WATER RESOURCES - Executive Summary
Mt. Ascutney Region River Subcommittee

INTRODUCTION

This Water Resources Plan is an updated and expanded edition of the Water Quality chapter originally published by the Connecticut River Joint Commissions as part of the *1997 Connecticut River Corridor Management Plan, Volume V,* for the Mt. Ascutney Region. This plan is a requirement of the New Hampshire Rivers Management and Protection Act. It was prepared by CRJC's Mt. Ascutney Region River Subcommittee in 2005-7 by volunteer representatives of the riverfront towns from Plainfield to Charlestown, NH and Hartland to Rockingham, VT, assisted by CRJC's Conservation Director. Planning boards and commissions can review its recommendations and integrate them into their local master plan, and select appropriate recommendations to bring to townspeople for adoption into their zoning ordinances.

The Mt. Ascutney Region - The 39 mile Mt. Ascutney segment runs from the northern boundaries of Plainfield and Hartland south to the Bellows Falls Dam. The character of the river is distinctly different in the northern and southern parts. In the upper ten miles, water moves with a perceptible current and there is an opportunity for flushing of nutrients and sediment. Rapids at Sumner Falls return oxygen to waters that may have acquired pollutants from upstream sources. The remaining 29 miles are captured by the Bellows Falls impoundment. The flow is also influenced by Wilder Dam, just upstream. Major tributaries to this section of the Connecticut are the Ottauquechee, Black, and Williams Rivers and Mill Brook in Vermont, and the Sugar and Little Sugar Rivers in New Hampshire.

Economic Value of Clean Water - Good water quality is important economically for the Headwaters region. Studies in New Hampshire have found that its rivers and lakes annually contribute an estimated $1.5 billion in total sales and $247 million in property taxes to its economy (2002 dollars). Statewide, fishing, boating, and swimming have the same economic impact as snowmobiling, ice-fishing, downhill skiing, and cross-country skiing combined. Overall, surface water recreation generates over 100 jobs in the Dartmouth-Sunapee Region of New Hampshire, which includes the Mt. Ascutney Region. These jobs equate to $2.6 million in personal income and almost $7.5 million in business sales, totaling about 3.5% of the recreational revenue generated by anglers, boaters and swimmers in New Hampshire. A perceived decline in water clarity and purity will bring about the greatest change in the Dartmouth-Sunapee economy. A decrease in water clarity and purity would cause a loss of 14 jobs, about $309,000 in personal income and almost $1 million in business sales.

CONDITION OF THE CONNECTICUT RIVER TODAY

Water Quality - For 29 miles from Cornish/Windsor downstream to the Bellows Falls Dam, the river's quality fully supports swimming and other contact recreation. However, the State of New Hampshire considers that CSOs in the wastewater collection systems serving White River Junction and Lebanon, discharging to the White and Mascoma Rivers, render the Connecticut River unsafe for swimming for 13.8 miles from the confluence of the White River to Blow-Me-Down Brook in Cornish. River contamination is more likely during and immediately after heavy rainfall. Among area tributaries, Blow Me Down Brook in Cornish has problems with aluminum and combined sewer overflows can contribute bacteria to the lowest 2.5 miles of the Black River. Parts of the Sugar River do not meet standards for pH, dissolved oxygen, aluminum, copper, and *E. coli* due to the effects of municipal discharges. Invasive aquatic plants are present, particularly near the Cheshire (Route 11) Bridge. There is currently no regular, on-going water quality monitoring program on the Connecticut River or its New Hampshire tributaries in this region. other than on the Sugar River by New Hampshire Community Technical College students.

Sediment Quality - A study by EPA indicated significant amounts of polyaromatic hydrocarbons in sediments below the confluence of the Sugar River. These chemicals can get into streams when roads closely follow waterways, from leaks and drips from automobiles, snowmobiles, or other vehicles, and from leaking underground storage tanks.

Toxins in Fish Tissue - In 2000, EPA and the four Connecticut River states conducted the first river-wide study of fish tissue in the nation. In the reach that included the Mt. Ascutney Region, mercury in fish is a threat to subsistence fishers and to fish-eating birds and mammals, but not to recreational fishers. Dioxin-like PCBs pose a risk to recreational and subsistence fishers and to fish-eating mammals and fish-eating birds. DDT and related breakdown products pose a risk

to human subsistence fishers and to fish-eating birds, but not to recreational fishers or fish-eating mammals. The study found that total mercury concentrations in all three species of fish were significantly higher upstream than downstream. Risk from PCBs was generally lower in upstream areas than in downstream areas, although this varied.

