
ANR	=	Vermont Agency of Natural Resources
BMPs	=	best management practices
CRJC	=	Connecticut River Joint Commissions, comprised of New Hampshire Connecticut River Valley Resource Commission & Vermont Connecticut River Watershed Advisory Commission
CSO	=	combined sewer overflow
DES	=	New Hampshire Department of Environmental Services
EPA	=	Environmental Protection Agency
EQIP	=	Environmental Quality Incentives Program of USDA's 1996 Farm Bill
FEMA	=	Federal Emergency Management Agency
FERC	=	Federal Energy Regulatory Commission
GIS	=	geographical information systems - a computerized mapping system
LRS	=	local river subcommittee
NEP	=	New England Power Company
NRCS	=	Natural Resources Conservation Service (under USDA), formerly the Soil Conservation Service
RSA 483	=	New Hampshire Rivers Management and Protection Act
RSA 483-B	=	New Hampshire Comprehensive Shoreland Protection Act
USDA	=	U.S. Department of Agriculture
USFWS	=	U.S. Fish and Wildlife Service
WWTF	=	Wastewater Treatment Facility

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A CITIZENS' PLAN FOR THE CONNECTICUT RIVER

The Headwaters region's plan is a blueprint for stewardship of the Connecticut River...for communities, landowners, businesses, and agencies on both shores. This plan was created by local citizens who know their town and the Connecticut River, not by state or federal agencies. Gathering together to create this plan for the Headwaters segment of the river were representatives from the twelve northernmost riverfront towns of New Hampshire and Vermont.

Because the actions of a private landowner can affect the quality of both public waters and private property downstream, the Headwaters Subcommittee believes that it is appropriate for all landowners to participate as caretakers of the river for the benefit of themselves and their neighbors. Private landowners can voluntarily be a big part of both problems on the river and their solutions.

Communities can and should also take action to keep the Connecticut River the valuable economic and environmental resource that it has long been to their citizens. This plan encourages continued economic development that is compatible with the well-being of the river.

Linked together as we are by the river, our care of the river should be coordinated - between towns, between states, recruiting all the players that affect the river. This plan provides a way for these players to work together as a team.

This plan is not an attempt to dictate to citizens and towns what they can and cannot do on the banks of the Connecticut River. Instead, this plan aims to stimulate stewardship and build partnerships across town lines, across the river, and among the many interests of those who live and work on its banks.

ORIGIN OF THE PLAN

Seeking a local avenue for river decision-making, the Connecticut River Joint Commissions (CRJC) mobilized hundreds of valley residents and local officials to nominate the Connecticut River into the New Hampshire Rivers Management and Protection Program in 1991-2. Designation of the river allows local design of the river corridor management plan you hold in your hands. Working groups of local citizens proposed designations to portray the character of each part of the river, which would then guide the state of New Hampshire and the development of this plan.

The majority of this segment is designated as a *rural river*, with a seven mile section between Brunswick and Stratford designated as a *natural river*, a two mile section around Colebrook as a *rural-community river*, and five short sections in the vicinity of the various dams as a *community river*, as shown on page 7. More information about the New Hampshire Rivers Program can be found in Appendix A.

The Headwaters Subcommittee includes the New Hampshire towns of Pittsburg, Clarksville, Stewartstown, Colebrook, Columbia, Stratford, and Northumberland, and the Vermont towns of Canaan, Lemington, Bloomfield, Brunswick, and Maidstone.

"We're not the legislature, we're the local people."

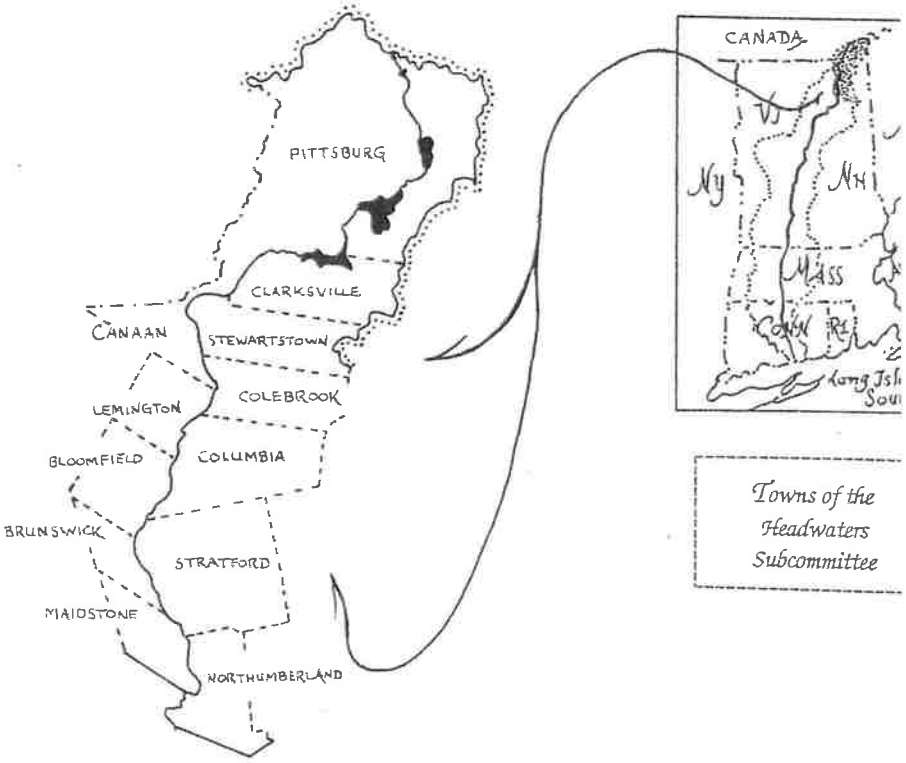
member, Headwaters Subcommittee

PLAN PARTICIPANTS:
the local river subcommittees

To ensure local leadership in implementing the New Hampshire Rivers Management and Protection Act on the Connecticut River, the CRJC established five advisory local river subcommittees, with the approval of the New Hampshire legislature. The Vermont legislature in turn directed its riverfront communities to participate on these subcommittees. The CRJC asked the selectmen of all riverfront towns for nominations, and appointed up to two members and several alternates from each of the 53 New Hampshire and Vermont towns. Some 150 citizens have thus participated in the subcommittees' work.

Duties of the local subcommittees

Creation of a river corridor management plan has been the primary duty of the local subcommittees, delegated to them by the CRJC so that the plan could best respond to the changing character of the river and the varying interests and needs of valley citizens. The subcommittees are also empowered by RSA 483 to review and advise state agencies on permits and other decisions that can affect the river, so that the states can make these decisions with better understanding of local points of view. The subcommittees, like the CRJC, have no regulatory powers and no authority to approve or deny permit applications. The subcommittees' leadership, planning, and expertise are local in nature, but their ideas now reach far beyond town boundaries as they advise the CRJC and state and federal agencies on river issues.



Towns of the Headwaters Subcommittee

Headwaters Subcommittee

The strength of the Headwaters Subcommittee's planning process lies in the diversity of its membership. These citizens, as directed by RSA 483, represent local business, local government, agriculture, recreation, conservation, and riverfront landowners. The Subcommittee also includes a member who manages the Connecticut Lakes dams for New England Power Company. Therefore, the group is truly reflective of the region, representing many perspectives from both sides of the river.

All of the recommendations of the Headwaters Subcommittee's plan represent the consensus of this diverse group of citizens.

PLAN PROCESS

The Headwaters Subcommittee has met monthly since January of 1993 to develop the Connecticut River Corridor Management Plan for this section of the river. The Subcommittee elected its own leadership and adopted rules of procedure. Meetings are always open to the public and have been held at the Colebrook Town Hall on the third Thursday evening of the month. The CRJC Communications Coordinator, who managed the five subcommittees' communications with each other, the CRJC, and various state agencies and organizations, transcribed the Subcommittee's discussions to construct drafts of the plan, which the members revised and approved.

The Subcommittee has discussed a number of topics important to the river and the region. These are presented in the following chapters. For each topic, the Subcommittee has tried to identify current and potential problems, as well as opportunities, and has made recommendations which it believes represent a positive, consensus-based response to these problems. Often, recommendations for action in one chapter are repeated in another. For example, actions taken by farmers to save money on fertilizer can also improve water quality and benefit both fisheries and recreation.

Scope of the plan - the river corridor

The Subcommittee has concentrated its planning upon the 80 miles of the Connecticut River in this segment, and the land adjacent to the river. Rather than selecting an arbitrary distance from the river, the Subcommittee has chosen to consider the "river corridor" as the area within the riverfront towns that the Subcommittee perceives as pertinent to the subject matter at hand. This is because some recommendations would be effective to apply only within a short distance from the shore, but others are more broad in nature. For example, the recommendation to improve funding for cost-sharing assistance to farmers for conservation practices will benefit farmers and water quality of the Connecticut River whether it reduces nonpoint pollution on a riverfront farm or on an upland farm drained by a tributary stream.

The Subcommittee defers to the individual towns to set wisely the scope of the river and shoreland conservation measures they adopt.

"It doesn't make any difference if the pollution comes from one side of the river or the other, it all ends up in the Connecticut."

Ed Mellett, Northumberland Chair, Headwaters Subcommittee

A broader view

Many of the plan's recommendations are aimed beyond town boundaries, toward state and federal agencies. While the Subcommittee strongly prefers local solutions to local problems, it also recognizes that caring for such a big river is a big job and important public duty, and that help from beyond the watershed is sometimes appropriate. Therefore, this plan is intended to guide these agencies in providing help where it would be most welcome and useful. The Joint Commissions pledge to honor

the work of the local river subcommittees by pursuing the state and federal actions they recommend.

The CRJC also offer an overview of the issues and opportunities raised by the local groups, to bring a riverwide perspective to the plan. This overview is presented, along with summaries of the five subcommittees' work, in Volume I of this series.

"It's an example of local government give and take, bend and not break."

riverfront landowner, Columbia

ADOPTION OF THE PLAN

It is the goal of the New Hampshire legislature through RSA 483 to empower each New Hampshire Connecticut riverfront community to adopt a locally-designed means of caring for the river and its shoreline. The legislature sought also that "the scenic beauty and recreational potential of [the Connecticut River] shall be restored and maintained, that riparian interests shall be respected" without preempting the land zoning authority already granted to the towns.

Each town must choose its own measures to ensure that future development happens in a way that will not harm the river, measures that reflect the character of each town's part of the river and expected land uses. This plan provides a toolkit to help towns and landowners keep the river the valued resource it still is.

The mechanism for adoption of this plan is the conventional local planning process. Planning boards and commissions can review the plan and adopt it as an adjunct to the local master plan, and select recommendations to bring to townspeople for approval. In those towns without planning boards, this responsibility falls to the selectmen. Vermont towns are also encouraged to adopt this plan to make them equal partners with their New Hampshire neighbors in conserving their shared river resource.

Adopting the local plan instead of the statewide ordinance in New Hampshire towns

Why adopt the Headwaters plan? This plan is custom-built, the other is general. This one is the product of discussion among Headwaters citizens, and has been designed specifically for the Connecticut River and the people in this region. The other is the result of legislative action, a generalized set of rules created by state agencies for any river or lake in the state, whether it be a slow-moving, urbanized river of the Seacoast or some of the finest trout water in northern New England.

Adopting the Headwaters plan and its guidance for state and federal agencies is also an opportunity for a town to send a clear message about its preferences to outside authorities.

Each New Hampshire riverfront town now has the opportunity to adopt appropriate recommendations of this Connecticut River Corridor Management Plan instead of the statewide Comprehensive Shoreland Protection Act (RSA 483-B, see Appendix B), which prevails on rivers not included in the Rivers Program. The law is clear that "in the event that...the cities and towns along designated rivers or segments thereof do not adopt the proposals made by their local river management advisory committees, the house and senate shall re-examine the exemption provided... and propose minimum standards..."

"Don't underestimate the potential power of your plan."

Tim McKay, Natural Resources Conservation Service

Therefore, New Hampshire towns along the Connecticut River have a choice that towns on other rivers do not have, but they must adopt either one or the other means of conserving the river.

THE CONNECTICUT RIVER JOINT COMMISSIONS

The Connecticut River Joint Commissions of New Hampshire and Vermont are advisory and have no regulatory powers, preferring instead to advocate and ensure public involvement in decisions that affect the river and its valley. The CRJC's broad goal is to assure responsible economic development and economically sound environmental protection.

The thirty volunteer river commissioners, fifteen appointed by each state, are citizens who live and work in the valley and are committed to its future. The CRJC believe that the most effective action takes place when all the players come to the same table to achieve consensus. Members represent the interests of business, agriculture, forestry, conservation, hydropower, recreation, and regional planning agencies on both sides of the river. The Commissions hold a joint meeting each month, and are supported by three staff: the executive director, communications coordinator, and administrative assistant.

The New Hampshire legislature created the Connecticut River Valley Resource Commission in 1987 to preserve and protect the resources of the valley, to guide growth and development here, and to cooperate with Vermont for the benefit of the valley. The Vermont Legislature established the Connecticut River Watershed Advisory Commission in the following year. The two commissions banded together as the Connecticut River Joint Commissions (CRJC) in 1989, and also achieved the status of a non-profit organization.

THE HEADWATERS REGION

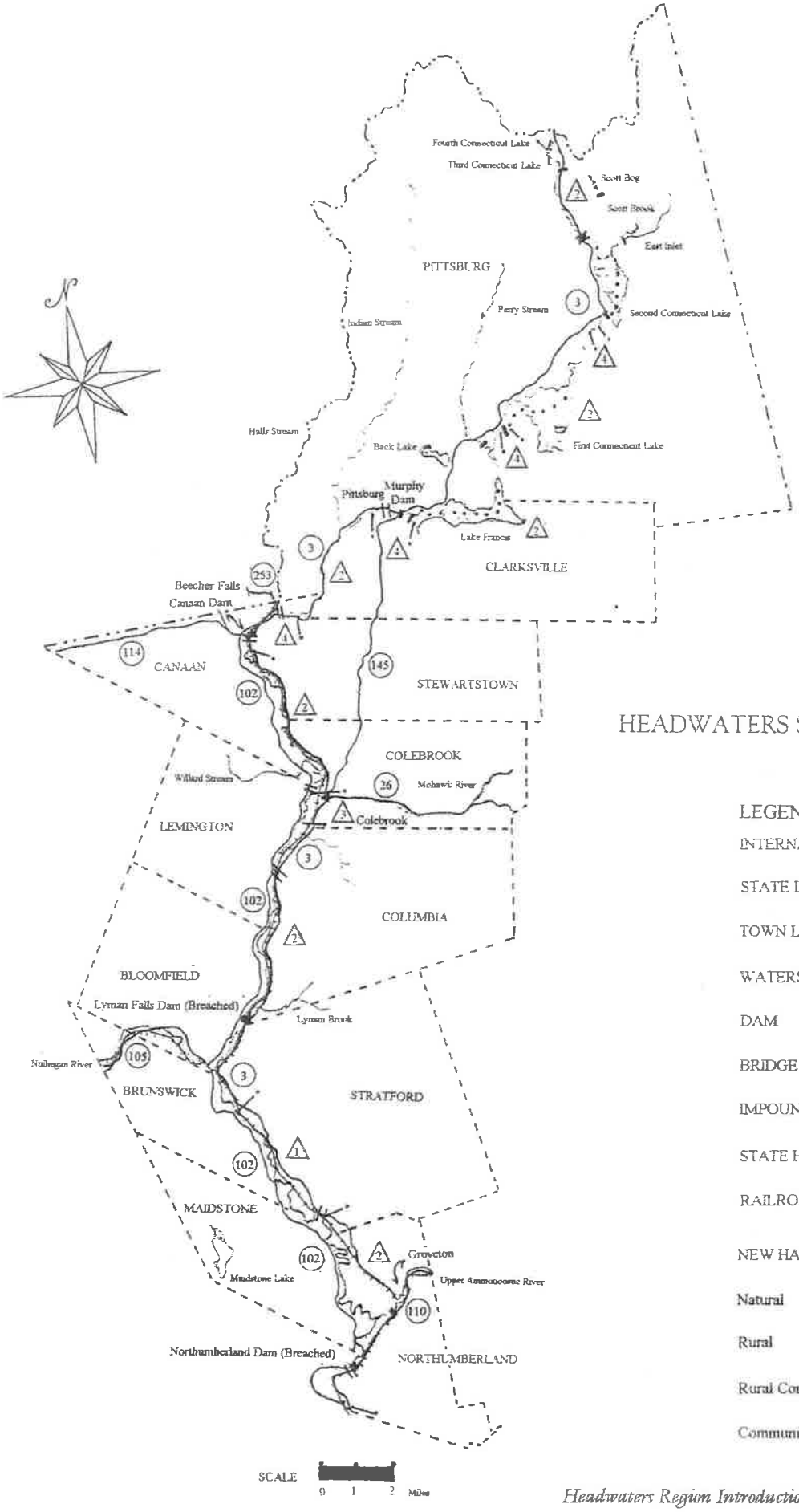
It is here, in a spruce-fir forest, that the largest river in New England begins. Here, it changes and grows from an icy splash over jumbled boulders to a meandering river between loamy banks. Some of the finest trout water in the Northeast, it is loon water, canoe water, and working water. The Headwaters region is the root of the river and reflects too the roots of human history on the land. The forests and the soils of the river valley still shape the lives and the work of people here, and there is a relationship with the land and the river that people from away may not always understand. The Connecticut River in its headwaters is a reminder of the river the way it once was throughout its length, and a river the region's citizens hope will remain the way it is.

The Headwaters segment runs 80 miles from the river's source at Fourth Connecticut Lake at the Canadian border, and flows between the New Hampshire towns of Pittsburg, Clarksville, Stewartstown, Colebrook, Columbia, Stratford, and Northumberland, and the Vermont towns of Canaan, Lemington, Bloomfield, Brunswick, and Maidstone.

◆

The Headwaters Subcommittee believes firmly in the right of each citizen to use and enjoy both his own property and the Connecticut River, and that the most effective protection of the river has come and will continue to come from private landowners. The Subcommittee also recognizes that the Connecticut River is a public resource that affects the quality of life for Headwaters region residents. The river draws many visitors as well, and plays a powerful role in the economic well-being of the region.

Because the actions of a private landowner can affect the quality of both public waters and private property downstream, the Headwaters Subcommittee believes that it is appropriate for all landowners to participate as caretakers of the river for the benefit of themselves and their neighbors. Private landowners can voluntarily be a big part of both problems on the river and their solutions. Communities can and should also take action to keep the Connecticut River the valuable economic and environmental resource that it has long been to their citizens.



HEADWATERS SUBCOMMITTEE REGION

LEGEND

INTERNATIONAL BOUNDARY

STATE LINE

TOWN LINE

WATERS

DAM

BRIDGE

IMPOUNDMENT

STATE HIGHWAY

RAILROAD

NEW HAMPSHIRE RIVERS PROGRAM DESIGNATION

Natural

Rural

Rural Community

Community

C.J. Sallen
April 1997

WATER QUALITY

QUALITY OF THE RIVER TODAY

The quality of Connecticut River water has improved vastly since 1951, when a government report described the thousands of homes discharging raw sewage and the many industries releasing untreated chemical wastes into the river. While the quality of the Headwaters stretch had deteriorated less than in downstream reaches, it too has improved with the investment in modern septic systems and leach fields, wastewater treatment plants, manure storage facilities, and use of best management practices. Today it is not only possible but enjoyable to swim in the river, where several decades ago, one might have looked the water over carefully before venturing in.

Indeed, water quality studies show that the Headwaters reach offers excellent swimming, perhaps the best anywhere along the Connecticut River. Very good water quality, adequate dissolved oxygen, and an aquatic food chain community in excellent condition distinguish the Headwaters segment of the river, in contrast to downstream reaches, where nutrient enrichment from development and polluted runoff still threatens the quality of the water. River water here is also suitable and used for agricultural and industrial water supplies, and a number of public and private wells are located near the river with the potential to draw upon groundwater that is associated with the river. Free flowing, steeply dropping waters, such as at the rapids at Lyman Falls, keep oxygen levels high and allow the river to support excellent fisheries and to assimilate the treated wastes it now receives.

A number of small and large wetland areas are connected with the river, particularly around the Connecticut Lakes. Riparian buffers, or filter strips of natural shoreland vegetation, remain in many locations to help hold the banks and to catch pollutants in runoff before they can reach the river.

The value of good water quality

Good water quality is an important economic as well as natural resource for the Headwaters region. The recreational opportunities offered by the Connecticut River which depend upon its water quality represent a $26-31 million dollar business in the river towns of Pittsburg to Haverhill, on the New Hampshire side alone, according to a study prepared for the Headwaters Subcommittee in 1996. (See Appendix C) Local water-dependent businesses are strongly interested in maintaining or improving waterquality, with the assistance of local governments.

The free-flowing nature of much of the river in this segment is especially valued, both because it ensures that river water is well oxygenated, because it provides excellent fishing and boating, and because it is highly scenic. The three mile segment from Lyman Falls to Bloomfield is important for all of these reasons, as is the free passage of the river over the breached Northumberland dam site, where water is reaerated after assimilating wastes added by the Groveton paper mill. Existing impoundments are also appreciated by residents of the region and by visitors, for the variety they provide in boating and fishing experiences.

A look at the specifics

Water quality classifications: New Hampshire classifies the entire Headwaters stretch as Class B. Vermont identifies several waste management zones where waters are authorized by a permit to receive the direct discharge of treated wastes which, prior to treatment, contained organisms pathogenic to humans. These zones are Mile 235.23-234.2 at Canaan, and three adjacent waste management zones totaling 1.24 miles from Mile 210.04 to 208.92 at North Stratford. (Distances in miles from Massachusetts border.)

Water withdrawals: There are 11 registered users of Connecticut River water, including the water works and wastewater treatment plant at Pittsburg, the wastewater treatment plant at Colebrook and Stratford, Persons Concrete at Columbia, two at the Groveton sawmill and one at Wausau Papers of NH, Inc., and the water works and the wastewater treatment plants at Northumberland and Groveton. Both towns and industries also withdraw waters from the tributaries.

Wastewater discharges: There are six facilities discharging treated wastewater into the Connecticut River mainstem in this segment: the municipal wastewater treatment plants for Canaan, Colebrook, Stratford Village, and Northumberland, and the industrial treatment plants for Ethan Allen in Beecher Falls and for James River in Groveton. In addition, there are industrial and municipal wastewater discharges into Kimball Brook and the Upper Ammonoosuc River.

Nonpoint pollution sources: These are difficult to identify because they do not come from an easily observed point, but can include residential landscapes, farms, logging sites, failed or inadequate septic systems, and eroding riverbanks. Tributaries can also deliver such pollution to the mainstem.

Water quality monitoring stations: there are 14 on the mainstem, one on the Mohawk River, and three on the Upper Ammonoosuc River. There is no lay monitoring program on the river in this region. Only a very few of these stations are monitored on a regular basis by the states.

Streamflow gauging stations: There are two in this segment, one at mile 242.25 just below the confluence of Indian Stream, and one at Mile 209.77 at N. Stratford, in addition to flow information gathered by New England Power Co. at the dams.

Dams: There are five active dams on the mainstem of the Connecticut River here, at Moose Falls, Second Connecticut Lake, First Connecticut Lake, Lake Francis (Murphy Dam), and Canaan. New England Power Company (NEP) operates all except the Canaan dam at Beecher Falls, which is operated by Public Service Company of New Hampshire. Murphy Dam and Moose Falls Dam are owned by the State of New Hampshire. Only the Murphy and First Lake dams are considered by New Hampshire to present a significant hazard to life and property if they fail.

The NEP-managed dams are operated to control flow for the company's downstream hydroelectric facilities at Fifteen Mile Falls and beyond, and do not generate electricity themselves. They are presently operated under an agreement with the Water Resources Board of New Hampshire, and are not covered by a Federal Energy Regulatory Commission license.

