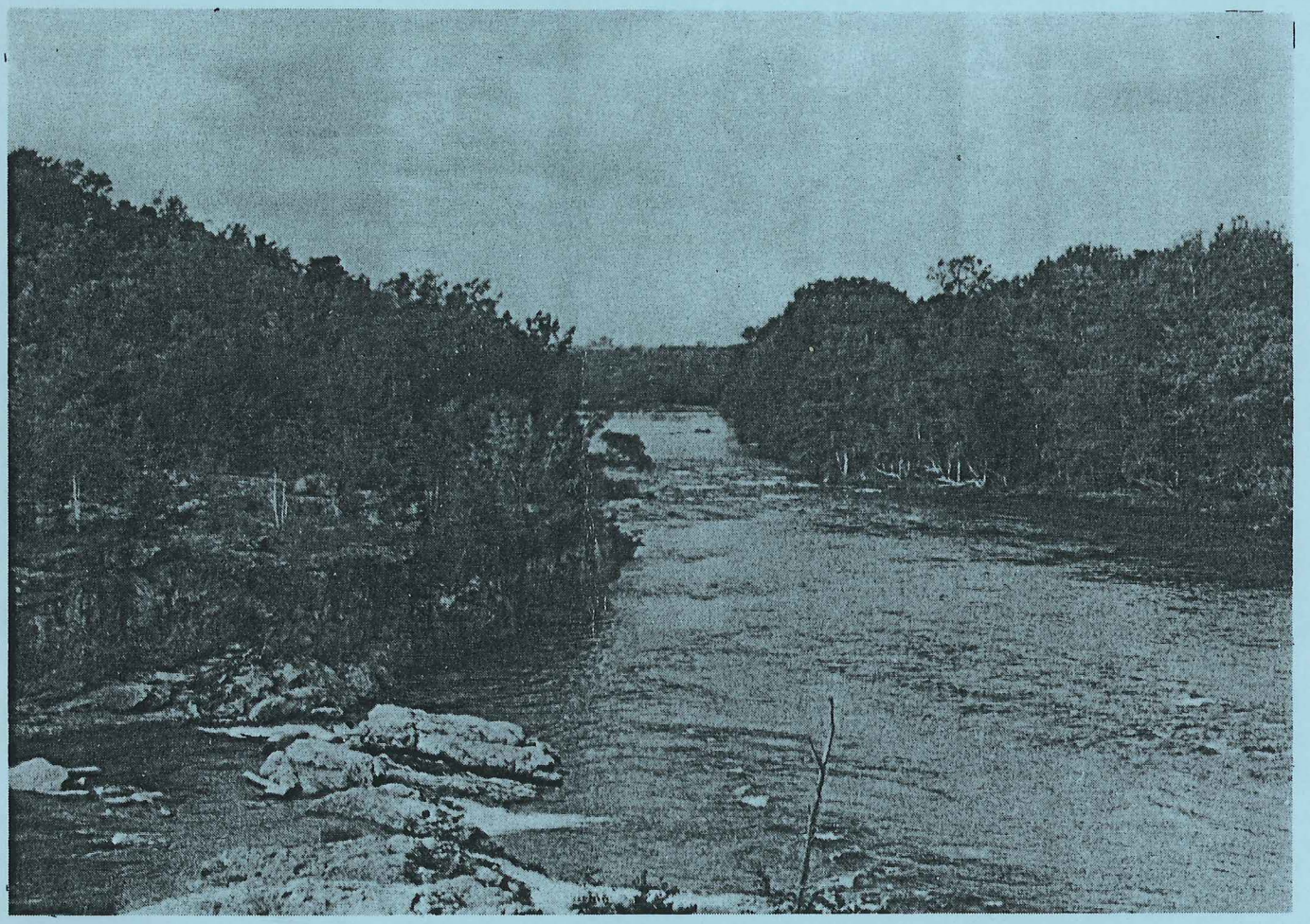
THE PRELIMINARY PROJECT REPORT

FOR THE

LOWER

WINOOSKI RIVER BASIN

AN INVENTORY OF USES, VALUES AND GOALS



Agency of Natural Resources
Department of Environmental Conservation
Water Quality Division
Waterbury, Vermont 05671-0408

April, 1992

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Special thanks to Betty Hutchinson for skillfully setting up some of the tables. Last but not least, many thanks to my secretary, Lois Quinlan for the wonderful typing job.

Song of the Onion River[1]

From the green wood ways of the forest fays
I leap with a lightsome laugh;
Thru the speckled shade, where the leaves are laid,
I follow my fickle path.

I steal from the hill with a venturous thrill
In a passion of youthful madness,
And the trouble and pain of the toiling plain
I drown with my gurgling gladness.

By the golden dome of the Commonwealth's home,
Where sit the Solons of State,
With pulses slow I soberly flow
Becomingly wise and sedate.

Again in the wild, like a mettlesome child,
I fret at my reins of rock,
And flounce and whirl like a vain young girl
Flaunting a fine new frock.

Thru the depths of the cleft in the mountain reft
I surge in a volume of thunder,
While the crags o'er the head of my cavern bed
Groan aghast as I struggle under.

Like a serpent lean with fangs of green,
I chisel my channel forth,
And worry in twain the fettering chain
Of the Couching King of the North.

Then into the West where the Sun folk rest
I race with their burning rack,
While I prance and play as I bear all the way
The Sunbeam Babes on my back.

Eclipsed by the fall of evening's pall
Where it cuddles my misty nest,
While the stars' silver gleams allure me to dreams,
I sorely am tempted to rest.

But I hurry amain to my tryst with Champlain,
From the myriad joys that enthrall,
To the meadows that yearn, to the mills that must turn,
The voices of duty recall.

Wave rocked and foam kissed, o'er the lake's amethyst.
I am guided with gentle motion,
Till weary of quest, serenely I rest
On the breast of my mother ocean.

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[1] "Song of the Onion River." Blanche Finkle Gile. 1918.
From a bequest to the Vermont Historical Society by H.G. Rugg, 1957.

LOWER WINOOSKI RIVER PROJECT REPORT

BACKGROUND and INTRODUCTION

During the past two decades, a renewed awareness of river values has taken place across the country. The Wild and Scenic Rivers program at the national level and the many state river protection programs bear this fact out. Several new laws passed in Vermont during the 1980's indicate that this state is also interested in protecting river values.

One of the main reasons for the renewed interest in Vermont's river resources is improvements in water quality as the result of the expenditure of approximately $370 million in state, local and federal funds for the construction of waste water treatment facilities. This renewed interest has led to increased river use, with the subsequent need for water flow and water quality maintenance, more access areas, boating portages, maintenance or establishment of greenways among others.

The Lower Winooski River (beginning at Bolton Falls), and its lakes and tributaries, provide almost 1/4 of the state's population with a broad range of water-oriented opportunities, including fishing , swimming, scenic vistas, hunting, nature watching, hiking and one of Vermont's few summer-long boating waters. The water resources of the Lower Winooski Basin also support unique wetlands, gorges, rapids, plant and animal communities and threatened and endangered species. The Lower Winooski River is a hard-working river, providing electricity from three hydroelectric facilities and assimilating treated wastewater from seven wastewater treatment facilities.

As the basin waters sustain more uses, conflicts occur with increasing frequency to the point where one use may exclude others. Strategies to resolve conflicts will be developed and adopted through this public process so that future management decisions may be made which properly balance the uses. At this time, there are several planning efforts being undertaken which may benefit from this process by coordinating mutual efforts. These include the update of the Winooski Valley Park District's Plan, the update of the Chittenden County Regional Plan and the development of several new town plans.

Of special interest is the relicensing of Green Mountain Power's Essex #19 hydroelectric facility in 1993. The process for relicensing requires the Federal Energy Regulatory Commission (FERC), the entity responsible for licensing power generating plants, to consider the extent to which a facility is consistent with a comprehensive plan for "improving, developing or conserving a waterway or waterways" affected by the facility. Decisions made during the relicensing process may have an impact on river uses during the next 30 years. The Lower Winooski River Basin Comprehensive Plan will be filed with FERC for their consideration.

Recognizing the opportunity for coordinating these planning efforts, plus guiding the relicensing project, the Agency of Natural Resources (Agency) initiated a public involvement effort, soliciting input from as many river interests as possible. The goal of this cooperative effort is to resolve use conflicts that exist and establish public agreements in a river management plan that:

- guides state administration
- encourages consistency in municipal and regional plans, bylaws, policies and projects along shorelines and streambanks
- guides private conservation and development projects
- influences federal decisions concerning the water resources of the Lower Winooski River Basin.

These goals are from "A Citizen's Guide to River Planning", published by this Department, September, 1989. Another goal of the plan is to set a standard for individual towns to develop their plans and to help them to protect the Lower Winooski river and its tributaries by offering river protection mechanisms and guidelines.

Copies of the final Lower Winooski River Basin Plan will be distributed to all the basin towns, the regional planning commissions, the Winooski Valley Park District, area businesses, conservation organizations and others. The Plan will increase awareness of the rivers, streams and lakes in the Basin, their cultural and natural resources and cause special water-related projects to be initiated to enhance this awareness. It is hoped that the Plan will encourage partnerships between businesses, towns and organizations to protect these water resources.

The Green Mountain Power Corporation has been involved with this planning project and is presently conducting detailed studies in preparation for its license application which is due to FERC by the end of 1991. Many of these studies are being performed to address Agency concerns regarding project impact on fish, wildlife, recreational uses and aesthetics, among others. The studies will also suggest mitigative actions for those impacts which they believe cannot be avoided. The utility will also determine the extent to which its hydroelectric facilities are consistent with or carry out goals generated by the Lower Winooski River Basin planning project.

Brief History of the Planning Process

The Lower Winooski River Basin Project has been a cooperative effort involving the Winooski Valley Park District, the Chittenden County Regional Planning Commission and over 400 people representing boating, agricultural, water quality, recreational, archaeological, open space, landowner, business, fishing and hydroelectric interest groups. Also involved were

all 12 communities in the Lower Winooski Basin. For a complete listing of public meetings and those attending, please refer to Appendix B.

The planning strategy used for the Lower Winooski River Basin followed the format recommended by the Citizen's Guide for Comprehensive River Planning.[1] The department first collected inventory information which was readily available in-house, such as water quality, fisheries, public ownership, river flows, direct and indirect discharge information, etc. Next, public river interest group and town meetings were conducted in order to inventory how the various interest groups and towns use the rivers in the basin. The groups and towns were also asked to identify what they liked and didn't like about the rivers and to discuss any issues they believed interfered with their use of the rivers. Also, they were asked their views of what the river should look like 20 years in the future. Participants were also asked to determine goals and actions needed in order to "create" their river of the future. This information was collected at break-out sessions with group leaders and recorders. Questionnaires with similar questions were also filled out and a few telephone interviews were taken.

The information was then summarized to determine areas of general agreement and those in conflict. A "Focus Group," representing all the river interests then met to develop a set of three (3) alternative futures scenarios based on each of their perspectives. Conflicts and agreements were also identified by the Focus Group. The scenarios, conflicts and agreements were then presented at the Alternative Futures Scenarios Workshop. At this workshop, attended by approximately 100 people, representing all river interest groups, a preferred scenario was selected by the participants. This preferred scenario is the focus of the goals and actions suggested by the public. A discussion of the preferred scenario begins in Chapter Two.

All the information gathered to date for the Lower Winooski River Basin is summarized in this Preliminary Project Report. It includes a physical inventory of certain natural and cultural resources, an inventory of the public's values, issues, goals and actions, a summary of town plans, the results of a riparian landowners survey and the preferred scenario for the Winooski River Basin in the year 2010.

What's Next?

This plan is the first step in a two-phase process for completing the final comprehensive river plan for the Lower Winooski River Basin to be filed with the Federal government. Public comment on the plan was solicited at a public hearing on August 6, 1991, as well as through correspondence following the hearing. These public comments and the Department's responses

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[1] See Bibliography

have been appended to this plan (Appendix G). A Citizens Advisory Committee (See Appendix F) for the Agency's Comprehensive Rivers Planning Program will then formally adopt the preliminary plan which will be filed with the FERC. This will be the end of the first phase.

The second phase of the process involves the preparation of the final comprehensive river plan. Green Mt. Power Corp. will be completing its detailed studies and submitting results to the Agency for review and comment in the coming months. The Agency will make these studies available to the public for their review and comment as well. Given the benefit of the relicensing studies and subsequent research results by Agency staff, issues raised or emphasized with appropriate actions and recommendations in the final plan. The second phase will involve a public meeting, period for written comments, and a public hearing after which the final comprehensive river plan will be adopted by the Citizens Advisory Committee and then filed with the federal government.

CHAPTER I

HISTORY OF THE WINOOSKI RIVER BASIN

For approximately 20 miles, the Winooski River travels through the Champlain Lowlands, one of six physographic regions which make up Vermont. This region is characterized by silt and clay soils and flat topography. Vermont's residents over the centuries, have transformed the Champlain Lowlands into fertile farm lands, after clear-cutting the pine forests that once grew there.

From approximately Richmond to Montpelier, the river winds through the Green Mountains physiographic region. This region is characterized by the Green Mountains, which run north and south through the state and contain two of the state's highest mountains: Mount Mansfield and Camel's Hump. The Green Mountains are part of the Appalachian Mountain chain, which extend from Alabama to the Gaspe´ Peninsula in Canada. The mountains were formed of the schist form of metamorphic rock and contain igneous mineral deposits in certain sections.

There are three vegetation regions in the Winooski River Basin. The lower portion of the Winooski Basin, from Lake Champlain to approximately Essex or Williston is within the Northern Hardwood-Oak-Hickory Forest vegetation region. The remainder of the basin, with the exception of the higher elevations, lies within the Northern Hardwood Forest vegetation region. The higher elevations contain Boreal Forests (Spruce and Fir) and Alpine Communities (tundra and other arctic plants).

Paleo-Indians are believed to be the first Vermonters. They were hunters and food-gatherers and lived in the Champlain Lowlands between 12,000 and 9,500 years ago. Archaic Indians lived here during the Archaic period, 9,500-3,000 years ago.

The "Winooskie-Took", or "Onion Land River", as the Abenakis called it, was a common highway in Colonial days between Lake Champlain and the Connecticut River in the 1600's. A course between the French settlements on the St. Lawrence and the English settlements in New England ran by way of the Richelieu River, Lake Champlain, the Winooski River (then called the 'French' and afterwards the 'Onion River'), across to the White River and downstream to the Connecticut," and the Connecticut River towns of western Massachusetts.

In 1783, Ira Allen built a dam at "upper falls of the Winooski." He then erected saw mills, a grist mill, two forges and a furnace.

After the Revolutionary War, a great quantity of pine and oak was cut along the shore and banks of the Winooski and floated in rafts down the river to Burlington. Many rafts were built just below Winooski Falls. At the time, Burlington was the third largest lumber market in the United States.

At Hubbel's Falls, between Williston and Essex, known as "the Little Falls of the Winooski," Abraham Stevens erected a dam in 1804. A stone grist mill was built by John Johnson here in 1819. A flood destroyed the dam, and Allen rebuilt it. When it was finished, he shook his fist at the river and said, "There! Old Onion, I defy you to move that dam for forty years." In spite of Allen's admonition, the northern end of his dam was swept away during a freshet in 1830. The southern end of the dam still remains at the site. Various industries operated here, including large saw mills, paper mills, and spool and bobbin factories. The first woolen mills in Burlington were built in 1837. One was the "Burlington Wollen Co." The Colchester woolen mills were built in 1880 and the "Winooski Worsted Mill" in 1896. One of the early companies housed near the energy-producing waterfalls was the "Burlington Flouring Co.", which housed generators for two electric railroads in its basement. They were the "Burlington Traction Co." and the "Military Post Street Railway Co." There were many other industries over the years which were built near the waterfalls in Burlington and Winooski, including numerous tanneries, distilleries, glass, nail and pottery companies, a cotton mill and brickyard.

A Winooski canal was considered "which would extend from Lake Champlain east to the Connecticut River and open the West to the Boston market." Plans were drawn for the "Onion River Navigation and Tow Path Co." The 100 mile waterway would have followed the river for one-half its distance. In the 1840s, the idea was abandoned when the railroads came to the Valley.

Before the dams were built on the Winooski, salmon and pike migrated up river to spawn. As Ralph Nading Hill states in his book, "The Winooski: Heartway of Vermont,"[1] "Salmon could not withstand the dams." According to Hill, yellow perch, green pickerel, brown trout, black bass, northern pike sheepshead, wall-eyed pike, catfish, mullet chubs, smelt and sturgeon were all found in the Winooski at one time. Hill says "Old men recalled grappling for sturgeon in the Intervale below Winooski Mills." Sometimes, specimens weighed 150 pounds and were nearly 6 feet long.

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[1] See Bibliography

CHAPTER 2

PUBLIC VALUES, USES and ISSUES

A major part of the inventory process was finding out what the public viewed as the values and issues of the Lower Winooski River and its tributaries. Also, they were asked what goals and actions would be necessary to maintain the values and uses and resolve the issues. In the process, user conflicts were identified and goals and actions were also formulated to deal with these conflicts. The planning vision is to balance all river uses through this goal-setting process such that one use does not dominate or eliminate other uses.

The following table entitled "Summary of Values, Uses and Issues From All Interest Groups" was compiled from meetings with user interest groups. Similar statements have been combined to avoid repetition. It should be made clear that this table contains a listing based on comments and observations by the public. It is not necessarily based on specific facts or studies and should not be cited as such. For a complete listing of values, uses and issues, the reader is directed to contact the Vermont Water Quality Division. Goals and actions are presented in Chapter 5.

TABLE 1
SUMMARY OF VALUES, USES AND ISSUES
FROM ALL INTEREST GROUPS

Synthesized from "Complete Listing of Values and Uses"
and "Complete Listing of Issues..."

SUMMARY OF VALUES AND USES	SUMMARY OF ISSUES
1. NATURAL and SCENIC RESOURCES	**1. NATURAL and SCENIC RESOURCES**
Land Use and Scenic Resources	Land Use and Scenic Resources
• The Winooski River corridor is an important greenbelt that offers attractive and undeveloped forest and agricultural landscapes, scenic beauty, and a natural character. These open-space landscapes of the Winooski River corridor serve as the foundation of its recreation, farming, and other river-related uses. Some tributaries, for example, the Huntington River, possess similar greenbelt-open space characteristics, however, on a lesser scale. The Winooski river is a connective thread, a unifier between communities. • Floodplains limit development and keep land in farming. Also, the floodplain is used for recreation. • Lands held in private ownership are often well-cared for, as property rights engender a land ethic or stewardship perspective. Furthermore, Winooski River and tributary corridor lands generate income, for example, agricultural lands can receive preferential taxation to remain in open space. • Citizens in the area realize the open space and recreational values of the Winooski River corridor. The Winooski Valley Park District is an important institution for providing conservation and recreation opportunities along the River.	• Development on the Winooski River and tributary corridors impacts on open space, scenic beauty, floodplains, and agricultural land features. Also, concerns were voiced about undesirable land uses like landfills and random trash and littering in and along the River. • There is a lack of effective planning and zoning, including: lack of a state policy on floodplains; lack of effective floodplain zoning and protection; lack of consistent definitions of wetlands and floodplain and inconsistent zoning and goals between communities (resulting in, for example, lack of continuous buffer strips). Also, a lack of public and/or recreational land available. • There are important land use policy questions. For example, should there be development on flood-plains?; How much agricultural land use and what type should there be?; Is zoning a sufficiently (permanent) means to preserve environmentally sensitive areas?; and should landowners be compensated for land use restrictions? If so, in what cases?