Invasive species -The first recorded invasive aquatic plant in the Connecticut River, Eurasian milfoil, was reported at Hoyt's Landing in Springfield in 1995 by a member of the Mt. Ascutney Subcommittee. This plant has since spread downstream. A 2006 survey added Curly Leaf Pondweed, Purple Loosestrife , and Japanese Knotweed at this site. Knotweed is particularly prevalent on banks of the Black River.

Key recommendations for river quality

- Town conservation commissions, tributary watershed groups, school groups, and other interested citizens should work with their state's water quality agency to ensure more regular and sustained monitoring of the Connecticut River and its tributaries. The states should continue to act to reduce sources of mercury contamination that affects Connecticut River fish and other wildlife. Congress should join this effort.

RIVER FLOW

Instream Flow- Two gages on the mainstem and six on tributaries provide real-time data for flow, precipitation, and air temperature via the Internet. Except in very high water conditions, instream flow of the Connecticut River in most of the Mt. Ascutney region is controlled almost completely by operations at Wilder and Bellows Falls Dams. A factor adding natural variation to the closely managed mainstem flow is the large watershed of the free-flowing White River, entering just below Wilder Dam.

Flooding & Flood Control - The Connecticut River in the Mt. Ascutney region typically experiences heavy flows with spring ice-out and snowmelt. Flooding is now dampened by flood control dams on the Ottauquechee and Black Rivers and also upstream on the Ompompanoosuc River, but these dams control less than 10% of the flow from the 5400 square mile watershed that drains through Bellows Falls. Ice movement and management are very important on the Connecticut River here, due in part to the White River, its largest tributary, which enters the mainstem just above the Mt. Ascutney section. The region has recently experienced some sudden, severe rainstorms, although none as strong as those that have affected the Cold River watershed in 2005.

Key recommendations for flow and flood control

- The Cold River flood experience suggests that towns should ask regional planning commissions for help with culvert and bridge surveys to identify those that are undersized. State agencies should assist towns with engineering costs for sizing culverts and bridges. State and local highway departments should ensure that culverts are properly sized when replacing them during road work, and that culverts for perennial streams do not impede fish movement.

WORKING RIVER

Mt. Ascutney Region Dams - Two major hydro power dams influence this part of the Connecticut River mainstem: Wilder Dam, located just above the segment in Lebanon/Hartford, and Bellows Falls Dam at the foot of the segment in Rockingham/Walpole. Their current federal operating licenses expire in 2018 with that of Vernon Dam. Both are daily peaking generation plants, raising and lowering water in the Bellows Falls impoundment as they store and release water during the day. There are currently no required "ramping rates," or controls on the suddenness with which water is stored and released at these dams. Sending large amounts of impounded water into the tailrace can also abruptly change water flow and temperatures there, which can affect spawning and other fish movements.

Key recommendations for dams

- The Federal Energy Regulatory Commission should include best management practices such as moderated ramping rates in the 2018 license for Wilder and Bellows Falls Dams. Dam owners should strongly consider removing those dams that no longer serve a purpose and cost more to fix than the benefits they offer or dams that pose a threat to areas downstream. The Town of Springfield should seek state assistance for removing the Springfield Reservoir Dam.

USING THE WATER

Water withdrawals - As a designated river in New Hampshire's Rivers Management and Protection Program, the Connecticut River's water is protected from being diverted outside of the watershed. The state requires registration of water withdrawals over a certain size, which helps identify future problems of well interference, declining water tables and/or diminished streamflows, but does not limit withdrawals. Vermont has no system for tracking withdrawals and the amount of water that would otherwise have flowed in the river from Vermont is unknown.

Groundwater and drinking water supplies - Clean drinking water may be our most valuable but under-appreciated commodity. New Hampshire has mapped stratified drift aquifers and regulates new groundwater withdrawals for public community water systems and large withdrawals to prevent harm to existing water users and nearby streams and rivers. Surficial geology mapping has been completed for south Claremont and Charlestown. Vermont has not mapped aquifers as comprehensively and does not regulate groundwater withdrawals, although Rockingham is undertaking an aquifer recharge area study and mapping project. Groundwater, which many residents pump into their homes for drinking, can be contaminated by a long list of pollutants which are difficult if not impossible to remove.

Key recommendations for water use

- Vermont should adopt water withdrawal registration rules for the Connecticut River mainstem similar to New Hampshire's. Towns should take advantage of source water protection grant and loan programs.