There are two breached dams which have not been redeveloped: one at Lyman Falls, and the former Wyoming Dam at Northumberland-Guildhall. There are also plans and permits in place for an additional dam, known as the Baldwin Dam, at a falls just below Pittsburg Village. In addition, there are many other dams and impoundments on tributaries to the river.

Impoundments: Second Connecticut Lake: 1272 acres, First Connecticut Lake: 3125 acres; Lake Francis: 2010 acres; Canaan: 381 acres. There are water release hazards below all three of these impoundments.

Conditions needed to sustain today's water quality

- safe swimming and other water contact uses depend upon absence of harmful bacteria and hazardous substances
- adequate flow through impoundments and in free-flowing sections to flush pollutants
- control of sediment and other nonpoint pollution entering the river

Room for improvement

- safe swimming even after storm events
- fish reliably safe for human consumption
- the ability of the Connecticut River in the Headwaters Region to assimilate additional treated wastes depends upon the specific location of the discharge. Near slow moving impoundments, the river has limited ability for reaeration, and already receives organic and nutrient enrichment from point and nonpoint sources. It should be noted that the State of New Hampshire's water quality standards state that "waste assimilation and transport shall not be considered to be beneficial uses."

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CURRENT WATER QUALITY PROBLEMS

Sedimentation and turbidity may be the most important problem threatening water quality in the Headwaters region. The river can run light brown after storms. While only a few Coos County riverfront farms still have surface erosion problems, riverbank erosion continues to be a problem. While riverbank erosion is a naturally occurring process on rivers and creates habitat for bank swallows and other kinds of wildlife, it also adds sediment to the river that can smother fish spawning areas and nutrients that can contribute to growth of algae. Siltation also poses problems at downstream industrial water intake pipes. Brown, silt-laden water is not inviting for swimming or boating, and ruins a fisherman's day.

Sedimentation may stem from natural sloughing of the banks, particularly where tributary watersheds are steep or where the river is actively meandering. Bank erosion can be accelerated by human activities, such as unwise logging practices. Uncontrolled grazing also contributes to bank erosion and turbidity; allowing cattle direct access to the river or a tributary not only contaminates the river with animal waste, but it destroys bank vegetation and makes the bank susceptible to erosion. However, fencing on flood-prone land to restrict cattle access can be problematic because the fencing must be replaced every year and will catch ice and debris.

A 1995 inventory of erosion sites in Coos and Essex counties found 70 sites of active erosion in the New Hampshire towns included in this segment, and 58 in the Vermont towns. The river appears to be most active in the Brunswick/ Stratford/ Maidstone/ Northumberland section, where it meanders sharply.

The erosion study showed that most of the moderate and severe erosion sites occurred on agricultural land, and areas with no vegetative buffer at all tended to have a higher rate of erosion, especially in combination with lack of vegetation due to livestock

"It is almost impossible to outwit that river."

Headwaters Subcommittee member

grazing. The most common erosive force is the river current. Steep, high, concave banks, where the current is forced against the shoreline, are especially vulnerable to erosion. Seasonal flooding is an evident erosive force. Ice action and freeze/thaw cycles also contribute to erosion. Various methods of erosion control have been employed, from stone riprap, tires, junk cars, and "biotechnology," and some have produced stable banks.

Septic systems located within the floodplain and inadequate or failed septic systems are also a problem, because they can contribute disease-carrying pathogens, and whatever else homeowners put down the drain, to groundwater which may reach the river.

According to the Connecticut River Water Quality Assessment, "residents report a decline in river water quality for a brief period each spring in the river below Lake Francis. Nutrient laden sediment contained in water released at Murphy Dam may be traced to spring run-off, lake drawdown, and erosion enhanced by present resource management practices in the watershed around Lake Francis. The reservoirs may be acting as a sink and source of organics and nutrients that stimulate algal growth during low flows in the spring."

Other water quality problems include:

- faulty construction or lack of regular maintenance of woods roads
- aerial herbicide spraying without adequate monitoring, particularly along railroad rights of way
- development along the river

Potential threats to water quality

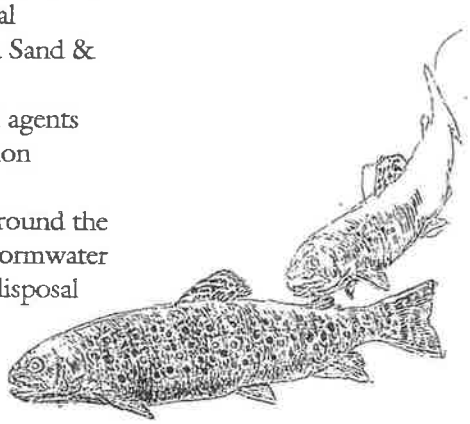
- effects of upstream activity on downstream landowners and water quality
- bank erosion and sedimentation from disturbance of stream bank buffers or inadequate buffer
- use of heavy equipment on streambanks
- water temperature increase resulting from use of riprap for bank stabilization
- unwise logging practices
- flash flooding and siltation from increased surface runoff when large areas of forest cover are removed
- siltation from improperly built stream crossings or skidder trails or harvesting when soils are prone to erosion
- redevelopment of Northumberland Dam and reduced opportunity for reaeration at this location
- other further impoundment of the river
- addition of fine silt to the river as a result of gravel washing operations and bank erosion on Hall Stream in Quebec
- some farms in region do not have adequate manure storage facilities
- indiscriminate land application of sludge, septage, or wood ash leading to contamination of runoff or soils by excess nutrients and/or heavy metals, particularly in the absence of a nutrient management plan, if current soil conditions are not considered, or if sludge from paper mill wastes or urbanized areas is used
- bacteria have been found on several occasions in sampling at the Colebrook-Lemington bridge, indicating that swimming may be threatened here
- homeowners may apply too much fertilizer or pesticide on the home landscape
- potential damage to water quality from industries located along the river
- State of NH currently monitors water quality only for dissolved oxygen, nitrates, and

"Everybody needs to take a little responsibility for their piece of sludge."

riverfront landowner, Lemington

a limited number of other parameters, which do not include many pollutants which could come from industrial sources

- the unlined industrial waste lagoon at Ethan Allen, located 200' from Hall Stream in Beecher's Falls, VT, contains process wastewater and sludge from furniture finishing. Monitoring by the states has found that while no toxicants were found in the surface water of Hall Stream, semi-volatile organics are present in its sediments up and downstream from site, and threatens the use of this water for agricultural irrigation.
- lack of adequate monitoring and regulation of excavation by state; potential contamination from suspension agents and cyclone operation at Columbia Sand & Gravel
- siltation and other pollution from careless or uninformed activities by road agents
- inadequately sized or located culverts; inadequate drainage ditch construction
- potential introduction of zebra mussel
- development of currently undeveloped lands along the river, particularly around the Connecticut Lakes, which could threaten water quality through changes in stormwater movement, erosion during construction, and addition of subsurface waste disposal systems



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OBJECTIVES

Improve the balance of compatible uses of the land without impacting the river. Minimize the impact of forestry and agricultural practices on the river and preserve these uses of the land. Discourage polluting industrial uses. Educate the general public and enforce existing regulations.

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RECOMMENDATIONS

FEDERAL GOVERNMENT

U.S. Department of Agriculture should:

- reinstate former funding levels for cost-share programs for conservation practices such as construction of manure storage pits to eliminate winter spreading within the floodplain

Natural Resources Conservation Service should:

- increase awareness of new nutrient management techniques as a potential cost-saving measure for farmers as well as a pollution-reducing technique
- study extent of bank erosion for Caledonia County, VT
- provide information on riparian buffers to landowners

Cooperative Extension Service should:

- distribute information on zebra mussel

Federal Energy Regulatory Commission should:

- provide more accurate floodplain maps to the towns

STATE GOVERNMENT

Water quality agencies should:

- educate public on permitting process to avoid unpermitted actions that could impact water quality

- develop better communication with local citizens
- continue communication and cooperation with forest landowners
- encourage more water quality monitoring, particularly by citizen volunteers, and provide results to local river subcommittee
- monitor for possible industrial contaminants
- encourage vegetative stabilization of streambanks and use of vegetation interplanted in riprap; include planting of vegetated buffers in streambank restoration projects
- encourage interested parties such as Wausau, state fish and wildlife/game agencies, and others to ensure that Northumberland dam site remains undeveloped and hazards to boaters are removed
- encourage riverfront towns below Murphy Dam to develop emergency plan in case of dam failure

Forest resources agencies should:

- provide education about best management practices and American Forest and Paper Association guidelines for corporate members for forestry; logger training programs

Legislatures should:

- provide tax incentives for land protection; assure protection of private property rights integrated into land conservation programs to encourage private landowners to participate

TOWNS should:

- discourage polluting industrial uses
- encourage road agents to use BMPs for road, ditch, and culvert maintenance and salt application to save the town money and to prevent siltation and pollution from salt in runoff
- encourage vegetative stabilization of streambanks and use of vegetation interplanted in riprap; include planting of vegetated buffers in streambank restoration projects
- ensure that riverside construction activities do not impact banks and buffers
- ask for sedimentation and erosion controls during and after construction
- encourage proper construction when it is to take place on steep slopes, to minimize erosion
- protect groundwater recharge areas to keep water supplies safe
- look at sludge/septage/biosolid spreading issues and develop their own guidelines; consider allowing injection spreading of septage and application of locally-produced biosolids with monitoring and careful adherence to regulations
- ensure that auto junkyards and facilities handling hazardous waste are located well back from the river
- encourage closure of completed sections of gravel excavations before these operations are expanded
- encourage an adequate buffer between the river and gravel pit operations
- help preserve agricultural and forest lands along the river
- encourage subcommittee involvement with planning boards and landowners
- work with regional planning commissions to help implement the river corridor management plan
- discourage development of currently undeveloped lands around the Connecticut Lakes, in order to provide the water quality protection which is important to the recreation and tourism component of this region's economy

Appendix E suggests a variety of tools for towns to use to maintain or improve the quality of their surface waters and groundwater drinking supplies.

PRIVATE SECTOR

Landowners should:

- help preserve agricultural and forest lands along the river
- establish and/or retain naturally vegetated areas along waterways to trap sediment and other pollutants, to help keep the riverbank stable, and to provide privacy
- select vegetative stabilization of streambanks and use of vegetation interplanted in riprap when eroding banks are a problem; include planting of vegetated buffers in the project
- develop management plans and conduct logging with the help of professional foresters

"Everybody knows that leaving an uncut strip along the bank is good for the river, but people should decide on their own to do that."

riverfront farmer, Stewartstown

Those working in the woods should:

- adopt the principles of sustainable forest management (Appendix I)
- follow best management practices for timber harvesting (Appendix F)
- protect and maintain forested riparian buffers on their property when logging-leave a strip of forest undisturbed along the immediate streambank, and intensively manage the forest nearby to allow new growth to effectively remove and utilize nutrients that might otherwise enter the stream

Farmers should:

- follow best management practices for agriculture (Appendix F)
- get together a core group of farmers to bring the Water Quality Incentive Program to Coos County with the help of the Farm Services Agency, Cooperative Extension, and Natural Resources Conservation Districts
- consider fencing off livestock access to protect bank stability, reduce siltation, and reduce the potential for animal waste to enter and contaminate the river

Citizens should:

- observe the permitting process for activities that can affect the river (Appendix G)
- support current guidelines for dredge and fill in the river in RSA 483
- consider participating in volunteer water quality monitoring

Regional Planning Commissions should:

- work with local planning boards and selectmen to help implement the river corridor management plan

Utilities should:

- maintain effective communication with local citizens and towns
- vegetate rights of way with plants not requiring maintenance with herbicide; require that abutters be notified before herbicide spraying
- monitor actual herbicide applications at the time of application

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REFERENCES

Connecticut River Water Quality Assessment, NH Dept. of Environmental Services and VT Dept. of Environmental Conservation, 1994. Prepared for the CRJC with support from EPA, this bi-state assessment of the watershed is written for a non-technical audience and describes general and specific water quality issues on the Connecticut River mainstem and its tributaries. It answers seven questions regarding water quality for each subcommittee region: is river water drinkable? Can the fish be eaten? Are the existing dams contributing to a water quality problem? Is the river healthy from an aquatic life point of view? Can I safely swim in the Connecticut River? Can I use the water for water supply, irrigation, and other purposes? Can I discharge additional wastes to the river? It also answers the question of whether NH and VT contribute to the nutrient pollution of Long Island Sound. The report includes an extensive technical appendix and presents the states' strategies for correcting water pollution in the basin.

Along the Northern Connecticut River: An Inventory of Significant Instream Features, Connecticut River Joint Commissions, 1994. This inventory contains the available information relating to in-stream features of the Connecticut River mainstem for both sides of the river. It covers water quality features, such as location of water quality and streamflow gauging stations water withdrawals, and wastewater treatment facilities; river flow and riverbank features, such as dams, impoundments, and significant streambank erosion sites; and recreational features, such as whitewater segments, boat launch sites and campgrounds. Information is presented by local river subcommittee region both in tables and on GIS-based maps. An extensive annotated bibliography covers both technical publications and those focusing on Connecticut River history and travel. The inventory is also provided on a computer disk in the front of the notebook for easy reference. Designed to be user-friendly, it can be run on a personal computer using MS-DOS. The appendix includes instructions on how to operate the disk.

LIVING WITH THE RIVER SERIES of publications by the Connecticut River Joint Commissions:
A Homeowner's Guide to Nonpoint Source Water Pollution in the Connecticut River Valley, 1994. This booklet offers useful hints for homeowners on managing runoff, caring for septic systems, conserving water, and dealing with yard waste, bugs, and chemicals. It also offers alternatives for toxic household products and a directory of sources of help.

The Watershed Guide to Cleaner Rivers, Lakes, and Streams, Brian Kent, 1995. Liberally illustrated, this guide describes the causes of nonpoint pollution, suggests ways to reduce and prevent it from reaching waterways, and provides basic ideas that citizens can use to help improve water quality in the valley. The report covers a number of best management practices for construction sites, developed areas, backyards, septic systems, gravel and sandpits, marinas, farms, golf courses, woodlots, and storage of hazardous materials, and includes a useful directory.

A Citizen's Guide to River Monitoring in the Connecticut River Valley, Geoff Dates, River Watch Network, 1995. This user-friendly guide is intended to help people establish long-term, community-based, and scientifically credible river monitoring programs in the valley.

The Challenge of Erosion in the Connecticut River Watershed, 1996. A series of informational fact sheets on riverbanks and buffers summarize the findings of a year-long multi-agency investigation into riverbank erosion. Written for the riverfront landowner or interested citizen, they cover river dynamics and the many causes of erosion, riparian buffers, streambank stabilization techniques, field assessment of problem sites, and a guide to permitting requirements on each side of the river.

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Best Management Practices to Control Nonpoint Source Pollution: A Guide for Citizens and Town Officials, NH Dept. of Environmental Services, 1994. This useful reference explains nonpoint source pollution and concisely covers the best management practices, current laws and regulations, and reasons for concern for the top ten land use activities which can cause pollution. Individual actions are highlighted, as well as current watershed protection and planning.

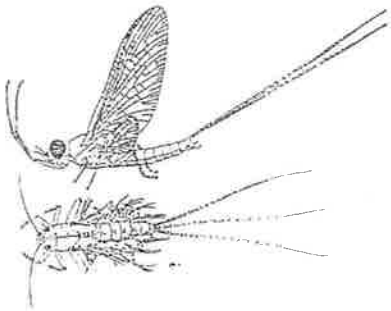
Connecticut River Erosion Inventory of Coos County NH and Essex County VT, Coos Co. Conservation District and Essex County Natural Resources Conservation District, 1995. This is a report on a field assessment of all erosion sites on the river in these two counties using the criteria developed by the 1992 Grafton County inventory. Field data sheets, color photographs, and topographic maps marking the erosion sites, which are color coded for severity, are available at the Coos Co. Conservation District office in Lancaster and at the CRJC office in Charlestown. A summary report is also available for public information.

FISHERIES & AQUATIC HABITAT

LIFE BENEATH THE SURFACE

Studies of the Connecticut River show a river in excellent condition in the segment above the confluence of the Upper Ammonoosuc River in Groveton. In almost all of the Headwaters segment, the riverbottom is swept clean and not embedded with fine particles or organic matter. Dissolved oxygen is adequate for the more sensitive species of fish and the aquatic creatures upon which they feed, and the water is free of large algal growths. Below Groveton, some of these conditions begin to change.

Bottom types vary from silt to sand to gravel, depending upon water flow and degree of scouring. The streambanks offer varying degrees of shading to keep the waters cool. There is currently no accommodation for fish passage around any of the dams in this segment.



The macroinvertebrate population sampled in Bloomfield, Vermont indicated a community of bottom dwelling organisms in excellent condition, although this may not necessarily describe the entire Headwaters segment. The community of creatures upon which fish feed has been observed to vary from year to year, particularly when ice breaks up during times of low river flow and moving ice can scour the bottom. Growth of algae is observed for a brief period each spring.

A fine fishery

The Headwaters reach of the Connecticut River from Fourth Lake to the Northumberland Dam site at Groveton is considered one of the finest coldwater fisheries in the Eastern United States.

The brook trout is the original native species, found throughout the segment. It is sensitive to pollution and is relatively easy to catch. Spawning habitat exists throughout the segment. The brown trout, introduced from Europe in 1885 and the rainbow trout, introduced from California in 1878, supplement dwindling numbers of native brook trout. Both of these species are more tolerant of warm water to varying degrees. They may be found throughout the segment, particularly in pockets at the mouths of tributary streams or in areas with good aeration, such as rapids and waterfalls. Landlocked salmon which originate in the Connecticut Lakes are sometimes found in the river from the lakes to the upper end of the Moore Reservoir. The Connecticut Lakes in particular are considered some of the best trout and salmon waters in the state.

Those lured to fish the headwaters of the Connecticut

This remarkable resource is an important key to the quality of life for local residents and to the economy of the region, through fisher-tourism. A 1993 creel census indicated that approximately half of the fishing done on the river between Clarksville and Maidstone is by New Hampshire residents, and half by visitors from Vermont and from Massachusetts, Connecticut, and others from outside the region. Since this census, a change has taken place in licensing for Vermont residents and non-residents, which may have contributed to a radical increase in fishing pressure. Professional fishing guides in the region report that some 70% of fishermen on this section of the Connecticut River are carrying Vermont fishing licenses.

Native Vegetation for Lakeshores, Streamsides, and Wetland Buffers, VT Dept. of Environmental Conservation, 1994. This guide describes buffer strips and contains general considerations, native plant descriptions and maps of hardiness zones in VT for buffer strip enhancement.

New Hampshire Resource Protection Project, New England Interstate Pollution Control Commission and Environmental Protection Agency, 1995. This project is a cooperative endeavor among federal, state and local government agencies along with private conservation and business interests. Its goal is to identify high priority natural resource areas in NH and assist in those regions' protection planning efforts. Using GIS technology, the study analyzed data on wildlife habitat, drinking water supplies, forestry, agriculture, recreation, and pollution threats. Six areas in NH were targeted for attention based on the value of their natural resources, including the Connecticut Lakes.

Maps

(NOTE: GIS = Geographic Information Systems, indicates computerized database as source of map)

Series of GIS maps produced for the CRJC and the local river subcommittees by MicroDATA, with the support of VT Agency of Natural Resources, 1994. These same maps are presented in Along the Northern Connecticut River: An Inventory of Significant Instream Features at a scale of 1:63,360.

- Headwaters Region- Water Quality. Map displays NH Rivers Program segment designations, VT wastewater management zones, water quality sampling stations, gauge stations, point discharges, water withdrawals, hydro electric water use, municipal water supplies, surface waters, roads, and railroad routes for the towns of Pittsburg through Maidstone/Northumberland, scale 1:31,680

- Headwaters Region- River Flow and Shorelines. Map displays dam sites, impoundment zones, and shoreline erosion distinguished as severe or moderate/unclassified, surface waters, roads, and railroad routes for the towns of Pittsburg through Maidstone/Northumberland, scale 1:31,680

Highlights of the New Hampshire Natural Resource Protection Project, New England Interstate Water Pollution Control Commission and the Environmental Protection Agency, 1996. GIS maps prepared for each of the five CRJC local river subcommittees show agricultural lands, unfragmented natural lands and shorelines, high value freshwater wetlands, drinking water supplies and pollution threats, bald eagle wintering sites, conservation and public lands, and some natural heritage inventory sites. Scale varies.

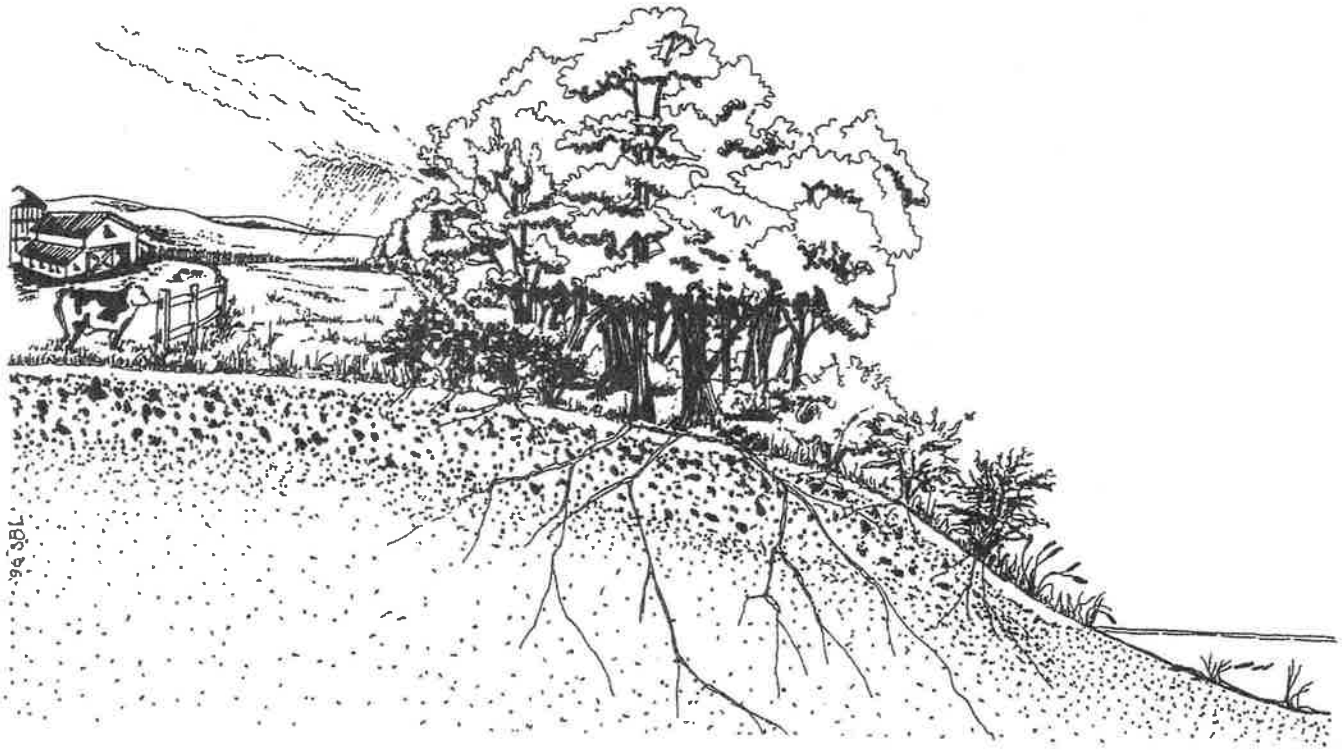
Connecticut River Basin Sampling Stations, NH Dept. of Environmental Services, 1994. Series of three GIS maps covering the entire watershed in NH and VT shows surface waters, sub-watershed boundaries, NPDES outfalls, and water quality sampling stations for the Connecticut River Watch Program, and NH DES, and the VT Dept. of Environmental Conservation. Scale 1:150,000.