SUMMARY OF VALUES AND USES	SUMMARY OF ISSUES
Land Use and Scenic Resources (cont'd.)	Land Use and Scenic Resources (cont'd.)
	• Winooski River and tributary landowners have more at stake, including their property rights, than the general public. Some landowners feel threatened by potential restrictions stemming from the Winooski River Planning effort. They believe that property rights may be taken without compensation. Other landowners feel they should be notified and be participatory parties in this or other planning initiatives. • Increased land fill fees is causing illegal trash dumping on riparian lands. • Lack of vegetated buffer strips. • Lack of money to encourage good land use practices. • Only one working farm left in Burlington and one in Essex Jct. They should not be developed.
Mineral Resources	Mineral Resources
• Prime farmland (prime agricultural) soils are abundant on the Winooski River floodplain and other tributary floodplains.	• Gravel removal is not allowed to the extent desired by many and permitting procedures and restrictions are viewed as too cumbersome. Farmers and other landowners view gravel as a valuable commodity that should be excavated for a variety of reasons, foremost, for the prevention of streambank erosion and loss of land. However, anglers are opposed to gravel removal. Should the gravel laws and regulations be changed? • Streambank erosion is caused by fluctuating flows from dams and other sources. Who should protect riverbanks, and how?

SUMMARY OF VALUES AND USES	SUMMARY OF ISSUES
Water Quality	Water Quality
• Water quality along the upper 20 miles of the Lower Winooski River, from Bolton Falls to IBM is good. • Water quality in the lower twenty miles of the mainstem, from IBM to Lake Champlain has improved, due to the construction of sewage treatment facilities and water quality regulations and programs. • Water quality in the Huntington River and selected tributaries, especially upstream tributaries, is excellent. • Water quality monitoring programs and citizen interest, like that displayed by the Mount Mansfield Riverwatch Association, are effective and working.	• The Lower Winooski River and selected tributaries have poor water quality, particularly in the lower twenty miles of the mainstem and tributaries. Specifically, citizens and groups questioned whether the level of treatment at municipal and industrial treatment plants (point sources) was sufficient (including treatment for toxics, phosphorus, and given effects of cumulative discharges). Pollution noticed below the sewage treatment plants. • Regarding nonpoint pollution the full range of potential sources were cited as problems, with emphasis on agricultural runoff; fluctuating water flows caused by dams; lack of buffer strips and consequent siltation and turbidity; landfill leachate and snow dumping. • Several water quality planning issues were cited, including the need to set reasonable goals and guidelines for water quality improvement. Issues included: Should the Winooski River continue to receive (most) of the effluent from the region?; What should the wasteload allocation be between communities?; Should portions of the Winooski River be reclassified to "B" zones and/or made swimmable? And, should more improved monitoring and enforcement of water quality regulations be implemented? • Respondents also wanted to recognize that water quality is a basin-wide issue, not just restricted to the Lower Winooski portion.

SUMMARY OF VALUES AND USES	SUMMARY OF ISSUES
Water Quality (cont'd.)	Water Quality (cont'd.)
	• The question was asked as to what could municipalities do to safeguard and/or improve water quality. • Specific areas of poor water quality cited include Winooski Falls and from Mill Brook to IBM. (septic system problems?) • Burlington North treatment facility precipitates algal growth during low water. • There is a problem at the Essex wastewater treatment facility (WWTF). • Cows erode streambanks. • "Suds" from storm drain below the Salmon Hole. • Lack of enforcement of water quality regulations.
Fish and Wildlife	Fish and Wildlife
• The Lower Winooski River Corridor has rich wildlife and birdlife habitat, and has unique areas, including wetlands, "wilderness-like" settings and a variety of natural communities (e.g. floodplain forests) and rare plant and animal species. • Fisheries and wildlife management initiatives in the Lower Winooski River Basin are desirable. These include the trap and truck operation proposed at Chase Mill Hydro, fish stocking programs, and cooperative initiatives between Green Mtn. Power and the Natural Heritage Program. • Biological integrity. • Presence of Great Blue Herons, snow geese, wood ducks, fox, deer.	• Lack of fish, poor fishing and a lack of natural reproduction were concerns. The loss of wildlife habitat, including wetlands, was also cited. • Relative to the low quality of the fisheries, the impact of dams, including their lack of fish passage facilities, adverse effects on water levels and fish habitats were cited as primary issues. • The Winooski River fishery cannot be managed until there are greater flows from all the dams. • Concern was expressed regarding what the proposed hydroelectric development would do to the fish habitat at Winooski Falls.

SUMMARY OF VALUES AND USES	SUMMARY OF ISSUES
Fish and Wildlife (cont'd.)	Fish and Wildlife (cont'd.)
• Osprey posts at Heineberg Bridge. • Tremendous physical habitat for trout (deep pools, long sweeping rapids, riffles and spawning tribs.) • Excellent potential for a variety of fish species. • Good spawning habitat for warm water fish from Lake Champlain to the Salmon Hole. • Amazing sucker run in Muddy Brook in the spring. • Steelhead and landlocked salmon are stocked downstream. (below Winooski Falls) • Brown trout and rainbows are stocked from Bolton Falls to Richmond.	• Fishermen are opposed to gravel removal because it destroys fish habitat.

SUMMARY OF VALUES AND USES	SUMMARY OF ISSUES
2. CULTURAL RESOURCES	2. CULTURAL RESOURCES
Historic and Archaeological Resources	Historic and Archaeological Resources
• Historic values, including early settlement patterns, bridges and buildings (notably the Winooski Woolen Mills) are appreciated and worthy to preserve for future generations. • Archaeological sites are abundant within the Lower Winooski River Basin and especially along the Intervale area. These sites are essentially the only record of Indian inhabitance in this area and hold the key to Vermont's rich cultural heritage.	• Archaeological sites are increasingly threatened by land and utilities development and operation (i.e. hydro dam operations). Their identification, evaluation, and interpretation is essential if Vermont residents wish to gain an appreciation of their cultural heritage.

SUMMARY OF VALUES AND USES	SUMMARY OF ISSUES
2. CULTURAL RESOURCES (cont'd.)	**2. CULTURAL RESOURCES** (cont'd.)
Commercial Resources	Commercial Resources
• The Lower Winooski River provides a low-cost energy resource with three hydroelectric facilities. • The River provides water for industrial/ski area/agricultural uses. • The wastewater assimilative capacity of the mainstem and Joiner Brook is important and valuable as is the ability of basin lands to receive sludge. • Valuable for multiple uses of the River. • "Business uses" of the Winooski River and tributaries, such as land development, wastewater disposal and snowmaking are important to the county and state economy. • Peak generation allows kayakers and canoeists to enjoy whitewater during the summer in the Lower Winooski. Thus, the Winooski is the only river except for the CT river in northern VT which is capable of having paddleable whitewater during low-flow periods such as the summer.	• Dams cause adverse effects on the Winooski River environment, including low and alternating flows with consequent environmental impacts. • The question was asked as to whether, if proposed, a hydroelectric project should be built on the Huntington River. • Potential expansion of water withdrawal and sewage treatment at Bolton Valley have a land use component. • Logging along Gleason Brook diminishes aesthetics.

SUMMARY OF VALUES AND USES	SUMMARY OF ISSUES
3. RECREATIONAL RESOURCES	**3. RECREATIONAL RESOURCES**
Opportunities and Uses	Opportunities and Uses
• Lands and waters of the Lower Winooski River corridor and selected tributaries have diverse opportunity characteristics including canoeing, power boating, fishing, swimming, scenic appreciation, nature study, environmental interpretation, cross-country skiing, ice skating, hunting, trapping and a variety of other recreational pursuits. • Included as part of the Lower Winooski's opportunity characteristics are its proximity to Vermont's major population center, the availability of public lands and access areas along the mainstem and tributaries and the continuous nature of the river as public resource. • Provides solitude - some very quiet and private places where not much is going on. • The Winooski Valley Park District provides nature preserves, two miles of hiking trails and access areas.	• General and selected areas, both land and water, within the Winooski River and tributary corridors, need protection to insure and maintain their recreational integrity. • Enhanced "usability" of the Winooski River and tributaries could serve some demands of the increasing population in the region (Note: "usability was a term made with reference to water quality, however, it can be applied to other recreational characteristics.) • Poor water quality inhibits recreational opportunities and enjoyment of the river, specifically for swimming and fishing, but probably other pursuits as well. However, one individual mentioned that improved water quality might lead to more use of the river and subsequent access across their property. • Lack of public facilities and recreational land were cited - these have obvious impacts on opportunities and use. • The lack of a Winooski Valley Park District-type institution in upstream communities (e.g. Bolton, Duxbury) was cited as a problem. • River programs need staffing, including park maintenance.

SUMMARY OF VALUES AND USES	SUMMARY OF ISSUES
Opportunities and Uses (cont'd.)	Opportunities and Uses (cont'd.)
	• Recreational use can interfere with private property rights. Landowners noted trespassing, trashing, vandalism and liability concerns. Other use problems cited, not exclusive to private lands, included loud music; trash in and along the river; off-road vehicle impacts; the need for park maintenance; and noise and visual intrusion/pollution from Interstate 89 and parts of roadways adjacent to the river. • Dangerous cliffs at Winooski Gorge and the Whitcomb farm should preclude recreational use.
Canoeing and Boating	Canoeing and Boating
• Canoeing, kayaking and associated fishing and swimming opportunities are good to excellent along the Lower Winooski and Huntington Rivers. • For flatwater and quickwater boating and associated recreation, most of the Lower Winooski is canoeable throughout the summer season...the only river in Northern Vermont that has enough summer flow to provide this opportunity. • Areas of specific attractions include: - Bolton Falls to Jonesville Bridge - Richmond to Essex Junction - Ethan Allen Park to Lake Champlain	• Dams and their adverse effects on recreation, including boating and fishing pursuits, were cited as issues. There may be a potential conflict in that whitewater boaters like peaking operations (and notified water releases) from dams, while fishermen want stabilized flows at all times. The Chace Mill project threatens whitewater boating above the Route 7 bridge. • Sedimentation of the Winooski River channel near its mouth and consequent navigational problems and damage to boats was cited. The need for dredging was noted, in addition to cleaning of trees and other obstructions to improve navigation and reclaim shore use (beach) areas. • Speeding boats at the mouth of the Winooski River create safety problems, cause bank erosion and disturb the wildlife.

SUMMARY OF VALUES AND USES	SUMMARY OF ISSUES
Canoeing and Boating (cont'd.)	Canoeing and Boating (cont'd.)
For whitewater boating specific preferred areas include: - Bolton Falls to 1/2 mile below railroad trestle bridge in Duxbury - Winooski Falls, above the Rte. 7 bridge - Below the Essex 19 Green Mt. Power Corp. dam, especially when generating - Around the Salmon Hole - Huntington River from the Audubon Society turnoff to Huntington Gorge. This is the best whitewater in the Lower Winooski basin - Class II and above. • GMP has provided flow releases when requested by kayakers on an ad hoc basis. • Accessibility of the lake by river, especially by sailboat, is a value.	• Boating access below Essex #19 on the Williston side of the River is very difficult because of the steep, rocky banks.

SUMMARY OF VALUES AND USES	SUMMARY OF ISSUES
Fishing	Fishing
• Fishing opportunity for cold water species from IBM to Bolton Falls. • Fishing opportunity for warm water species from the lake to the Salmon Hole. • Fishing opportunities all along the Huntington River. • Native brook trout in Honey Hollow (Preston) Brook. • Ridley Brook is used for fishing, swimming and scenic value. • Proximity of the Winooski River to home and large population. • Public access and access across selected private lands is good. • Two dozen people fish the Lower Winooski River daily. • Tremendous potential for any fish.	• Lack of fish • Poor fishing due to flow regulation. • Some access sites are too crowded. • Only the Lower Winooski River Basin was looked at. Should have looked at the whole river. • The water temperature (warm) from Little River is a problem. • Need spawning habitat of the tribs. • There are no fishery management plans for the Winooski River Basin. • Good fishing many years ago, but it was stopped due to pollution. Still not clean enough for good fishing and swimming.

SUMMARY OF VALUES AND USES	SUMMARY OF ISSUES
Swimming	**Swimming**
• Swimming at mouth of the Winooski River was once a delight. • Huntington Gorge experiences heavy swimming and sunbathing uses. • Swimming takes place on the Huntington River, Mill Brook, Gleason Brook, Little River and Joiner Brook....excellent swimming at the "pot-holes" on Joiner Brook. • Teens swim in the Winooski River in Bolton-they "jump screaming off the ledges."	• Can't swim in the Winooski River any more due to pollution (turbidity, leaking septic systems.) • Nonswimmable Class C waters (Winooski River).
Access	**Access**
• Access to the Lower Winooski River is good. There are a variety of larger public lands and more discrete access points that are available for recreational pursuits. Public lands are held by the Winooski Valley Park District, the State of Vermont, municipalities and conservation organizations. Additionally some private landowners permit use of their lands. • Some specific access areas include: - land along the Huntington River, owned by the Audubon Society - Salmon Hole Park (being improved) - canoe access at the Millyard Condominiums, managed by the Winooski Valley Park District - pedestrian access at Riverfront Park and Falls Terrace Park in Winooski. • The Winooski River's present water quality tends to discourage public access across private land which some landowners look on with favor. • Good public access from Richmond to IBM.	• Lack of public access and threats to access posed by development. Guaranteed public access is extremely important if the Winooski River is to be a viable recreational resource. Specifically noted was the lack of linear (i.e. trail) access; lack of public land in certain areas and need for handicapped facilities. • Access should be restricted, because too much can degrade use values. For example, a marina on the River could create problems. • Are additional access areas needed? If so, what, where, and who is responsible for their funding, development and maintenance? • Abuse of private land and landowner rights by trespassing, trashing and littering. • Lack of scenic overlooks along River. • Little public land between Richmond and Bolton Dam fronting on the Winooski.

SUMMARY OF VALUES AND USES	SUMMARY OF ISSUES
Access (cont'd.)	Access (cont'd.)
• Access is adequate from Bolton Dam to Jonesville. • GMP lands provide access/recreational uses. • Reasonably good access on the Huntington River. • Public access to the Winooski River below Essex #19 is good.	• On north bank of river from Richmond to Bolton Falls dam, access is limited by I-89 and US2. • No access upstream of the Winooski Bridge at Rte. 7. • Some access sites are too crowded. • Access with parking needed in Essex Jct. below Essex #19. • Too few access areas between Bolton Falls and Jonesville. • Access below Gorge #18 and in the Essex #19 impoundment could be improved with cartop boat launches. • Only a portion of the several miles of Winooski River frontage in Winooski is accessible for public use. • Existing access areas are vandalized and trash dumped at these areas. • Riparian landowners fear possible law suits from permitting the public access to the River. • The state has no "managerial niche" for acquiring general recreation access to the state's rivers. • Some riparian land owners spend too much time responding to the public's request for access across their land.

SUMMARY OF REGIONAL, TOWN AND OTHER PLANNING EFFORTS

Regional and Town Plans

In reviewing the regional and town plans during the inventory stage of the Project, it became clear that there was simply too much information to summarize for the purposes of this report. As an alternative, the material has been provided in a matrix-type summary (page 20A). This should allow the reader to quickly assess the amount of protection or enhancement being provided by the regions and lower basin towns.

The matrix includes only those elements directly associated with rivers and streams, such as water quality, access, buffer strips amd natural features. Excluded are such items as housing, transportation (except bike trails), and schools.

Of interest are the number of town and other plans (9 plans out of 16) which call for the construction of bike trails, many of them along stream buffers. Eight plans promote green belts or buffers. Eleven plans call for stream-side trails and/or stream access areas. Protection or enhancement of natural areas or natural systems is prescribed by eleven plans. Ten plans call for the protection or enhancement of views of the river and streams. Five plans recommended reviewing existing zoning along rivers and streams and natural areas for the purpose of limiting or prohibiting development in these areas.

On the other hand, only two plans mentioned the encouragement of stream or natural area education programs. Only three plans recommended river or stream fishery improvements. Two plans call for cleaning up river banks. Only two plans recommend directing future development to growth centers, requiring developers to contribute recreation or open land monitoring water quality, requiring stream set-backs, forming intermunicipal recreation districts or acquiring parklands.

Riparian Landowner Survey

An additional planning study has been done as a direct result of the Lower Winooski Project. This survey, "Disposition of Riparian Landowners toward a Greenway Along the Winooski River," was performed by Larry Warshaw as his senior thesis in partial fulfillment of a Bachelor of Arts Degree from the University of Vermont, Environmental Program.

The reason this thesis topic was chosen was because the Lower Winooski Project had identified the need for a greenway or buffer along the Winooski River and some of its tributaries. Also identified was the need to protect open-space lands, flood plains and agricultural land and to provide public access.

SUMMARY MATRIX OF TOWN/REGIONAL PLAN RECOMMENDATIONS FOR NATURAL RESOURCES PROTECTION/ENHANCEMENT

	Promote green belt/buffer	Protect/encourage farms	River value education	Provide trails and/or access areas	No development in flood plain	Natural systems protection/enhancement	Encourage biological integrity	Improve the fishery	Clean the river banks	Encourage growth centers	Protect/improve water quality	Protect/enhance views, aesthetics	Protect/enhance historic resources	Require developer's contributions	Develop riverside parks	Water Quality monitoring	Stabilize stream banks (erosion)	Stabilize Winooski River flows	Stream setback requirement	Develop bike trails	Protect open lands	Shoreland zoning	Strong NPS/sludge control	Intermunicipal recreation district	Establish Commission/Land Trust	Upgrade WWTF's	Improve zoning requirements	Acquire parklands
Chittenden Co. Draft Regional Plan. 1990.	●	●		●		●				●	●	●	●							●	●							
Central VT Regional Land Use Plan. 1985.												●	●	●						●		●	●	●				
Bolton Town Plan. 1989.				●											●				●									
Burlington Planning Commission Questionnaire			●	●	●	●						●								●		●				●		
Burlington Municipal Development Plan. 1989.	●			●		●	●							●						●	●		●			●	●	●
Burlington Waterfront Board "The Winooski River Plan" (Draft)	●		●	●	●	●		●	●			●			●	●	●			●		●			●		●	
Burlington Plan. Dept. "The Winooski Riverfront Report" (Draft) Feb., 1990.		●							●			●								●			●			●		
Colchester Master Plan. 1988.				●		●					●	●	●		●		●		●	●		●			●			
Essex Town Municipal Development Plan. 1986.				●										●														
Village of Essex Jct. Master Plan. 1985.	●	●		●	●	●		●				●						●		●	●							
Jericho Comprehensive Plan 1989 (Draft).	●	●			●	●					●	●									●				●			
Richmond Town Plan. 1984.						●	●																					
So. Burlington Comprehensive Plan. 1985.				●		●	●	●			●	●	●			●		●			●			●		●	●	●
Williston Comprehensive Plan. 1990.	●			●	●	●				●		●	●								●		●				●	
Winooski Municipal Development Plan. Draft 1990.	●			●	●																							
Chittenden Greenway Plan. 1990.	●			●		●														●								

FIGURE 1

A first step for realizing public needs, or goals, is to work with the riparian landowners since the goals all require some use of landowner rights. Consequently it was important for the survey to find out riparian landowner attitudes toward these goals, obtaining their ideas as to how planners might achieve them.

Greenways

Warshaw interviewed 18 riparian landowners representing eight farmers, eight residential properties and two businesses. Warshaw found that all landowners support the idea of a vegetated buffer along the river. Most would participate in a formal greenway project. Some landowners would willingly and formally participate with little or no compensation. Others would require more substantial compensation for formal participation. There is general interest in knowing exactly what planners aim to accomplish with the greenway, whether it is solely river protection (bank erosion and pollution) or for public access.