LAND USE & WATER RESOURCES

Wastewater discharges A number of communities discharge treated wastewater into the Connecticut River and its tributaries here. Just upstream, the river also receives wastewater from Hanover, Lebanon, and White River Junction. Springfield, Vermont, has recently completed a major upgrade of its wastewater treatment facility, vastly improving the quality of its discharge. A major issue in this region is combined sewer overflows, where runoff from a heavy storm mixes with untreated sewage, sending it into the river and rendering the water unsafe for swimming. Three communities have CSOs that affect the Mt. Ascutney region. Lebanon is making progress and has eliminated four of its six CSOs, although withdrawal of federal funds has forced the City to request an extension. Five of the six CSOs in White River Junction have been eliminated. Springfield, Vermont has worked aggressively to eliminate its 26 CSOs, and the town expects that all will be gone by mid-2008. Other concerns include pharmaceuticals and personal care products in wastewater. A better way to dispose of these materials is needed.

Key recommendations for wastewater discharges

- Communities with combined sewer overflows, including those upstream of the Mt. Ascutney region, should continue their efforts to eliminate them as quickly as possible. EPA should provide funding to assist with these expensive projects.

Landfills, Junkyards, & Transfer Stations - Landfills must be carefully sited, based upon good surficial geologic mapping. When a new solid waste landfill was proposed in Rockingham in 2004, a partial knowledge of the location of unstable varved soils was important in the decision not to locate the landfill close to the Connecticut River. The ash landfill in Claremont has been capped. This facility, which began as a burning dump, is built upon varves. Communities are working to reduce the tonnage of solid waste they bring to landfills, by recycling, although rates vary greatly. WinCycle in Windsor recycles old computer equipment, thus removing an important source of hazardous material from the waste stream. At the unlined Browning-Ferris landfill site in Rockingham, monitoring wells down-gradient from the landfill near the river, showed benzene, arsenic, manganese, chromium, nickel, and tetrochloroethene at levels higher than the clean-up criteria. A landfill has been proposed by Upper Valley Solid Waste District for land in Hartland but not yet built. From time to time, people still illegally dump tires in the Connecticut River, and roadside dumping is also still a problem. The Black River Action Team has energized local citizens for successful cleanups on this largely urban tributary. A carbon injection system has been installed at the Claremont incinerator that has reduced mercury emissions and other pollutants by approximately 98%. The state now considers pollutant emissions here to be fully controlled.

Shoreline & Floodplain Development - The Subcommittee is concerned about the lack of enforcement of New Hampshire's Shoreland Protection Act and about development of lands along the river which could threaten water quality through changes in storm water movement, erosion during construction, and new septic systems. Vermont is the only state in New England that does not have a statewide shoreland protection law. All of the towns along the Connecticut River in the Mt. Ascutney region, except Cornish, currently permit building in both the flood hazard area and in the 100-

year floodplain. The subcommittee believes that there should also be more protection for this and smaller streams. Glacial Lake Hitchcock left behind layers of ancient lake-bottom sediments that in some places near the river sort themselves into varves, layers that have differing physical properties that can create unstable drainage.

Key recommendations for shoreland and floodplain development

- Towns should adopt ordinances prohibiting building in the 100-year floodplain and ensure that buildings are set a safe distance back from the river even when outside of the floodplain, to reduce the risk of property loss in erodible areas. Vermont should adopt statewide shoreland protection. NH towns and NH DES should inform landowners about the Shoreland Protection Act, and should not issue permits for projects that violate state law. Towns should work with state geologists to map varves in their towns, to be sure major construction does not take place on unsafe soils.

Roads and railroads - In the Mt. Ascutney region, roads follow the Connecticut River and tributaries on ancient routes that are little changed in the last two centuries, except that the river, especially where it is impounded, has attempted to claim parts of them. People have responded by widening, straightening, and armoring riverfront roads, rarely by moving them a safer distance from the river. While the railroad has contributed much to the river valley over the century and a half of its presence, it has new and chronic implications for river health. An under-sized culvert or bridge can block with debris in a sudden storm and cause a stream to cut through a road. Because culvert and bridge size is so important for public safety, they should be checked in all towns. There are several places in the Mt. Ascutney Region in Vermont where salt is stored near water by town and state highway departments and by a rail company. Long-time snow dumping sites may also show signs of lead accumulation in the soil from the days of leaded gasoline.

Key recommendations for roads and railroads

- Rail managers should manage the rail system to protect nearby surface waters, by ensuring that all waste is disposed of properly. Federal agencies should partner with the railroad to identify ways to help its management become more aware of ways to avoid pollution of surface waters.