The 1993 census showed that in one season, 18,362 angler hours were spent on the river, with an average catch rate of .6 fish/hour. Half of this fishing pressure was applied to a single section from the Colebrook bridge to a point above the North Stratford catch and release area, where there is easy access to the river. Fishermen tended to keep half their catch.

Conditions needed to sustain the Headwaters fishery

High water quality, water that is cool and provides ample oxygen, is required for the survival of brook trout in particular. Many riverfront farmers choose to maintain streamside buffers, which help to shade the water and keep it cool, allowing it to retain more oxygen. Oxygen is also mixed into the water by riffles and rapids throughout the Headwaters section. A healthy, diverse gene pool is also required to keep fertility high and the river near its carrying capacity for fish.

The Connecticut River is currently managed by the New Hampshire Fish and Game Department as "put and take," with the exception of a three mile long catch and release only section that extends from 250 feet south of Lyman Falls to just north of the North Stratford-Bloomfield bridge. This management policy requires stocking to maintain population levels, particularly of brook and rainbow trout. The river is stocked down to the confluence of the Upper Ammonoosuc River with 20,000 trout per year in one, two, and three year old age classes. The 1993 study indicated that approximately half of stocked fish survived the succeeding winter. The Connecticut Lakes provide good wintering habitat, although there is limited wintering habitat in free-flowing sections of the river due to biological oxygen demand during long iced-over periods.



CURRENT PROBLEMS

Streambank erosion threatens water quality and aquatic habitat in the ›nnecticut River and its tributaries in the Headwaters segment. Thirty-one miles of uatic habitat in the Connecticut River between Canaan, Lemington, and Bloomfield d Stewartstown, Colebrook, and Columbia are threatened by sedimentation and rbidity, resulting from streambank erosion and siltation that may result from attended streambanks on active and inactive farms, logging, and other activities in the ıtershed, both on the tributaries and on the Connecticut River. These have been ›orted both by the 1994 Connecticut River Water Quality Assessment conducted by : States of Vermont and New Hampshire, and by local residents as the predominant urces of eroded sediments in the Headwaters area. Timber cutting which is permitted ı the banks of Vermont tributaries may contribute to sedimentation in the river and us threaten fisheries. Hydropower use, especially from the occasional cleaning and ıshing of sediment from the Canaan/W. Stewartstown dam and other low head hydro ›erations, in addition to a gravel pit in Columbia, have been sources of turbidity and liment.

Spawning and rearing habitat in the bypass reach of the Canaan hydroelectric project ay be threatened during low flow times of year. Seasonal drawdowns from the ›nnecticut Lakes and Lake Francis cause unnatural fluctuations in river flows. New ıgland Power Company is presently authorized to release as little as 15 cubic feet of ater (cfs) per second from Lake Francis reservoir, although it is the company's working ›licy to maintain 60 cfs to support fisheries.

Low levels of dissolved oxygen during critical times, particularly in July and iced-over inter months, can impact fisheries habitat. There is limited wintering habitat in the river ıe to the limited cross-sectional area available which is influenced by flowage rates, ice rmation, and their effect on dissolved oxygen in winter pools.

Minimal fish reproduction occurs with present management policies. The brown trout most successful, at 10-15%, because of its higher survival rate and difficulty of catch, ıd its greater tolerance of pollution and water temperature variations.

Very few brook trout survive one year in the river.

Approximately 2-5% of resident rainbow trout are products of natural reproduction. heir survival is slightly better than brook trout since this fish is more tolerant of mperature variations and fishing pressure.

Disregard of the rights of private landowners and their property by the visiting public a persistent problem. Fisherman sometimes reach the river by crossing on private lands, ›metimes without the permission of landowners, causing damage to crops and the verbank, and sometimes leaving trash.

"That Connecticut River is a beautiful river...the nicest piece of water in my patrol."

Eric Stowell, NH Fish and Game Dept.

Potential problem areas

- There is potential for over fishing in the Headwaters segment of the river, particularly as the quality of the fishery becomes better known outside the region and should access to the river be greatly expanded
- potential damage to fisheries from spraying of herbicides
- reduced dissolved oxygen, decreased habitat, and forage area, particularly for juvenile trout and salmon, at low water flowage
- any delay of flowage in water from Lake Francis and downstream, at critically low water periods, is potentially damaging to fisheries, especially because of temperature impacts
- a designated catch and release area, established in 1980, is not stocked. This management strategy has resulted in enforcement difficulties in the past, because it was patrolled from the New Hampshire side but not from the Vermont side, and has been unpopular with Vermont landowners. Since this area has no natural boundaries, fish will move in and out of the designated area with changes in water flows. Catch and release management schemes show little success without physical boundaries that restrict fish migration.
- there is some question about the value of designating this section for catch and release, because it excludes the majority of fishermen (80%) who fish with bait, which would prevent them from releasing fish without fatal injury
- redevelopment of Northumberland/Guildhall (Wyoming) Dam and loss of reoxygenation that occurs at this site
- impact of upstream activity on downstream fisheries, such as siltation from upstream timber harvesting in 1972 which covered smelt eggs and decimated the smelt population in First Connecticut Lake
- reduced oxygen resulting from extra nutrients in the stream coming from manure runoff, over fertilization of home landscapes by homeowners, and direct deposits by cattle and other animals with access to the river
- damage to fish eggs from road salt
- contamination from heavy metals, such as those which could be contained in biosolids and could leach into the river if not properly applied and/or soil pH is too low to capture them
- should currently undeveloped lands around the Connecticut Lakes be developed, erosion and sedimentation from construction could threaten fisheries

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OBJECTIVES

The Headwaters Subcommittee wishes to see the excellent cold water fishery in the region maintained and improved if possible, through maintenance or improvement of current water quality and increased survivorship among fish populations. The fishery should be more self-sustaining and enjoyed by both residents and visitors to the region.

FEDERAL GOVERNMENT

U. S. Department of Agriculture *should:*

- increase awareness of new nutrient management techniques through county Cooperative Extension Service and conservation districts as a potential cost-saving measure for farmers as well as a pollution-reducing technique

STATE GOVERNMENT

Fish and game/wildlife agencies *should:*

- educate fishermen
- carefully consider the potential impacts upon fisheries from increased access and publicity. Provide better publicity of public access sites, and provide limited signage at river access points which is aesthetically in keeping with rural nature of the region.
- increase enforcement by fish and game wardens, and encourage them to continue watching for sources of turbidity and educating landowners about non-point source pollution which may impact fisheries
- pursue greater cooperation in stocking and enforcing existing regulations in the Headwaters area
- work with New England Power Co. and its successors to help minimize the effects of low dissolved oxygen levels during critical times by cold water releases from Lake Francis. A suggested release is at least 150 cfs combined flow from Lake Francis and Indian Stream during the typically low flow, warm water months of July and August.
- establish new cartop, gravel-surfaced river access point at N. Stratford-Maidstone bridge, on New Hampshire side, at end of natural segment, at the confluence of Bog Brook
- better cooperate in stocking and patrolling the river
- recognize the importance of rapids and areas such as Lyman Falls in returning oxygen to river water
- encourage maintenance of current undammed sections of the river, such as at the breached Wyoming Dam site
- encourage planting or maintenance of streamside buffers to minimize runoff, filter sediment nutrients, and other pollution that might otherwise enter the stream, and for the shade they would provide to keep water cool and thus better oxygenated for trout
- protect the breeding stock by establishing a "slot limit" that would require use of a single hook and the immediate release (after the photo) of 12-18" fish. Larger fish may be kept as trophies, which could be a benefit to trophy fisher tourists.
- maintain a limit of 5 fish/day, of which only one may be larger than 18"
- continue fish community studies

Forest resources agencies *should:*

- enforce existing logging regulations. Recommend adherence to forestry "best management practices" and provide education about the impact of improper logging practices on water quality

TOWNS *should:*

- town road agents should use best management practices for road salt and sand application
- discourage development of currently undeveloped lands around the Connecticut Lakes, in order to provide water quality protection for fisheries

PRIVATE SECTOR

Landowners *should:*

- farmers should decide on their own to adopt best management practices and to establish and retain filter strips between their fields and water courses
- plant or retain streamside buffers to minimize runoff, filter sediment nutrients, and other pollution that might otherwise enter the stream, and for the shade they would provide to keep water cool and thus better oxygenated for trout
- follow best management practices for application of biosolids, paying careful attention to existing soil pH and other conditions to be certain heavy metals and extra nutrients do not reach the river
- minimize erosion resulting from logging, farming, and other activities on the land wherever practicable to minimize turbidity and sedimentation

NEW ENGLAND POWER COMPANY and its successors *should:*

- continue or improve its already good cooperation with the states in fisheries management
- continue to maintain at least 60 cfs as working minimum flow from Lake Francis to keep undammed river habitat as stable as possible, and continue to respond to critical low flow periods

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REFERENCES

Connecticut River Water Quality Assessment, New Hampshire Department of Environmental Services and Vermont Departm of Environmental Conservation, 1994.

Connecticut Valley Inventory, Vol. I, NH Connecticut River Valley Resource Commission (of the CRJC), 1989. Writter non-technical language,this and its companion volume are a source of basic information about the river and the New Hampsh side. Volume I covers corridor character, protected parcels, surface water quality, public access, boating suitability, fisheries, a endangered species.

Improvement of Fisheries Management Techniques, NH Fish and Game Department, 1993. Report of a creel survey on a mile section of the Connecticut River between Pittsburg and Stratford, NH.

Silvio Conte National Fish and Wildlife Refuge Final Action Plan and Environmental Impact Statement, U.S. Fish and Wild Service, 1995. This extensive report details the findings of the Service in addressing Congress's direction to establish a wild refuge in the Connecticut River Valley, and describes the environmental and economic consequences of five alternative plans action. In addition to description of the plant, fish, and wildlife resources of the watershed, the report identifies sources of fund assistance, technical support, public concerns and comments, and various management options for land, water, and pul education. The report also describes "special focus areas" identified by the Service.

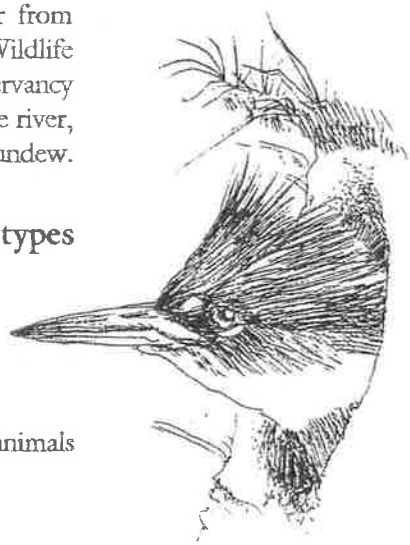
SHORELINE & UPLAND HABITAT

LIFE ALONG THE CONNECTICUT RIVER

The Connecticut River and its corridor provide a home for many different kinds of plants and animals. A rich variety of habitat types is concentrated in the area immediately adjacent to the river, from the oxbows, wetlands and setbacks associated with the river's edge, to the fertile floodplain and remnants of its silver maple forest, to the wild spruce-fir forests of the ledgy uplands, islands, and shorelines of the Connecticut Lakes and Lake Francis. Wetlands offer highly productive habitat for wildlife, while they filter pollutants and reduce the effects of flooding.

The variety of wildlife in the Headwaters Region is a distinctive and significant contributor to the quality of life here. The diversity of wildlife is directly related to the health and diversity of available habitat. Here in the headwaters of the Connecticut River, habitat is much less fragmented than it is in more developed areas downstream, allowing wildlife to move more freely and find more cover. Some species, such as the beaver, Canada goose, and the cattail, are common and are familiar to us all. They may occur along the river, but are also found in a variety of different types of habitats. Other species have narrower ranges, and are primarily found in the special sorts of conditions that the river and its corridor provide.

There is a great blue heron rookery on an island in Second Connecticut Lake and also at the Colebrook lagoons. Breeding wood, black, and mallard ducks, hooded mergansers, Canada geese, and blue-winged teal use the Connecticut River from Canaan/W. Stewartstown south to Groveton. The 610-acre Fort Hill Wildlife Management area at Maidstone/Stratford is especially active. The Nature Conservancy protects the entire shoreline of Fourth Connecticut Lake, the headwaters of the river, where acid conditions provide habitat for bog plants such as pitcher plant and sundew.



Important biological community types

- floodplain forests
- river shore grassland
- riverside outcrop community
- lowland bogs
- seepage swamps
- forests that may be either acidic or calcareous and support different plants and animals depending upon their acidity
- cliff community
- northern white cedar swamp

Species of concern on or near the river

- bald eagle (state status: endangered; federal status: threatened) fishes in ice-free waters
- osprey (threatened in New Hampshire); first nesting on the Connecticut River in many years occurred near Lake Francis in 1995 and 1996
- common loon (threatened in New Hampshire); at least seven pairs use both natural and artificial nesting sites at First Connecticut Lake, and loons also are regularly seen, but currently do not nest, at Second and Third Lakes and at Lake Francis. New ngland Power Co. personnel have participated actively in building and installing artificial

nesting islands on First Lake, and have plans to continue this on the others.

- northern harrier (marsh hawk; threatened in New Hampshire); nests in open grasslands near the river
- bluebirds nest in open fields as far north as Pittsburg

Migration corridor

The river functions as a corridor for migrating birds and other species which take advantage of the slightly milder conditions near the river before passing into the uplands as spring proceeds. Many of the birds using this habitat prey upon forest insects such as the spruce budworm. Conserving the integrity of this habitat may well contribute to the health of forests in the region and beyond. The Connecticut Lakes are an important staging area for migration of waterfowl and other birds in the fall.

Riverfront farms are particularly significant resources for some species of wildlife. They support wild turkeys in winter, at least as far north as Maidstone, and migrating geese largely from New Brunswick and Nova Scotia.

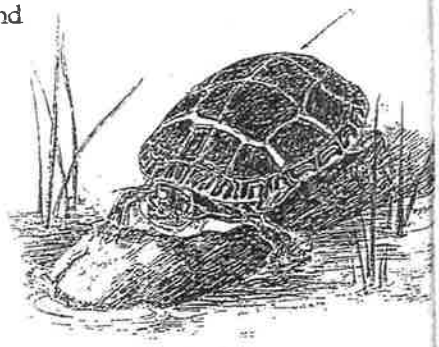
Wildlife-oriented recreation

Hunting and trapping are important forms of recreation in the Headwaters Region, for both residents and visitors, and contribute heavily to the seasonal economy. Wildlife are also taken for sustenance. Many people enjoy observing and photographing wildlife. Strong populations of bear, deer, moose, otter, mink, fisher, and beaver currently exist in the region. Moose are increasingly abundant, to the point where they in particular could be considered an economic resource. Their presence draws visitors who patronize not only local merchants selling film and postcards, but other service-oriented businesses.

> *"Moose are a money crop."*
>
> *riverfront farmer Maidstone*

Conditions needed to sustain habitat along the river

- riverfront farms and the open space they provide are important for certain kinds of wildlife, most notably game birds, because of the mixed habitat of open fields, fencerows, and wooded land; turkeys forage during the winter on crop residues left in fields, and may depend upon this source of food during particularly harsh winters.
- unimpounded river where it now exists; passage over riffles and cascades mixes oxygen into the water
- high water quality for otter, mink, fish, and other aquatic wildlife
- good forestry and agricultural practices that minimize erosion and sedimentation
- forest management practices that enhance diversity of habitats (included in the American Forest and Paper Association guidelines - see Appendix J)
- large tracts of unbroken land for bear
- spruce/fir or cedar groves for deer wintering yards
- corridors for travel between pockets of suitable habitat
- adequate buffers of native vegetation between upland areas and wetlands, streams, and the river to protect these habitats from sedimentation and other effects of development. This transition zone between the river and nearby uplands provides food, cover, and travel routes, roosting sites, nesting sites, and denning sites, and is also a refuge to wildlife during high water events.
- river and oxbow habitat are relatively free from disturbance by power boats
- good stewardship of land and water resources by NEP and other landowners



- water elevations adequate to keep significant wetlands flooded
- wetlands provide highly productive wildlife habitat, flood control, open space, natural filter for sediment and other water pollutants, and recreation

Opportunities for habitat management

- plantings of millet, corn, and fruiting shrubs near the river can provide valuable turkey and deer forage. Allowing some standing corn to remain in the fields offers a significant boost to foraging wildlife, especially turkeys and geese. Farmers could use assistance to plant forage crops on land they no longer use, allowing them to justify keeping this land and keeping it open.
- habitat conservation
- scientific research
- "ecotourism," educational field trips, low impact recreation

Good communication is needed between landowners and Fish and Game/Wildlife agencies and Natural Resources Conservation Service to allow landowners to take advantage of cost-sharing and incentive programs to improve habitat, such as the Environmental Quality Incentives Program of the 1996 Farm Bill.

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CURRENT PROBLEMS

- decline of dairy farms and reduction of the wildlife habitat they provide
- variable water levels may temporarily or permanently eliminate instream and shoreline habitat
- draining of setbacks reduces habitat
- areas of suitable habitat are becoming fragmented, preventing dispersal of wildlife
- introduction of non-native species such as purple loosestrife and *Phragmites* (giant reed), which displace native plants which offer better food or cover for wildlife.
- disturbance of nesting loons by boaters, leading to nest and chick loss
- lead poisoning of loons and other waterfowl who ingest lead sinkers

Potential problems

- habitat fragmentation and loss through residential and second-home development; riverfront farms are particularly vulnerable to development; the undeveloped landaround the Connecticut Lakes may also be threatened by development
- alteration of forest cover, especially of deer yards, and mast-producing plant species, by imported conditions such as acid rain, hemlock woolly adelgid, and gypsy moth
- loss of deer yards
- introduction of zebra mussel and other exotic plants and animals
- data used by Natural Heritage Inventory programs may not be entirely reliable

OBJECTIVES

Most of the property along the river is owned by individual landowners who have in the past and will continue in the future to play a key role in habitat conservation. The Subcommittee values the diversity of wildlife in our region, particularly that associated with the Connecticut River and its rich bottom lands. The Subcommittee seeks to maintain biodiversity here and to balance multiple uses of the region with wildlife requirements. The approach should be oriented toward conservation rather than strict preservation. Particularly since the entire impact of the loss of a species cannot be completely understood, it is both our opportunity and our responsibility to provide for the future of these rarer plants and animals, for we can play a major role in their survival. A primary means of ensuring future habitat in the region is to maintain and protect the economic viability of riverfront farms.

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RECOMMENDATIONS

FEDERAL GOVERNMENT

Natural Resources Conservation Service *should*:

- assist landowners to take advantage of the 1996 Farm Bill's Environmental Quality Incentives Program

Cooperative Extension Service's SeaGrant program *should*:

- provide education for visitors, boat owners and waterfront property owners about zebra mussel

STATE GOVERNMENT

Legislatures *should:*

- retain current use program in New Hampshire and strengthen it in Vermont
- support funding of Natural Heritage Inventory programs

Fish and game/wildlife agencies *should:*

- provide education on significant habitat and good stewardship for local conservation and planning commissions, outfitters, citizens
- use incentive programs for landowners for good habitat stewardship
- provide information to landowners about how to conserve biodiversity on their land
- work with farmers toward integrating seasonal and year-round farm activity with wildlife habitat needs; look at both where and when farm work is done to minimize conflict with wildlife when possible
- lease or purchase development rights on privately-owned riverfront farms *if the farmer is interested*
- adopt a community level conservation strategy, which is more efficient and cost effective than one which focuses upon individual species. Many of the total number of species present in an area can be preserved by maintaining good examples of the major community types. These groups of species require many of the same physical conditions, and occur close to each other. Protecting these communities helps to maintain the particular environments they require.
- examine the impact of water flow regime upon habitat
- ensure that management decisions are based on good science and not upon old data or hearsay
- work with New England Power Company and its successors to install osprey

nesting platforms at Lake Francis and the Connecticut Lakes; help NEP manage its extensive riverfront lands appropriately for wildlife
- discourage fishermen from using lead sinkers

Water quality agencies *should*:

- encourage vegetative bank stabilization along the river; minimize the use of riprap
- discourage impacts upon wetlands
- avoid construction of additional dams and further impoundment of the river

Tourism offices *should:*

- develop information for visitors on low impact visitor etiquette, including proper driving habits and parking procedures for moose watching to avoid endangering the native population of humans
- help local businesses develop tourism oriented around the region's wildlife

TOWNS *should:*

- encourage the maintenance of natural features along the river
- learn about species of concern within the town
- encourage use of cluster development to minimize impact upon waterfront habitat and to encourage growth or expansion of buffers
- encourage cooperation and local partnerships among private landowners and non-profit organizations which can help in conserving or maintaining natural communities
- encourage road agents to use vegetative bank stabilization and minimize use of riprap and other "hard" solutions where bank erosion is a problem
- discourage impact to wetlands along the river
- encourage an adequate buffer between the river and gravel pit operations
- encourage closure of completed sections of gravel excavations before expanding operations
- develop management plans for town-owned conservation areas
- discourage development of currently undeveloped lands around the Connecticut Lakes, in order to provide water quality protection and wildlife habitat

PRIVATE SECTOR

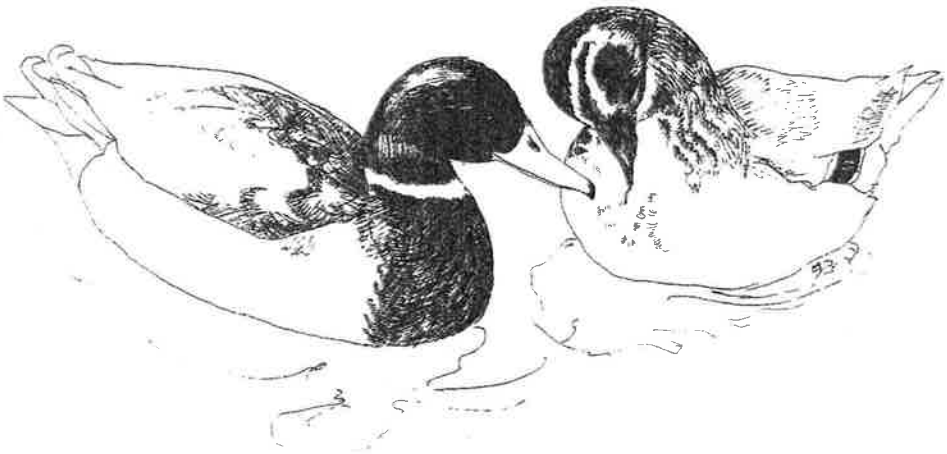
Landowners *should:*

- follow current laws
- support the maintenance of natural features along the river
- retain vegetated riverside buffers which stabilize the riverbanks; the buffer should be sufficient to permit wildlife to avoid using its edge, where they may be more vulnerable to predators such as raccoons and domestic cats and dogs
- choose vegetative bank stabilization over riprap where bank erosion is a problem
- avoid impacts to wetlands
- contact the NRCS about the 1996 Farm Bill's Environmental Quality Incentives Program
- learn to recognize species of concern
- consider presence of deer yards and den trees when planning and conducting logging operations

- avoid planting purple loosestrife in gardens
- avoid disturbance to nesting loons on the lakes; contact Audubon Society of NH with information

Business community *should:*

- develop ecotourism in the area; prepare and distribute information on lodging, attractions
- assist with appropriate literature for visitors interested in natural history
- New England Power Company and its successors should continue to be aware of their stewardship role



EXISTING PROGRAMS TO BENEFIT HABITAT

- 1996 Farm Bill's Environmental Quality Incentives Program
- The Natural Heritage Programs of VT Dept. of Fish and Wildlife and the NH Dept. of Fish and Game have done extensive surveys of rare species and have developed a system to rank their degree of rarity. This provides a well thought out, nationally consistent system for setting priorities for protection. Our plan in general adopts the species rankings and classification of community types used by the state Natural Heritage Programs.
- Partners for Wildlife Program (cost-sharing grant program for habitat conservation)
- Silvio Conte National Fish and Wildlife Refuge (grant program and other means of habitat conservation)
- Connecticut River Joint Commissions' Partnership Program (grant program for river stewardship projects)
- relicensing procedure for hydro dams, which will involve review of any comprehensive management plan already in place for the affected reach of the river and involve public participation
- state fish and game/wildlife departments offer funding to assist farmers in planting forage crops
- conservation easements and other land protection options through local land trusts, Connecticut River Watershed Council The Nature Conservancy, Society for Protection of New Hampshire Forests, Audubon Society of New Hampshire; Vermont Audubon Society chapters, New England Wildflower Society
- county conservation districts and Cooperative Extension Service programs such as the SeaGrant Program, which works to prevent introduction of zebra mussel

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REFERENCES

Finding Common Ground: Conserving the Northern Forest, Northern Forest Lands Council, Concord, NH, 1994. This report presents the findings and recommendations of the collaborative effort to reinforce the traditional patterns of land ownership and uses of large forest areas in the Northern Forest of New Hampshire, Vermont, New York, and Maine.