List of concerns related to greenway:

- Who will pay property tax?
- Wary of state. What will a greenway mean?
- Restrictions. Don't want to give up ownership
- Wary of government control
- Loss of landowner rights
- Who would plant buffer and maintain it?
- Liability insurance
- Don't need New Yorkers in Montpelier making decisions
- Should be landowner controlled
- Fear far fringe environmentalists going too far
- People trashing land/dumpspot
- Need to generate income from their land
- BIG DIFFERENCE BETWEEN 50 AND 500 FEET
- Liability cases should not go to courts due to high cost
- HEAVY handed planning by state
- Want landowner involvement all the way
- Privacy
- Want greenway environmentally correct
- Loss of viable acres for farming
- Would it cost landowners?
- Development rights/easements should be market value

A pattern emerging with these concerns has been landowner desire to protect private property rights. Much of the fear of state regulations is related to the fact that landowners feel they lose money every time restrictions are imposed on them. Another pattern is resentment of planners who do not make enough of an attempt to involve the owners in plans for **their** lands. Many landowners feel they "are the last ones invited to the show." They resent being the last ones around to see the new plans for their land slated on planners' maps. Suggestions have been to involve

them more, from the beginning, and to reverse the procedure in planning. A number of landowners feel that certain individuals would come up with a new idea, rally the community behind it first, and then bring it to the landowners. "The attitude is - All we have to do now is convince the landowners." This approach, combined with fear of regulations, has the potential of polarizing planners and landowners, and consequently promoting negative landowner attitudes toward present and future greenway projects.

List of ways to make Greenway more appealing:

- Give tax abatements
- Landowners should retain control of land
- Greenway should be town and landowner controlled
- Address liability and insurance issue
- Purchase easements
- Purchase development rights
- Show other greenway examples to landowners
- Explain all details of landowner impacts and benefits from public access
- Help with bank erosion (rip-rapping, planting)
- Pay for greenway
- The public should buy the land
- Education for maintaining buffer should be provided

It should be noted that what would make one landowner more agreeable to a greenway may not work for another. Responses have been extremely diverse with respect to land use, as well as individuals. Every landowner, but one, has given conditions under which they would participate in the greenway.

Public Access

More than half the landowners feel more access is desirable along the river. When asked "Where?," most suggest other land in their community, but a handful have proposed places on their land. The Richmond Land Trust has been promoting a greenway bike path along the Winooski River in Richmond, and there is strong polarization related to that. A few landowners feel that no one would use it, and that it would disrupt the normal operations of their farms.

Nearly all landowners currently allow open access on their land. Most cite isolated incidents where the privilege has been abused, but have no intention of posting their land. All landowners would like to see more people asking them before going on the land.

It is unclear whether access is appropriate for residential landowners with land less than 300 feet along the stream. Most of the residential owners interviewed value privacy, and would not allow access. Some farmers don't want access on their land, as it

would disrupt normal farm operation. Other farmers and larger residential owners would allow public access under varying circumstances. Concerns are different with respect to land use and location along the river.

List of concerns related to public access:

- Loss of privacy
- Litter
- Power boats uncontrolled at mouth of River
- Inadequate parking
- Wildlife: nesting migratory birds disturbed on Derway Island by speeding power boats
- Respect river and landowners
- Bring more bad people
- Lawsuits and liability
- Involvement of landowners in public access decisions
- Changing the value of their land
- Compatibility with development plans
- Don't want people to start thinking its theirs (land)
- Users should give their time to work on public access areas

Most of the ways to make the greenway more acceptable to landowners also apply to public access. Others not included as greenway ideas are:

- Post signs
- Educate public (newspaper, radio, pamphlets)
- Lights at access areas
- Reliable and consistent police patrols at access areas along trails
- Adequate parking space
- Get community involved in construction

Other Concerns/Ideas

List of other concerns and ideas raised during the survey:

- GRAVELING!
- Want to see other projects (HUDSON RIVER)
- Inability to attend past meetings
- State should continue with rip-rapping projects
- Sediments at the mouth of the Winooski River
- Water quality worse by the mouth of the Winooski River
- Water quality improved upstream
- Migratory birds may be disturbed
- Planners don't understand landowner concerns
- Cannot zone people into poverty
- Fund retirement for farmers for development rights
- Want to have farmers input in decisions

Many of the other ideas and concerns discussed have suggested alternative ways of making the greenway happen and identify other bargaining chips in dealing with each landowner. The results of Warshaw's thesis have also been incorporated into the goals and actions table to assist in achieving the public's preferred scenario of balanced uses.

Alternative Futures Scenarios

The decision-making process consists of choosing the best alternative of several presented. This process is being used for the Lower Winooski River Project. The Project was assisted by the "Lower Winooski Basin Alternative Futures Project," (See Appendix E) a planning effort initiated by the Winooski Valley Park District, funded by Green Mountain Power Corporation, and carried out by consultants.

The Alternative Futures Project, using data compiled by the State's Lower Winooski Project, prepared three alternatives and asked the public to decide which "future" they wanted to see in the basin by the year 2010. The three "futures" were: #1 - Full Corridor Development; #2 - Use with Stewardship; and, #3 - Natural Systems. The "future" chosen by the public represented a fourth one .... one which was between the Natural Systems and Use with Stewardship futures. The fourth "future" chosen by the participants has been developed into a vision statement by the consultants. This public "decision" has helped to guide this planning effort by providing a "framework" upon which specific goals and actions may be built.

VISION STATEMENT
LOWER WINOOSKI RIVER BASIN
2010

The Lower Winooski River Basin, located as it is in Chittenden County, Vermont's most prosperous region, has enjoyed steady growth in its economy and its population. With this growth has come a demand for new housing, work space, shops and public facilities. Through far sighted planning and investment in the necessary support systems, the municipalities in the region have succeeded in channeling a large share of the new development to designated growth centers. These are compact areas where a mixture of uses support a wide range of activities, permitting high levels of pedestrian movement and supporting an efficient public transit system.

A major requirement of the compact settlement pattern has been an increase in the capacity of the Basin's sewage treatment plants. The plants discharge to the River, which has a limited capacity to assimilate waste. The public has supported the additional cost of advanced waste treatment to insure that the water quality in the River is not diminished by the increased effluent discharge. Steps

have also been taken, including education and regulation, to reduce the pollution caused by run-off from farms, roads, parking lots and other sources throughout the Basin.

The move to a more compact pattern of land use has relieved the pressure to develop rural areas. However, the public has recognized the need to compensate landowners in return for the conservation of desirable open space, and has therefore supported efforts to raise revenues for land acquisition and to relieve tax burdens on land owners. Key properties are held in trust and managed by the region's conservation district. In general, agricultural lands and wildlife habitat have been protected from development, but the principal focus of conservation efforts has been along the Basin's watercourses. A buffer has been protected along the River and its tributaries and retained in a vegetated state.

The size of the buffer, its function and the degree of public access varies throughout the Basin, depending on the role assigned to the particular watershed segment through the Comprehensive River Planning process. Responsibility for the process has been assumed by the Regional Planning Commission, which has assisted the parties with an interest in the River and its tributaries in a negotiation process aimed at resolving areas of conflict and developing acceptable approaches to river management. Uses and activities are assigned to specific portions of the watershed, resulting in some areas of high accessibility, with well developed recreation facilities and opportunities, and other areas maintained in a less accessible, more natural state. Land conservation targets have been coordinated with the land use and access objectives.

Consensus is well established for the management of a healthy fish habitat throughout the Basin. Impoundments have been prohibited in some segments of the watershed. The license for those impoundments that do exist are conditioned to insure that a minimum stream flow is maintained, sufficient to support a healthy downstream fishery, consistent with the fisheries management strategy for each segment of the Basin. Fish migration is enabled at all impoundments, and is selectively assisted at certain dams, again consistent with fisheries management plans. Buffers, access and fishing rules vary within the watershed, and are designed to provide a variety of fishing experiences.

In summary, the River and its tributaries are clean and healthy. They support a diverse set of uses, including power production, waste assimilation and recreation. However, these uses defer to the primary role of the watercourses, namely, the support of native plants and animals. By showing this respect for its rivers and streams, the region has retained a balance and remained a desirable place to live.

CHAPTER 3

PHYSICAL CHARACTERISTICS AND NATURAL RESOURCES OF THE LOWER WINOOSKI RIVER AND ITS TRIBUTARIES

Land Use and Land Character

The Lower Winooski River Basin, as the subject of this plan, begins at Bolton Dam in the town of Duxbury. The Winooski River flows approximately 40 miles through ten other towns and villages and the City of Burlington before emptying into Lake Champlain. Thirteen named tributaries drain to the Lower Winooski, beginning with Sunderland Brook in Winooski and ending with Ridley Brook in Duxbury. The Lower Winooski Basin drains an area of approximately 225 square miles or about one-fifth its total drainage of 1080 sq.mi. Elevations in the basin vary from 95.5 feet above sea level at Lake Champlain to 4083 feet at the summit of Camel's Hump.

The terrain surrounding the segment of the River from Bolton Dam to Williston is wooded and quite steep, rising abruptly from the narrow valley floor which averages approximately 2500' in width. Small farms, with cultivated fields down to the River's edge, follow the River most of the way. Where farming is not practical, small scattered housing developments have sprung up, tucked between Interstate 89, US Route 2, the railroad, and steep, undevelopable sections and the flood plain. With the exception of the Village of Richmond and Bolton Dam, and an occasional intrusion of a highway bridge or railroad trestle, this segment of the river has a rural, almost wild quality to it. The character of the River here could be characterized as rural meander.

From Bolton Falls to one-half mile below the railroad trestle in Duxbury, the boating flows are Class I, "flat riffle," then are flat water to the dam at Essex. From Ridley Brook to Jonesville Bridge, the River's depth ranges between six inches and four feet (July). The River runs 25 to 40 feet wide and slowly meanders over a rock bed, passing many gravel bars and islands through this segment. Land use is primarily farming and hardwood forest. The railroad, US Route 2, Interstate 89 and the River Road follow the river rather closely, but for the most part, are hidden from view due to steep hills. There are no developed access areas, but there are several informal pull-offs along the River Road, presumably used by anglers and perhaps, some bathers.

The segment of the Winooski River from the Jonesville Bridge to the Richmond Bridge varies from six inches to five feet deep and is from 75 to 125 feet in width. The River bed is rocky and the current moves slowly. The land use along the River is agricultural and forest land in a rolling landscape.

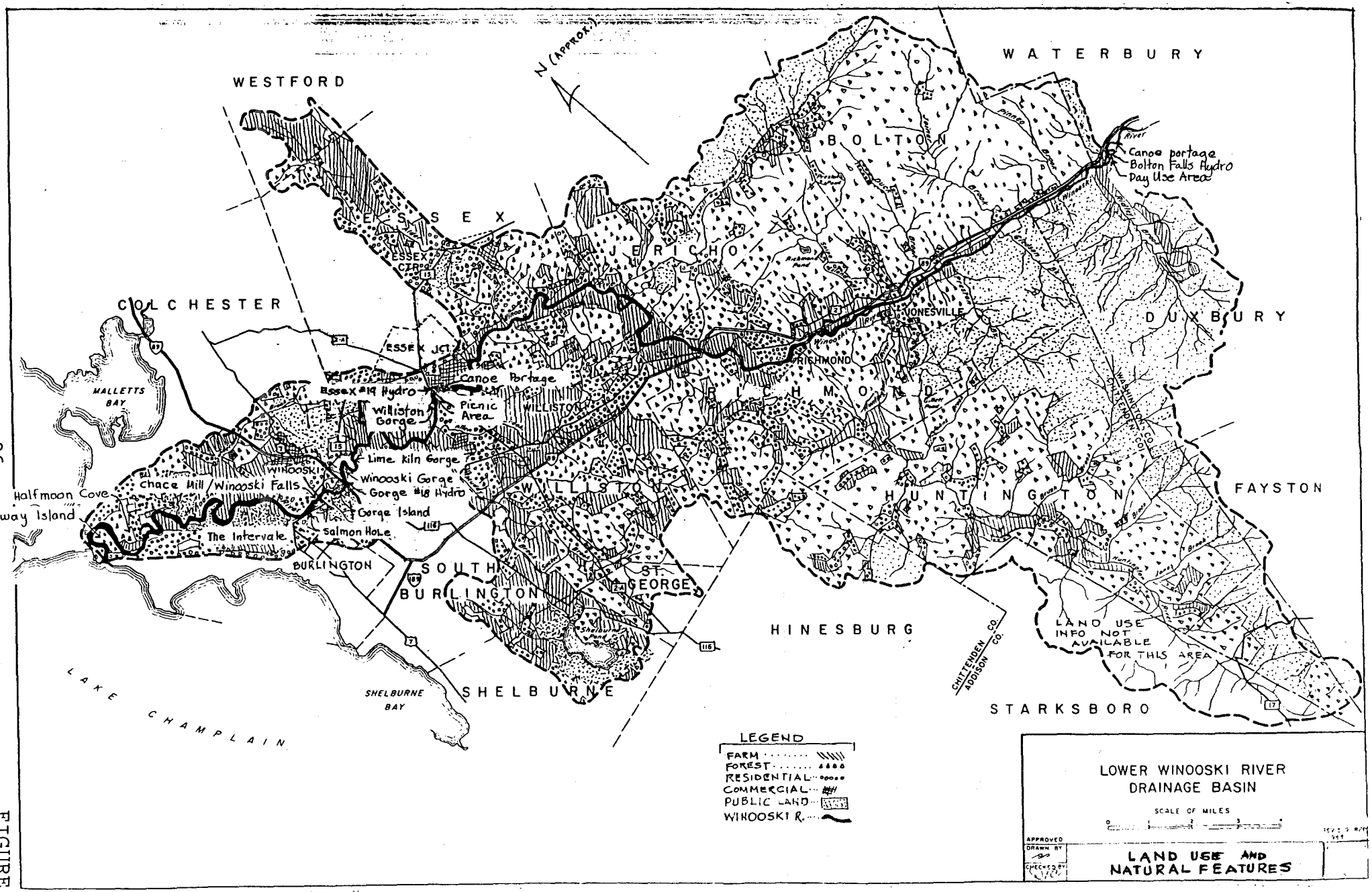
WESTFORD
N (APPROX.)
WATERBURY
BOLTON
Canoe portage
Bolton Falls Hydro
Day Use Area
ESSEX
ESSEX CTR.
JERICHO
COLCHESTER
VONESVILLE
DUXBURY
ESSEX JCT.
RICHMOND
Canoe Portage
Essex #19 Hydro
Williston Gorge
Picnic Area
WILLISTON
MALLETTS BAY
Lime Kiln Gorge
WINOOSKI
Chace Mill/Winooski Falls
Winooski Gorge
Gorge #18 Hydro
Halfmoon Cove
Gorge Island
Salmon Hole
The Intervale
BURLINGTON
SOUTH BURLINGTON
ST. GEORGE
HUNTINGTON
FAYSTON
HINESBURG
LAND USE INFO NOT AVAILABLE FOR THIS AREA
CHITTENDEN CO.
ADDISON CO.
LAKE CHAMPLAIN
SHELBURNE BAY
SHELBURNE
STARKSBORO
LEGEND
FARM
FOREST
RESIDENTIAL
COMMERCIAL
PUBLIC LAND
WINOOSKI R.
LOWER WINOOSKI RIVER
DRAINAGE BASIN
SCALE OF MILES
APPROVED
DRAWN BY
CHECKED BY
LAND USE AND
NATURAL FEATURES

FIGURE 2

The River slowly meanders from Richmond to North Williston in a rocky river bed which varies from six inches to five feet in depth and from 100 feet to 150 feet in width. Land use is mostly dairy farming, with sparse growth of hard woods. The terrain is relatively level along this segment.

From North Williston to the Essex #19 dam, the River deepens to three to five feet and widens from 125 to 175 feet. At the pool above the dam, the River is approximately 250 feet wide. The hydro pool above the dam is in a flood plain and flood plain is as wide as 4,000 feet in some areas. As a consequence of the flood plain, there is no development and most of the land along the river is primarily cultivated with hay, pasture and corn. Chronically flooded areas are generally in idle meadows or are forested. The area around the dam is developed as part of the Essex Junction urban area. International Business Machines, Chittenden County's largest employer, is located upstream of the dam.

Just below the dam is Williston (Essex) Gorge, which lies between the towns of Williston and Essex Junction. North of the gorge is the urban development of Essex Junction. Southerly, factories and housing developments make up the village of Williston. Utility lines are seen originating from three sub-stations located in the vicinity. Route 2A crosses the Winooski River just below this dam.

WILLISTON GORGE

Williston Gorge is approximately 150 to 200 yards long and the rock walls are from 15 to 35 feet high. Steep, partially forested banks rise above the gorge. The River is approximately 175 to 200 feet wide in this location and contains several rock islands 150 to 200 feet long. No vegetation grows on the islands due to high scouring spring flows. In his waterfalls and gorges report, Jerry Jenkins notes "The length of this rocky stretch of river and its jaggedness are the primary aesthetic appeals. When the Winooski River is running at flood, the whitewater in the gorge is spectacular and frightening." Other than the temporal aesthetic value, "nice rocks" and the existence of "two rare plants," the gorge is unremarkable. It has local significance for picnics and parties. Higher significance is not warranted due to its impact by the hydro facility, "mildly polluted water," its industrial setting and the fact it is not used for swimming.

Below Essex #19, Class I-II rapids develop when water is released for power generation (See the Recreation Resources section for further discussion about this area). Three quarters of a mile below the dam there is an island which is accessible by boat. Muddy Brook enters the river from the south a short distance below the island. Just below Muddy Brook is a set of rapids about one quarter of a mile long. The River meanders

through relatively undeveloped farm land and flood plain for approximately four miles, then enters Lime Kiln Gorge before flowing under Lime Kiln Bridge, the first bridge in approximately five miles.

LIME KILN GORGE

Jenkins' waterfalls and gorges report describes Lime Kiln Gorge as 60 to 80 feet wide, about 250 yards long and from 15 to 70 feet high with nearly vertical walls. Access to the top of the Gorge is from the railroad tracks. Access to the gorge proper is via some lightly-used trails to the south. Jenkins and Zika report that "The gorge is formed of a pale limestone or dolomite of Ordovician Age. It forms steep, irregularly fractured walls with little smoothing or sculpture....there are some rippled rocks at the upstream end of the gorge and there are several caves on the north shore. No potholes were found."

Rare plants formerly found at the Gorge in the late 1800's and early 1900's are no longer present, due primarily to over-collecting by botanists. The remaining plants are commonly found at limestone gorge sites. The Lime Kiln Gorge is one of Vermont's deepest; but its state-wide importance has been reduced due to its "industrial setting, impacted by a hydroelectric project, average rocks, formerly with an exemplary vascular flora, now average biology, no privacy or wildness, some trash, polluted water, not a popular recreational site."

WINOOSKI GORGE

Winooski Gorge is located approximately one-half mile downstream from Lime Kiln Gorge. The riverbanks between the two gorges are forested with cedars, oaks and maples. Physical access to Winooski Gorge is quite limited, due to its steep walls. However, an access road to the Winooski Gorge dam enters from the Winooski side of the river. Also, an access road enters from the So. Burlington side, under the I89 bridge. Visual access is available from the railroad trestles which cross the River just east of Interstate 89, and also the Gorge is readily visible from I89.