Storm Water runoff - Cleared, compacted, or paved land sends water downhill faster than when it is captured by thick vegetation and transpired by trees. There are a number of common sense ways to mimic the natural pattern of runoff when a property is developed, with “low impact development” techniques that slow it down and soak it up.

Key recommendations for stormwater management

- Towns should look at ways to include “low impact development” ideas as they review projects, and at how to change existing development to reduce runoff and promote stormwater infiltration.

Home landscapes - Residential development in the Mt. Ascutney region continues to occur, often very close to the river. Many people building on a waterfront parcel are tempted to cut down the vegetation along the stream in order to get a view of the water, not realizing that they are removing the protective barrier that keeps runoff from their lawns and gardens from reaching the water, or keeps the riverbank from eroding. Homeowners living near water have a responsibility to be sure they are good caretakers of those waters.

Key recommendations for home landscapes

- Landowners should encourage native plants on their riverbanks, resist the temptation to cut and mow to the water’s edge, and remove invasive plants. Towns should educate landowners to establish, maintain and enhance the native riparian buffer vegetation on their property.

Farms and rivers - Prime agricultural soils distinguish much of the floodplain in the Mt. Ascutney region. Land on both riverbanks has a long farming tradition. Development pressures focus easily upon the remaining available farmland, which is often flat and easy to build upon. Few functioning farms remain, and those that do should be encouraged by spirited local markets for their produce and, for those who are willing, with assistance in conserving their land.

Key recommendations for farming

- Farmers should employ best management practices and work with conservation districts and the Cooperative Extension Service to prepare a total nutrient management plan for their farm, to make best use of available nutrients, reduce potential for water quality impacts, and save money in purchasing fertilizer.

Brownfields - Historical industrial sites along the Connecticut River, such as Bellows Falls, Springfield, Claremont, and Windsor, have properties where contamination may linger in the soil and prevent the property from contributing once again to the tax rolls and economic vitality of the community.

RIVERBANK EROSION

Causes of Erosion - Riverbank erosion is a significant cause of concern for landowners on this segment of the Connecticut River. While it is a natural process, and is caused primarily by shear stress of water forced against the bank, wind-driven waves, and abrasion by ice, erosion is made worse by human actions, including water level fluctuations at the dams, boat wakes, and removal of the riverside vegetation that naturally holds the bank together. Inventorying erosion on the Mt. Ascutney segment, the Sullivan and Cheshire County Conservation Districts concluded that areas with severe and moderate erosion are largely attributable to natural forces such as higher velocity flows against concave banks and factors such as steep, high banks composed of sandy soils. Low banks with gentle slopes were generally stable.

Commissary Brook - Commissary Brook in Rockingham now exhibits erosion with documented influence on the Connecticut. At its mouth upstream from the Bellows Falls Dam, the brook has deposited a delta of gravel, silt, and clay. Fishermen and divers report that in places where the Connecticut River was once 30 feet deep, it is now six inches deep, due to sediment delivered by Commissary Brook. The brook is also sending a plume of turbidity into the river that violate the New Hampshire surface water quality standard. Sediment deposits are attributable to exposed, sloughed banks of an intermittent gully draining a reclaimed clay extraction pit. The presence of varved soils associated with glacial Lake Hitchcock appear to be a major contributing factor to the release of tons of sediment that have washed down the steep tributary stream into Commissary Brook and the Connecticut River. As of this writing, the sediment from Commissary Brook has continued to spread sediment into the Connecticut River mainstem and a visible plume has moved hundreds of yards down river, reaching Roundy's Cove. A head cut is developing that could affect nearby homes.

Riparian Buffers - Riparian buffers are the single most effective protection for water resources in Vermont and New Hampshire. These strips of grass, shrubs, and/or trees along the banks of rivers and streams filter polluted runoff, capture sediment and nutrients, and provide a transition zone between water and human land use. Natural riparian buffers have been lost in many places over the years. Demonstrating the importance of restoring buffers, US Gen New England sponsored the largest buffer planting projects in New Hampshire, on floodplain farmland owned by the company in Charlestown.

Key recommendations for erosion and riparian buffers

- State and federal agencies should examine the severe erosion involving varves at Commissary Brook, identify its causes, and fund a means to halt the surge of sediment into the Connecticut River mainstem.
- Towns should require developers and landowners to establish and/or maintain buffers of native vegetation along rivers and streams for privacy and pollution control. Landowners should encourage native plants on their riverbanks and remove invasives.