New Hampshire Natural Heritage Inventory, NH Dept. of Resources and Economic Development, 1995. Listing of plant and animal species and plant communities of special concern in each NH town along the Connecticut River, their rarity rank on a global and state level, listing under the federal Endangered Species Act, date last observed, and USGS quadrangle map.

New Hampshire Resource Protection Project, New England Interstate Pollution Control Commission and Environmental Protection Agency, 1995. This project is a cooperative endeavor among federal, state and local government agencies along with private conservation and business interests. Its goal is to identify high priority natural resource areas in NH and assist in those regions' protection planning efforts. Using GIS technology, the study analyzed data on wildlife habitat, drinking water supplies, forestry, agriculture, recreation, and pollution threats. The six resulting areas in NH targeted for attention based on the value of their natural resources include the Connecticut Lakes.

Silvio Conte National Fish and Wildlife Refuge Final Action Plan and Environmental Impact Statement, U.S. Fish and Wildlife Service, 1995. This extensive report details the findings of the Service in addressing Congress's direction to establish a wildlife refuge in the Connecticut River Valley, and describes the environmental and economic consequences of five alternative plans of action. In addition to description of the plant, fish, and wildlife resources of the watershed, the report identifies sources of funding assistance, technical support, public concerns and comments, and various management options for land, water, and public education. The report also describes "special focus areas" identified by the Service.

MAPS

Highlights of the New Hampshire Natural Resource Protection Project, New England Interstate Water Pollution Control Commission and the Environmental Protection Agency, 1996. GIS maps prepared for each of the five CRJC local river subcommittees show agricultural lands, unfragmented natural lands and shorelines, high value freshwater wetlands, drinking water supplies and pollution threats, bald eagle wintering sites, conservation and public lands, and some natural heritage inventory sites.Scale varies.

GIS maps produced for the CRJC and each of the local river subcommittees in 1994 by the U.S. Fish and Wildlife Service Connecticut River Coordinator's Office:

Communities. Map showing the general location of unidentified biological communities of concern and their rarity within the watershed, in all the watershed towns in the Headwaters region. Accompanied by descriptive listing of these communities and their rarity rank on a state, watershed, and global scale, location unidentified. Scale 1:100,000

Plants. Map showing the general location of unidentified plant species of concern and their rarity within the watershed, in all the watershed towns in the Headwaters region. Accompanied by descriptive listing of these species and their rarity rank on a state, watershed, and global scale, location unidentified. Scale 1:100,000

Wildlife. Map showing the general location of unidentified wildlife species of concern and their rarity within the watershed, in all the watershed towns in the Headwaters region. Accompanied by descriptive listing of these species and their rarity rank on a state, watershed, and global scale, location unidentified. Scale 1:100,000

Bald Eagles in the Connecticut River Watershed. Map shows bald eagle use areas in the four-state watershed.

Waterfowl in the Connecticut River Watershed. Map shows waterfowl use areas in the four-state watershed.

RECREATION

ON AND ALONG THE CONNECTICUT RIVER AND LAKES

There are few places more beautiful or attractive for recreation than the headwaters of the Connecticut River. A number of guides, outfitters, merchants, campgrounds, and other businesses derive income from both local and visiting recreationists who come to enjoy the river.

Swimming, fishing, boating, camping, hiking, bicycling, snowmobiling, hunting, trapping, and bird-watching are all popular with residents and visitors, as well as simply driving along river, enjoying the scenery. Free-flowing waters and rapids provide a highly valued canoeing experience for residents and visitors, and existing impoundments add a diversity of fishing and boating experiences. Canoeing and kayaking are especially popular along the seven-mile designated natural segment. Route 102 and Route 3 are well-used bicycle routes. The Monadnock Fire Tower is a popular destination for hikers.

Boating

There are three whitewater segments on the mainstem of the Connecticut River: a Class 2 section of .24 miles in Canaan/Stewartstown just below the bridge; a .1 mile section of Class 3 water a mile below this, and a 1.5 mile section of Class 2 water between Bloomfield and Stratford on the section designated as ***natural***. The 70 miles of uninterrupted boatable water between Canaan Dam and Gilman Dam is longer than any boatable segment in Vermont, according to "A Guide for Evaluating the Outstanding Rivers and Streams of Vermont" by Peter Jenkins, cited in the 1994 Connecticut River Water Quality Assessment.

River access and camping

There are 10 direct boat access sites open to the public in the segment: one at Third Connecticut Lake, two at Second Lake, two at First Connecticut Lake; two at Lake Francis, and one each at the Canaan- W. Stewartstown Bridge, at Columbia Bridge, and in N. Stratford at mile 203. Lake boat access sites accommodate trailered boats, while the river sites are accessible to cartop boats. There is also a walk-in access at the Amey Farm at mile 244. Camping currently takes place on private lands, sometimes with the permission of landowners. There are also six campgrounds presently open to the public near the Connecticut River.

Extent of river use for recreation

The extent of river use appears to have increased significantly during the last several years. In an effort to better understand the nature of this increase and which segments of the river are receiving the most pressure, the Subcommittee conducted an aerial study of river recreation with the help of the CRJC. (See Appendix C) Colebrook presently appears to be the center of the most highly used portion of the river, and is the

home base for the largest known river tour operator. Use of the river itself varied with its character, which can be divided into roughly equal thirds. Fishing pressure appeared to be heavy in the 25.5 mile stretch from Canaan to Bloomfield/North Stratford, which features quick water and some Class II rapids and is a well-known cold water fishery. Along this stretch many canoes and the highest number of parked cars were seen. In the 24 miles between Bloomfield/N. Stratford and Guildhall/Northumberland, which is characterized by some quick water giving way to slow moving meanders and oxbows with sandy beaches, oxbows were frequently used for camping, and a number of canoes were observed.

Guildhall/Northumberland to Gilman/Dalton presented a different picture. Just as high use characterized the Colebrook region, low use characterized this one. The 21 river miles are slow moving, with fewer of the oxbows and beaches that attract campers. The fishing and canoeing are still excellent, yet few fishermen and canoes were observed.

Economic value of river-related recreation

In an effort to understand the economic contribution of this recreation to the communities in the valley, North Country Council and the National Wildlife Federation conducted a study for the Headwaters and Riverbend subcommittees (See Appendix C). Using a survey of businesses that provide goods and services both directly and indirectly related to water-based recreation on the Upper Connecticut River, the study showed that water-based recreation along the upper Connecticut River in New Hampshire alone is at least a $26 to $31 million business, creating a minimum of 650 to 750 jobs. The business respondents are strongly in support of improving fishing opportunities in these New Hampshire riverfront towns, and public investment -- particularly for increasing access for fishing, swimming, canoeing, and kayaking, improving water quality, and for habitat management -- and for both local and state government involvement to protect the Connecticut River.

Conditions needed to sustain recreational use of the river

- scenic quality maintained
- safe travel for bicyclists on busy highways
- rerouted trailhead for Monadnock Fire Tower and relief from responsibility for Champion International Corporation
- adequate managed access to the river for launching, fishing, swimming
- road conditions which permit residents and visitors alike to enjoy the rural beauty of the region at a reasonable pace
- maintained or improved water quality
- sustainable, non-degrading use of the river by recreationists
- lack of access for high-powered boats

Recommended potential recreational uses

- greater variety of possible canoeing/kayaking trips with more access alternatives
- greater use of the section between Guildhall/Northumberland to Gilman/Dalton
- use of abandoned railroad bed for trails
- Heritage Trail; plan remains to be completed by towns

CURRENT PROBLEMS

- disregard of private landowners and their property by the visiting public. Due to a lack of adequate launch sites, the public often launches over and camps on private lands, sometimes without the permission of landowners, causing damage to crops and the riverbank, and sometimes leaving trash.
- lack of reciprocity between Vermont and New Hampshire snowmobile clubs leads to difficulties over trail use
- danger to bicyclists from truck and other traffic on Route 3
- liability issues at the Monadnock Fire Tower for the current landowner. The trailhead's current location also poses problems for a private landowner in Lemington.
- structural debris remaining at the breached Northumberland dam site is a hazard to canoeists and is unsightly

Potential problems

- problems for all river users posed by zebra mussel infestation
- slash left from forestry operations near streambanks is unsightly and negatively influences the public's perception of forestry activities
- inappropriate development and signage could alter the familiar rural character of the area, particularly around the Connecticut Lakes
- location of canoe campsites on islands and other areas of the river which flood frequently could threaten water quality

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OBJECTIVES

The Headwaters Subcommittee wishes to encourage low impact use and enjoyment of the river. Organizations offering recreational amenities should avoid commercialization.

RECOMMENDATIONS

STATE GOVERNMENT

Legislatures *should:*

- consider user fees to compensate landowners for keeping land open
- update liability statutes to establish hold-harmless mechanisms whereby the state underwrites a landowners' defense

Natural resource and recreation agencies should:

- educate visitors to the region on respect for private land and on visitor etiquette
- provide better publicity of public access sites, and provide limited signage at river access points which is aesthetically in keeping with rural nature of the region
- support reciprocity between state snowmobile clubs
- support forestry guidelines that discourage slash near streambanks
- identify an organization to assume responsibility for the Monadnock Fire Tower, and relocate trailhead onto property of abutting willing landowner

New Hampshire Fish and Game Dept. *should:*

- accept the parcel of land at the end of natural segment at the confluence of Bog Brook at N. Stratford-Maidstone bridge, which the landowner has offered for the purpose of a boat landing, and establish a new cartop, gravel-surfaced river access point. This will provide alternatives for day canoe trips on the river, and could increase business to two small stores in the vicinity.
- work with the landowner to remove dangerous debris at the breached Wyoming dam

New Hampshire Office of State Planning *should:*

- request that Scenic Byway Study include study of possible paved shoulder to accommodate bicyclists on Route 3 between Groveton and N. Stratford
- recommend that each New Hampshire town participate in Heritage Trail planning

New Hampshire Dept. of Safety Services *should:*

- continue to inform boaters of non-motorized boating on natural segment

Transportation agencies should:

- provide at least a paved shoulder on Route 3 from a point 2 miles north of Groveton to N. Stratford to increase safety for bicyclists
- avoid further road improvement that could lead to increased speed of traffic

Tourism agencies *should:*

- establish communication with riverfront farm and forest landowners
- attract tour groups rather than individual river users in order to reduce the impact of travel through the region

TOWNS *should:*

- discourage development of currently undeveloped lands around the Connecticut Lakes, in order to provide water quality protection, wildlife habitat, and the scenic qualities that are so important to the recreation and tourism component of this region's economy

PRIVATE SECTOR

- Connecticut River Watershed Council should revise errors in its booklet on canoeing

REFERENCES

Along the Northern Connecticut River: An Inventory of Significant Instream Features, Connecticut River Joint Commissions, 1994.

Rivers, Recreation, and the Regional Economy: A Report on the Economic Importance of Water-Based Recreation on the Upper Connecticut River, August, 1996, Kari Dolan and Thomas Dunham, Northeast Natural Resource Center, National Wildlife Federation, Montpelier, VT and Daniel S. Woods, North Country Council, Bethlehem, NH. Report prepared for the Headwaters and Riverbend Local River Subcommittees of the Connecticut River Joint Commissions with the support of NH Dept. of Environmental Services. Covers New Hampshire communities from Pittsburg through Haverhill.

The Complete Boating Guide to the Connecticut River, Connecticut River Watershed Council, Easthampton, Mass., 1986. This guide covers the river's passage through all four states, and includes illustrations, historical anecdotes, and maps.

MAP

Headwaters Region - Recreation, GIS map produced for the CRJC and the Headwaters Subcommittee by MicroDATA, with the support of VT Agency of Natural Resources, 1994. Displays surface waters, roads, railroad routes, public boat launch sites, campgrounds, waterfalls and cascades, and whitewater segments for the towns of Pittsburg/Canaan through Northumberland/Maidstone, scale 1:31,680

AGRICULTURE

ON THE BANKS OF THE CONNECTICUT RIVER TODAY

Prime agricultural soils distinguish much of the floodplain in the Headwaters region. Land use along both sides of the river still speaks loudly of their value in the long-time lively agricultural economy and way of life in the river valley. The majority of the farms in this county are well-prepared to help maintain water quality.

Dairying has been the primary agricultural activity for over a century, but is declining as the pricing formula for milk discourages dairy expansion. There are a number of part-time farms in the region, whose owners rely upon outside income to maintain their operations, a trend which will likely continue. The cool climate and plentiful rainfall provide ideal conditions for grazing dairy and beef cattle and sheep. Dairy farms currently produce more beef than beef farms. Riverfront farms, the subject of this discussion, are distinctly different in character and resources from the hill farms which are also common.

The region's working agricultural and forest landscape mean much to residents and visitors alike. Products of the land are the direct economic mainstay of the area, and the rural agricultural landscape appeals to year-round working residents. The farmlands of the river valley mean home, even for those who do not make their living on them.

A secondary economic benefit to the region comes from urban and suburban visitors who are attracted by this landscape. The region offers a number of sweeping vistas of the river and surrounding valleys and farmland, such as that from a long stretch along Route 3 from the Colebrook-Stewartstown town line to the Coos County farm in the village of West Stewartstown, and along most of Vermont's Route 102.

Valuable soils

Connecticut River Valley floodplain soils of the Headwaters area are among the most productive agricultural soils in the entire region. The 1600 acres in Coos County currently used for cultivating corn yield an average of 18 tons of silage per acre. According to a mapping study performed for the Headwaters Subcommittee, more than half of the land close to the river on the New Hampshire side alone has soils of national, state, county, and local significance, according to the U. S. Department of Agriculture. (See References). Such information is unfortunately not available for the Vermont side of the river because computerized mapping of these soils has not been completed. Agricultural activity is of course not limited to these soils.

Of the 12,366 acres of these agriculturally important soils within one half mile of the river on the New Hampshire side, only 24% are actually in active agricultural use. Seventy-six percent are not in agricultural use, and development has permanently taken 11% of these local agricultural soils out of production. 8100 acres remain available for agriculture but are currently forested or otherwise not actively farmed.

There are presently 1765 acres of valuable soils protected from development within half a mile of the river on the New Hampshire side. Five percent of these are being actively farmed, while 10% are not in active agricultural use.

Local agricultural land use

The following is a sketch of agricultural land use in the Headwaters towns, drawn from the river's nomination to the New Hampshire Rivers Program, which was prepared by a working group of local citizens in 1992. Soils information is added for New Hampshire towns.

Pittsburg, NH: South of the village of Pittsburg there are occasional farms, but most riverfront land is forested. A major farm at the confluence of Indian Stream is under conservation easement. 63 (1.6% of the total available) acres of important agricultural soils within ½ mile of the river in this town are in active use.

Clarksville, NH: Riverfront land in Clarksville is almost entirely forested. Of 1088 acres of important agricultural soils within ½ mile of the river, 25 (2.3%) acres are active.

Canaan, VT: Above Beecher Falls the riverfront is mainly forested with a few farms. Below Canaan, land along the river is mostly agricultural.

Stewartstown, NH: South of West Stewartstown the land beside the river is mostly agricultural. Of 842 acres of important agricultural soils within ½ mile of the river, 281 (33%) acres are active.

Colebrook, NH: North of Colebrook village, the land is mostly agricultural along the river. Of 970 acres of important soils within ½ mile, 271 (28%) acres are active.

Lemington, VT: Riverfront land in Lemington is predominantly agricultural.

Columbia, NH: Open space along the river is predominantly forested. Of 1316 acres of important agricultural soils within ½ mile of the river, 323 (25%) acres are active.

Bloomfield, VT: Land along the river is mostly agricultural.

Stratford, NH: Between North Stratford and Stratford Hollow, riverfront land is generally forested. Of 2045 acres of important agricultural soils within ½ mile of the river, 730 (36%) acres are active.

Brunswick, VT: Riverfront land is generally agricultural.

Maidstone, VT: Riverfront land is generally agricultural.

Northumberland, NH: Land along the river is primarily agricultural and there is a conservation easement on a large dairy farm. Of 2329 acres of important agricultural soils within ½ mile of the river, 1221 (52%) acres are in active use.

Conditions needed to sustain agriculture in the Headwaters

- favorable or at least not harmful taxation policy toward agricultural land and agricultural buildings
- healthy general economy
- consumer recognition of the costs of food production
- consumer desire to support local agriculture
- prime agricultural soils that remain in place
- adequate and fair price for farm products
- adequate local agricultural support infrastructure
- local outlet for local products, such as new farmer's market at Colebrook Feeds Store
- asistance from Natural Resources Conservation Service, state departments of agriculture, and Cooperative Extension Service
- local government support of right to farm, expressed in local regulations.
- local government support for keeping good agricultural land available for agriculture, expressed in master plan

Opportunities for local agriculture

- more utilization of manure as a cash crop
- larger market for locally grown vegetable produce and fruits
- more maple sugar production
- increased local production of beef and lamb; potential market for Holstein dairy beef within the Valley as long as a local slaughterhouse could service this market. Outside of the Valley, Angus and Herefords are filling the market for beef.
- regional farmers' market
- horse-drawn sleigh and wagon rides for the large tourist industry, which in turn could support another market for hay, a crop less demanding upon water and soil than corn
- more part-time farming to help keep agricultural infrastructure viable
- production of specialty foods at commercial cooks' kitchen, such as has been recently built in Lancaster
- small local dairy processing plant to serve smaller farms
- locally bottled water
- more value-added dairy products
- hybrid poplar tree farming

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CURRENT PROBLEMS

Farmland trends during the last decade show a general decline in the number of farms, their acreage, and the proportion of harvested cropland. During the period 1982-7, the region experienced a loss of 10% of Caledonia County farms, 6% of Essex County farms, and 16% of Coos County farms. During the following five years, however, Coos County actually added 19 farms, bringing its 1992 total close to 1982 levels.

The loss of acres in farmland from 1982-87 was 13% for Caledonia County and 14% for Essex County for 1982-7, and 16% for Coos County for 1982-1992, where 9055 acres were removed from agricultural use over this ten year period. While some of this land is being converted to residential use, particularly in the Hall Stream watershed, the majority is simply falling out of active agricultural use, and substantial effort would be required to bring it back into production.

The percentage of the average farm's harvested cropland, which was approximately a third of the farm's total holdings, also declined during 1982-7, from a 2% loss in Caledonia County, 8% in Essex, and 6% in Coos County. This is part of a long-time trend which has seen, for example, the number of dairy farms in Pittsburg decline from 35 to only two over the last half century.

The average sales per acre in Coos County was the lowest for any Connecticut River Valley county in 1987, at $162.53. Farmers across the river in Caledonia Co. were grossing an average of $229.50 and, in Essex Co., $223.23.

Unlike other businessmen, a farmer is unable to pass many of the costs of doing business, including pollution remediation or prevention practices and devices, on to the consumer. If a farmer could regulate his income, he would be in a better position to set land aside for water quality protection. Those farmers fortunate enough to have a larger land base have more flexibility in this area.

Other concerns include:

- local farmers are fighting an attitude among distant buyers and policy-makers that food cannot be effectively produced in this northern region

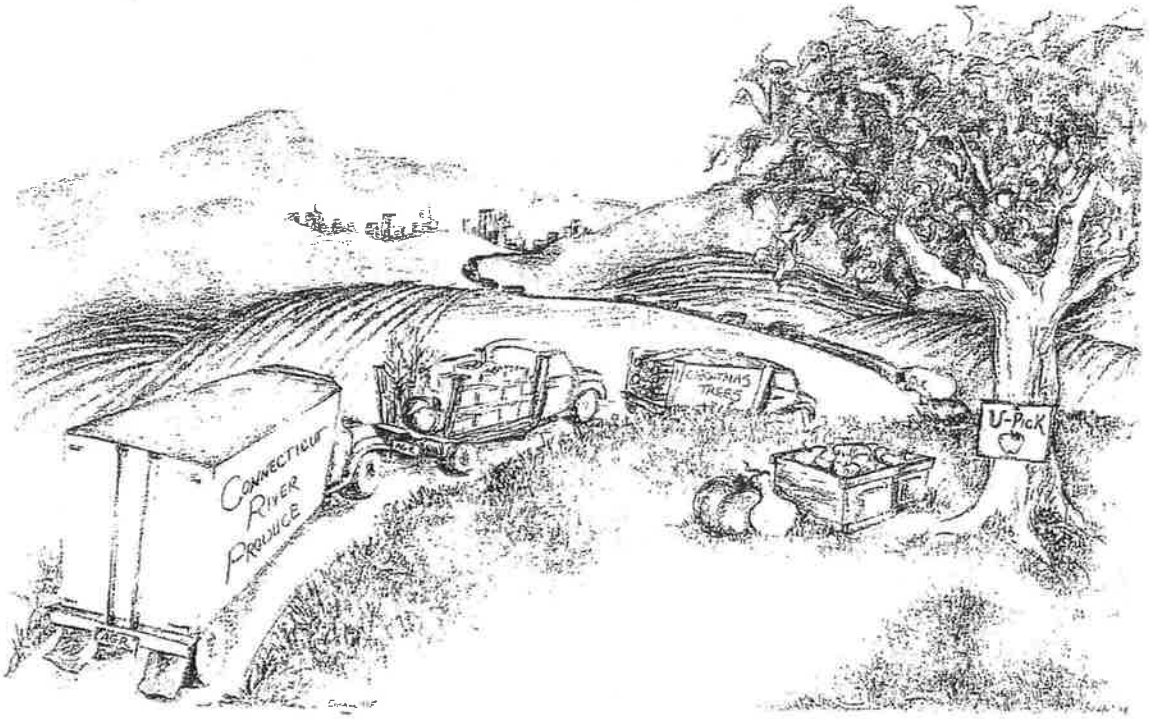
"We pay property tax, federal income tax, social security, business profits taxes, medicaid taxes, workman's compensation taxes, unemployment taxes, (Vermont farms pay state income taxes), and finally estate taxes. Every bit of this comes out of a little hole at the end of a cow's teat."

riverfront dairy farmer

- farmers are under economic pressure to sell land to developers for second homes, particularly along shorelines
- farmers are discouraged by the level of interference in their activities by state and federal agencies
- some farmers are financially forced to grow corn on riverbottom lands more continuously than is beneficial for either the soil or for water quality. Corn land is highly exposed to erosion during flooding.
- the status of the general economy is detrimental to the health of agriculture
- slaughterhouses in New England are inadequate
- the price offered for lamb is artificially low, since the current regulations defining "American" lamb allow imported New Zealand lambs to be sold as American if they are held and fed here no longer than 60 days
- cost-sharing programs are often difficult to understand and have changing conditions attached to them

Potential problems

- loss of agricultural support infrastructure (dealers of equipment, seed, feed, etc.) as their clientele decreases
- megadairies may face increasing problems in the costs of transportation, fuel, labor, and insurance
- field applications of sewage sludge may lead to potassium deficiency, and the high pH required to kill pathogens may make other nutrients unavailable
- overapplication of fertilizers
- the risk of pollution increases when more animals are crowded onto a smaller piece of land, which may happen at megadairies
- very few banks in New Hampshire are doing local loans for farming operations, and the towns east of the river are being serviced from the FHA office in Newport, Vermont; New Hampshire farmers may face greater difficulty in securing credit
- loss of agricultural land to development of second homes



OBJECTIVES

The floodplain soils of the Connecticut River are prized in this region for the opportunities they provide for agriculture, and for the familiar scenery of the farm landscape. The Headwaters Subcommittee wishes to see the river and its corridor remain as close to their present condition as possible, and recognizes that a sustainable agriculture in the region is key to the scenic quality of the river valley. The local economy should be protected and enhanced, particularly agriculture and forestry, which are highly valued ways of life in this region and should continue as its economic mainstay.