The Winooski Gorge was formerly one of Vermont's most notable natural features. It is now dammed for hydroelectric power, rendered inaccessible and has nearby highways, railroads, bridges, quarries, landfills and an airport. However, a sense of privacy can be found upon some of the wooded ledges of the area. Starting 1000 feet below Lime Kiln Gorge, rock walls increase in height to 50 feet. Two dams with an island in between them span 500 feet to back up the River in the Gorge. Below the dams, the wooded cliffs rise to a height of about 60 to 80 feet. It is one of the ten largest in the state. The waterfalls and gorges report states that the site has one of the most exemplary limestone floras in Vermont. The rarest species have been

extirpated; however, six species with fewer than ten current Vermont stations are found at the gorge. Inaccessibility and surrounding developments limit the level of use of the area. In spite of the Gorge's industrial setting, its impact by the hydroelectric facility and lack of physical access, the gorge remains one of Vermont's most impressive as a visual resource, particularly as viewed from the cliffs overlooking the gorge. Jenkins and Zika believe the gorge is "important botanically from a historical and contemporary viewpoint."

Below the Gorge #18 dam, the River turns southwest under the railroad and I-89 bridges. It then encounters the 32-acre Gorge Island, flood plain forest and a brackish backwater cove before widening and crashing over a set of rapids and cascades by the Champlain Mill in the City of Winooski. The River at this location is highly urbanized with concrete walls dropping vertically down to the river's edge, old factories, apartment buildings and commercial buildings within sight of the river. The River passes under the U.S. Route 2 and 7 bridge between Burlington and Winooski before dropping over the old American Woolen Co. dam at Winooski Falls.

WINOOSKI FALLS & THE SALMON HOLE

A wooden-crib dam was constructed in the early 1800's at what was probably a natural falls. Presently, the site has been licensed for hydro redevelopment (Chace Mill). The site is a limestone gorge with 30-40 foot walls where the River drops 20 feet over the old dam. Below the falls is a large deep pool (known as the Salmon Hole) and stone islands. A substantial sport fishery exists in the deep pool below the falls and the endangered lake sturgeon (Acipenser fulvescens) was sighted here in 1986. According to the waterfalls and gorges report, the falls are noteworthy for harboring Vermont's only surviving colony of Anemone multifida, which is a rare plant species in New England. The Gorge, cascades, rock ledges and falls are a highly valued visual and recreational resource to the City of Winooski, and have been the focus of a successful redevelopment project, containing shops, restaurants, a park and pedestrian access to the river.

The River downstream of Salmon Hole quickly leaves the urban setting and meanders through flat land with farms and wetlands in the 700-acre Intervale. The setting in much of this lower segment is quite rural and remote in spite of the fact it is so close to downtown Burlington. The River is from three to five feet deep and averages approximately 150 feet in width to the route 127 bridge.

Approximately 3 1/2 miles downstream of the Central Vermont Railway bridge, there is a grassy slope and a sandy beach on the left bank. Both are suitable as canoe stops. Beyond them,

marshes begin to appear along the edges of the river. An island occurs in this stretch, just upstream of the Route 127 bridge. The island is suitable as a canoe stop. Vegetation along the River changes from evergreen to deciduous forest, and the forest floor is covered with wild flowers. A small stream enters the River in this area. There is potential to develop an access area on the right side above the Route 127 bridge.

From the Route 127 bridge to the lake, the river is approximately 225 feet wide, and slowly meanders through forests and wetlands. Historically, the river has been five feet deep in this stretch. However, boaters report that the mouth has silted in, making it difficult for motorboats to get to and from the lake.

HALFMOON COVE & DERWAY ISLAND

Halfmoon Cove begins just downstream of the Route 127 bridge. Halfmoon Cove, together with Derway Island, located near the mouth of the river, are the subject of Vermont's "Flagship" purchase by a joint venture of representatives from the Vermont Fish and Wildlife Department, the Vermont Nature Conservancy, Ducks Unlimited and the U.S. Fish and Wildlife Service. The Halfmoon Cove / Derway Island purchase area falls within the Lower Great Lakes / St. Lawrence Basin, one of the six priority wildlife habitat ranges identified in the North America Waterfowl Management Plan. The plan, an agreement signed by the United States, Canada and Mexico, has as its goal the protection of wetland habitats across North America.

The 410-acre parcel of wetlands borders approximately three miles of the Lower Winooski River in Burlington and Colchester. These "high priority" wetlands are a valuable breeding and staging point for waterfowl and provide an important habitat for furbearers and many species of Lake Champlain sportfishes, including northern pike, walleye, chain pickerel, yellow perch and brown bullhead. The wetlands are extremely important spawning areas, because there are very few lakeshore wetlands between Burlington and Grand Isle in the northern part of Lake Champlain. The area is noted as a productive habitat for black ducks, mallards, wood ducks, blue-winged teal and hooded mergansers. Wading birds, and many song birds use the various habitats. Osprey and other birds of prey frequent the area. Beaver, muskrat, raccoon, fox otter, mink, deer and a large population of small mammals use the Halfmoon Cove / Derway Island / Delta Park / Northshore natural area complex. The City of Burlington quantified the wildlife on Derway Island. Out of a possible total of 105, the General Wildlife Habitat was ranked at 94, thus confirming that the area is an extremely productive habitat.

Flood Plains

Town of Bolton - Bolton has incurred extensive damage from major floods in the past. Studies show that even larger floods can occur in the future. Property has been damaged by eleven floods beginning in 1785. The most severe flood occurred in November 1927, when a peak flow of 97,500 cfs was estimated at Bolton Dam. Immediately downstream of the dam, a high water mark of 371.0 feet above mean sea level was recorded. Flood waters broke through the railroad embankment, covering the village with over 30 feet of water and killing 26 people. Since the construction of the East Barre, Wrightsville and Waterbury reservoirs in the mid to late 30's, more recent flood elevations have been reduced.

The Corps of Engineers has determined that a major flood ("Standard Project Flood") could occur in the future. This flood would inundate portions of US Route 2, I89, the railroad, and several buildings. A 100-year or "Intermediate Regional Flood," would inundate portions of US Route 2, the railroad and several buildings. This flood would not inundate the Interstate, causing it (Interstate 89) to act as a berm, possibly protecting buildings to the north of it.

While the existing flood control reservoirs can reduce flood velocities and flood stages (2.5 feet lower for a 1927-type flood), they do not prevent floods. Additional measures should be taken to prevent future property damage and loss of life. These include flood-proofing, relocations and flood plain zoning.

The Town of Bolton has developed a flood hazard area zoning bylaw. Development in the flood plain requires a conditional use permit under that ordinance.

Towns of Jericho and Richmond - Eight sizeable floods beginning in 1830 caused extensive damage to the towns of Jericho and Richmond. The 1927 flood was the greatest flood since 1830, causing the water to rise 20 feet in the middle of Jonesville and 6 feet in Richmond Village.

Most of the flood plain is in agricultural use; however, parts of the Village of Richmond, including the elementary school and the waste water treatment (WWTF), lie within the flood plain. Approximately 40 mobile homes are located in the flood plain, about two miles downstream from Richmond.

The 1927 flood crested at 310.9 feet above sea level just downstream of the Richmond bridge. This compares to a 10-year flood of 302.7 feet, an Intermediate Regional Flood (100-year flood) of 308.4 feet and a Standard Project Flood (major flood

occurring from a severe combination of meteorological and hydrologic conditions) of 317.3 feet.

Flood control reservoirs were built in the basin to control flood flows by reducing velocities and flood stages. Additional measures are necessary, however, because these reservoirs do not prevent floods. The town of Jericho, in their amended July 8, 1985, zoning regulations, has delineated the 100-year flood boundary as "River District." Buildings are allowed in the district under conditional use, provided they are elevated one foot above the 100-year flood level.

The town and village of Richmond delineates a "Flood Hazard Overlay District" in their 1986 zoning ordinance. Buildings are allowed in the floodway fringe provided they are "elevated or flood-proofed to at least one foot above the 100-year flood level."

Towns of Essex and Williston and Village of Essex Junction - The 1927 flood caused extensive damage to the railroad, roads, bridges and the Green Mountain Power Co. Essex #19 station. Due to the primarily rural area along the Winooski River in Essex and Williston, apparently few commercial or residential structures were destroyed.

For future flood plain planning, the U.S. Corps of Engineers has predicted a water level elevation of 295.88 feet above mean sea level at the North Williston Bridge resulting from an Intermediate Regional Flood (100-year flood). For reference, this would be approximately two feet above the bridge road surface. The 1927 flood was approximately three feet higher than that, or five feet above the bridge. A standard project flood is estimated at 307.2 feet, or approximately 10 feet above the bridge surface.

The 1973 Corp of Engineers flood plain maps for the Essex / Williston area showed no structures in the flood plain. However, a quick comparison with recent USGS maps indicate some building in the flood plain, particularly along Route 117.

The Towns of Essex and Williston and the Village of Essex Junction zoning maps and regulations identify the flood plain and impose substantial restrictions on its use. No new structures are allowed to be built in the flood plain in the towns of Essex and Williston. The Essex Town ordinance requires major modifications to existing residential structures to be flood-proofed and/or raised one foot above the 100-year flood elevation. The Williston ordinance provides no conditional uses for buildings in the flood plain. Any such use requires special deliberations by the zoning board. The Essex Village zoning regulations require modifications to exiting structures in the

flood plain to be flood=proofed. New structures are to be placed on fill raised above flood level.

Town of Colchester and Cities of Burlington and Winooski - Damaging floods have occurred in these communities in 1830, 1869, 1927, 1936 and 1938. The 1927 flood was the highest of record. Approximately one-half mile below the American Woolen Co. dam (9.4 mi. from mouth), the 1927 flood crested at 126.5 feet above mean sea level. (Streambed elevation was 89.7 feet). An intermediate flood elevation at this point would be 122.8 feet, while a standard project flood would be 139.5 feet.

In Winooski, the flood plain is quite narrow due to the steep slopes of the river banks. This natural feature reduces potential damage from flooding. However, several commercial buildings and the Winooski waste water treatment facility located along the banks could suffer severe damage. An extensive flood plain extends downstream of the Winooski City line. Very few buildings are located in this area upstream of the Route 127 bridge. However, more extensive residential and commercial areas, plus the Burlington wastewater treatment facility near the river's mouth have been constructed in the flood plain. Burlington City is, for the most part, located above the flood plain.

The town of Colchester has zoned the Winooski flood plain as "W/F", Wetland/Floodplain District. Construction of buildings in this district is prohibited. Encroachment in the floodway is "prohibited if it will result in any increase in flood levels..." Conditional uses may be granted for construction within the floodplain provided the building is floodproofed or elevated above the 100-year (intermediate flood), among other things.

The City of Burlington has zoned the flood plains along Lake Champlain, the Winooski River and other streams as "Floodway District" (FHD) or "Floodway Fringe District" (FFD). No new construction or fill is allowed. Conditional uses are granted with conditions similar to Colchester's.

The City of Winooski has zoned the flood plain along the Winooski River as "FP" Floodplain District. No new construction or fill is allowed. However, certain conditional uses are allowed. Conditional uses are granted with conditions similar to Colchester's.

Natural Communities

Liz Thompson, in "Natural Communities of Vermont," describes a natural community as "an area, or portion of the landscape, which has certain physical characteristics that unify it and make it different from other areas, and has a community of plants and

animals that are characteristic of that kind of habitat." The Lower Winooski River contains twelve natural communities within eight separate sites. Following are descriptions of these communities as recorded by Ms. Thompson.

1. GORGE ISLAND

Typical of floodplain forests, Gorge Island is flooded in most years during spring high water; dry to mesic during the remainder of the growing season. This 32 acre community is mostly undeveloped with dominants of silver maple, cottonwood, ash and butternut typical of the floodplain forest. The lush understory includes tall herbs such as ostrich fern, sensitive fern and meadow rue. This is the best example of a floodplain forest on the Winooski River. While the floodplain forest was once prevalent along bottomlands, land cultivation replaced them. Only small strips and inaccessible patches remain in Vermont, making the floodplain forest an unusual community. Some of Gorge Island was once cleared for pasture, however it remains relatively undisturbed. Gorge Island is significant because of its remoteness and exceptional natural community; it also provides a secluded picnicking site for canoeists and scenic vista from Interstate 89. This island is owned by Green Mt. Power; however it is under lease to the Winooski Valley Park District.

2. DERWAY ISLAND

Derway Island is a shallow rush/grass marsh and floodplain forest. It is a 40-acre peninsula formed by the Winooski River near its mouth at Lake Champlain. The wetland and adjacent upland areas have formed on alluvial soils deposited by the Winooski. The wetland is a complex mix of open water, marsh shrub, and forested wetland with duckweeds, button bush, and silver maples dominating the vegetated areas. Derway Island is relatively pristine and the communities there provide functions important to the water quality and water quantity of the river and Lake Champlain, for example groundwater recharge, sediment trapping, and nutrient retention. The Island contains rare species and is part of a complex of wetlands along the Lower Winooski (including Halfmoon Cove, Delta Park, and Northshore Wetland) containing the largest waterfowl/wildlife habitat in Burlington.

3. TWIN BRIDGES SITE

This outcrop community is found along the Winooski Gorge below the Lime Kiln Bridge. It is characterized

by steep, calcareous (chalky - in this case limestone) cliffs and sparse vegetation, including successional shrubs, grasses and herbs. The community is very dry and shows evidence of fire disturbance. Distinguishing plants include shrubby cinquefoil, ebony sedge, snow aster, fragrant sumac and snowberry.

4. WINOOSKI DELTA

Encompassing the northern and southern land reaches to the mouth of the Winooski River, this area includes a number of natural community types. These communities are discrete, however, but combine to form, along with Derway Island, Halfmoon Cove, and the Intervale, Burlington's richest waterfowl and wildlife habitats. Communities described for the Winooski Delta area include cattail marsh, deep shrub marsh, lake sand beach, and Lakeshore grassland.

Cattail Marsh

This is a deep-water marsh community dominated by cattails (scirpus americanus) and other robust herbs. Cattail marshes are important breeding grounds for certain uncommon birds, including bittern, sedge wren, and virginia rail.

Deep Shrub Marsh

This is also a deep water marsh (water < 6" deep throughout the growing season) dominated by bulrushes, with other emergents, rushes, giant burrweed arrowhead, and pickerelweed often present.

Lake Sand Beach

This is a lakeside community, extending south from the mouth of the river with a row of scattered trees. The community is found on the shores of larger lakes, and often disturbed by ice scour and flooding, however dry during the growing season and sparsely vegetated. Cyperus (species), clammyweed, and cockleburr plants may be found in these low-lying areas.

Lakeshore Grassland

As opposed to the Lake Sand Beach Community, the Lakeshore Grassland is moist during the growing season, with 70% or greater plant cover. This community is dominated by tall grasses, rushes, and sedges (Spartina pectinata, Scirpus americanus), and other herbs. These are not wetlands.

5. MOUNT CAVALRY SWAMP

This is a red maple-black ash type swamp. Swamps are wetlands dominated by trees or tall shrubs, in this case, the hardwood red maple. Other trees might include black ash, American elm, green ash, swamp white oak, white birch, hemlock and tamarack. The understory is indicative of nutrient-poor growing conditions and includes Spagnum mosses and sheep laurel. This 23 acre wetland is surrounded by residential land uses; however it provides important groundwater recharge, has some wildlife value, and includes habitat to three rare plant species: Yellow bartionia, Black gum, and a rare orchid. The black gum tupelo is also found here.

6. OSPREY WETLAND

The 16-acre osprey wetland is a shrubby, densely vegetated area with some open water located in the center of the wetland. The dominant vegetation is buttonbush, willows, alders, and calla lilies. The wetland's edge bordering the river is quite wild and an osprey platform was constructed there. This shrub swamp community has excellent wildlife habitat and provides important groundwater recharge, sediment trapping, and nutrient retention functions.

7. INTERVALE

The Intervale consists of two types of natural communities, "Shallow Water Marsh" and "Open Water and Marsh." Their descriptions follow:

Shallow Water Marsh

This shallow water marsh encompasses about 220 acres with a mixture of marsh, (192 acres); deciduous forest (20 acres); and open water (10 acre) wetlands, and is located on the eastern side of the northern connector. This wetland complex is a high profile wildlife area with waterfowl, birds, and mammals viewable from the northern connector (Rte. 127). Additionally the complex harbors the Cursed crowfoot and Least bittern, both rare species, and provides important floodwater conveyance, sediment trapping, and nutrient retention functions. Much of this area is owned by the State and is known as the Intervale Wildlife Management Area.

Open Water and Marsh

This open water and marsh complex encompasses about 46 acres on the western side of the northern connector.

It is hydrologically unconnected to the above-mentioned marsh except during periods of extreme high water. Along its western edge are found steep cliffs containing several small caves, some owned by the Winooski Valley Park District. Like the Intervale wetland, this complex provides excellent wildlife/waterfowl habitat, has high aesthetic value and provides the stormwater retention and nutrient absorption like that of its neighboring community.

8. SUNDERLAND BROOK PITCH PINE STAND

This pitch pine forest/woodland community is the only remaining example of its kind in Vermont. Once common on the sands of the Winooski Delta, these flat and well-drained areas have been largely developed. It is a dry forest recognized by a lack of dense shrub layer. The canopy is open, and the forest floor is dominated by low sedges and forbs rather than tall herbs. Pitch pine, white pine and oaks are the dominant species.

Flora, Fauna and Threatened and Endangered Species

FLORA

An analysis of 1978 orthophotos of the Lower Winooski River revealed that approximately one-third or 13 miles of riverfront contains riverine buffers 50 feet or less in width. Most of this mileage (approximately 10 miles) occurred along farmland. The balance of three miles was evenly distributed between residential, commercial and road frontage.

Jenkins and Zika report that at Bolton Falls, there are hemlock and hardwood forests on the edges of the Gorge and silver maple forests on the river banks below it. A small grass and a sedge (Eragrostis hypnoides and Cyperus inflexus) are found on the sandbar below the dam. These plants are considered rare away from the Lake Champlain shore.

Downstream of Lime Kiln Gorge, the riverbanks are forested with cedars or dry oak and maple. In the 1800's, Lime Kiln Gorge and Winooski Gorge were famous for rare plants. However, most of them are now gone. Currently, the vascular plants found at Lime Kiln Gorge are much commoner than those that have disappeared. The flora as a whole is similar to that of other limestone cliffs and gorges in Chittenden County.

At Williston Gorge, the steep riverbanks are sparsely forested with young deciduous trees. Three species of plants are found at Williston Gorge that are noteworthy. Williston Gorge is the only location in the western Vermont lowlands where one species is found. Vermont is the southern limit of another

species and is declining in the state. It is proposed as a threatened species in Vermont. The third species is found on ledges in the gorge, but is scarce through the rest of Vermont. A wood mint, Blephila hirsuta, a rare species once found in the gorge, is now apparently extinct.

A colony of Anemone multifida is found at Winooski Falls. This is the only surviving colony of the species in Vermont. It is also rare in New England. They are primarily located among the rock outcrops on the north shore of the river, where they may be easily trampled due to their inconspicuous habit. The plant is also threatened by construction of the proposed Chace Mill hydroelectric project. The project will need to get a permit from the Agency of Natural Resources for removal of some of the plants.

FAUNA

According to the "Vermont Rivers Study,"[1] the Winooski River Basin has the greatest amount of riverine wildlife habitat (213 miles) of all Vermont's river basins. Also, the basin has the greatest river mileage of deer wintering habitat area (157 miles) and the second largest mileage of moose habitat (40 miles).

For the purpose of this report, wildlife habitat has been identified as occurring primarily from the mouth of the Winooski River to Sunderland Brook, along the Huntington River and several unnamed tributaries.