Farmers are in strong need of assistance to achieve nonpoint pollution control on their property. The primary answer for the many difficulties facing North Country agriculture is a taxation policy which encourages agriculture. Local rather than federal initiatives to strengthen local agriculture are preferred.

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RECOMMENDATIONS

FEDERAL GOVERNMENT

U. S. Department of Agriculture *should*:

- recognize that New England should have its fair share of federal assistance, and that the needs of its agriculture are distinct from those of other regions
- maintain funding levels for Cooperative Extension Service cost-share programs for conservation practices and adopt consistent, simple terms for cost-sharing programs
- continue to offer cost-sharing for construction of manure storage pits to eliminate winter spreading in the floodplain
- increase awareness of nutrient management planning as a potential cost-saving measure for farmers as well as a pollution-reducing technique, through county Cooperative Extension Service and conservation districts
- develop local credit for FHA loans through banks on New Hampshire side of river
- adjust the time land is left in grass based on individual farm conditions
- conservation districts should cooperate across the river to benefit valley farming

Federal Emergency Management Agency *should*:

- maintain accurate, up-to-date floodplain maps

STATE GOVERNMENT

Legislatures *should:*

- Vermont review its current use legislation with consideration to changes to bring it closer to that of New Hampshire
- encourage banks to develop socially responsible investment programs that promote local agriculture and forest-based economy

Departments of agriculture *should:*

- educate the public about the value of locally-produced foodstuff
- create newsletters and other public information
- encourage small part-time farming as a viable form of agriculture; utilize financial programs, markets, and educational tools
- educate the farming and non-farming public about community-supported agriculture
- provide marketing assistance to farmers

- NH Department of Agriculture expand its marketing assistance capability
- VT provide support for NVDA to prepare mapping of prime agricultural soils along the river and their present use to complement similar maps prepared for NH
- review the Soil Production Index tax scale for farmland to make taxation fairer to farmers

TOWNS *should*:

- avoid using high end of the Soil Production Index scale to derive tax figures for riverbottom lands
- investigate how conservation easements can help keep town service and school costs down if the land is not developed into houselots or into second homes which could later become year-round residences
- develop the means to guide development that occurs on prime agricultural soils
- consider land use guidelines to help preserve agriculture, such as:
  - -discouraging building in the floodplain
  - -allowing use of cluster development as a way of keeping farmland available
  - -encouraging commercial development in areas that are not prime agricultural areas
  - -asking residential developers of land next to farms to add a buffer to prevent conflicts between new residents and existing farm use

PRIVATE SECTOR

Farmers *should:*

- voluntarily adopt best agricultural management practices
- learn about estate tax issues and seek advice on estate planning
- learn how conservation easements help keep the farm in the family and the land working (see Appendix H)
- keep good records of yields, fertilizing, and soil/plant tissue analysis
- decide on their own to establish/retain filter strips between fields and water courses
- rotate corn frequently with other crops, particularly on flood-prone land

Business community *should:*

- establish a regional farmers' market to help make people aware of the kinds of commodities which can be produced well in this region
- keep agricultural infrastructure strong (seed/equipment dealers, auction houses; slaughterhouses)
- establish commercial scale slaughterhouse
- establish commercial cooks' kitchen similar to that recently completed in Lancaster

Farm Bureau *should*:

- work with Connecticut River Joint Commissions to promote valley agriculture

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Existing programs to assist local agriculture

- Environmental Quality Incentives Program of 1996 Farm Bill
- Current use legislation as it now exists in New Hampshire, and to some extent in Vermont
- USDA Natural Resources Conservation Service and Farm Services Agency
- UNH and UVM County Cooperative Extension Service
- State departments of agriculture
- CRJC's Connecticut River Agricultural Network
- CRJC's Connecticut River Valley Partnership Program
- State and local farm bureaus
- State fish and game/wildlife departments
- land trusts, particularly those that focus upon agricultural lands
- Clean Water Act Section 319 grants through the states for fencing and other nonpoint pollution control projects
- current study for small dairy processing plant in Groveton
- certain local planning and zoning regulations, where they exist

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REFERENCES

Connecticut River Valley: Opening New Markets for Agriculture, Conference Proceedings and Recommendations, 1994. This report reviews a valley-wide conference sponsored by the CRJC, and presents dozens of recommendations dealing with financing, market regulations, government support, processing and distribution, agri-tourism, cooperatives and contract marketing, and community supported agriculture. Farmland trends from supporting research papers are also summarized.

Findings to Support Classification of Segments of the Connecticut River, Connecticut River Valley Resource Commission, 1991. These findings, prepared with the help of citizens along the length of the river, nominated 34 specific segments of the river through the New Hampshire Rivers Management and Protection Program.

Agriculturally Important Soils, Pittsburg-Northumberland,NH. GIS maps created for the Headwaters LRS by North Country Council with the support of NH DES, 1996. Displays all agriculturally important soils within ½ mile of the Connecticut River, as defined by the Soil Conservation Service. Soils are distinguished as in active agricultural use or inactive, both protected and unprotected from development, and those soils lost to development. Total acreages of each catergory are provided.

FORESTRY

KEY TO THE RIVER'S HEALTH

The northern forest is likely the single most important factor in the water quality, fisheries, wildlife, recreational, scenic, and economic values of the river in the Headwaters Region. The industry based upon this forest is a major landowner, major employer, and major contributor to local taxes. Forest management is a more significant land use in the Headwaters than in any other subcommittee region. At the same time, the northern forest is a major destination for thousands of visitors.

Most of the forest land along the river is privately owned. The riverbanks are heavily wooded north of Pittsburg village. The Connecticut Lakes State Park includes portions of the corridor above First Connecticut Lake; the remainder is managed forest held by private companies, including New England Power Company, which is a major landowner around the lakes. Below Pittsburg village, most of the corridor land is wooded through Clarksville to W. Stewartstown village. In Vermont, the corridor is mainly forested above Beecher Falls. In Columbia, New Hampshire, and between North Stratford and Stratford Hollow, undeveloped land along the river is predominantly forested. The forest presently varies from large tracts to small forested strips bordering the river along open farmlands or developed areas.

Conditions needed to sustain forestry in the Headwaters

- healthy forest products industry
- effective communication and cooperation between timber management companies and other forest landowners with state water quality agencies
- better public understanding of forest management practices
- better communication between the recreation/tourism and wood products industries
- forested riparian buffers to control flooding and erosion, shelter coldwater fisheries, trap pollutants, and provide connected wildlife habitat, an attractive streambank, and recreational opportunities
- stewardship of the forest by forest landowners, with attention to:

  - ecological diversity
  - timber sustainability
  - wildlife
  - water quality
  - aesthetics
  - public use
  - economic viability
  - community involvement
  - land use planning
  - communications

Potential benefits of good forest management

- sustainable forest management of timber resources
- more stable riverbanks and better wildlife habitat in forested riparian buffers
- excellent water quality in Connecticut River received from its tributaries

Conditions needed to make these possible

- adherence to best management practices for timber harvesting (Appendix E)
- acceptance of standards developed by American Forest & Paper Assoc. (Appendix J)
- landowner awareness of the many values of streamside forests
- landowner development and use of management plans for their forests
- use of forested riparian buffers to trap pollutants and reduce flooding

CURRENT PROBLEMS

- negative perceptions of forestry by the public; particularly objection to clearcutting and slash disposal near waterways, on the grounds of aesthetics and potential water quality impacts
- sale of forest land associated with farms if farms in economic stress
- siltation from natural sloughing of banks is sometimes attributed to logging activity
- siltation can result in impacts to fisheries, water quality, and aesthetics, and pose problems at downstream industrial water intake pipes
- public questions surrounding use of herbicides as a silvicultural tool in the corridor

"The timber companies are doing a much better job these days. They're more careful with their stream crossings."

forest landowner, Pittsburg

Potential problems

- siltation from improperly built stream crossings or skidder trails or harvesting when soils are prone to erosion
- faulty construction or lack of regular maintenance of woods roads
- bank erosion and sedimentation from removal of forested riparian buffer or from inadequate buffer
- flash flooding and siltation from increased surface runoff when large areas of forest cover are removed
- landowners may be unaware of the many values of their streamside forests
- application of biosolids and wood ash in the absence of a nutrient management plan or on unsuitable soils
- loss of biodiversity

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OBJECTIVES

The Headwaters Subcommittee seeks a healthy local forest products industry, healthy recreation industry, and excellent water quality to sustain the river's fine fisheries and river-oriented recreation. Integral to this is sustainable forestry: managing our forests to meet the needs of the present without compromising the ability of future generations to meet their own needs by practicing a land stewardship ethic which integrates the growing, nurturing, and harvesting of trees for useful products with the conservation of soil, air and water quality, and wildlife and fish habitat. *(This definition is used by the American Forest and Paper Association)*

◆

FEDERAL GOVERNMENT

Congress *should:*

- pass the Northern Forest Stewardship Act and the Family Forestland Preservation Tax Act, and implement other recommendations of Northern Forest Lands study

Natural Resources Conservation Service *should:*

- provide information on forested riparian buffers to landowners

STATE GOVERNMENT

Legislatures *should:*

- maintain current use program in New Hampshire, with increased penalty for taking land out of current use; strengthen program in Vermont
- implement recommendations of Northern Forest Lands study
- provide incentives such as property tax abatement for landowners to participate in land conservation

Forest resource agencies *should:*

- promote ecosystem management as the preferred means of achieving sustainable forestry
- encourage continuing education for loggers, landowners, and foresters
- protect the ability of private landowners to manage their woodlands on a sustainable basis
- promote wood as a renewable resource
- encourage conservation easements with interested landowners (Appendix H)
- implement recommendations of Northern Forest Lands study
- educate landowners about benefits of stewardship
- encourage better communication between the recreation/tourism and wood products industries
- explore mechanisms to provide incentives for alternate financing to encourage sustainable natural resource business; develop special financing program targeted to the forest products industry such as enterprise zones
- encourage banks to develop socially responsible investment programs that promote forest-based economy

Water quality agencies *should:*

- continue communication and cooperation with forest landowners

PRIVATE SECTOR

Landowners *should:*

- adopt the principles of sustainable forest management
- follow best management practices for timber harvesting (Appendix E)
- develop management plans for their forests and conduct logging with the help of professional foresters
- promote ecosystem management as the preferred means of achieving sustainable forestry
- adopt American Forest and Paper Association guidelines (Appendix J)
- increase overall forest growth, quality and productivity

- minimize the visual and water quality impacts of clearcutting, especially near the river
- reduce the risk of and suppress wildfires
- promote and use integrated pest management to lessen the reliance on chemicals
- protect and maintain a forested riparian buffer along waterways in which a strip immediately adjacent to the banks is surrounded by a zone of intensive selective management that allows new growth to effectively remove and utilize nutrients that might otherwise enter the stream
- streambank restoration projects should include planting of vegetated buffers
- dispose of slash away from streams and out of public view
- consider conservation easements on their property to allow it to continue in active forest management and to contribute to the economic, scenic, and timber resource base of the region, but also allow it to remain unfragmented by development (Appendix H)

◆

REFERENCES

Connecticut River Water Quality Assessment, NH Dept. of Environmental Services and VT Dept. of Environmental Conservation, 1994.

Finding Common Ground: Conserving the Northern Forest, Northern Forest Lands Council, Concord, NH, 1994. This report presents the findings and recommendations of the collaborative effort to reinforce the traditional patterns of land ownership and uses of large forest areas in the Northern Forest of New Hampshire, Vermont, New York, and Maine.

Good Forestry in the Granite State: Recommended Voluntary Forest Management Practices for New Hampshire, New Hampshire Forest Sustainability Standards Work Team, Concord, NH, 1997.

HISTORICAL & ARCHEOLOGICAL FEATURES

HISTORY ALONG THE RIVER

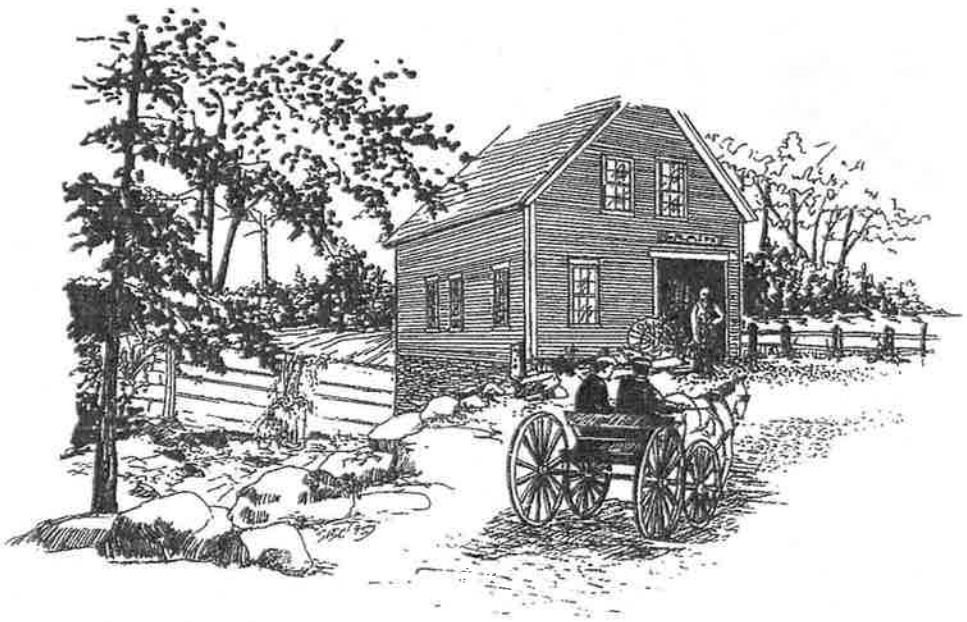
The cultural heritage of the Headwaters Region is closely interwoven with the Connecticut River. The rich soils enabling an agricultural history of thousands of years came from high in the watershed by the river and its tributaries. The forest industry has long depended upon the river for its power, and once also depended upon the river to move its raw products to market. Today, collections of historic agricultural buildings and the working lands surrounding them are perhaps the most important evidence of a land-based economy that still continues in this region. Abandoned logging railroad rights of way, threaded throughout the region, are other traces of the powerful impact of forestry. Village clusters still retain their nineteenth-century flavor, blending comfortably with stone culverts, covered bridges, and dirt roads. Stone walls remain as traditional boundary markers and blunt reminders of the ice age. Archeological sites are known to exist at Canaan bridge, Bissell Brook, Columbia bridge, and near the site of a proposed landfill in Stratford.

Highlights of the historical and archeological features of Headwaters towns include:

Pittsburg, NH: Indian Stream Republic historical marker on the town common. Covered bridge over the river.
Stewartstown, NH: 45th parallel marker about a quarter mile north of West Stewartstown village on Route 3.
Canaan, VT: Canadian border stations constructed in the 1930s for Customs and Immigration & Naturalization Services personnel, establishing the Federal presence in remote, rural towns. The Beecher Falls Border Station is listed on the National Register of Historic Places, as is the Alice M. Ward Memorial Library. The Fletcher Park Historic District is considered to be of national significance. Archeological site in vicinity of bridge.
Colebrook, NH: "Boomtown" storefronts; Greek Revival style town hall and courthouse.
Lemington, VT: Covered Bridge to Columbia, NH is listed on the National Register of Historic Places.
Columbia, NH: Covered bridge to Lemington, VT is listed on the National Register of Historic Places. There is also an old pier in the River left over from the logging days. Archeological site in vicinity of bridge.
Stratford, NH: Historical marker commemorating the log drives on the Connecticut River just south of North Stratford village. Nineteenth-century housing for workers in the paper mills of Groveton. c. 1885 Steel Pratt Truss bridge between Stratford and Maidstone. Archeological site at Smarts Brook.
Brunswick, VT: Brunswick springs with its seven minerals and the ruins of the old hotels that legend states have fallen victim to an Indian curse on the site.
Northumberland, NH: Old ruins of Fort Wentworth on Potter Farm (private property). There is an historical marker on the Fort that sits just across Route 3 at the Old Meeting

House building, which was featured in Kenneth Roberts' historical novel, *Northwest Passage*; paper mills and mill-worker housing.

Maidstone, VT: There is an old Maine Central Railroad abutment in the river approximately one mile from the Brunswick town line. The privately owned Maidstone-Stratford Hollow bridge dates from c. 1885.



Making the most of history in the future

- tourists in the region could be attracted by and better appreciate the Headwaters Region's history and pre-history, bringing dollars into the area by respectful visitors ("heritage tourism")
- reuse historic buildings rather than razing, rebuilding, to discourage commercial sprawl outside the historic village center
- new development could be clustered rather than spread out, in order to keep more of a sense of agricultural and forested landscapes

Conditions needed to make these possible

- economically viable agriculture and sustainable forestry practices
- local appreciation for its heritage as exhibited in landscapes and older buildings
- economically viable historic village centers
- careful education and promotion of the rural historic values of the region
- respect of private property rights by visitors and residents alike

◆

CURRENT PROBLEMS

- neglect, decay
- loss of stone walls through road widening projects, skidder activity, insensitive development, and pilfering for the residential home landscape
- lack of understanding or appreciation of historic features
- a number of historic barns, including a rare round barn, have been taken down by their owners because of the tax burden they represented

Potential problems

- loss of agricultural landscapes
- development sprawl outside historic village clusters
- decay and removal of agricultural outbuildings by non-farming owners
- bank erosion exposing archeological sites; looting of archeological sites
- deterioration of historic bridges if they are taken out of service
- replacement of stone culverts through road maintenance projects

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OBJECTIVES

The Headwaters Subcommittee hopes that the region will retain the familiar historic character of its villages, river crossings, and the working landscape while people continue to live and work here.

◆

RECOMMENDATIONS

STATE GOVERNMENT

Historic resources agencies *should:*

- work with state departments of transportation to establish fund for maintenance of historic bridges
- provide education for town officials, students, homeowners on historic resources
- seek bank stabilization to protect eroding archeological sites
- investigate ways to assess historic barns and other such buildings to avoid loss from heavy taxation

TOWNS *should:*

- focus on local history education in schools
- consider adopting some form of guidance for cluster development to minimize impacts of development upon the historic working landscape, and to keep the sense of community of historic villages
- those towns which have zoning could consider specifically allowing multiple uses in historic buildings in village centers, particularly home occupations, which could allow these buildings to be more economically feasible. This could support continued activity within the historic village center and discourage sprawl.
- investigate ways to assess historic barns and other such buildings to avoid loss from heavy taxation
- consider controlling signage so that it does not compete with rural and historic character of area
- consider building height limits so that village skylines remain dominated by steeples and 2-3 story houses (this is also a safety feature; firefighting equipment may not be capable of reaching taller structures)

PRIVATE SECTOR

Historical societies *should:*

- educate their fellow citizens about local history and how it relates to the Connecticut River; consider writing and publishing histories of their town, conducting oral history interviews of long-time residents, and looking into the history of individual buildings
- provide education for town officials, students, homeowners on historic resources

- participate in the Scenic Byway Study to be certain that it is responsive to their area's interests and concerns and provides their towns with the information they will find most useful; work with NVDA and North Country Council

Business community *should:*

- investigate the heritage tourism development program undertaken in Berlin
- participate in the Scenic Byway Study

Property owners *should:*

- examine possible tax benefits for restoration of their historic buildings
- consider conservation easements as a way of keeping historic agricultural and forest landscapes intact and unfragmented by development (Appendix H)

Local media *should:*

- continue or consider carrying regular articles featuring an historic area, buildings, activities, or interviews with longtime residents

Those working in the woods *should:*

- avoid damaging stone walls especially when operating skidders; if crossing is necessary, use only one location

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EXISTING PROGRAMS TO SUPPORT LOCAL HERITAGE

- CRJC's Connecticut River Valley Partnership Program which provides grants to community groups for projects oriented toward local heritage, among others
- Vermont's "Barn Again!" program to help property owners restore historic barns
- Certified Local Government program through the state historic resources agencies in both NH and VT which provides funds for towns for their own historic research or education projects
- review of federally-funded projects by state historic resources agencies, which allows historic and archeological information to be collected and provided to the towns
- Scenic Byway Study

REFERENCES

Cultural Landscape of the Connecticut River in New Hampshire and Vermont, Richard Ewald, draft report 1995, final report in publ. An illustrated report to the National Park Service from the CRJC, covering pre-history and early settlement, transportation, agriculture, industry, conservation, culture and government, architecture and settlement patterns, and tourism and recreation. Includes maps identifying selected sites of interest in each subject.

Connecticut Valley Inventory, Vol. II, NH Connecticut River Valley Resource Commission (of the CRJC), 1989. Written in non-technical language, these two volumes are a source of basic information about the river and the NH side. Volume II covers flood hazard areas and impoundments, aquifers, historic and archeological resources, and wildlife.

Findings to Support Classification of Segments of the Connecticut River, Connecticut River Valley Resource Commission, 1991. These findings, prepared with the help of citizens along the length of the river, nominated 34 specific segments of the river in several categories for classification and instream protection through the New Hampshire Rivers Management and Protection Program.

LAND USE & DEVELOPMENT

ALONG THE CONNECTICUT RIVER TODAY

The Headwaters Region of the river valley still is, for most, the way residents want to remember it and the way they expect that their children will know it. Forests and fields are scattered with riverfront farms, homes and villages that show their years in a way that fits with the land. Newer homes, busy commercial corners, and the rumble of traffic are signs that the region is moving into its future, not mired in its past. The following is a sketch of present development along the Connecticut River today, drawn from the river's nomination prepared by local citizens:

Pittsburg, NH: The village of Pittsburg is in the river corridor. Other corridor land use is predominantly seasonal camps, state park, and forestry.
Clarksville, NH: The river corridor in Clarksville is mainly open space.
Canaan, VT: The villages of Beecher Falls and Canaan are in the river corridor. There is industry in Beecher Falls and houses in the village areas back right up to the river.
Stewartstown, NH: West Stewartstown is opposite Canaan village and is close to the river. The County Farm and Hospital are south of the village. Abandoned railroad tracks and Route 3 are close to the river in places. Commercial development is close to the river on Route 3 near West Stewartstown.
Colebrook, NH: The village of Colebrook lies within the river corridor. The Colebrook industrial park abuts the river near the Route 26 bridge although it is not visible from the river. Railroad tracks and Route 3 are close to the river in places.
Lemington, VT: Lemington is primarily agricultural.
Columbia, NH: Land use in the river corridor in Columbia is open space near the river and mixed residential along Route 3. There is a sand and gravel operation along the river south of the covered bridge.
Bloomfield, VT: Bloomfield village is in the river corridor. Otherwise, land along the river is mostly agricultural.
Stratford, NH: North Stratford and Stratford villages are in the river corridor. There is mixed residential use along Route 3. There are two mills in North Stratford, one of which is currently not operating.
Brunswick, VT: Land use in the corridor is primarily agricultural.
Maidstone, VT: Land use along the river is predominantly agricultural and there are two commercial nurseries.
Northumberland, NH: Northumberland village is in the river corridor and includes several industries. There is mixed residential use along Route 3. Land along the river is primarily agricultural open space.