A detailed inventory of the fauna in the basin has not been undertaken, except in the instance of important communities, such as wetlands. Of interest, however is the mention of fauna observed during the 1970 "Rivers and Streams Survey." Between the Jonesville and Richmond bridges, raccoons, kingfishers and bank swallows were observed. Kingfishers, gulls, a heron, loons and raccoon were observed between the Essex and Winooski Dams. From the second Winooski Dam (Forest Hills) to the Route 127 Bridge, sightings included a bald eagle, mussels, small mouth bass, bank swallows, gulls and kingfishers. Gulls and kingfishers were sighted from the Route 127 bridge to Lake Champlain.

The Winooski Valley Park District's "Canoe Guide" indicates that, in addition to white-tailed deer, squirrels and snowshoe hare are the dominant mammals. Also, mink, muskrat, beaver and otters are present. Canadian and snow geese feed and rest throughout the area, particularly in the Intervale. Riverine

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[1]See Bibliography

wetlands provide habitat for black ducks, mallards, pintails, teals, shovelers, wood duck and snipes.

According to the Agency's Heritage Program, seven rare or endangered species of mussel are known to occur in the Winooski River. Of these, only one Interior Basin species, Lasmigona compressa is known. Other rare or endangered species along the main stem include the Beach-Dune Tiger Beetle, the Black Tern, Easter Sand Darter, Lake Sturgeon and Least Bittern.

Tributary streams provide habitat for three rare or endangered animal species: American Brook Lamprey, Four-toed Salamander and the Great Blue Heron. (Colonies of Great Blue Heron are uncommong or rare.) For a listing of these and the rare and endangered species along the mainstem, refer to Appendix D.

The Winooski River watershed is said to offer every type of moving water that Vermont has to offer. (i.e. riffles, pools and flatwater). Habitats along the mainstem and tributaries provide ecological niches for coldwater and warmwater fish populations. Natural reproduction of brook, brown and rainbow traout occur in several tributaries from Mill Brook upstream.

Winooski Mainstem

Populations of brown and rainbow trout are naturally sustaining along the upper reaches of the mainstem, from Jonesville upriver. Brown trout are also stocked in this stretch, downstream to Mill Brook, with the assistance of Trout Unlimited. Natural populations of walleyes occur from Essex to Bolton. Abundant smallmouth bass occur naturally from the Winooski's mouth to the Essex #19 impoundment. From Mill Brook downstream, the mainstem is dominated by warmwater smallmouth bass and walleye species, although trout or landlocked salmon, migrating up from Lake Champlain, may be found below the City of Winooski.

The presence of all species in the lower river is related to the influence of Lake Champlain. Migrating landlocked salmon and steelhead (a lake-run rainbow trout) are known to spawn at the Salmon Hole, a popular fishing spot offering diverse habitats below Winooski Falls. Brown trout are also known to be resident species in the Salmon Hole area. The "Vermont Rivers Study" indicates that Atlantic salmon and rainbow trout are stocked in the segment from the Salmon Hole to the mouth.

Ridley Brook

Brown and rainbow trout from the mainstem spawn in the lower reaches. Brook trout occur naturally, but their populations are enhanced through stocking. The brook is used for migration.

Joiner Brook

Joiner Brook is also used for fish migration. Brook trout occur naturally from its headwaters to its mouth, and are supplemented through stocking. Brown and rainbow trout from the mainstem spawn near its mouth.

Preston Brook and Gleason Brook

Brook trout are naturally sustained in both brooks from their headwaters to their mouths. There are used for migration. Rainbow trout spawn in the lower reaches.

Huntington River

From Huntington Gorge to the Winooski River, natural populations of brown and rainbow trout and smallmouth bass occur in the mainstem and tributaries (to the Upper Huntington River). The river is used for migration. Brook trout occur naturally and though stocking from the headwaters to the Gorge.

Snipe Island Brook

Snipe Island Brook has natural populations of browns and brook trout from the headwaters to the Winooski River. The brook is used for migration.

Mill Brook

Mill Brook has naturally sustaining population of brook, brown and rainbow trout from its headwaters to its mouth at the Winooski River. The brook is a migratory stream.

LAND OWNERSHIP

The Lower Winooski River Basin contains a variety of state, private, local, regional, federal and quasi-public land. Much of this land provides access to the mainstem and tributaries or protects important natural communities. The largest public holding is Camels Hump State Forest, containing 20,500 acres in six towns, and providing protection and access to Honey Hollow, Ridley, Gleason and several unnamed brooks and a portion of the Winooski River mainstem.

The Winooski Valley Park District owns or leases approximately 800 acres in the Basin, providing opportunities for access and river-related recreation and conservation at twelve areas. According to the Green Mountain Power Corporation, 110 acres of the Corporation's land are leased to the Park District. The leased land consists of four islands and five separate pieces fronting on the mainstem. The Vermont Fish and Wildlife

Department owns several areas in the basin, including a 43-acre parcel along the Winooski river in Jericho.

Several towns along the Lower Winooski own community recreation and/or access areas along the river. These include Burlington, Colchester, Winooski, Essex Town and Richmond. There are approximately 72 farms in the Lower Winooski Basin. At least two of these farms contain in excess of 100 acres and several miles of river frontage. Williston has the most farms with 16, followed by Richmond with 15. Following is a listing, presented by town, of the numbers of farms located in the Basin.

TABLE 2
NUMBER OF FARMS, BY TOWN, IN THE LOWER WINOOSKI BASIN

TOWNS	NUMBERS OF FARMS
Bolton	3
Richmond	15
Huntington	9
Jericho	9
Essex Town	8
Essex Village	1
Williston	16
St. George	1
So. Burlington	3
Burlington	1
Colchester	6
Total	72 Farms

The average size of a Basin farm is 348 acres.

WATER QUALITY

The water quality of the Lower Winooski River, although meeting water quality standards most of the time, is still perceived by the public as being impaired. However, residents are quick to agree that the water quality has improved over what it was 20 years ago.

A few quotes from the previously mentioned 1970 "Rivers and Streams Survey" serve to point out how poor the water quality really was 20 years ago. This will help to put the present water quality situation in perspective. In the segment from Richmond

to North Williston, the survey states, "In Richmond, below the bridge, there is a large outlet from the creamery on the right. This is followed in quick succession by three sewage pipes. The water is very unpleasant and the vegetation and algae increase in amount..... The water is very unpleasant throughout the reach and makes anything else difficult to enjoy." In the reach from the Essex Dam to the Winooski Dam, the report describes the water quality as "... extremely poor throughout the reach. There is overabundant water vegetation, and much scum and algae ...The smell of the river is bad .... There is much oil and slime on the water below the dam and the smell is very poor. There is no canoeing below this to the next dam, no access to the water, and little reason to want any. The water is particularly foul and the sights are ugly." The paper goes on to report a sewage pipe flowing into the river, junk cars, garbage and fill on the banks and a temporary earth and boulder "bridge" across the river which silted the river a mile downstream. The foregoing was occurring in the reach between the Forest Hills dam and the Route 127 bridge.

The 1976 "Winooski River Basin Water Quality Management Plan" reported that a special survey for dissolved oxygen at key locations in the Winooski River was performed in August of 1974. Because of wide swings in flow below Green Mountain Power Dam No. 19, there was a correspondingly wide variation in dissolved oxygen levels below this dam. "The flow varied from a high of 1420 cfs to a low of 47 cfs which is one-third of the 7Q10 flow** of ...." (167 cfs). Dissolved oxygen concentrations "varied from a high of 11.9 mg/liter to a low of 5.8 mg/liter which is below the lowest allowable level of 6.0 mg/liter."

The high level of dissolved oxygen reflected the period of power generation when high flows were passed. Low dissolved oxygen levels, conversely, reflect those times when no power was being generated and the river was allowed to pond behind the dam. The only flows passed at those times were those which leaked through the dam. As a point of reference, cold water fish species, such as brook trout, require a dissolved oxygen content of "Not less than 6mg/l or 70 percent saturation at all times," according to the Vermont Water Quality Standards. Warm water fish habitat requires not less than 5 mg/l or 60 percent saturation at all times. Total coliform abundance for August, 1973, ranged from a low of 550 coliforms per 200 milliliter to approximately 20,000/ml. In 1973, there were no upward limits for total coliform where the receiving water was Class C (the Lower Winooski is Class C). The upper limits for Class B (suitable for water contact sports and drinking water, if filtered and disinfected) was 500 coliforms per 100 milliliters.

** The average low flow for seven consecutive days with a 10-year return period.

At no time were the total coliforms less than 500 coliforms per 100 ml.

In 1970, there were seven municipal and one industrial wastewater treatment facilities which discharged treated wastes to the Lower Winooski River. Four of these were primary plants (Richmond, Essex Village, Essex Town and South Burlington.) The remainder were secondary plants (IBM, Colchester, Burlington Riverside, Winooski and Burlington North).

These treatment facilities, particularly the primary plants, contributed to the low dissolved oxygen levels, which was exacerbated by the hydroelectric flow management regime. They also contributed high coliform and phosphorus levels. In addition, sanitary surveys discovered several cases of individual pollution sources.

The 1976 Basin Plan acknowledged that non-point sources of pollution play a significant role with respect to water quality impairments. Non point sources included the Colchester, South Burlington, Burlington and Williston landfills. Leachate was suspected of finding its way to tributaries of the Winooski. Erosion from construction was identified as causing turbidity problems, particularly in the upper Winooski Basin. The basin plan also indicated concern over the lack of sufficient regulations for the disposal of septage and sludge in the basin.

Thus, it is easy to understand why the canoeists commented as they did about the pollution they encountered in their "Rivers and Streams Survey." Sewage treatment plants only provided primary treatment; industries were discharging process wastes; flows were highly regulated; landfill leachate and septage and sludge were probably reaching the river and tributaries and private septic systems were malfunctioning.

In the few years since the 1970 "Rivers and Streams Survey" and the 1976 "Winooski River Basin Water Quality Management Plan," much has taken place which has resulted in higher water quality in the Lower Winooski River Basin. Specifically, all the waste water treatment facilities have been upgraded to secondary treatment. All six community facilities (Colchester is now piped to South Burlington) are activated sludge plants. This process uses biological treatment to remove 85% of the organic components and suspended solids. The Essex Junction, Winooski and South Burlington treatment facilities provide high levels of treatment and remove phosphorus. By 1992, phosphorus removal will be constructed at the Burlington North and Burlington Riverside plants.

Another factor contributing to a cleaner river has been Green Mountain Power Company's voluntary release of at least 7Q10 flows at their Essex #19 and Gorge #18 plants since 1987. The

Department of Environmental Conservation had requested 7Q10 flows (or 167 cfs) because the water quality standards for dissolved oxygen were not being met as the result of poor assimilation of the sewage treatment facility discharges due to low flows.

In 1988, a wasteload allocation was approved for the Lower Winooski River. This was necessary due to the limited assimilative capacity of the River and the fact the water quality standards would not be met if all the treatment plants were at capacity and the River was at its average low flow. In order to increase the capacity of the River, the Water Resources Board changed the water quality standards for dissolved oxygen from six parts per million to five parts per million during the summer period. Also, the allocation requires the larger dischargers and certain critical plants to achieve a higher level of treatment.

During the warm summer low flow months, the Essex, Winooski and Burlington treatment facilities must adhere to stricter discharge limits to prevent any adverse effects to the River. This requires a nitrification process to be induced at these plants. The treatment facilities are at 39% to 83% of their design capacity. Refer to table 3 which compares present flows to design capacity.

As a result of increased flows and the wasteload allocation, the water quality has improved. There are still problems, however, which need attention. The River improved from a determination of "Not Support" (of water quality standards) to "Partially Supported." This means that one or more uses or values for that particular classification (in this case, Class C) are only impaired part of the time, as opposed to continually being impaired. The Water Quality Standards define Class C waters as being suitable for certain uses including recreational boating and any recreational or other water uses where contact with the water is minimal and where ingestion of the water is not probable; irrigation of crops not used for human consumption without cooking; and compatible industrial uses. (See table 2 for a summary of classified uses). Values for Class C waters include habitat suitable for biota, fish and wildlife.

Biota and non contact recreation are partially supported from Essex #19 dam to the mouth of the river due to low flows and physical blockage by the dam; nutrient enrichment and stormwater runoff from urban areas; soil erosion from construction sites; odors from sewage effluent; oil slicks from surface runoff, machinery spills and service stations; siltation and turbidity from bank erosion; agricultural runoff from pasture lands and cropland; desilting from hydro dams; pathogens and nutrient enrichment from whey, sludge and manure spreading on floodplain fields, and threats of metals and organics from landfills, hazardous sites and waste water treatment facilities.

Two and one-half miles of the Lower Winooski River have threats to aquatic biota due to organics, nutrients and sediments from an industrial hazardous waste site and agricultural runoff. This hazardous waste site has now been closed by the State Hazardous Materials Division. Groundwater sampling, last performed in the fall of 1989, indicated there were no problems at this time at the hazardous waste site.

Previous water quality problems have been caused by the Burlington Combined Sewer Overflows (CSOs) and five waste water treatment facilities. All the CSO's have been corrected and corrective actions have been taken through implementation of the Wasteload Allocation Process for the waste water treatment facilites.

Presently, approximately 65% or 26 miles, of the Lower Winooski River is Class C and the remainder, or 14 miles, is Class B. The Class C zone begins in Plainfield and extends to the Bolton/Richmond town line, including approximately 6.4 miles from Bolton Falls to the town line. From that point, it is Class B for approximately 3.7 miles to the Richmond sewage treatment facility outfall. A Class C zone, 0.7 mile long, accommodates the Richmond facility, then it continues as Class B to Alder Brook, a distance of approximately 10.2 miles. From Alder Brook to its mouth, it is Class C, approximately 19 miles. The locations of the Class B and Class C zones are depicted on the Figure 3.

The Department of Environmental Conservation is petitioning the Water Resources Board to shorten the Class C zones in the Winooski River Basin. In the Lower Winooski, the petition, if approved, would result in 33 miles of Class B waters and seven miles of Class C risk reduction segments below the seven waste water treatment facilities. The reason for the petition is due to the fact that the existing Class C waters are longer than necessary to protect existing uses. See Figure 3 for a summary of the proposed reclassification for the Lower Winooski.

The Class C segments were established in the 1950's and 1960's, before secondary treatment of sewage was common. Primary treatment only removed solids and chlorinated the discharge. This minimal treatment required inordinately long Class C zones to protect users from health risks. As mentioned earlier, all the treatment plants in the basin have been upgraded to secondary, with some providing advanced waste treatment. Technically, waste water treatment facility discharges must meet Class B water quality standards. However, a Class C risk reduction segment extending for a minimum of one mile below the discharge is necessary to protect water uses in the event of a plant or operational failure.

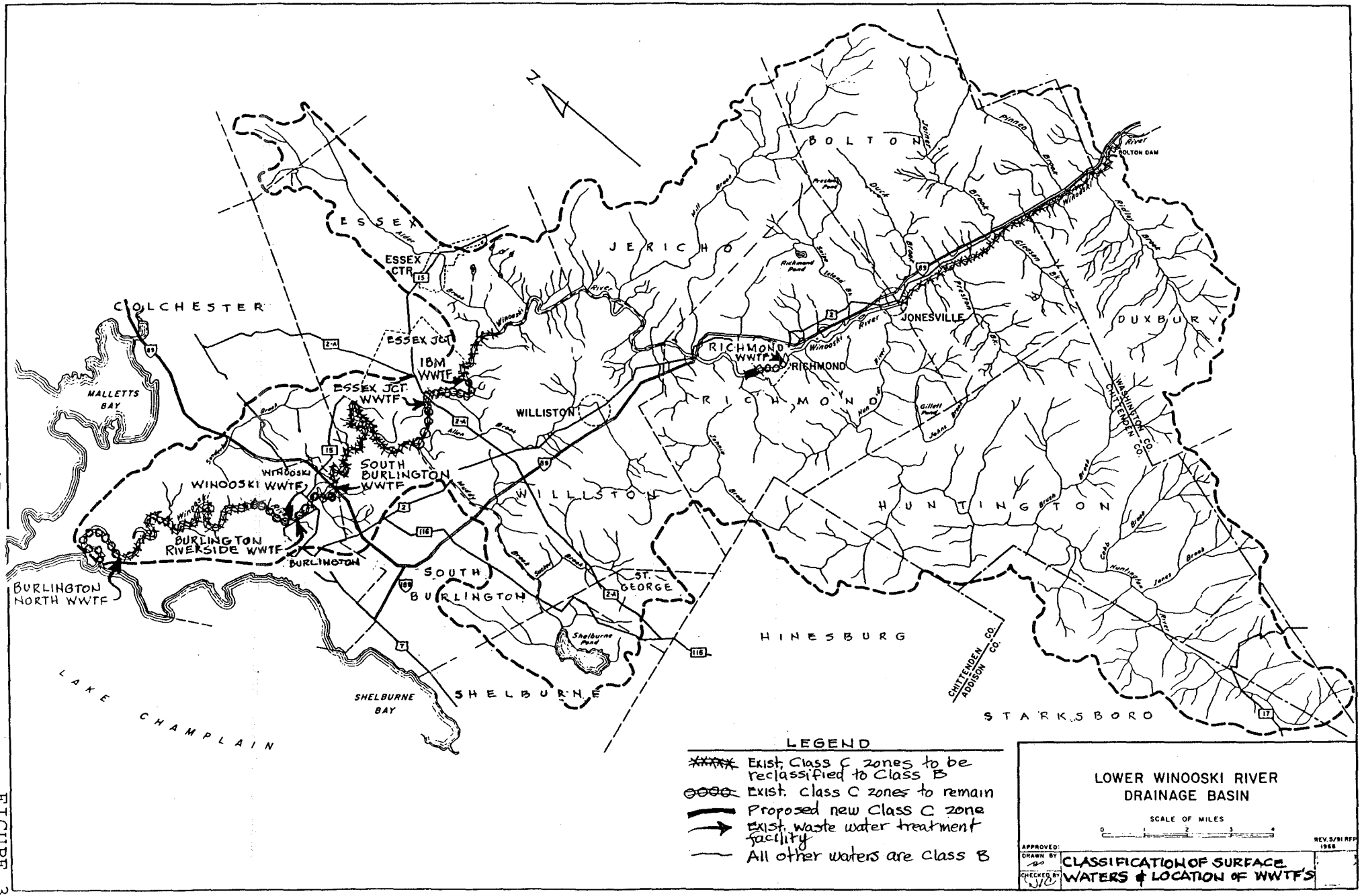

N
ESSEX
ESSEX CTR
COLCHESTER
ESSEX JCT
IBM WWTF
ESSEX JCT WWTF
MALLETTS BAY
WINOOSKI WWTF
SOUTH BURLINGTON WWTF
BURLINGTON RIVERSIDE WWTF
BURLINGTON
BURLINGTON NORTH WWTF
WILLISTON
SOUTH BURLINGTON
ST. GEORGE
SHELBURNE
SHELBURNE BAY
LAKE CHAMPLAIN
BOLTON
JERICHO
RICHMOND WWTF
RICHMOND
JONESVILLE
DUXBURY
RICHMOND
WILLISTON
HUNTINGTON
HINESBURG
CHITTENDEN CO.
ADDISON CO.
WASHINGTON CO.
CHITTENDEN CO.
STARKSBORO
BOLTON DAM
LEGEND
Exist. Class C zones to be reclassified to Class B
Exist. class C zones to remain
Proposed new Class C zone
Exist. waste water treatment facility
All other waters are class B
LOWER WINOOSKI RIVER DRAINAGE BASIN
SCALE OF MILES
0 1 2 3 4
REV. 5/91 RFP 1968
APPROVED:
DRAWN BY
CHECKED BY
CLASSIFICATION OF SURFACE WATERS & LOCATION OF WWTF'S

FIGURE 3

TABLE 3

SUMMARY OF CLASSIFIED WATERS IN THE LOWER WINOOSKI RIVER BASIN

Classified Uses and Values	Stream Segments
Class A	
• water quality uniformly excellent • public water wupply with disinfection • high quality waters with significant ecological value	1. An unnamed tributary to the Winooski River. 0.5 mile. This stream joins the Winooski river 1/2 mile downstream of the confluence of Alder Brook. 2. The public surface water supplies for Winooski, Essex Center, Essex Jct. and Pinewood Manor.
Class B	
• water quality consistently exhibits good aesthetic value • swimming and recreation • public water supply with filtration and disinfection • high quality habitat for aquatic biota, fish, and wildlife • irrigation and other agricultural uses	1. All rivers and streams in the basin not classified as Class A or Class C.
Class C:	
• minimal contact recreation and other uses where water ingestion is not probable • irrigation of crops not consumed without cooking • habitat suitable for aquatic biota, fish, and wildlife • compatible industrial uses	1. Winooski River Juncture with Stevens Branch to the Bolton-Richmond Town Line. 24.5 miles 2. Winooski River-Richmond Treatment plant to Johnnie Brook. 0.7 mile 3. Winooski River-Alder Brook to old Rutland Railway Bridge. 19.0 miles

TABLE 4

PRINCIPAL POINT SOURCES - LOWER WINOOSKI MAINSTEM

NAME	FACILITY/ WASTE TYPE	DISCHARGE (1)	% CAPACITY
Richmond	WWTF	0.22 mgd	39%
Williston	Stormwater	14 discharges	
Essex	Stormwater	27 discharges	
Essex Jct.	WWTF	2.75 mgd	54%
Essex Jct.	Bypass	1.25 mgd	
GMP	Cooling Water	1.73 mgd	
IBM	COMB/IND.	5.0 mgd	17%
IBM		1.5 mgd	
IBM	Stormwater	11 discharges	
Colchester	WWTF	0.31 mgd	
Colchester	Stormwater	9 discharges	
Winooski	WWTF	1.2 mgd	82%
Winooski	Overflow	2 discharges	
Winooski	Stormwater	14 discharges	
Twincraft	Cooling Water	6,000 gpd	
S. Burlington	Stormwater	8 discharges	
Burlington	Stormwater	9 discharges	
Burlington/Riverside	WWTF	1.0 mgd	83%
Burlington/Riverside	SAN/Stormwater		
Burlington/McNeil		0.5 mgd	
Burlington/McNeil		0.5 mgd	
Burlington/No. End	WWTF	2.0 mgd	68%
Burlington/No. End	SAN/Stormwater		
So. Burlington	WWTF	2.3 mgd	53%

LOWER WINOOSKI BASIN - TRIBUTARIES

Alder Brook	Stormwater	28 discharges
Allen Brook	Stormwater	31 discharges
Muddy Brook	Stormwater	40 discharges
Sunderland Brook	Cooling Water	0.13 mgd
Sunderland Brook	Cooling Water	0.07 mgd
Burlington Main	Comb. Sewer Interceptor	

(1) All discharge figures for WWTFs are design flows, and do not necessarily represent operating flows. All wastewater treatment plants on the Lower Winooski provide secondary treatment, except for the Essex, Winooski, and South Burlington plants which provide tertiary treatment, including phosphorus removal.

WASTE TYPE CODES

WWTF	-	Waste water treatment facility
COMB/IND.	-	Combined sewer and industrial waste discharge
SAN/STORMWATER	-	Combined sanitary and stormwater waste discharge

The "Nonpoint Source Management Program" developed lists of "high priority targeted/impaired" and "targeted/threatened" water bodies through a public participation process, consultations with professionals and interest groups and a public hearing. The Program describes how the state will focus its implementation programs on targeted impaired waterbodies. With regard to the Lower Winooski, table 4 lists those waters that are "High Priority Targeted-Impaired Waters" and those that are "Targeted/Threatened" (Table 5).

TABLE 5
HIGH PRIORITY TARGETED -IMPAIRED WATERS

River Segment/lake	Threat or Problem	Assessment Needed	Best Management Practices Needed	Program/Fund	Current Status
Lower Winooski River-Alder Brook to the mouth of the Winooski River	Agricultural Runoff	AG. Small Watershed Project 1983; Watershed Plan 1985; Reassessment 10/88	Nutrient and ag. waste management; soil erosion control	PL83-566 Program for Lower Winooski River; Agricultural Conservation Program. (ACP)	5/77 Farms contracted; 3/5 contracts complete; low partic. rate req. re-assessment
	Poor dissolved oxygen concentrations below hydro dams	7Q10 spillage over dams			
	Poor flow regime below Essex #19 & Gorge #18 hydro dams				License Prep. 1988. WQ Cert. will be required Problems at #18 & #19 should resolve together.
	Poor flow regime below Essex #19 & Gorge #18 hydro dams	Fisheries flow needs assessment completed	Improve flow regime		Gorge #18 unlicensed. 10 VSA §1003 conf. Essex #19 FERC lic. expires 1993.
	Possible fish passage problem below hydro dams	Needs assessment	Measures to prevent impingement and entrainment and allow for passage		

TABLE 5 (cont'd.)

River Segment/lake	Threat or Problem	Assessment Needed	Best Management Practices Needed	Program/Fund	Current Status
Lower Winooski River-Alder Brook to the mouth of the Winooski River	Sludge spreading on floodplain fields	Some sludge applied on certified sites; some appl. on not certified sites.	Utilize sludge application guideline	VT DEC Public Facilities Septage/Sludge Review	Pending Adoption of Septage/ sludge rules (10/88), permit
	Soil Erosion from construction sites				
	Stormwater runoff, highway runoff from urban areas	Needs Assessment			
	Streambank erosion	Small watershed assessment 1983; watershed plan 1985	Rip-rap; revegetate where necessary	ACP	ACP administered by county
	Winooski wastewater treatment facility passes combined sewer overflows		Separate storm lines from sewer lines	Public facilities construction grants program; state revolving loan fund	Winooski WWTF scheduled for planning to correct CSO's by FY'89
Winooski River below Burlington's Riverside Wastewater Treatment Facility	Riverside WWTF may create toxic instream chlorine levels at times	Desktop modeling predicts toxic levels during low (7Q10) and max. capacity flows	Chlorine removal	Permits, Protection & Compliance Div. Permits Section	Chlorine removal to be completed by 12/31/92 when NPDES permit reissued

TABLE 5 (cont'd.)

River Segment/lake	Threat or Problem	Assessment Needed	Best Management Practices Needed	Program/Fund	Current Status
Winooski River below Winooski Wastewater Treatment facility	Winooski WWTF may create toxic instream chlorine levels at times	Desktop modeling predicts toxic levels during low (7Q10) and max. capacity flows	Chlorine removal	Permits, Protection & Compliance Division, Permits Section	Chlorine Removal to be completed by 12/31/92 when NPDES permit reissued

TABLE 6
TARGETED/THREATENED WATERBODIES

River Segment/Lake	Threat or Problem	Assessment Needed	BMP Needed	Program/Funds	Current Status
Intervale Wetland	Burlington Landfill: Surface water contamination from landfill leachate	Continue Assessment of leachate collection system; need chemical & Benthic sample		Solid Waste Div., Water Quality Div.	Chemical monitoring by Burlington PWD; Benthos sampling to be done fall 1988.
Joiner Brook from Headwaters to Mouth	Ski area development in upland; threats are soil erosion and potential sewage treatment plant failure	Needs assessment for sensitivity to alteration; Devils Pothole is swimming area		Water Resources Investigators	
Huntington River from Headwaters to Mouth	Agricultural Runoff	Watershed Plan 1985; Re-assessment 1989	Nutrient and Agricultural Waste Management; Soil Erosion control	ACP; PL83-566 Project	566 Project authorized for construction very low participation
Huntington River, Headwaters to Mouth (high significance for recreation)	Construction erosion from land development; threat of failing septic systems	Septic System survey needed; initial survey 1970s	Vegetated Buffer strips along river needed	VT DEC Water Resource Investigators	More Water Resource Investigators needed; Town Erosion Control standards needed

CHAPTER 4

HISTORICAL AND CULTURAL RESOURCES AND RIVER USES

Historical Resources

According to the "Vermont Rivers Study," the Winooski Basin has the second largest number of historic sites (21) compared to the 16 other river basins in Vermont. This number includes historic districts as well. Only those sites or districts within 1/4 mile of a river and listed on the National Register of Historic Places and/or the Vermont Historic Sites and Structures Survey were included. A listing of historic sites for the Lower Winooski River is presented in Table 7, "Historic Resources."

Of particular note is the home of Ethan and Fanny Allen and their six children, located at the Ethan Allen Homestead Park in Burlington. The 1787 Allen House is a small, unassuming farmhouse which overlooks the Winooski River. It is managed by the Winooski Valley Park District.

The Winooski Falls Mill District is also of special interest. It was here that Ethan Allen's brother Ira, constructed a sawmill complex at the upper falls. In the 1800's, the Mill District was one of the largest in New England, employing a large number of Irish and French-Canadian workers in the textile mills. The American Woolen Company purchased the mill complex in 1902 and operated it until 1954, when it was forced to close due to economic circumstances. The top 8 feet of the timber crib dam, originally built by Ira Allen to furnish power for his lumber mill, which was re-built over the years to power subsequent mills, was finally breached when the American Woolen Co. went out of business. The Chace Mill hydroelectric project will be constructed over the timber crib dam, retaining only the under-water section of the old dam.

TABLE 7
HISTORIC RESOURCES

River	Name	Location	County	Register Listing
Winooski	Fort Ethan Allen	Colchester Essex	Chittenden	State
	1787 Allen House	Burlington	Chittenden	National
	Bridge Street HD*	Richmond	Chittenden	State
	No. Main St. HD	Richmond	Chittenden	State
	Old Stone House	Winooski	Chittenden	National
	Winooski Archeological Site	Winooski	Chittenden	National
	Chittenden-Martin House	Jericho	Chittenden	National
	Round Church	Richmond	Chittenden	National
	Winooski Falls Mill HD	Burlington Winooski	Chittenden	National
	Battery Street HD	Burlington	Chittenden	National
Alder Brook	Essex Ctr. HD	Essex	Chittenden	State
Huntington Rvr.	Huntington Ctr. HD	Huntington	Chittenden	State

*HD - Historic District

Archaeological and Prehistoric Resources

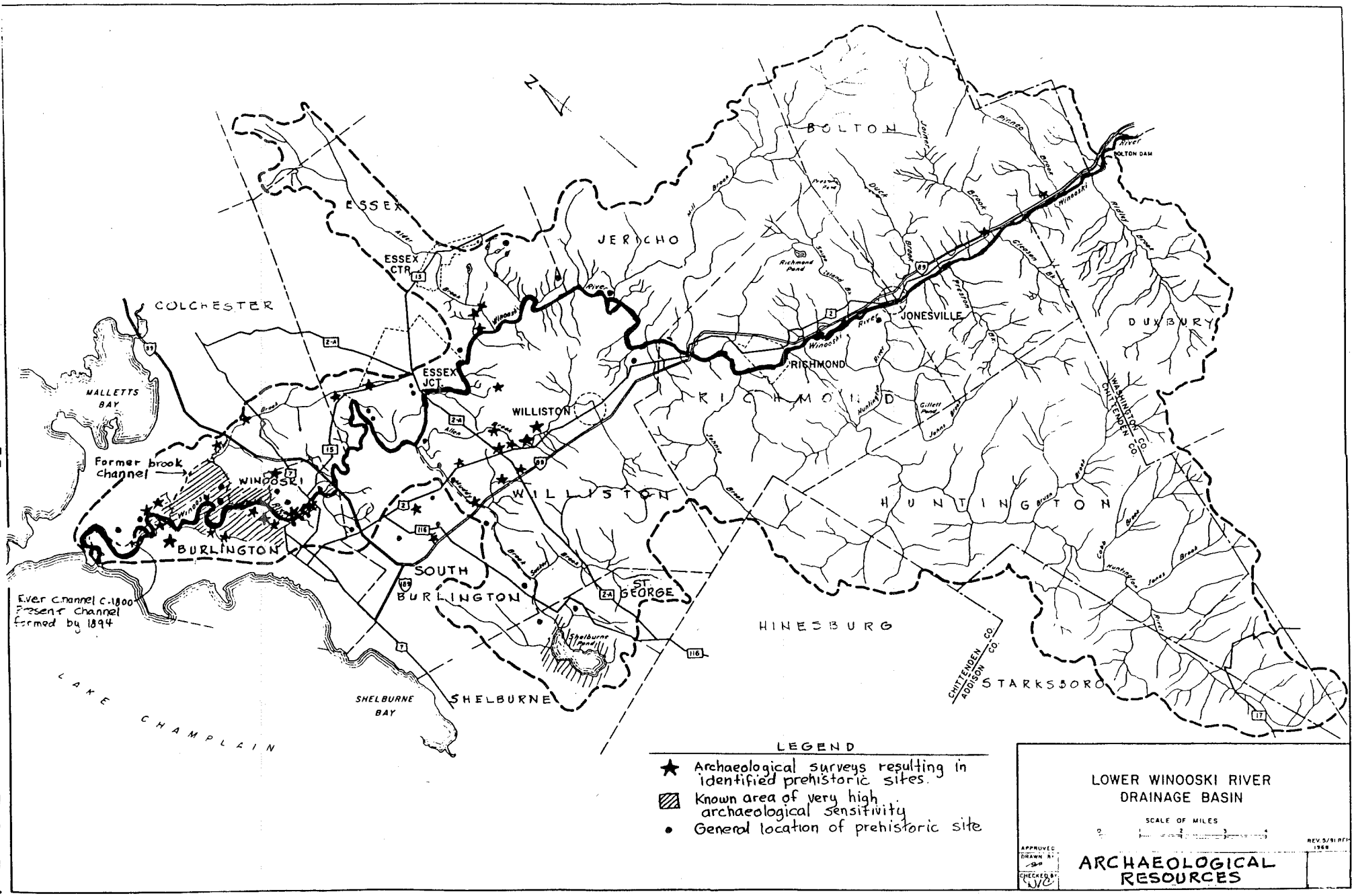
Archaeological sites are the only historical record of people who have lived in Vermont for 12,000 years. Each site is unique, reflecting a wealth of information about the people who lived, hunted, fished or farmed there. Archaeological sites also indicate how people adapted to substantial climatic changes and how they interacted with members of other communities.

The Lower Winooski Basin contains a high number of historic and pre-historic sites. Only 5% of the basin has been surveyed, yet over 100 prehistoric sites or more extensive site areas have been identified by the Consulting Archaeology Program at the University of Vermont. Program findings indicate that "The Winooski Intervale along the lower nine miles of the river contains one of the densest concentrations of archaeological sites anywhere in New England." Some of these sites occur near the surface of the ground, but others are up to 10 feet deep. With the exception of the Winooski River's old oxbows, there is a high probability that each 5-acre parcel in the Intervale contains some evidence of Vermont's past residents.

Of particular significance is the discovery of the "Winooski Site." This prehistoric site, recording early civilizations' living habits 5,000 years ago, is located on the Winooski-side of the river about a mile downstream from Winooski Falls. Its location, on a high terrace on a bend in the river provided a good vantage point for its inhabitants. The site was first discovered by a member of the Vermont Archaeological Society, who noticed "cultural materials" on the eroding riverbank during spring flooding in 1972. Under the auspices of the Archaeological and Historic Preservation Act of 1974, data recovery was performed.

Investigation discovered that prehistoric people used the site, beginning 5,000 years ago, and continuing for 4,000 years. Archaeologists were able to determine that the Winooski Site was used during the summer and fall months, with fish and agricultural crops their main food. It is theorized that these early Vermonters moved to wooded more protected sites during the winter months where game was their main food source. Archaeologists discovered there were five episodes of occupation at the site. Archaic Indians were the earliest occupants, around 3,000 BC and 1,900 BC. No evidence was found to indicate the site was used more recently than 1,000 years ago (AD 915 ± 115 years). It is hoped "that an Abenaki village occupied some time after the beginning of the Contact period, about 1609, will someday be discovered and excavated so that the gap between prehistory and history might be bridged." So says "Seasons of Prehistory ..."*

*See Bibliography


BOLTON
ESSEX
JERICHO
COLCHESTER
ESSEX CTR.
ESSEX JCT.
WILLISTON
RICHMOND
JONESVILLE
DUXBURY
MALLETTS BAY
Former brook channel
WINOOSKI
BURLINGTON
SOUTH BURLINGTON
ST. GEORGE
WILLISTON
HUNTINGTON
HINESBURG
STARKSBORO
SHELBURNE
SHELBURNE BAY
LAKE CHAMPLAIN
RICHMOND
WASHINGTON CO.
CHITTENDEN CO.
ADDISON CO.
CHITTENDEN CO.
River C.hannel C.1800
Present Channel
formed by 1894
LEGEND
Archaeological surveys resulting in identified prehistoric sites.
Known area of very high archaeological sensitivity
General location of prehistoric site
LOWER WINOOSKI RIVER
DRAINAGE BASIN
SCALE OF MILES
ARCHAEOLOGICAL RESOURCES

-55a-

FIGURE 4

Peter Thomas suspects there is a tie between the prehistory civilizations discovered at places like the Winooski Site and the Abenaki Indians found living in Vermont by French explorers in the early 1600's. However, archaeological proof is needed to document this tie. Thomas is hopeful that the so-called Donohue Site in the Intervale will provide this proof. Carbon dating of certain artifacts found at the site indicate they are approximately 550 years old. This would date this find at around the 1400's. Thomas said financial resources are necessary to continue work at the Intervale site, which would be an on-going project, useful for educational purposes, as well as for archaeological evidence.

Although not as numerous as in the Intervale, there are many prehistoric sites upstream of Winooski Falls. These sites are found not only along the Winooski Mainstem, but also in the tributary stream valleys. A study of the "Archaeological Resources" map (Figure 4) shows four identified prehistoric sites on Sunderland Brook; four sites on Muddy Brook and tributaries; four sites on Allen Brook and two sites on Alder Brook. There are also many general locations of prehistoric sites along the tributaries and Winooski mainstem. Peter Thomas notes that "Any segment of the Winooski floodplain and areas within 500 feet of a tributary are likely to contain a site; 95% of the watershed is unsurveyed."

RECREATIONAL RESOURCES

The Lower Winooski River and its tributaries provide many recreational opportunities, including fishing, swimming, boating, picnicking, overlooks, bird-watching, river walks, among others. Recreational facilities are offered by private, local, quasi-public, state and regional agencies. Most of the present facilities are described in this report so that with a full understanding of what is available, the reader may see what additional facilities should be provided. An attempt has been made to inventory the basin's recreational resources by stream or stream segment and activity.

Boating

Boating in the Lower Winooski Basin takes place primarily in two waterbodies - the Winooski main stem and the Huntington River. Recreational boating can, with some exceptions, take place on the Winooski River from Bolton Falls to the mouth of the River. It is also available on the Huntington River from Hanksville down to Huntington Gorge, a distance of 10.5 miles. The "The Vermont Rivers Study" reports that the Winooski River provides an extended season for boating. The River receives "high use" for "general touring", and "several dams require portaging." The classification of the River is "flat to Class II" with "scenic diversity."

The public involvement process elicited specific boating responses from Jay Appleton for the Winooski and Huntington Rivers, which follow:

Winooski River

Bolton Falls to 1/2 mile below railroad trestle bridge in Duxbury - At high flows this is a fun kayak section. At medium flows it is good for touring in canoes or kayaks. At high flows there are many large waves (2 ft.+) for surfing, and eddies to play around.