Scenic views

The scenery that makes the Headwaters Region a spectacular place to live and sells the picture post cards is composed of many ingredients. Framing the river itself are mountains, deep forests, clear lakes, and productive fields. More subtle are the comfortable set of an old house on its land, the lines of an old fencerow, the spray of

rapids, the changing backdrop at every twist of a meander, and the lure of a shaded trout pool. Residents of the region listed these views in the river's nomination:

Pittsburg, NH: There are sweeping views of Third, Second, and First Connecticut Lakes as well as Lake Francis from Route 3. About a mile north of the Pittsburg-Stewartstown town line, there is a long stretch of fast water that is scenic. In the center of town, just off Route 3, there is a short road leading to an old covered bridge that overlooks some gorges and whitewater.

Stewartstown, NH: There is a long stretch along Route 3 from the Colebrook-Stewartstown town line to the Coos County farm in the village of West Stewartstown that offers sweeping vistas of the river and surrounding valleys and farmland.

Colebrook, NH: Approximately half a mile north of the village there is an overview of the river valley. Another scenic spot runs from the state rest area on Route 3 approximately a mile north.

Columbia, NH: There is a nice view from Route 3 about a mile north of the Stratford-Columbia town line. There is also a nice open stretch that extends approximately a mile ending at the covered bridge in Columbia.

Stratford, NH: There is a magnificent view of the river valley looking over to Vermont from the top of Ramsey Hill just south of the village of North Stratford near the state historical marker commemorating the old log drives on the river. Just north of the village of North Stratford, there is an old railroad siding where the trains would switch tracks along the river. And just south of the Stratford-Columbia town line, there is a nice view of the rapids below what was once the old powerhouse for Lyman Falls hydro dam.

Northumberland, NH: There are some impressive views of the White Mountains and Percy Peaks from the river as it winds from the Maidstone-Stratford town line through Northumberland to the junction of the Upper Ammonoosuc River.

Vermont: The entire stretch of Route 102 from Beecher Falls to Guildhall could be designated a scenic drive. For the most part, it closely winds along the river offering views that range from scenic to breathtaking in scope. A number of views along the route are among the most spectacular in the entire river corridor. They are the rapids in Lemington just above Lyman Falls, the view looking off at the Stratford mountains in Brunswick about three miles from the Bloomfield town line, and perhaps the most breathtaking of all - the sweeping view looking across the river valley with Percy Peaks in the background as seen about a mile north of the Stratford-Maidstone bridge.

> *"The good Lord isn't making any more shoreline property."*
>
> *planning board member, Lemington*

Conditions needed to keep the river valley as it is today

- economic viability of riverfront farming and forest management
- good stewardship by riverfront landowners
- opportunity for towns to guide development

Potential land uses to be encouraged in the future

- open space and conservation; note that homes adjacent to conserved land, whose view is protected, increase in taxable value
- commercial and residential development in present village centers and re-use of older structures

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CURRENT PROBLEMS

- sand and gravel excavations and processing are located very close to the river
- waste disposal and uncertain responsibility for maintenance at designated "primitive" campsites along the river
- FEMA maps are inaccurate

Potential problems

- property loss from flooding and bank erosion
- loss of good agricultural and forestry areas to development
- deterioration of the extraordinary scenic quality of the river corridor
- second-home development on shoreline, which is a limited resource, especially around the Connecticut Lakes
- there is presently no means to guide shoreline development in most towns
- sedimentation from eroding construction sites could reach the river
- commercial and residential sprawl outside of historic village centers and loss of their vitality
- increasing conflicts between new residential development and existing farm uses
- nuisance floodlighting from commercial development near the river could detract from river recreation
- inappropriate signage could detract from the rural character of the area
- farmers may be financially forced to sell land for residential development, resulting in higher town costs for services and schools
- sale of present New England Power Company lands around the Connecticut Lakes and subsequent development of vacation homes

"We should keep the river from getting commercialized, and keep it as natural as we can."

planning board member, Columbia

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OBJECTIVES

The Connecticut River and its corridor are prized for their scenic qualities and the opportunities they now provide for recreation and agriculture. The Subcommittee is reluctant to see development occur on the riverbanks. The local economy should be protected and enhanced, particularly agriculture and forestry, which are highly valued ways of life in this region, and which in turn protect open space along the river.

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FEDERAL GOVERNMENT

Federal Emergency Management Agency *should:*

- FEMA should be sure that floodplain and special flood hazard maps are accurate

STATE GOVERNMENT

Departments of transportation *should:*

- provide attractive signs identifying the Connecticut River at river crossings

TOWNS *should:*

Consider these ways to protect private property values and the public values of quality of the Connecticut River and its corridor:

- discourage building or public investment (roads) in the floodplain and on flowage rights of way, to allow the river to use its floodplain for flood storage, to keep property loss low, and to reduce public cost of disaster relief
- set structures a safe distance back from the river even when outside of the floodplain, to reduce the risk of property loss in erodible areas and maintain scenic character
- ask for sedimentation and erosion controls during and after construction
- encourage proper construction if it is to take place on steep slopes, to minimize erosion
- encourage commercial development in areas that are not prime agricultural or forestry areas
- consider various means to preserve agriculture and/or forestry , such as the forestry zone in Groveton
- use cluster development or similar tool as a way of keeping farmland available and road maintenance low. There are some versions of this tool which do not require a town to have subdivision regulations.
- allow multiple uses in historic buildings in historic village centers, to discourage sprawl, to keep village centers active, and to help make it economically feasible to use historic buildings
- use building height limits to ensure that existing fire-fighting equipment can adequately protect buildings and to ensure that new construction is compatible with the scale of existing buildings
- ask developers of residential housing on tracts abutting farms to include a buffer to prevent conflicts between the new use and existing farm use
- encourage developers to shield lighting to avoid floodlighting the river and abutters
- consider signage and how it can fulfill the needs of local businesses and citizens without detracting from the rural character of the area
- investigate how conservation easements can help keep town service and school costs down if the land is not developed into houselots or into second homes which could later become year-round residences (Appendix H)
- encourage developers and landowners to establish and/or maintain buffers of native vegetation along rivers and streams for privacy and pollution control
- ensure that auto junkyards and facilities handling hazardous waste are located well back from the river
- discourage development of currently undeveloped lands around the Connecticut Lakes, in order to prevent increased demands upon town services from such development and to provide water quality protection, wildlife habitat, and the scenic qualities that are so important to the recreation and tourism component of this region's economy

RECOMMENDATIONS

"The best deal for any town is open land."

John Amey, Pittsburg Vice-Chair, Headwaters Subcommittee

Please see Appendix A for a summary of the New Hampshire Rivers Management and Protection Act, and its guidance for towns on managing the variously designated segments of the river. Appendix D presents a look at present town statements regarding the Connecticut River, water quality, or shorelines. Appendix E provides a variety of tools, both regulatory and non-regulatory, that towns and citizens can use to help protect their water quality and shorelines. A list of model ordinances is contained in the appendices of Volume I of the Connecticut River Corridor Management Plan. The North Country Council and Northeast Vermont Development Association can provide other ideas.

PRIVATE SECTOR

Businesses *should:*

- locate businesses in appropriate areas away from the river and prime agricultural land

Landowners *should:*

- investigate estate tax issues, and how conservation easements can help keep land in the family and working (Appendix H)
- establish or retain buffers of native vegetation along rivers and streams for privacy and pollution control

◆

REFERENCES

The Watershed Guide to Cleaner Rivers, Lakes, and Streams, Brian Kent, 1995. Liberally illustrated, this guide describes the causes of nonpoint pollution, suggests ways to reduce and prevent it from reaching waterways, and provides basic ideas that citizens can use to help improve water quality in the valley. The report covers a number of best management practices for construction sites, developed areas, backyards, septic systems, gravel and sandpits, marinas, farms, golf courses, woodlots, and storage of hazardous materials, and includes a useful directory.

Findings to Support Classification of Segments of the Connecticut River, Connecticut River Valley Resource Commission, 1991.

Finding Common Ground: Conserving the Northern Forest, Northern Forest Lands Council, Concord, NH, 1994. This report presents the findings and recommendations of the collaborative effort to reinforce the traditional patterns of land ownership and uses of large forest areas in the Northern Forest of New Hampshire, Vermont, New York, and Maine.

MAPS

Highlights of the New Hampshire Natural Resource Protection Project :Headwaters Region, New England Interstate Water Pollution Control Commission and the Environmental Protection Agency, 1996. GIS maps prepared for the local river subcommittee shows agricultural lands, unfragmented natural lands and shorelines, high value freshwater wetlands, drinking water supplies and pollution threats, bald eagle wintering sites, conservation and public lands, and some natural heritage inventory sites.

Agriculturally Important Soils, Pittsburg -Northumberland,NH. GIS maps created for the Headwaters Subcommittee by North Country Council, with support of NH DES, 1996. Displays all agriculturally important soils within ½ mile of the Connecticut River, as defined by the Soil Conservation Service. Soils are distinguished as in active agricultural use or inactive, both protected and unprotected from development, and those soils lost to development. Total acreages of each catergory are provided.

Appendices

to the Headwaters Plan

ACKNOWLEDGMENTS

The strength of this plan lies largely within its creation by a cross-section of local citizenry. From time to time, however, the local subcommittee called upon the expertise of state agencies and other professionals to educate them about issues of particular concern. We would like to express our gratitude to those who lent their time to share information with the Headwaters Subcommittee:

Larry Bandolin, U. S. Fish and Wildlife Service
Dick Flanders, Surface Water Quality Bureau, NH Department of Environmental Services
Ernie Griggs, Director of Hydro, New England Power Company
Dick Haldeman, Natural Resources Conservation Service, Coos County, NH
Bing Judd, Pittsburg selectman and member NH Wetlands Board
Mike Kline, Water Quality Division, VT Agency of Natural Resources
Jim MacCartney, Rivers Coordinator, NH Department of Environmental Services
Tim McKay, Natural Resources Conservation Service, Essex and Caledonia Counties, VT
Norm Olson, U. S. Fish and Wildlife Service
Brendan Prusik, Champion International Corporation
Eric Stowell, NH Fish and Game Department
Steve Turaj, Cooperative Extension Service, Coos County, NH
Bob Ward, area representative for Connecticut Lakes region, New England Power Company
Brendan Whittaker, Brunswick, VT

We are particularly grateful to the Town of Colebrook for providing meeting space in the courtroom of its Town Hall.

Technical assistance
Mapping and other technical assistance was provided by the North Country Council, the Northeastern Vermont Development Association, the Conte Refuge Planning Project of the U.S. Fish and Wildlife Service, the New England Interstate Water Pollution Control Commission, Upper Valley Land Trust, the VT office of the National Wildlife Federation, VT and NH Natural Heritage Inventory Programs, Natural Resources Conservation Service, Cooperative Extension Service, VT and NH offices of historic preservation, and the Connecticut River Watch Program.

Funding to support the work of the Headwaters Subcommittee came from:
NH Department of Environmental Services
VT Agency of Natural Resources
Rivers and Trails Conservation Assistance Program of the National Park Service

Funding for this publication came from:
Town of Canaan, Vermont
Town of Columbia, New Hampshire
New England Power Company
Rivers and Trails Conservation Assistance Program of the National Park Service
John F. and Dorothy H. McCabe Environmental Fund, NH Charitable Foundation
NH Department of Environmental Services

Illustrations

The Connecticut River Joint Commissions are pleased to feature the artwork of Connecticut River Valley artists in this publication.

- *Matt Brown* of Lyme, NH created the cover illustration using a self-taught method which pursues the tradition of color woodbock printing developed in Japan during the 18th century. Each color is printed from a separate carved block, using rice paste as the binder and a hand-held baren and brushes as the printing tools. Matt is a state-juried member of the League of NH Craftsmen.
- *Joan Waltermire* of Flying Squirrel Graphics in Vershire, VT is the creator of pen and ink drawings of fish and wildlife, seen in Vermont Woodlands magazine and other publications.
- *Susan Berry Langsten* of Cottage Designs in Lebanon has contributed her pen and ink drawings to other CRJC publications, including the Challenge of Erosion and The Cultural Landscape of the Connecticut River Valley in New Hampshire and Vermont
- *Christine (Fuchslocher) Castenas* of Charlestown, NH and New York City, did the farm-to-market drawing.
- *Cheryl Sallen*, a freelance graphic artist of Reading, Vermont, created the maps in consultation with Bill Bridge of the Upper Valley Land Trust.

Design & Printing

Susan MacNeil prepared the design of this publication with the assistance of Kelly Short of Canterbury Communications in Canterbury, NH. Printing is by Letter Man Press of Claremont, NH.

APPENDIX A

THE NEW HAMPSHIRE RIVERS MANAGEMENT & PROTECTION ACT (RSA 483)

The 1992 designation of the Connecticut River into the New Hampshire Rivers Management and Protection Program established the following criteria and management practices.

ALL RIVER SEGMENTS

- management shall ensure rights of riparian owners to use the river for forest management, agricultural, public water supply, and other purposes compatible with instream public uses
- DES shall review and consider adopted local river corridor management plans before issuing permits
- water quality shall be restored to or maintained at least at the Class B level; significant adverse impacts on water quality or other instream public uses shall not be permitted
- no permanent channel alteration, including dredging, shall be permitted except for construction or maintenance of a project such as public water supply intake
- DES shall encourage vegetative bank stabilization
- land application of solid waste (except manure, lime, wood ash, sludge, septage) shall be immediately incorporated into the soil, and set back 250' from normal high water mark
  no new solid waste landfill within 500 year floodplain; any new landfill to be set back at least 100' from edge of floodplain and screened; may be 250' from river if outside 500 year floodplain
- any existing solid waste facility within 250' of river may continue to operate under existing permit provided it does not degrade beyond permit area
- protected instream flow level shall be established by DES
- no interbasin transfers of water shall be permitted
- motorized boats operating within 150' of shore shall travel at the slowest possible speed necessary to maintain steerage way, but at no time shall exceed 6 miles/hour (pre-existing state law)

◆

NATURAL RIVER SEGMENT

- free-flowing segment of at least five miles in length
- high quality of natural and scenic resources
- shorelines in primarily natural vegetation; river corridors generally undeveloped
- development, if any, is limited to forest management and scattered housing
- minimum distance to paved public road is 250' except where sight and sound are screened by natural barrier
- management shall perpetuate natural character as defined above, and ensure rights of riparian owners to use the river for forest management, agricultural, public water supply, and other compatible purposes (in addition to that described above)
- no dam or other structure that alters natural character of river shall be constructed
- no channel alteration activities except temporary alterations to repair or maintain bridge, road, or riprap which was in place at time river was designated
- water quality shall be maintained at Class A or B or restored to Class A
- no new solid waste facility permitted in corridor; existing, permitted and secure landfill cannot be expanded within 100' of the 500 year floodplain, and must be visually screened with vegetation
- no new hazardous waste facilities storing for more than 90 days permitted within corridor
- non-motorized watercraft only except for emergency purposes

In the entire Connecticut River in New Hampshire and Vermont, only one *natural* segment has been designated, in the Headwaters:

◆ from Wheeler Stream in Brunswick, VT to the Maidstone-Stratford Bridge. (7 miles) The town of Stratford should honor the stipulations of this designation, and the town of Brunswick should consider these provisions.

◆

RURAL RIVER SEGMENTS

- river corridors are partially or predominantly used for agriculture, forest management, dispersed or clustered residential development
- some instream structures may exist, including low dams, diversion works, and other minor modifications
- no minimum distance for roads
- at least three miles in length
- existing water quality at least Class B or restorable to Class B
- management shall maintain and enhance natural, scenic, and recreational values of the river protection (in addition to that described above)
- no new dam shall be constructed; repair of failed dam permitted only at same location, same impoundment level within six years of date of failure
- new hydropower facilities may be allowed at existing dams only if they are run-of-the-river, include no significant diversions, and impoundment height is constant and not above maximum historic level

In the Headwaters Region, eight segments of the Connecticut River are designated as *rural*:

- from the outlet of Fourth Connecticut Lake to a point .3 miles above Second Connecticut Lake (8.7 miles)
- from a point .3 miles below Second Connecticut Lake to a point .3 miles above the First Connecticut Lake Dam (6.8 miles)
- from a point .3 miles below First Lake Dam to a point .3 miles above Murphy Dam (7.8 miles)
- from a point 2.0 miles below Murphy Dam to Bishop Brook in Stewartstown (5.7 miles)
- from Leach Creek to the confluence with the Mohawk River (8.7 miles)
- from the Columbia/Colebrook town line to Wheeler Stream in Brunswick, VT (13.6 miles)
- from the Maidstone-Stratford Bridge to a point 1 mile above the breached Wyoming Dam (11.2 miles)
- from 1 mile below the breached dam site to a point .3 miles above the Simpson Paper Co. Dam (18.6 miles)

The towns of Pittsburg, Stewartstown, Colebrook, Columbia, Stratford, and Northumberland, NH should honor the stipulations of this designation. Canaan, Lemington, Bloomfield, Brunwick, and Maidstone, VT should also consider these provisions.

◆

RURAL-COMMUNITY RIVER SEGMENTS

- flow through developed areas with existing or potential community resource values such as those defined in official town plans or land use controls
- river corridor has combination of open space, agricultural, residential, commercial, industrial land uses
- readily accessible by road or railroad
- may include impoundments or diversions
- at least three miles in length
- existing water quality at least Class B or restorable to Class B
- management shall maintain/enhance the natural, scenic, recreational and community values of the river
- management shall include rights to use river for residential, recreational, commercial, industrial, flood control and other community uses as noted
- no new dam shall be constructed; repair of failed dam permitted only at same location, same impoundment

level and only within 6 years of date of failure

- new hydropower facilities may be allowed at existing dams only if they are run-of-the-river, include no significant diversions, and impoundment height is constant and not above maximum historic level

In the Headwaters Region, one segment of the Connecticut River are designated as *rural-community*:

- from the confluence with the Mohawk River to the Columbia/Colebrook town line (1.9 miles)

The town of Colebrook, NH should honor the stipulations of this designation. Lemington, VT should also consider these provisions.

◆

COMMUNITY RIVER SEGMENTS

- flow through developed or populated areas and possess existing or potential community resource values such as those identified in official town plans or land use controls
- combination of open space, agricultural, residential, commercial, industrial land uses; may include urban centers
- readily accessible by road or railroad
- may include existing/potential impoundments, hydropower diversions, flood control, water supply
- at least one mile in length
- existing water quality at least Class B or restorable to Class B
- management shall maintain/enhance natural, scenic, recreational, and community values of river
- management shall include rights to use river for hydroelectric energy production and flood control protection in addition to that described above)
- new dams permitted if consistent with protection of resources for which segment designated, and only if they are run-of-the-river, include no significant diversions, and impoundment height is constant and not above maximum historic level for site

In the Headwaters Region, five segments of the Connecticut River are designated as *community:*

- from a point .3 miles above Second Lake Dam to .3 miles below the dam (.6 miles)
- from .3 miles above First Lake Dam to a point .3 miles below the dam (.6 miles)
- from a point .3 miles above Murphy Dam to a point 2.0 miles below the dam (2.3 miles)
- from Bishop Brook to Leach Creek in Canaan, VT (3.8 miles)
- from 1 mile above the breached Wyoming Dam to 1 mile below the dam site (2.0 miles)

The towns of Pittsburg, Clarksville, Stewartstown, and Northumberland, NH should honor the stipulations of this designation. Canaan, VT should also consider these provisions.

APPENDIX B

NEW HAMPSHIRE COMPREHENSIVE SHORELAND PROTECTION ACT (RSA 483-B)

Minimum protection measures defined by this Act appear below. The Connecticut River and others designated into the New Hampshire Rivers Management and Protection Program before January 1, 1993 are presently exempt. Shoreland protection for these rivers is the responsibility of riverfront communities and, in the case of the Connecticut River, the CRJC and the local subcommittees. In the event that the New Hampshire cities and towns along the river do not adopt the proposals made in the plan prepared by their local subcommittee, the legislature will re-examine the exemption provided in RSA 483-B and propose minimum standards defined by the Act for the area within 250 feet of the river's ordinary high water mark. In either case, the riverfront community must adopt river protection standards into its local zoning ordinance.

For further information, contact the Shoreland Coordinator at NH Dept. of Environmental Services at 603-271-3503.

LIMITS WITHIN THE PROTECTED SHORELAND

250 ft

- Prohibited Uses:
  - Establishment/expansion of salt storage yards, auto junk yards, solid waste & hazardous waste facilities.
  - Use of fertilizer, except limestone, within 25 feet of the reference line. Low phosphate, slow release nitrogen fertilizer allowed beyond 25 foot zone.
- Uses Requiring State Permits:
  - Public water supply facilities
  - Public water & sewage treatment facilities
  - Public utility lines
  - Existing solid waste facilities
  - All activities regulated by the DES Wetlands Bureau per RSA 482-A

OTHER RESTRICTED USES

- All new lots, including those in excess of 5 acres, are subject to subdivision approval by DES.
- Setback requirements for all of new septic systems are determined by soil characteristics.
- Minimum lot size in areas dependent on septic systems determined by soil type.
- Alteration of Terrain Permit standards reduced from 100,000 square feet to 50,000 square feet.
- Total number of residential units in areas dependent on on-site sewage & septic systems, not to exceed 1 unit per 150 feet of shoreland frontage.

NATURAL WOODLAND BUFFER RESTRICTIONS

150 ft

- Where existing, a natural woodland buffer must be maintained.
- Tree cutting limited to 50% of the basal area of trees, and 50% of the total number of saplings in a 20 year period. A healthy, well-distributed stand of trees must be maintained.
- Stumps and their root systems must remain intact in the ground within 50 feet of the reference line.

NEW SEPTIC SYSTEM LEACHFIELD SETBACKS

125 ft

100 ft

75 ft

- 125 feet where soil down gradient of leachfield is porous sand & gravel.
- 100 feet where soil maps indicate presence of soils with restrictive layers within 18 inches of natural soil surface.
- 75 feet where soil map indicates presence of all other soil types.
- 75 feet minimum setback from rivers.

PRIMARY BUILDING LINE*

50 ft

- Primary buildings setback behind line.

REFERENCE LINE

- For coastal waters = highest observable tide line
- For rivers = ordinary high water mark
- For natural fresh water bodies = natural mean high water level
- For artificially impounded fresh water bodies = water line at full pond

* If a municipality establishes a shoreland setback for primary buildings, whether greater or lesser than 50 feet, that defines the Primary Building Line for that municipality.

APPENDIX C

RIVER RECREATION STUDIES

1. Rivers, Recreation, and the Regional Economy: A Report on the Economic Importance of Water-Based Recreation on the Upper Connecticut River

This study was conducted in 1996 by the National Wildlife Federation and North Country Council, with support from NH Dept. of Environmental Services, at the request of the Headwaters and Riverbend Subcommittees, who wished to know more about the role played in the economy of their towns by recreation associated with the Connecticut River. This information should also help local governments and the State of New Hampshire decide how to best manage this important natural resource.

Methods: A survey was conducted of 217 "water-dependent" businesses in New Hampshire along the river from the third Connecticut Lake to the Haverhill/Piermont town line. The response rate was 31%. (This study did not survey water-dependent businesses on the Vermont side of the river because the principle funding was from a New Hampshire source. Nevertheless, water-based recreation presumably has similar economic impacts for Vermont communities, as well.) Water-dependent businesses are those that provide goods and services related to water-based recreation, and includes all recreational activities conducted on or by the river, stream, lake, or pond, such as fishing, boating, and hiking, camping, and picnicking. Water-dependent businesses were targeted to investigate the relationship between environmental quality and economic health. A change in a river or lake's water quality has an effect on how and where recreationists spend their time and disposable income. Recipients of the survey were:

(1) businesses that are **directly** reliant on water-based recreation and tourism, including camps, campgrounds, guiding services, and retailers, such as sellers of bait, fishing gear, etc.