Bolton Falls to Jonesville bridge - This is an excellent section for lazy summer days (low flows), touring by canoe, fishing, and swimming. It is also pleasant on crisp fall days for touring. One problem is there are few parking spots and put-ins between Bolton Falls and Jonesville. Two-hundred-yards below Essex #19 is a good site for beginning whitewater canoeists and kayakers when water is released. Parking and access to the River's edge is a problem, though.

Winooski Falls, behind the Waterworks Restaurant (Between Champlain and Chace Mills) is a good surfing spot for kayaks - There are very few good spots in northern Vermont during low flow times, in the summer. Water quality is a health problem here, though. Diaherra, nausea, and eye infections have occurred among boaters after accidental ingestion of the River water. From a safety viewpoint, this place is only usable at low flows. Below the big falls (which can kill people) are some other good surfing waves and eddies.

Above Winooski Falls - There is a short whitewater "play area" here, but there is no access to it. The Chace Mill hydro project will impound this area.

Salmon Hole - nice "play areas" around the Salmon Hole.

Ethan Allen Park to Lake Champlain - Excellent flatwater training water, bird-watching and fishing.

With regard to the Huntington River, the "Vermont Rivers Study" indicated that the River experiences "moderate use" for general touring. The River possesses "scenic diversity" and it is a spring run with white water Class I-II. The Huntington River has the best whitewater in the Lower Winooski River Basin.

Audubon pull-off (also a swimming hole) to Huntington Gorge - This is the best whitewater section of the River, especially the section along Dugway Road to the Gorge. It is very beautiful with excellent water quality. Difficulty of rapids is Class II+. The Huntington is runnable from Hanksville to the Gorge, although it is more commonly run from the bridge right near where the Hinesburg Hollow Road ends (upstream from Huntington Lower Village) down to the Gorge. The Huntington is runnable only during runoff, usually April. Its scenic value is high - a mix of forest and agricultural land - its difficulty only moderate, its water quality is excellent and, it has

reasonably good access. It is more of a river to run, as it does not have play spots like on the Winooski. The Huntington is run by boaters in the spring; the Winooski has play spots for non-runoff periods.

Jerry Jenkins, in his report, "Vermont's Whitewater Rivers," calls the Huntington "Highly Important for boating and fishing; the nearest whitewater stream to Burlington." Jenkins describes the river as a "small rocky stream, mixed Class I-II rapids, and a Class III pitch near the lower end." (Hanksville to Huntington Gorge). He goes on to say it is "popular for general touring; pleasant whitewater in spring." The season for boating is during snowmelt and after rain.

Fishing

The following fishing inventory was provided from a meeting with fishermen and from completed questionnaires.

Winooski Main Stem

It is conservatively estimated that at least two dozen people fish the Lower Winooski River every day during fishing season, and that 30+ cars use the Bolton Falls access area daily for fishing.

Walleyed pike fishermen fish from the Salmon Hole down to Lake Champlain (warm water fish habitat). Trout fishermen fish from Bolton Falls to IBM. Fishing for smallmouth bass occurs from IBM to the lake. Seasonal fishing for salmon and steelhead occurs from the Salmon Hole to the lake. Access to the Lower Winooski is a problem .... access areas tend to be overcrowded. According to Trout Unlimited, access above IBM is satisfactory.

Fishermen like fishing the Winooski because it's "in their back yard." They believe it's a "very pretty stream to fish" (above Essex) and they like its wilderness feeling and may see wildlife along the river. Fishermen believe the River is relatively unpolluted and there are "lots of insects" upstream for fish to feed on. However, some say fishing was better 20-40 years ago when one could "catch anything...." One could catch "wheelbarrows" full of walleyes," according to Ralph Nading Hill's "The Winooski, Heartway of Vermont." (1949) Fishermen believe the River has tremendous potential for any fish.

The fisheries biologist stated that the fishery in the Winooski River cannot be managed to full potential until more consistent flows are released by Green Mountain Power. The "Winooski is coming back, however. Many walleyes that are caught in the river are from the south end of the lake .... not in the Winooski." The biologist noted that most walleyes that do spawn in the River have their eggs left high and dry due to fluctuating flows from hydro operation.

Fisherman believe that fish need more flows, at least

minimum flows year round. Fish passage past the dams is needed for spawning. Trout Unlimited wants the lower Winooski River managed for trout and salmon and for resident brown trout in the upper basin. The Walleye Association would like the river managed for Walleyes.

Huntington River

Trout Unlimited reported that the Huntington River is hot in the summertime due to lack of sufficient buffers. Development is encroaching on the river.

Muddy Brook

One angler commented that there is an "amazing sucker run in the spring.

PUBLIC LANDS AND ACCESS AREAS

The following table and map entitled "Lower Winooski Basin Access Lands and Points" lists information and locations for a variety of public and quasi-public lands along the mainstem Winoosk River and major tributaries (also large ownerships within the basin), including:

1. PUBLIC LANDS:

    a. Municipal Parks and Town Access Areas
    b. State Lands
        i. Fish & Wildlife access areas, stream parcels and wildlife management areas
        ii. State Forests and Parks
        111. Miscellaneous State Lands (e.g. Agency of Transportation Waysides)
    c. Winooski Valley Park District Lands

2. PRIVATE LANDS (that permit public access):

    a. Green Mountain Power Lands
    b. Other quasi-public lands (e.g. UVM)
    c. Private parcels that permit public use (e.g. IBM)

Under the two major categories of public and private lands, there are a total of 29 sites listed for the mainstem Winooski and 14 sites listed for tributary streams and/or the basin. In terms of gross acreage, the land stock is dominated by Camels Hump State Forest, including the Robbins Mt. Wildlife Management Area. However, it is smaller and often-spaced parcels that provide continuous opportunities for access and river-related recreation and conservation along the Winooski. Especially noteworthy are the Winooski Valley Park District's eleven areas encompassing over 800 acres.

TABLE 8

LOWER WINOOSKI BASIN ACCESS LANDS & POINTS

River Mile/Name/Map #	Location & Topo Map*	Ownership	Acreage & Frontage	Facilities & Use
40.0 Bolton Falls Access (1)	River Road; (S) Waterbury	Green Mtn. Power		Parking/Picnic Tables/Grills/Canoe Portage
34.5 Winooski River Streambank (2)	Rte. 2; (N) Bolton/Richmond	VT Fish & Wildlife	4.1; 1,300 feet	Streambank Parcel
33.5 Canoe Stop/Access (3)	Rte. 2-Jonesville Bridge; (N) Richmond			Canoe Stop
31.0 River Road Access (4)	River Road; (S) Richmond	Town-Leased to State		Access Area/Unimproved
30.0 Volunteer's Green Park (5)	Bridge Street; (N) Richmond	Town of Richmond	18.0	Playground/Ballflds/ Agricultural Lease

*Location includes nearest road, bank of river (north or south), municipality, and topographic maps.

(S) - South side of river
(N) - North side of river

TABLE 8 (cont'd)

RIVER MILE/NAME/MAP #	LOCATION & TOPO MAP	Ownership	Acreage & Frontage	FACILITIES & USE
27.0 Rte. 2 Rest Stop (6)	Rte. 2 Bridge; (S); Richmond/Essex Jct.	VT Agency of Transportation		Canoe Access
25.0 Rte. 117 Rest Stop Area (7)	Rte. 117; (N); Jericho/Essex Jct.	VT Agency of Transportation		Parking/Picnic Tables/Trash Barrels
23.3 Rte. 117 (7A)	Rte. 117(N); Essex Junction	VT Fish & Wildlife	43.0	River Frontage
22.5 Rte. 117 Boat Access (8)	Rte. 117; (N); Essex Jct.	Leased to State		Boat Access
17.5 IBM Boat Launch (9)	IBM: (N); Essex Jct.	IBM		Boat Launch
17.5 Essex Dam Canoe Stop (10)	Above "Essex 19"; (S); Williston/Essex Junction	Private Landowner		Unimproved camping area/agreement with landowner
17.5 "Essex 19" Access Area (11)	Rte. 2A; (S); Williston/Essex Junction	Green Mountain Power		Parking/Picnic Area/Portage (2,000')

TABLE 8 (cont'd)

RIVER MILE/NAME/MAP #	LOCATION & TOPO MAP	OWNERSHIP	ACREAGE & FRONTAGE	FACILITIES & USE
16.5 Muddy Brook Park (12)	Poor Farm Rd; (S); So. Burlington/Burlington	Griswold Copr. Leased by WVPD	8.0	Parking/Fishing/ Picnicking/Nature Trail
14.5 Essex Overlook (13)	Rte. 15; (N); Essex/Colchester	Winooski Valley Park District	5.0	Parking/Picnicking/Inte rpretive signs/Part of Woodside Natural Area
14.5 Woodside Natural Area (14)	Rte. 15; (N); Essex/Burlington- Colchester	Winooski Valley Park District	58.0	Parking/Boat Access/4WD Roads
12.5 LimeKiln Access/Colchester WWTP (43)	Lime Kiln Rd; (N); Essex/Burlington	Town of Colchester		Canoe Access
12.0 Gorge Island (15)	Below East Allen/Winooski- Burlington	Green Mtn. Power/Leased to WVPD	32.0	Island w/Floodplain Forest Natural Community
11.0 Valley Ridge (16)	Grove St; (S); So. Burlington/Burlington	Winooski Valley Park District	18.0/150'	Wildlife Refuge/Wetlands/No Facilities

TABLE 8 (cont'd)

RIVER MILE/NAME/MAP #	LOCATION & TOPO MAP	OWNERSHIP	ACREAGE & FRONTAGE	FACILITIES & USE
11.0 Winooski Natural Area (17)	Rte. 15; (S); Burlington- Winooski/Burlington	Green Mtn. Power Leased to WVPD	15.0	Natural Area/Fishing 2 mile "Winooski Trail"
10.7 Winooski Falls Park (18)	Rte. 7; (N) Winooski/Burlington	City of Winooski	<.5	Urban Pocket Park Above Falls
10.6 Salmon Hole (19)	Riverside Ave; (S); Burlington	Winooski Valley Park District	5.6	Parking/Fishing/Trail/ Picnicking
10.5 Millyard Canoe Launch (20)	West Allen St; (N); Winooski/Burlington	Winooski Valley Park District	2.0+	Parking/Canoe Launch
8.0 Ethan Allen Homestead (21)	Rte. 127; (S); Burlington	Winooski Valley Park District	284.0	Parking/WVPD Hdqtrs./ Interpretive Center/Nature Trails/Canoe Access/Picnic Shelter
Northern Connector Greenway/Bicycle Trail (22)	Adjacent to 127; (S); Burlington	City of Burlington	8.5	Paved Bicycle Trail/Greenway
Twin Bridge	Colchester	GMP		Registered Natural Area

TABLE 8 (cont'd)

RIVER MILE/NAME/MAP #	LOCATION & TOPO MAP	OWNERSHIP	ACREAGE & FRONTAGE	FACILITIES & USE
5.5 McCrea Farm (23)	Macrae Rd; (N); Colchester	Winooski Valley Park District	288.0	Picnic/Parking area/Canoe Access/ Nature trails/ag. land use
4.6 Heineberg Wetlands (24)	Rte. 127; (S); Interval/Colchester	Winooski Valley Park District	11.0	Undeveloped/Bird Nesting Area
4.5 Winooski River Access (25)	Rte. 127-Heineberg Bridge; (N); Colchester Point	VT Fish & Wildlife	44.44; 360.1'	Winooski River Access
0.0 Colchester Point Access (26)	Windemere Way; (N&S); Colchester/Colchester Point	VT Fish & Wildlife	5.2/679' River 0.8/150' Lake	Unimproved
0.0 Windemere Way Fishing Access (27)	Windemere Way; Colchester/Colchester Point	Town of Colchester	18.0	Fishing Access
0.0 Delta Park (28)	Windemere Way; Colchester/Colchester Point	Town of Colchester	18.0	Fishing Access

TABLE 9

SELECTED PUBLIC AREAS IN WINOOSKI BASIN
(N indicates north side of basin; S indicates south side)

NAME/MAP REFERENCE	LOCATION/TOPO MAP	OWNERSHIP	ACREAGE & FRONTAGE	FACILITIES & USE
Mt. Mansfield State Forest (N); (29)	Bolton, Waterbury, Underhill/Richmond, Bolton	VT Forests & Parks	< 500 acres in Winooski Basin (estimate)	State Forest Parking/Trails
Ethan Allen Firing Range (N); (30)	Jericho, Underhill/Richmond/ Bolton	Federal Government		Firing Range
UVM Research Forest (N); (31)	Jericho, Richmond/ Essex Junction	University of Vermont	365.0	Forest Research Area
Winooski River Streambank-Mill Brook (N); (32)	Jericho/Richmond	VT Fish & Wildlife	41.51/1,00	Streambank Parcel
Sunderland Pond-Pond Site (N); (33)	Colchester/Colchester	VT Fish & Wildlife	5.2/2,100'	Pond Site
Saxon Hill Forest (N); (34)	Essex/Essex Jct., Essex Center	Private	775.0	Conservation/Recreation/ Trails/Industrial
Camels Hump State Forest (S); (35)	Bolton, Huntington, Richmond, Waterbury/Waterbury, Huntington, Mt. Ellen	VT Forests & Parks (some Fish & Wildlife)	19,500.0 (total) [all drain to Winooski River]	State Parks & Forests Parking/Trails [includes Robbins Mtn. WMA]

TABLE 9 (cont'd)

NAME	LOCATION	OWNERSHIP	ACREAGE & FRONTAGE	FACILITIES & USE
Green Mtn. Audubon Nature Center (S); (36)	Huntington/Huntington	Audubon Society	232.0; frontage on Huntington River	Nature Center Trails/Interpretive Programs/Activities/ Open to public
Shelburne Pond Access (S); (37)	Shelburne/Burlington	VT Fish & Wildlife	4.0; 300'	Parking/Boat Access
Shelburne Pond Natural Area (S); (38)	Shelburne/Burlington	University of Vermont	600.0	Conservation Area/Passive Recreation
Centennial Woods (S); (39)	Burlington/Burlington	University of Vermont	200.0	Conservation Area/Passive Recreation
Donahue Sea Caves (S); (40)	Burlington/Burlington	Winooski Valley Park District	15.0	Limestone Caves/Access from adjoining lands
Arthur Purchase (S); (Not mapped)	Burlington/Burlington; next to Sea Caves		20.0	
Interval Wildlife Management Area (S); (42)	Burlington/Burlington	VT Agency of Transportation	122.0	Wildlife Management

Information Sources Include:

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Additional land use information and field verification needed.

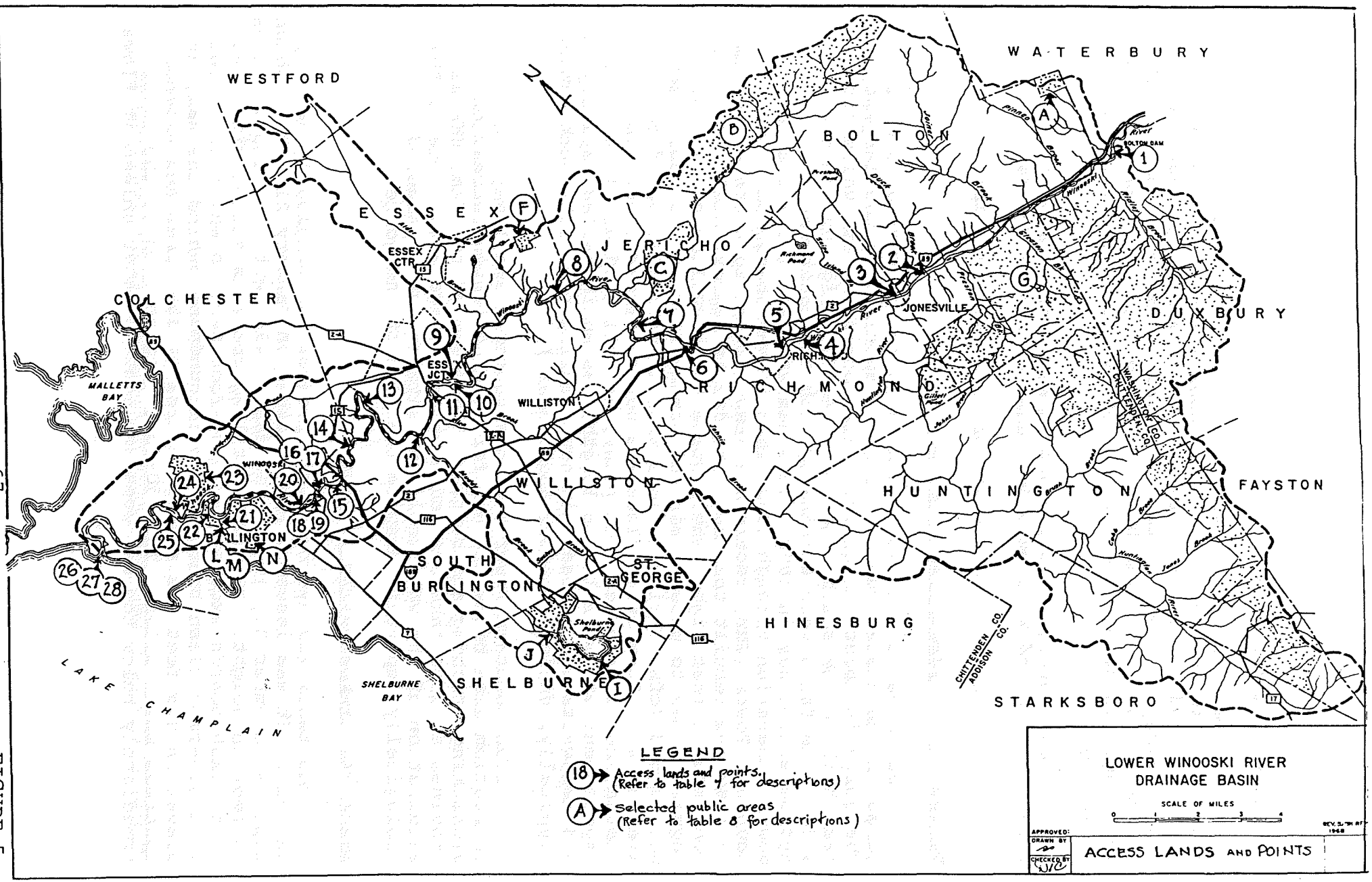
WESTFORD
WATERBURY
BOLTON
ESSEX
JERICHO
COLCHESTER
JONESVILLE
DUXBURY
RICHMOND
WILLISTON
HUNTINGTON
FAYSTON
HINESBURG
SOUTH BURLINGTON
ST. GEORGE
SHELBURNE
STARKSBORO
ESSEX CTR.
ESS JCT.
MALLETTS BAY
LAKE CHAMPLAIN
SHELBURNE BAY
BOLTON DAM
WASHINGTON CO.
CHITTENDEN CO.
ADDISON CO.
LEGEND
18 → Access lands and points. (Refer to table 7 for descriptions)
A → Selected public areas (Refer to table 8 for descriptions)
LOWER WINOOSKI RIVER DRAINAGE BASIN
SCALE OF MILES
ACCESS LANDS AND POINTS

FIGURE 5

Hydroelectric Resources

The Green Mountain Power Corporation operates three hydroelectric dams on the Lower Winooski River: Bolton Falls, Essex #19 and Gorge #18. Essex #19 is the only project due for relicensing in 1993. Bolton Falls was recently reconstructed and licensed. Gorge #18 was built prior to the time when projects were required to be licensed; therefore, it is exempt from licensing.

A new hydroelectric project in Winooski, Chace Mill, has been licensed and will be under construction in the fall of 1991.

Following is a description of these hydroelectric projects.