(2)businesses that are **indirectly** dependent on water resources include lodging establishments, restaurants, farm stands, and general stores, whose customers come because of their proximity to a recreational site.

Results: The section of the river by far most frequently used by the customers of the respondents was that in Pittsburg and Stewartstown (30%). The results of the survey show six principle messages:

- Water-based recreation in New Hampshire along the Upper Connecticut River is a $26 to $31 million business, creating at a minimum of 650 to 750 jobs;
- The business respondents strongly support improving fishing opportunities;
- The business respondents are in support of greater instream flow levels, especially for fish;
- The business respondents support public investment -- particularly for increasing access (specifically for fishing, swimming, canoeing, and kayaking), improving water quality, and for habitat management --and government involvement to protect the watershed, by both the state and local towns;
- The overwhelming interest of the business respondents to minimize environmental impacts associated with increased recreation indicate a need for a management framework to accompany tourism promotional efforts to educate tourists and businesses about sustainable recreational use; and,
- The business respondents are in favor of increases in marketing and advertising support.

Conclusions: The results demonstrate the economic value of clean water to area businesses, and its role in providing sustainable jobs and income in these rural communities along the Upper Connecticut River. Almost 70% of the business respondents agreed or strongly agreed that local governments should be involved in protecting the river. The stretch of the river most often used by their customers and likely the businesses most heavily patronized lie in Pittsburg, Clarksville, and Stewartstown. The results also show a need for a management strategy for any future tourism promotion of the river, including educating businesses and recreationists about sustainable recreational use.

2. Aerial Reconnaissance of Recreation on the Upper Connecticut River

This study was conducted by the CRJC in response to concerns of the Headwaters Subcommittee over a recent dramatic increase in recreational use, and possible effects upon the quality of the river and private property. Particular issues were over-fishing, property damage, illegal camping and improper access.

Methods: Since no data on river use existed other than some creel surveys, and much of the river is impossible to survey from the ground, it was decided to conduct a number of flights over the region counting boats, fishermen, campsites, and automobiles parked at access points. A portion of the Riverbend region was included, for a total of 71 miles of free-flowing river from Gilman Dam to Canaan Dam. Subcommittee members were invited to participate to see their river and observe other issues such as erosion and land use patterns. A total of eight flights were made and 11 people participated besides the pilot. Most flights took place during the early Saturday evening hours, since camping was the primary issue, and three flights were made mid-day. Observations were recorded on maps and later transferred to a master composite map so clusters and patterns could be identified.

Results: 1996 turned out to be a poor year for river recreation. Rain and cool weather kept use down through June and July. The VT Dept. of Forests and Parks reported a 40% decline in users of its facilities, and this same decline was probably true of river users. Usage patterns did clearly emerge, however. Colebrook appears to be the center of river recreation and is the home base for the largest known river tour operator. The Route 26 bridge and Arlins rest area on Route 3 are popular parking and access spots. Use of the river itself varied with the its character, which can be divided into roughly equal thirds. The 25.5 mile stretch from Canaan to Bloomfield/North Stratford features quick water and some Class II rapids, and is a well-known cold water fishery. Fishing pressure seemed heavy, with a total of 50 fishermen counted. 34 canoes were observed, and the highest number of parked cars. The only camping observed was at two sites on islands near the bottom of this stretch.

The 24 miles from Bloomfield/North Stratford to Guildhall/Northumberland include some quick water giving way to slow moving meanders and oxbows with sandy beaches. The quick water attracted fishermen, but only six were seen. Six campsites and 29 canoes were observed. Oxbows are frequently used for camping. There seems to be a commercial camping operation on an oxbow at mile 196.5, where up to 20 canoes were beached for the night at one time. Guildhall/Northumberland to Gilman/Dalton presented a different picture. Just as high use characterized the Colebrook region, low use characterized this one. The 21 river miles are slow moving, with fewer of the oxbows and beaches that attract campers. The fishing and canoeing are still excellent, yet only two fishermen and six canoes were observed. There was just one campsite, that on the property of an outfitter in Dalton.

Among the maintained and informal access points, those seeing the most use were in Canaan, where as many as five vehicles were parked at a time, and what may be an informal access just north of the Route 26 bridge in Vermont near Colebrook. Accesses at Bloomfield and Dalton often were empty. This contrasts with what the author of this study and local residents have observed in the past, and indicates the unusually low recreational use this summer. To get a broader picture of use and to share data with New England Power Company, two overflights of Moore and Comerford reservoirs took place. Our July 6th overflight of Moore occurred in the rain, and observed only two boats with wet fishermen. Our Labor Day Weekend flight saw six fishermen on shore, fifteen boats and one water skier on Moore, and eight boats and one water skier on Comerford.

Conclusions: This was a low use year, yet patterns are obvious. The highest use occurs in the narrowest, most sensitive portion of the river. Fishing pressures need to be closely monitored. With no formal campsites, camping may also become a problem. Commercial outfitters are discovering the river and entering into agreements with landowners. River recreation is of growing economic importance to Colebrook. The lowest portion of the surveyed river is under used. This survey should serve as a base line study so that future trends can be determined. "Capacity" itself, that is, the ability of the resource to withstand increasing pressure, might best be understood by examining three factors; the river itself, (water and fish) the users, (outfitters and vacationers), and residents.

Prepared by VT River Commissioner Nathaniel Tripp of Barnet, with thanks to pilot Alden Blanchard of Newport, VT

APPENDIX D

PRESENT TOWN REGULATIONS REGARDING THE RIVER

NEW HAMPSHIRE TOWNS

Town tools	Pittsburg	Clarksville	Stewartstown	Colebrook	Columbia	Stratford	Northumberland
Master Plan	none	none	none	1989/ yes*	1985/ yes	1992/ yes	1991/ yes
Zoning Ordinance	none	none	none	1993/yes 75' setback for septic systems	1987/no	1995/yes	1994/yes development prohibited in floodplain in agricultural district; waste disposal system review
Subdivision Regulations	none	1981	1988/yes	1994/yes	1988/yes many water quality provision s	1995/yes	1992/yes stormwater drainage control
Site Plan Review	none	none	none	1988/yes requires storm drainage plan	none	none	1991/yes
Excavation Regulations	none	none	none	none	none	RSA 155E/yes	1991/yes, more detailed than state required
National Flood Insurance Program	no	no	no	yes	yes	yes	yes
Wetlands Regulations	none	none	none	none	none	none	none
Shoreland Protection	none	none	none	none	none	none	none

*addresses water quality

prepared with the assistance of North Country Council and support from NH Dept. of Environmental Services

VERMONT TOWNS

Town tools	Canaan	Lemington	Bloomfield	Brunswick	Maidstone
Master Plan	1992	1995	none	1995	1993
Zoning Ordinance	yes	yes	none	yes	yes
Subdivision Regulations	no	no	no	no	no
National Flood Insurance Program	yes	yes	yes	yes	yes
Shoreland Protection	none for river (apply only to Wallace Pond)	none	none	yes; building setback 100' from shore; permitted uses: agriculture, forestry, accessory use; 200' minimum frontage	yes; building setback 100' from shore; permitted uses: residential and accessory; require approved on-site septic systems; 200' minimum frontage

prepared with the assistance of Northeast Vermont Development Association

APPENDIX E

TOOLS FOR PROTECTING RIVERFRONT LANDS & WATER QUALITY

STATE STATUTES

NEW HAMPSHIRE

NH's Comprehensive Shoreland Protection Act (RSA 483-B) sets minimum shoreland protection standards for shore lands along New Hampshire's great ponds, rivers, artificial impoundments and coastal waters. These standards are designed to minimize shoreland disturbance in order to protect the public waters, while still accommodating reasonable levels of development in the protected shoreland. Although the act sets minimum standards, section 483-B:8 gives municipalities the authority to adopt land use control ordinances which are more stringent. This section also encourages communities to adopt ordinances to protect non-public waters. The Connecticut River, having been designated into the NH Rivers Management and Protection Program prior to 1993, is exempt from the statute. However, towns along the river have the opportunity to examine their sections of the river and in those sections where it is appropriate, recommend stronger controls than those set forth in the legislation.

VERMONT

Section 1422 of Title 10 of the Vermont Statutes gives towns the authority to regulate shore lands to prevent and control water pollution; preserve and protect wetlands and other terrestrial and aquatic wildlife habitat; conserve the scenic beauty of shore lands; minimize shoreland erosion; reserve public access to public waters; and achieve other municipal, regional or state shoreland conservation and development objectives. Other state regulations set standards for management of agricultural land, silvicultural practices, and sediment and erosion control. In-stream water quality continues to be directly regulated at the state level, including withdrawals and discharges from and into surface waters.

◆

LOCAL TOOLS

Besides the state statutes, many tools are available to communities and individuals to protect water quality; some are of a regulatory nature, some are non-regulatory. Local tools can include adopting a master plan (town plan) and/or water resources management plan with strong recommendations for protecting water quality, scenic views, agricultural soils, riparian buffers, prime wetlands, floodplains, open space, and wildlife habitat. These recommendations could then be carried through to regulatory documents such as zoning, subdivision and site plan review.

LOCAL REGULATORY MEASURES

Floodplain Ordinances

Floodplain ordinances can prohibit construction in the floodplain. Floodplains provide flood storage, wildlife habitat and essentially act as buffers to protect water quality. Construction, development, or filling in of floodplains removes flood storage and displaces floodwater to locations further downstream. There is the added benefit of protecting buildings from flood damage which costs taxpayers millions of dollars each year.

Shoreland Overlays

A community could also adopt a shoreland protection ordinance or a buffer overlay to the zoning ordinance in which protection measures for surface waters can be more closely defined than for the rest of the town. In both states the requirements of the shoreland ordinance supersede that of the underlying zoning ordinance. In 1994 the New Hampshire Office of State Planning updated its model shoreland protection ordinance to be consistent with the requirement of NH's Comprehensive Shoreland Protection Act.

Others

- separation of storm water and wastewater in municipalities with combined sewer overflows;
- confinement of the amount of impervious surface created by new development to reduce the transportation of sediments and nutrients
- use of sediment and erosion control measures during and after construction

LOCAL NON-REGULATORY METHODS

Vegetated Buffers

The use of riparian buffers can be either regulatory or voluntary, and is one of the best and most commonly used methods of protecting surface water. This strip of natural or planted vegetation along the riverbank can intercept harmful nutrients, toxic chemicals and sediments before they enter the surface waters, and control bank erosion. Vegetated buffers are relatively inexpensive and have the added advantage of providing habitat for both land based and aquatic animal species and privacy for landowners. Shading streams with vegetation helps to optimize light and temperature conditions critical to the survival of certain species, such as trout. Naturally vegetated buffers promote high biological productivity and diversity.

Conservation Easements

- purchase or donation of development rights
- acquisition of land or rights of way

Towns or conservation groups can use these tools to provide a buffer on land adjacent to surface waters and wetlands, to protect water quality and provide public access without creating new regulations. Prime agricultural soils, sites for rare and endangered species, and historic and archaeological sites can be protected in the same manner.

Incentives

- current use assessment program
- encourage farmers to use the established and extensive resources of the State Department of Agriculture and the Natural Resources Conservation Service (NRCS) to develop and implement a land management plan which incorporates the use of best management practices

Education programs

Education programs through schools and non-profit education and land use organizations can increase the awareness of the general public regarding private property rights and ways to control nonpoint pollution on private land. Programs should emphasize the locations and use of existing public access and asking permission before stepping on private property.

APPENDIX F

SELECTED BEST MANAGEMENT PRACTICES

Long experience with the water quality impacts of various kinds of land management has led the States of Vermont and New Hampshire to develop detailed guidance for landowners and towns in how to best manage land to minimize nonpoint pollution. Below is a general summary of selected practices for a variety of activities.

Each state has its own approach to these land management practices. For instance, spreading of manure in the winter, when it is likely to wash into streams because the frozen ground cannot absorb it, is highly discouraged by New Hampshire but prohibited between December 15 and April 1 by Vermont's rules for "acceptable agricultural practices." Contact the New Hampshire Dept. of Environmental Services or Vermont Agency of Natural Resources, or your county office of the Natural Resources Conservation Service, for information on the guidance or regulations which apply in your area (see Appendix G).

CONSTRUCTION SITES

Ensure good oversight of erosion and sedimentation control.

- provide erosion, sedimentation, and stormwater management plans
- use all natural resource information, including soils, topography, and geology

Minimize the amount of bare soil exposed.

- limit clearing on building sites and rights-of-way
- cluster buildings; build one phase at a time
- mulch all bare soil as soon as possible, before storms or rainfall
- stabilize, seed and mulch the area when soil will be exposed for an extended period

Minimize water-impervious surfaces that increase runoff.

- minimize the area of roofs, roads, sidewalks, and parking lots
- leave undisturbed as much of the site's natural vegetation as possible
- consider using porous pavement

Direct water away from construction areas.

- don't concentrate stormwater into channels
- redirect clean water that could otherwise drain onto the construction site
- schedule work during periods of low water, low rainfall, and when vegetation can best be established
- work with the natural contours of the site; use natural drainways (not man-made ones or streambeds)
- avoid building roads up and down steep slopes
- provide ditches and channels of sufficient stability and capacity to handle storm runoff velocities
- install ditch turnouts so that runoff flows into vegetated areas
- use natural ground cover (such as grass) on slopes and in drainage ditches
- use wet (retention) ponds to trap sediment and phosphorus
- ensure that storm and other drainage systems (not wastewater systems) empty into adequately sized channels and don't enter sewage systems

Protect existing stormwater inlets and culverts from sediment.

- mulch all bare soils
- install silt fencing and hay bale filters
- use sediment traps in larger ditches
- install a temporary, perforated riser at culverts

Make sure your erosion control measures are effective.

- adjust, maintain, and repair erosion controls after every storm event
- remove all temporary measures once construction has ceased and vegetation has taken root

DEVELOPED AREAS

Minimize pollutants washed into waterways from developed sites.

- use natural vegetation or new landscaping to act as a filter or buffer
- limit the amount of clearing
- divert runoff around sites where it could pick up pollutants
- keep parking areas, outdoor storage areas, and streets clean of debris
- maintain catch basins to prevent backup
- use grassed swales, constructed wetlands, detention ponds, wet ponds, and catch basins
- direct water away from unpaved road surfaces and keep runoff velocities low

TIMBER HARVESTING

Control erosion on exposed soils.

- construct water bars, turn-ups, and ditches on sloped trails and haul roads to divert runoff into the forest
- use appropriate method of wetland or water crossing for size of stream and traffic it must bear cross streams at right angles
- keep steep road pitches to a minimum and run skid trails at an angle to the slope
- size culverts properly; use on all truck road crossings of permanent streams
- maintain filter strips between logging operations and water bodies
- locate landings and roads on level or gently sloping ground, away from water bodies
- install water diversions at log landings to prevent sedimentation
- keep all slash away from streams and water bodies
- seed and mulch trails and exposed soils once operations are complete

AGRICULTURE, LAWNS, and GOLF COURSES

Keep fertilizers from fertilizing waterways.

- tailor the application of manure and fertilizer to the nutrient needs of the crop
- use soil tests to determine current nutrient levels and soil pH
- diversify crop rotations and plant cover crops after harvesting to use residual nutrients
- avoid spreading manure or fertilizer on frozen or snow covered ground
- incorporate manure into the soil as soon as possible after spreading
- do not store manure in the floodway or near wells
- maintain filter strips between surface waters and fields and feedlots
- control livestock access to water bodies
- divert runoff away from high animal use areas
- keep accurate fertilizer application and crop yield records
- manage milkhouse and parlor wash water
- store manure in properly constructed and located facilities

Control sedimentation and erosion.

- plant crops along contour lines
- rotate crops that provide limited ground cover with those that provide generous ground cover
- maintain filter strips between fields and surface waters
- plant cover crops or maintain residue cover on the fields after harvest
- construct and stabilize diversions to control runoff across cropland and control erosion in gullies
- keep livestock off bare streambanks
- set farm buildings back from streams

Use pesticides carefully.

- apply pesticides only when needed
- consider using integrated pest management to reduce pesticide use
- apply, store and handle pesticides properly
- obtain training in pesticide application or hire a licensed applicator
- do not spray or apply pesticides on windy days or before a heavy rain storm

ROAD SALTING AND SNOW STORAGE

It is illegal in both states to dump plowed snow directly into water bodies.

Keep salt, sand, and other pollutants in winter snow piles out of waterways.

- store disposed snow near flowing surface waters, but at least 25' from the high water mark, in order to dilute the salt with river water and avoid impacts to ground water, lakes, and wetlands; solid materials contained in the snow remain on the land surface and should be removed each spring
- avoid storing snow near water supply wells
- store salt piles under cover and on a flat, impervious surface so salt does not wash into the ground
- remove sand from streets in early spring

Apply road salt carefully.

- identify sensitive areas such as public water supplies and ponds, and consider de-icing alternatives
- give salt time to work; know when to plow and reapply salt
- determine salt application rates and frequency for all roads in a service area
- apply salt in a 4-8' wide center strip along lesser traveled roads
- use ground-speed controllers on spreaders

CHEMICAL AND PETROLEUM PRODUCTS

Keep these pollutants out of ground and surface waters.

- ensure that chemicals are recovered, recycled, or reused wherever possible
- have a spill prevention and response plan, with containment equipment readily available
- store containers and transfer chemicals only in areas that will contain spills, and away from waters, storm drains, and wells
- inspect regularly for leaks or potential contact with stormwater
- schedule routine cleanup operations
- do not allow floor drains and work sinks to discharge into or onto the ground

SEPTIC SYSTEMS

Keep the system working well to prevent groundwater pollution.

- know the location of septic tank and leach field; mark tank cover
- inspect tank frequently and pump it out at least every 3 years
- use water conservatively
- keep vehicles and livestock off the system
- do not use kitchen garbage disposal, which can clog the system
- do not pour caustic or toxic materials down the drain; these may kill necessary bacteria and contaminate sludge later intended for land application
- do not flush bulky items such as disposable diapers or sanitary pads into the system
- avoid putting food waste and grease into the system
- keep deep rooted trees and shrubs away from the leach field

Encourage local oversight.

- consider a town septic system education and inspection program
- consider adopting a local health ordinance for septic system regulation

DOCKS, MOORINGS, AND MARINAS

Ensure that new marinas are properly constructed to minimize water pollution.

- minimize the amount of paved, impervious surface
- limit use of pressure-treated lumber
- retain natural, vegetated buffers along the shore where possible
- provide erosion, sedimentation, and stormwater management plans

Prevent pollution from marina and boating activities.

- use only phosphate-free detergents and treat wash water before it enters the waterbody
- perform engine maintenance out of the water
- use propylene glycol as an antifreeze
- conduct painting and scraping where debris will not enter the water
- provide for spill containment
- install catch basins around boat launches to trap pollutants
- provide public restrooms and pumpout facilities to limit input of wastewater into water bodies
- use an on-board holding tank

Avoid introducing exotic species.

- remove plant fragments from boats and trailers
- wash boat and flush cooling system; leave boat out of water for 48 hours after boating in a contaminated waterbody

SAND AND GRAVEL EXCAVATION

Avoid pollution of nearby drinking water supplies and surface waters.

- investigate proposed pit areas during planning; allow space for mild pit slopes, diversions, and setbacks from abutters, water bodies, and drinking water supplies
- provide buffer strips of natural vegetation
- maintain 5 feet of unexcavated material above the seasonal high water table as a filter
- do not store petroleum products in the pit area
- develop spill prevention plan and clean up spills immediately
- maintain and wash equipment outside the pit area
- control dust to prevent nuisance and public hazard; use water rather than calcium chloride; never use oil
- use retention basins to trap fine material; clean out regularly
- use anti-tracking pads at gravel pit access roads to dislodge mud from tires

Reclaim excavations.

- leave surface soil which can sustain vegetation, and plant with grass or seedlings to prevent erosion
- grade slopes to at least the natural angle of repose
- restore original, natural drainage

BIOSOLIDS

Reduce risk of nutrient contamination of surface or subsurface water.

- do not store or apply biosolids near surface water or wells
- do not apply biosolids during time of high water table
- total available nitrogen should not exceed crop requirements

Reduce risk of contamination of feed crop lands.

- prioritize non-cropland or non-food crop lands for application
- for feed crop land, apply in fall before soil freezes or prior to planting
- avoid application where food crops are grown, especially leaf and root crops
- manage and monitor the land carefully

Apply and monitor carefully.

- select weather conditions when odors will dissipate quickly
- test soil nitrate levels annually
- calibrate equipment for uniform application rates
- avoid use of heavy equipment on wet soil
- do not apply on frozen, excessively wet, or snow-covered ground
- monitor the site and maintain at pH 6.5 long-term
- keep good crop records on individual fields

◆

PUBLICATIONS

NEW HAMPSHIRE

- *Best Management Practices to Control Nonpoint Source Pollution: A Guide for Citizens and Town Officials*, NH Dept. of Environmental Services, 1994.
- *Best Management Practices for Urban Stormwater Runoff*, NH Dept. of Environmental Services, 1996
- *Stormwater Management / Erosion and Sedimentation Control Handbook for Urban and Developing Areas in New Hampshire*, NH Dept. of Environmental Services, 1992
- *Best Management Wetland Practices for Agriculture*, NH Dept. of Agriculture
- *New Hampshire's Manual of Best Management Practices for Agriculture*, NH Dept. of Agriculture, 1993
- *Resource Manual: Best Management Practices for Erosion Control on Timber Harvesting Operations in New Hampshire*, NH Division of Forests and Lands, 1991.
- *Best Management Practices: Biosolids*, UNH Cooperative Extension, 1995

VERMONT

- *Vermont Agricultural Nonpoint Source Pollution Reduction Program Law and Regulations*, VT Dept. of Agriculture, Food and Markets, 1996
- *Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont*, VT Dept. of Forests, Parks, and Recreation, 1987
- *Vermont Handbook for Soil Erosion and Sedimentation Control on Construction Sites*, VT Agency of Natural Resources, 1982
- *Vermont Streambank Conservation Manual*, VT Agency of Natural Resources, 1987
- *Vermont Better Backroads Manual*, George D. Aiken/Northern VT Resource Conservation & Development Councils, 1995
- Wetland Fact Sheets: "Erosion Control," "Agricultural Activities in Wetlands," "Stormwater and Wetlands," VT Dept. of Environmental Conservation, 1992
- "Road Salt and Salted Sand Storage Guidelines," Dept. of Environmental Conservation, 1993

CONNECTICUT RIVER JOINT COMMISSIONS

- *The Challenge of Erosion in the Connecticut River Watershed*, 1996
- *The Watershed Guide to Cleaner Rivers, Lakes, and Streams*, 1995
- *A Homeowner's Guide to Controlling Nonpoint Source Pollution in the Connecticut River Valley*, 1994

APPENDIX G

GUIDE TO PERMITS

GET THE RIGHT PERMITS FOR PROJECTS NEAR RIVERS AND STREAMS

Any work you do near a river or stream can affect other landowners and public values such as water quality, fish, wildlife, and flood control. To protect the public's interests, federal, state and local governments have developed laws, rules, and ordinances for projects in or near rivers and streams. Permits and approvals are necessary for streambank stabilization, construction, and other earth disturbances on the bank or in the bed of a stream. It is important that the necessary approvals and permits are obtained before any work is begun. Penalties exist for unauthorized work.

LOCAL CITY OR TOWN

Contact: Selectmen's Office/Town Manager/Zoning Administrator

Provides Information About: Local Zoning Regulations and/or Federal Emergency Management Agency (FEMA) regulations for work in the floodplain and wetland protection.

STATE OF NEW HAMPSHIRE

All projects in New Hampshire must be reviewed by the NH Wetlands Board, which has been charged by the legislature with protecting the State's submerged lands and wetlands from despoliation and unregulated alteration (RSA 482-A). A wetlands permit is required to excavate, remove dredge, fill, or build a structure in or on the bank of any surface waters or wetlands in the state. Surface waters include lakes, rivers, brooks and perennial or seasonal streams, but exclude sheet runoff in the absence of a defined channel or wetland vegetation. Projects that significantly expose raw earth may require an Alteration of Terrain permit.

I. Wetlands Permit

A. *Obtain Application* from your Town Clerk or Wetlands Bureau

B. *Primary Permit Requirements are explained in:* NHDES fact sheet, "Wetland Permits for Bank Stabilization" (Technical Bulletin #WRD-1991-5)

C. *Contact for Information:* Wetlands Bureau, NH Dept. of Environmental Services, 6 Hazen Drive, P.O. Box 95, Concord, NH 03301 • Phone: (603) 271-2147 – Fax: (603) 271-6588

D. *Fee Schedule:* Minimum filing fee of $50 for all Minimum Impact Projects. Additional filing fee may be required for Minor or Major Projects at $ .025/square foot of requested jurisdictional area impact.

E. *Other Considerations:* Contact Rivers Coordinator at NHDES • Phone (603)271-1152

1. *New Hampshire Rivers Management and Protection Act (RSA 483):* Projects on the Connecticut River and others designated under this program must meet the requirements of the law. Copies of all permit applications needing NHDES approval are also reviewed by the Rivers Coordinator and the local river management advisory committee. (Technical Bulletin NHDES-CO-95-2)

2. *Comprehensive Shoreland Protection Act, (RSA 483-B):* Projects located on fourth order or higher rivers, except the Connecticut River and others designated for protection under RSA 483 prior to January 1, 1993, must comply with the minimum standards of this law which are usually added as a condition of the Wetlands Permit. Phone: (603)271-6876.

II. Alteration of Terrain Permit

A. *Obtain Permit Application and Information* from: Water Supply & Pollution Control Division (WSPCD), NH Dept. of Environmental Services, 6 Hazen Drive, P.O. Box 95, Concord, NH 03302-0095 • Phone: (603) 271-3503 Fax: (603) 271-2867

B. *Primary Requirements for Permit:* Projects with significant alteration of 100,000 sq. ft. or more. Projects with significant alteration of 50,000 sq. ft. or more on rivers which fall under the jurisdiction of the Comprehensive Shoreland Protection Act (see above).

C. *Fee Schedule:* 50,000 - 199,000 sq. ft of disturbance requires a fee of $100. Add $100 for each additional 100,000 sq. ft thereafter.

D. *Other Considerations: New Hampshire Rivers Management and Protection Act:* (see above)

III. Federal Clean Water Act Section 404 Permit and Section 401 Water Quality Certification
New Hampshire implements a State Program General Permit (NHSPGP) through the U.S. Army Corps of Engineers for activities involving dredge or fill in waters of the state and work affecting navigable waters. The NHSPGP excludes certain activities and is generally limited to minor or controversial activities. Projects which require a Section 404 permit from the Corps must also obtain a Section 401 Water Quality Certificate from NHDES-WSPCD.

A. *Contact for Information:* U.S. Army Corps of Engineers, Regulatory Division for Permits in NH, 424 Trapelo Rd., Waltham, MA 02254-9149 • Phone: (800)343-4789 – Fax: (617)647-8303

B. *Obtain Water Quality Certificate and Information from:* Surface Water Quality Bureau, Water Supply & Pollution Control Division, NH Dept. of Environmental Services, 64 North Main St., Concord, NH 03301 Phone: (603) 271-2457 Fax: (603) 271-7894

C. *Project Types:*
Minimum Impact Project: work can proceed following receipt of Wetlands permit (see above)
Minor Impact Project: work must wait 30 days after Wetlands Board approval for reply from Army Corps
Major Impact Project: work cannot proceed until after Wetlands Board approval and until Army Corps sends written confirmation that the project has been approved.

STATE OF VERMONT

The Vermont Stream Alteration Law, Title 10, Chapter 41, requires that all stream alteration projects which seek "to change, alter or modify the course, current or cross-section of any water course having a drainage area greater than 10 square miles by movement, fill or by excavation of 10 cubic yards or more of material," require a permit from the Stream Alteration Engineers of the VT Agency of Natural Resources.

I. Stream Alteration Permit

A. *Obtain permit application and information from:* (For projects located on the Ompompanoosuc River and north AND the Winooski River and north): VT Agency of Natural Resources, 184 Portland Street, St. Johnsbury, VT 05819 • Phone: (802) 748-8787 Fax: (802) 748-6687
(For projects on the White River and south AND Lewis Creek and south): VT Agency of Natural Resources, 450 Asa Bloomer Bldg, Rutland, VT 05701-5903 • Phone: (802) 786-5906 Fax: (802) 786-5915

B. *Fee Schedule:* $100 per permit

II. Federal Clean Water Act Section 404 Permit and Section 401 Water Quality Certification
Water Quality Certification is required for all projects regarding discharge and dredged or fill materials in waters of the U.S., regardless of the size of the watershed. Contacts are same as for stream alteration permits, above.

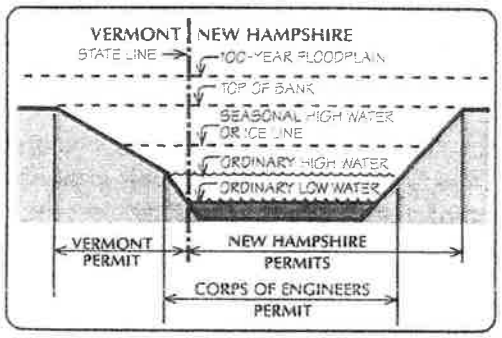
III. Wetlands Permit
If the proposed project is located in or near a wetland, a site visit may be necessary. Impacts may be addressed under Title 10 VSA, Chapter 37, Section 905(a), 401 Water Quality Certification and Act 250.

A. *Obtain permit application and information from:* Wetlands Coordinator, Water Quality Division, VT Agency of Natural Resources, Building 10N, 103 So. Main St., Waterbury, VT 05671 • (802) 241-3770

IV. Connecticut River Projects
The Ordinary Low Water mark (OLW) is the New Hampshire/Vermont state line. By agreement with the VT Agency of Natural Resources, permit applications involving the Connecticut River are reviewed by the local river management advisory subcommittee.

A. *For projects on the Vermont side of the Connecticut River riverward of the Ordinary Low Water mark,* contact NHDES to see if additional permits are required at: Wetlands Bureau, NH Dept. of Environmental Services, 6 Hazen Drive, P.O. Box 95, Concord, NH 03301 • Phone: (603) 271-2147 Fax: (603) 271-6588

B. *For projects on the Connecticut River landward of the Ordinary Low Water mark,* contact the U.S. Army Corps of Engineers for information about jurisdiction and application procedures at: U.S. Army Corps of Engineers, Regulatory Division, Camp Johnson, Bldg 10-18, Colchester, VT 05446 • Phone: (802) 655-0334 Fax (802) 655-0818



APPENDIX H

CONSERVATION EASEMENTS

Land trusts offer a voluntary mechanism for protecting individual parcels of land forever. Using a legal document known as a conservation easement, land trusts can ensure continued stewardship and productive use without relying on public regulation or public ownership.

Land subject to conservation easements remains in private ownership and can be sold, given or transferred at any time. A conservation easement assures the landowner that the resource values of his or her property will be protected forever, no matter who the future owners are.

What is a conservation easement?

A conservation easement is a legally enforceable agreement between a landowner and a private conservation organization (such as a land trust) or governmental agency that specifies forever, the types and locations of activities permitted on a particular parcel of land. A conservation easement is a deed "running with the land," and all future landowners are bound to the provisions of the easement deed.

Landowners place conservation easements on their properties voluntarily, working with land trusts to craft provisions that will protect the natural features of the property and meet the landowner's objectives. For instance, a landowner may choose to conserve some, but not all, of her land; or a landowner may wish to specify timber or habitat management standards to continue his investment in good stewardship.

Conservation easements are usually donated to land trust, but in certain cases, land trusts may purchase conservation easements. This is sometimes called "selling development rights."

Conserved land remains in private ownership, used for farming, forestry and other activities that are consistent with the purposes of the conservation easement deed. The land trust accepts the responsibility of monitoring the property - forever - to ensure compliance with the terms of the conservation easement.

Does a conservation easement allow public access to the property?

Landowners who grant conservation easements make their own choice about whether to open their property to the public. A conservation easement does not allow access to the general public unless the landowner has specifically provided for access in the easement agreement.

Public access is more often granted when the property has a history of public use and is perceived to be a recreational resource. Some landowners provide public access rights to a limited area, such as allowing fishing in designated areas or hiking along a clearly defined corridor. Landowners may choose to permit public access for specific purposes (scientific research, education, or hunting, for example). Some landowners restrict public access to particular types of activities, such as walking, skiing, biking, or horseback riding.

Conservation easements do permit regular access by the land trust for the purpose of monitoring the use and activities on the property to ensure that the terms and conditions of the conservation easement are upheld.

Who can grant an easement?

Any owner of property with conservation values may grant a conservation easements. If the property belongs to more than one person, all owners must consent to granting an easement. If the property is mortgaged, the owner must obtain an agreement from the lender to subordinate its interests so that the easement cannot be extinguished in the event of foreclosure.

How restrictive is a conservation easement?

A conservation easement generally permits existing land use practices to continue and may allow a limited amount of future development. Each easement is designed to prohibit development and other activities to the degree necessary to protect the significant natural values of that particular property.

Agricultural and forestry activities are permitted and encouraged on most easement-protected land. This includes: building structures such as culverts, bridges, barns, sheds, fences and dams when necessary for farming and forestry. Habitat management and improvement, such as creating ponds and wetlands or establishing plant species to benefit wildlife, is also usually permitted.

Depending on the characteristics of the property and the landowners' wishes, future residential or commercial construction may be prohibited entirely or limited to sites where the impact will not impair the natural values of the property. Additional limitations may include prohibition of mining, excavation, or installation of billboards, and the establishment of protective buffers around ponds or waterways.

How much land must be included?

Any amount. A conservation easement may apply to only a small part or all of an owner's land, depending upon what the owner wants to protect and on whether the restrictions are acceptable to the land trust.

Are there financial benefits to donating a conservation easement?

Income Taxes: The donation of a conservation easement constitutes a charitable gift which may be deductible for federal income tax purposes if the property meets conservation standards established by the federal government. The value of the gift, determined by an appraisal, is equal to the difference between the fair market value of the property before and after the easement is donated.

Estate Taxes: A conservation easement can be a useful estate planning tool, enabling heirs to keep land they would otherwise have to sell. State and federal inheritance taxes on real estate are often so high that the heirs are forced to sell some or all of the land just to pay the taxes. Because an easement reduces the value of the property, the inheritance taxes are also reduced.

Gift Taxes: When a landowner gives land to a family member, the gift is subject to gift taxes if its value exceeds the maximum tax-free amount. Lowering the value of the land through a conservation easement may allow the landowner to give more land free of tax, or may help reduce the amount of tax owed.

Property Taxes: Most property subject to a conservation easement is eligible for preferential tax treatment under current use taxation. Landowners whose property is already enrolled in a current use program will generally not see a further reduction in their property taxes.

How are conservation easements enforced?

The recipient organization (usually a land trust) is responsible for monitoring compliance in perpetuity. Representatives of that organization will visit the property periodically to determine that no violations have occurred. The organization will use written records and photographs to document the condition of the property.

A property owner should make sure that the recipient organization has the time and resources to carry out its monitoring responsibility. Most land trusts maintain endowments for this purpose, and many ask the landowner to make a contribution to the endowment at the time an easement is accepted.

*Prepared with the assistance of the **Upper Valley Land Trust**, which was founded in 1985 with a mission of helping people conserve land. UVLT has worked with farmers and forest owners, local conservationists, and elected officials to conserve nearly 12,000 acres of land since then: productive farmland, working forest, remote wild places, stream and river corridors, scenic vistas, wetlands, hiking trails, and picnic and camping spots. The Upper Valley Land Trust works in 40 Upper Valley towns on both sides of the Connecticut River. For more information about how you can conserve your land, or a special place in your community, call or write:*
UVLT, 19 Buck Rd, Hanover, New Hampshire 03755 (603) 643-6626.

APPENDIX I

SOURCES OF ASSISTANCE

FEDERAL AGENCIES

Environmental Protection Agency
Region 1
JFK Building
Boston, MA 02203
617-565-9026

USDA Natural Resources Conservation Service
◆ NH county offices:
Coos County: 788-4651
Grafton County: 747-2001
Sullivan County: 863-4297
Cheshire County: 352-3602
◆ VT county offices:
Essex/Caledonia Counties: 748-3885
Orange/Windsor Counties: 295-1504
Windham County: 254-5323

USDA Cooperative Extension Service
◆ NH county offices:
Coos County: 788-4961
Grafton County: 747-6944
Sullivan County: 863-9200
Cheshire County: 352-4550
◆ VT county offices:
Essex/Caledonia Counties: 676-3900
Orange/Windsor Counties: 296-7630
Windham County: 257-7967

New England Interstate Water Pollution Control Commission
255 Ballardvale St.
Wilmington, MA 01887
508-658-0500

National Park Service
Rivers and Trails Conservation Assistance Program NH/VT
King Farm, 5 Thomas Hill
Woodstock, VT 05091
802-457-4323

U.S. Fish and Wildlife Service
Conte Refuge Planning Project
38 Avenue A
Turners Falls, MA 01376
413-863-3070

NEW HAMPSHIRE STATE AGENCIES

Dept. of Environmental Services
6 Hazen Dr., P.O. Box 95
Concord, NH 03302-0095
603-271-3503
◆ Rivers Coordinator: 271-1152
◆ Water Division: 271-3503
◆ Wetlands Bureau: 271-2147

Fish and Game Department
2 Hazen Dr.
Concord, NH 03301
603-271-3211

Dept. of Resources & Economic Development
172 Pembroke Rd., P.O. Box 1856
Concord, NH 03302-1856
603-271-2411
◆ Natural Heritage Inventory: 271-3623

Division of Historical Resources
19 Pillsbury St., P.O. Box 2043
Concord, NH 03302-2043
603-271-3558

Department of Agriculture
25 Capitol St., 2d Floor
P.O. Box 2042
Concord, NH 03302-2042
603-271-3551

Department of Safety
31 Dock Rd.
Gilford, NH 03246
603-293-0091

VERMONT STATE AGENCIES

Dept. of Agriculture, Food, & Markets
116 State St.
Montpelier, VT 05620-2901
802-828-2500

Agency of Natural Resources Dept. of Environmental Conservation
103 S. Main St., 1 South
Waterbury, VT 05671-0401
802-241-3800
◆Water Supply: 241-3400
◆Water Quality: 241-3770
◆Solid Waste Management: 241-3444

Dept. of Fish & Wildlife
103 S. Main St., 10 South
Waterbury, VT 05671-0501
802-241-3700
◆ Natural Heritage Inventory Program:241-3700

Dept. of Forests, Parks & Recreation
103 S. Main St., 10 South
Waterbury, VT 05671-0601
802-241-3670

Department of Travel & Tourism
134 State St.
Montpelier, VT 05602-3403
802-828-3237

Division for Historic Preservation
135 State St., 4th Floor, Drawer 33
Montpelier, VT 05633-1201
802-828-3226

Housing &Conservation Board
136 ½ Main St., Drawer 20
Montpelier, VT 05620-3501
802-828-3250

Water Resources Board
58 E. State St. Drawer 20
Montpelier, VT 05620-3201
802-828-2871

REGIONAL PLANNING COMMISSIONS
and Resource Conservation and Development Areas

Northeast Vermont Development Association
P.O. Box 640
St. Johnsbury, VT 05819
802-748-5181

North Country Council
107 Glessner Rd.
Bethlehem, NH 03574
603-444-6303

Upper Valley/Lake Sunapee RPC
77 Bank St.
Lebanon, NH 03766-1704
603-448-1680

Southwest RPC
20 Central Square, 2d Floor
Keene, NH 03431
603-357-0557

Two Rivers/Ottauquechee RPC
King Farm, 5 Thomas Hill
Woodstock, VT 05091
802-457-3188

Southern Windsor County RPC
Box 320 Ascutney Prof. Bldg., Route 5
Ascutney, VT 05030
802-674-9201

Windham Regional Commission
139 Main St., #505
Brattleboro, VT 05301
802-257-4547

George D. Aiken Resource Conservation & Development Area
P.O. Box 411
Randolph, VT 05060
802-728-9526

North Country Resource Conservation & Development Area
103 Main St., Suite 1
Meredith, NH 03253
603-279-6546

PRIVATE ORGANIZATIONS AND LAND TRUSTS

River Watch Network
New England Office
RR 1, Box 209
Hartland, VT 05048
802-436-2544

Connecticut River Watershed Council
1 Ferry St.
Easthampton, MA 01027
413-529-9500

NH Rivers Council
54 Portsmouth St.
Concord, NH 03301
603-228-6472

Vermont River Conservancy
RR 5, Box 920
Montpelier, VT 05602
802-229-9282

The Nature Conservancy- NH
2 ½ Beacon St., Suite 6
Concord, NH 03301
603-224-5853

The Nature Conservancy-VT
27 State St.
Montpelier, VT 05602
802-229-4425

Vermont Natural Resources Council
9 Bailey Ave.
Montpelier, VT 05602
802-223-2328

Audubon Society of NH
3 Silk Farm Rd.
Concord, NH 03301
603-224-9909

Society for Protection of NH Forests
54 Portsmouth St.
Concord, NH 03301
603-224-9945

Upper Valley Land Trust
19 Buck Rd.
Hanover, NH 03755
603-643-6626

Vermont Land Trust
8 Bailey Ave.
Montpelier, VT 05602
802-223-5234

Passumpsic Valley Land Trust
P.O. Box 124
St. Johnsbury, VT 05819
802-748-8089

Windmill Hill Pinnacle Association
RR 3 Box 248
Putney, VT 05346

Inherit New Hampshire
266 N. Main St.
Concord, NH 03301
603-224-2281

Vermont Institute of Natural Science
Church Hill Rd.
Woodstock, VT 05091
802-457-2779

Montshire Museum
P.O. Box 770
Norwich, VT 05055
802-649-2200

Bonnyvale Environmental Center
Old Guilford Road
Brattleboro, VT 05301
802-257-5785

NH Farm Bureau
295 Sheep Davis Rd.
Concord, NH 03301
603-224-1934

VT Farm Bureau
RR 4, Box 2287
Montpelier, VT 05602
802-223-3636

APPENDIX J

FOREST PRINCIPLES AND GUIDELINES

American Forest and Paper Association

The American Forest and Paper Association developed these principles and guidelines as part of its Sustainable Forestry Initiative, and since January, 1996, has required compliance as a condition of membership. The Headwaters Subcommittee endorses these guidelines and encourages their use by private forest landowners in the region.

DEFINITION OF SUSTAINABLE FORESTRY: Managing our forests to meet the needs of the present without compromising the ability of future generations to meet their own needs by practicing a land stewardship ethic which integrates the growing, nurturing, and harvesting of trees for useful products with the conservation of soil, air and water quality, and wildlife and fish habitat.

FOREST PRINCIPLES

1. Meet the needs of the present without compromising the ability of future generations to use the forest for products as well as for ecological and other uses.
2. Promote both environmentally and economically responsible practices on AF&PA members' and all other forest lands.
3. Improve long-term forest health and productivity by protecting forests against wildfire, pests, and diseases.
4. Manage forests of biological, geological, or historical significance to protect their special qualities.
5. Continuously improve forest management and regularly track progress toward achieving the goal of sustainable forestry.

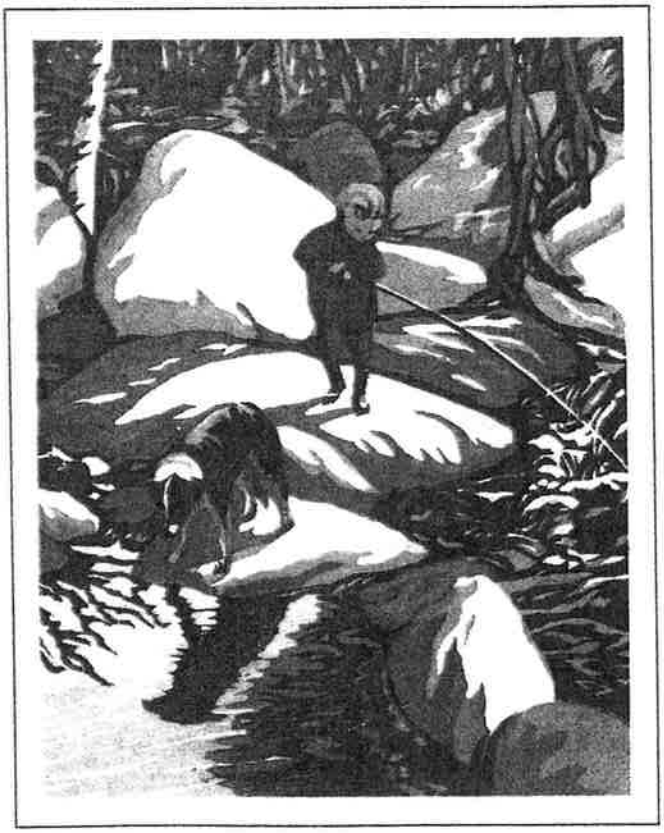
IMPLEMENTATION GUIDELINES (compliance required for member companies):

1. Broaden the practice of sustainable forestry
   - require members of AFPA to develop specific programs, plans, and policies to achieve sustainability
   - support research
2. Ensure prompt reforestation within a specified time following harvest
3. Protect water quality
   - meet or exceed all existing government standards
   - protect all perennial lakes and streams
   - involve independent experts to improve existing programs; support research
4. Enhance wildlife habitat
   - develop specific programs, policies, and plans to promote habitat diversity; support research
5. Minimize the visual impact of harvesting
   - develop specific programs and policies
   - control clearcut sizes
   - comply with "green up" requirements before harvesting adjacent areas
6. Protect special sites
   - identify and manage them appropriately
   - involve independent experts as appropriate
7. Contribute to biodiversity
   - support biodiversity research
   - employ adaptive management techniques
8. Continue to improve wood utilization; employ appropriate technology
9. Continue the prudent use of forest chemicals to ensure forest health
   - meet or exceed legal requirements
10. Foster the practice of sustainable forestry on all forest lands
    - inform other woodland owners about the benefits of reforestation
    - promote the establishment of training programs for loggers
    - support and promote other landowner education efforts
11. Publicly report progress
12. Provide opportunities for public outreach

APPENDIX K

MEMBERS OF THE HEADWATERS SUBCOMMITTEE

past and present

- ◆ John Amey, Pittsburg, NH
- Paul Amey, Pittsburg, NH
- Sherry Belknap, Bloomfield, VT
- Earl Bunnell, Colebrook, NH
- Stanley Bunnell, Clarksville, NH
- Jean Burrill, Pittsburg, NH
- Lawrence Clough, Canaan, VT
- Allen Coats, Stewartstown, NH
- Odette Crawford, Canaan, VT
- Joe Daley, Lemington, VT
- James Fay, Lemington, VT
- Alan Fogg, Northumberland, NH
- Gordon Gray, Northumberland, NH
- Lindsey Gray, Pittsburg, NH
- Ken Hastings, Columbia, NH
- Louis Lamoureaux, Maidstone, VT
- Richard Lapoint, Pittsburg, NH
- Kevin McKinnon, Colebrook, NH
- ◆ Ed Mellett, Northumberland, NH
- Gary Paquette, Stratford, NH
- Chuck Patterson, Lemington, VT
- ◆ Mary Plumley, Brunswick, VT
- Bill Schomburg, Columbia, NH
- ◆ Barbara Tetreault, Northumberland, NH
- Bob Ward, Pittsburg, NH
- Timothy White, Maidstone, VT
- Robert Young, Lemington, VT

◆ *indicates elected officers of the subcommittee*