Bolton Falls Hydroelectric Project

The gorge just above Bolton Falls is the second largest gorge in the state (Quechee Gorge in Hartland is the largest). The gorge is about one-quarter mile long with rock walls 100-120 feet high on the south side and 45-60 feet high on the north side. The falls were eliminated with the construction of a hydroelectric dam in 1898. This dam was used for electrical power generation through 1938, when it was abandoned. Green Mountain Power (GMP) received a FERC license to operate the dam in 1982 and rebuilt the dam. The dam is approximately 190 feet long and 71 feet high. Their State Water Quality certificate requires them to pass a "minimum stream flow of 300 cubic feet per second (cfs) during periods when it naturally would be available." Generation flows are not to exceed 2,000 cfs, instantaneous release. The plant, at full head of 51 feet and an impoundment of two miles in length, has an installed capacity of 6.5 megawatts for a least six hours during the daily peak demand (typically, during December and January).

Green Mountain Power has constructed a small day-use recreation area below the dam for water-oriented recreation, picnicking, fishing and boating. Upstream of the dam, GMP has provided a canoe take-out and a canoe portage area. Due to the elimination of the waterfall, the site is not considered geologically important despite the size of the gorge.

Essex #19 Hydroelectric Project

The Essex #19 hydroelectric project was originally developed in 1917. It was issued a FERC license on January 21, 1969, which expires December 31, 1993. The dam is 494 feet long and averages 46 feet in height. The 345-foot long crest is fitted with five-foot flash boards except for an 84-foot section which is fitted with 6.5-foot flash boards. The impoundment behind the dam, at elevation 275 feet has a surface area of 352 acres and extends upstream seven miles. The 750-foot long section of the river immediately below the dam does not contain water unless it flows

over the top of the dam. This "dewatering" is due to penstocks installed behind the dam which divert the water to the powerhouse to generate electricity.

The hydroelectric project has an installed capacity of 7200 kilowatts (KW) at maximum capacity with four horizontal turbines. Each turbine can operate with up to 525 cubic feet of water flowing through it, which is released in an area below the plant called a "tailrace." Essex #19 operates as a "peaking" plant, producing electricity during hours of peak demand. With moderate river flows, the project operates Monday through Friday from 7:00 A.M. to 4:00 P.M. with average drawdown of three feet. However, during periods of high river flows, the plant operates constantly, providing "base load" electricity. It operates in coordination with the Gorge #18 hydroelectric facility, located 6.4 miles downstream in Williston Gorge.

According to the state report, "Hydropower in Vermont, Volume II," Green Mountain Power Corp. began releasing at least 7Q10 flows (the average low flow for seven consecutive days with a 10-year return period) on August 1, 1987. At this location, 7Q10 flows are 167 cfs.* Prior to this time, the only flows released when the plant was not operating and during periods of low flows, was the water which leaked through the dam. This amounted to approximately 55 cfs, a quantity insufficient to sustain stream life and dilute treated sewage wastes in the river. Green Mountain Power reports that, according to the United States Geologic Survey flow gage below the Essex #19 plant, flows exceed the 270 cfs minimum approximately 90% of the time.

Gorge #18 Hydroelectric Project

The Gorge #18 hydroelectric facility is located on the Winooski River in the towns of Colchester and South Burlington. The facility is 6.4 miles downstream of Essex #19 and 1.0 miles upstream of the proposed Chace Mill Project. It is owned and operated by Green Mountain Power Corporation and has an installed capacity of 3,000 killowatts (KW).

Project features include two dams separated by an island. Five foot flashboards create an impoundment of 87 acres which extends three miles upstream. Gross head at the facility is 34 feet. A 50-foot long penstock bypasses 150 feet of stream; however, backwater from the tailrace extends upstream to the dam.

The Gorge #18 project preceded the 1920 Federal Power Act, and is therefore unlicensed. In 1979, GMP applied for a FERC license; however, the application was dismissed. Gorge #18

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*Flow of at least 167 cubic feet per second are sufficient to meet water quality standards, but do not necessarily provide for a balanced/healthy fishery.

operates simultaneously with Essex #19. As of August, 1987, GMP began release of 7Q10 flows (167 cfs) at all times. Previously, as with Essex #19, flows were leakage only.

Chace Mill

The Chace Mill project will be located on the Winooski River in Winooski and Burlington, immediately below the Route 7 bridge. It will be owned and operated by the City of Burlington Electric Department and Winooski One Partnership. Installed generating capacity will be 6,500 kw with a gross head of 36 feet.

Project features, upon completion of construction in 1992, will include a rehabilitated dam (raised 8 feet); 70-foot-long intake structure, a powerhouse excavated into rock ledge downstream of the dam, a tailrace, and a fish trapping facility. The existing impoundment will be enlarged from 4.9 acres to 5.7 acres.

A 401 Water Quality Certificate was issued in May of 1987 and a FERC license granted in November of 1988 for the project. Chace Mill is conditioned to operate strictly as a run-of-the-river project. (Inflows to the impoundment shall equal discharge at the tailrace and/or dam crest in high flow periods.) A minimum flow of 168 cfs at all times is conditioned to meet downstream assimilative capacity.

The Salmon Hole, located below the project site, is an important local fishing spot and supports trout and walleye populations. Park facilities exist along the river, and additional amenities will be developed at the site.

CHAPTER 5

SUMMARY OF GOALS AND ACTIONS FROM ALL INTEREST GROUPS

The selection of the following goals and actions was guided by the results of the Alternative Futures Scenarios workshop. Selection was made from the "Complete Listing of Goals and Actions." (Contact the Water Quality Division for a copy.) Where certain of the actions appear conflicting or redundant, appropriate actions will be selected through public process during the next phase of the planning process.

1. NATURAL and SCENIC RESOURCES

Land Use and Scenic Resources

GOAL: ***Improve, maintain and promote conservation greenways, open space and scenic areas in the Lower Winooski Basin, including protection of floodplains and agricultural land.***

ACTIONS:

- Local conservation commissions, land trusts, and the Winooski Valley Park District should work with farmers and other large landowners to keep farms operating. Acquisition of development rights, retirement benefits, reduced taxes and other incentives should be employed.

- Town plans and zoning regulations should encourage new development to take place in growth centers, utilizing Transferable Development Rights and other mechanisms as necessary.

- Town plans and zoning regulations should prohibit development from flood plains and ecologically sensitive areas. Maintain Derway Island and the Intervale in their natural state.

- Acquire land and development restrictions. Responsible groups include towns, regions, conservation organizations (including WVPD), and private-public partnerships.

- Funding from the Housing and Conservation Trust Fund as well as Land and Water Conservation Fund should be allocated to purchase development rights in the Winooski and Huntington River corridors.

- Continue working with Nature Conservancy regarding purchase of selected sites (e.g. Vilas Swamp).

- Specific land areas to consider for public purchase include:
    1. Half Moon Cove, owned by Audrey Deforge
    2. Upriver of the Heineberg Bridge - Charlie Scribner seeks land preserved.
    3. Near mouth of Winooski - owner seeks to donate one acre to the Boy Scouts.

- Work with the Whitcomb farm to encourage continued agricultural use of their property.

- Create a new zone, such as RCO-Natural Area, for those areas that should remain in their natural state. No development of any kind in this zone. e.g. Rezone Howe Farm in Burlington from R-6 to RCO-Natural.

- Evaluate and rezone if appropriate the 15 acre Winooski Natural Area from General Commercial to Recreation, Conservation, and Open Space.

- Evaluate and rezone lands behind the Champlain Mill complex that are subject to flooding and other environmental restrictions from Commercial to Recreation, Conservation, Open Space.

- Identify scenic landscapes and their corridors (river and highway) and prescribe overlay districts with design review control.

- Legislate property taxation that corresponds to river lands' current use within the Winooski and Huntington River corridors.

- The Agency of Natural Resources and Regional Planning Commissions should take active roles in the Act 200 process to assist municipalities in maintaining the undeveloped forest and agricultural landscapes in the Winooski and Huntington River corridors.

- Work with Colchester and Winooski on a Winooski River Plan that addresses visual quality.

- Use land planning consultants or hire landscape architects for regional commissions. Regional Commission or the Winooski River Valley Commission should provide concept plans for development location based on inventory (including visual). Commission(s) should then provide educational guidance to town planning commissions for incorporation of suggested criteria for sighting and siting of development.

- Develop public education programs regarding farming and its value (e.g. school kids tour farms).

- Preserve scenic corridor by limiting development and establishing greenbelt/open space buffer along the river as much as possible.

- Develop a greenbelt along Muddy Brook.

GOAL: ***Recognize and protect riparian landowner rights.***

ACTIONS:

- Balance uses of the public and landowners.

- Provide just compensation for restrictions that would preserve a scenic corridor.

- Involve riparian landowners early in the planning/decision-making process.

- Assist riparian landowners with stream-related problems, such as stream-bank erosion, public trespassing, trash dumping, etc., in exchange for public use/resources protection.

Mineral Resources

GOAL: ***Protect agricultural land from eroding stream banks.***

Actions:

- SCS to initiate streambank protection and restoration thru bank plantings, willow wattles and rip-rap, where required.

- Assist farmers in keeping cattle off river banks by installing fences.

- Require Green Mt. Power to stabilize banks caused by fluctuating flows due to hydroelectric production.

Water Quality

GOAL: ***Maintain and improve water quality in the Lower Winooski River basin, including management of point and non-point pollution sources.***

Actions:

- Upgrade all basin wastewater treatment facilities to advanced waste treatment (AWT).

- The state should investigate and manage nonpoint sources of pollution.

- Better enforcement of water quality standards

- Prohibit snow dumping into the river and streams.
- Close Williston landfill.
- Evaluate impact of proposed regional landfill site on Winooski River water quality.
- Provide fencing to farmers to keep cows away from river in exchange for a r-o-w for access across their land.
- State of Vermont and Soil Conservation Service should develop criteria to identify farms in the Winooski River watershed for funding to cost share installation of manure storage facilities, barnyard and milkhouse waste filter strips, and streambank stabilization structures. Farms along mainstem Winooski and Huntington River corridors should be given priority.
- Seek financial assistance and incentives to riparian landowners for streambank stabilization practices.
- Require and establish streamside vegetation.
- Utilize the relicensing process to set minimum stream flows for hydroelectric plants.
- Investigate setbacks and local septic regulations.
- Utilize River-Watch network and program to develop a basin-wide or monitoring program that evaluates water quality at points beyond just the wastewater treatment plants. Encourage participation of schools in "Adopt-a-River"
- Establish more frequent monitoring of sewage plants with data available to the public. Improve biota reporting.
- Evaluate and monitor sludge areas, landfill leachate, and other suspected areas for water quality pollution sources. Police river for cleanliness.
- The State should focus the Plan on in-stream (water quality) issues in order to provide guidance and drive decisions in the permit process at the local, regional, state and federal levels.
- Keep river available for effluent disposal.
- Evaluate potential for reclassification of portions of the Lower Winooski River from Class C to Class B.
- Actions must address entire Winooski watershed, not just Lower Winooski watershed.

Fish and Wildlife

GOAL: ***Protect and enhance fish and wildlife resources in the Winooski River Basin.***

Actions:

- Department of Fish and Wildlife should take a close look at the river now and see how it differs than from twenty years ago.
- Establish a Park Ranger program to protect threatened natural areas, wetlands, and rare species from domestic animals, motor vehicles, dumping, etc. State should fund ranger program on state land; municipalities should fund ranger program on city and town lands. Spend money on habitat restoration and enhancement, not catch and release, slot limits, reduced bag limits, and artificial only (no bait restrictions).
- Manage river for better fishing.
- No hatchery-supported fisheries. Emphasize a management strategy that will maximize the Winooski Rivers' ability to support self-sustaining and naturally reproducing fish populations.
- Develop fisheries management plans for each of the four district sections of the Lower Winooski - Bolton Falls to Richmond; Richmond to IBM; IBM to Gorge #18; Gorge #18 to the mouth.
- Keep well-stocked with fish.
- Manage river for trout and salmon downstream and resident brown trout (Trout Unlimited).*
- Manage river for walleyes (Lake Champlain Walleye Association).**
- Develop upstream and downstream fish passage at existing impoundments and institute run-of-the-river flows at the same.

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*The fisheries biologist recommends managing for trout in the upper sections of the Lower Winooski.

**The fisheries biologist also recommends that walleyes be managed in the Salmon Hole and downstream for one month during spawning and that salmonids be managed there during other times.

2. CULTURAL RESOURCES

Historic and Archaeological Resources

GOAL: ***Preserve/enhance historic and archaeological resources.***

ACTIONS:

- Archaeological sites need to be identified, evaluated, and excavated or preserved for future exploration whenever possible.
- Archaeological information recovered needs to be incorporated into interpretive programs, school curriculum and general public educationa formats.
- Develop a long-range site identification and evaluation program in the Lower Winooski watershed.
- Integrate interpretive exhibits where appropriate at points of public access or along developing trail networks.
- Initiate school tours of historical and archaeological sites along the river. (Coordinate with Green Mt. Power Corp., which presently provides tours of the Essex #19 power house.)
- Consulting Archaeological Program at UVM will assist the Division of Historic Preservation in developing archaeological sensitivity maps for various towns in the Lower Winooski watershed. Such a map is being currently developed for Williston.

Commercial Resources

GOAL: ***Preserve existing "business uses" of the river, including hydro production, water withdrawal and wastewater assimilation, balanced with other water uses.***

ACTIONS:

- Produce as much peaking energy as possible with minimal spillage and a balance of uses. This could be achieved by replacing the existing generators with more efficient ones, if appropriate.
- Establish minimum flow requirements.
- Work with GMP to better regulate water levels. Require flow studies for relicensing of dams.
- Protect Winooski River from undue impacts from hydro by participating in review of hydro proposals and by

seeking conditions regarding public access to the river, river flow levels, and other operational issues.

- Establish an economic balance between power production and river flows (i.e. consider possibility of more consistent river flows).
- Maintain power-generating capacity of the river.
- Recognize the potential for Bolton Valley to expand its snowmaking withdrawal (from the Winooski River) and its sewer plant operations in the basin.
- Permit irrigation for farm use to preserve agricultural landscapes and farm operations.
- On the Huntington River, permit no dams, other impoundments, or diversions, no matter how small. Also, permit no channelization or other river bed alteration except for gravel removal and streambank stabilization to protect agricultural land.

3. RECREATIONAL RESOURCES

Opportunites and Uses

GOAL: ***Promote and expand recreational opportunities in the Lower Winooski River Basin***

Actions:

- Open riverfront for public use.
- Promote commercial recreation along river.
- Encourage development of public facilities, including canoe rentals.
- Provide funding to determine recreation potential of Winooski River Valley.
- Increase awareness of recreational opportunities on the Winooski River.
- Promote/establish environmental interpretation facilities.
- Work with WVPD, Conservation Board, School Departments, Burlington Parks and Recreation to create programs.
- Develop park at Heineberg Bridge.
- Develop four parks and eight access points in Williston along the Winooski.

- Acquire sites along river for vistas and recreational opportunities, especially identified areas.

- Protect Ridley Brook for fishing, swimming and scenic values.

Canoeing and Boating

GOAL: *Preserve/enhance boating opportunities on the Lower Winooski River.*

Actions:

- Protect three-season whitewater opportunities afforded by hydro operations thru the relicensing process if possible.

- Allocate different river reaches for motor vs non-motor boats and restrict uses on the type and size of boats.

- No boats with motors larger than 10 hp.

- Prohibit jet-skis.

- Place speed limit or no-wake signs at high traffic areas (e.g. near Colchester Fish and Game Access).

- Station police at the Colchester (Winooski river) access area to cite boat speed limit violations when they come back to their cars.

- Create a Water Patrol from Lake Champlain up to the Salmon Hole.

- Research environmental impacts of dredging mouth of Winooski River.

Fishing

GOAL: *Preserve/enhance fishing on the Lower Winooski River*

ACTIONS:

- Achieve Potential for salmon and trout.

- More fish.

- Enhance fishing opportunities.

- Stock perch and bullhead like we used to.

- Improve fish stocking in the Huntington River, self-guided nature walks, etc....

Swimming

GOAL: ***Preserve/attain swimming opportunities in the Lower Winooski Basin.***

ACTIONS:

- Install safety features at Huntington Gorge to protect swimmers.
- Improve water quality; make Winooski River swimmable.

Access

GOAL: ***Enhance Access to the Lower Winooski River and Tributary Streams.***

Actions:

- Acquire and manage access sites on the Winooski and Huntington Rivers for non-trailer boats and for recreational purposes not limited to fishing (Idea is to consider access sites that provide services in addition to strictly a fishing access).
- Improved access, especially for natural heritage areas.
- Develop walking paths and canoe ramps like those at Ethan Allen Homestead through a combination of state and town effort.
- Public acquisition from Salmon Hole to Lake Champlain for fishing.
- Develop a public access plan for hiking, canoeing, and fishing which minimizes destruction of natural habitat. Perform environmental assessments to determine proper location of reparian trails and access areas to avoid harming ecosystems. Hiking trails should be designed as minimum maintenance facilities.
- Develop an educational program regarding public access.
- Acquire access property (in South Burlington), via WVPD, land trust, or City of South Burlington, for recreational use.
- Establish a park, picnic area and access on Essex Junction side of river downstream from Essex 19.
- Negotiate with power companies for parking, access sites and portage trails at power dams.
- Insure access at Bolton Falls Dam (i.e. railroad crossing).

- Potential Long Trail crossing 1/4 mile west of Central Vermont Railway Bridge in Bolton would allow canoe access to both sides of the river.

- Expand Bamforth trailhead at the Winooski River for river users and/or consider improvements to Winooski River streambank parcel owned by Fish and Wildlife, including parking and path to river.

- City of Winooski should work with the WVPD to provide improved access and pathways to the two-acre open space parcel in western Winooski village.

- Add an access at Jonesville.

- Develop a boat entry point in Richmond with coordination with the Richmond Recreation Committee.

- Establish a pedestrian access outside of Burlington, South Burlington and Winooski.

- Provide public access at North Williston Bridge if it is repaired or replaced.

- Agency of Transportation should provide rest areas adjacent to major roads.

- Access points to consider for purchase or to secure for public benefit:
  - At unnamed road on the east bank of the Huntington River (first left south of East Street). Currently used as a put-in.
  - Off Main Road in Huntington below Huntington Center although parking is restricted.

- Existing pulloff off Huntington Road south of junction with Main Road. Used by locals for swimming in the summer and boaters in the spring. If not owned by the Audubon Society, this is a high priority site because below it is the best Class I-II whitewater section on the Huntington, down to the Gorge.

- Do not acquire access at Huntington Gorge because of liability considerations, <u>unless</u> this area is threatened with development.

- On Governor Chittenden Road (Winooski River) where hay field is currently used by anglers, swimmers, and canoeists. Pine Ridge School may own land closeby; it may be an alternative (and less expensive) access option.

- Establish a managerial niche within the Agency of Natural Resources for non-trailer river access sites that involve general river recreation.

- Secure public access through ownership or easements.
- State must consider Winooski River corridor lands as priority.
- State must work closely with land trusts and conservation organizations.
- Locate all existing and potential public access points and decide who will do acquisition.
- Institute user fees.
- Negotiate with landowners to obtain legal access across their properties to the river.
- To reduce vandalism at access areas and trails, institute bicycle or horse police patrols; close at night; provide lighting.
- Improve attitudes.
- Reduce ltter.
- Institute a Green-Up project and river clean-ups.

Trails

GOAL: ***Coordinate with WVPD and private landholders to provide citizen pathway access along the entire length of the Winooski River, including a connection from downtown to the Winooski Natural Area. Include consideration for multipurpose trails.***

ACTIONS:

- Develop loop for Burlington bike path to connect to other communities.
- Extend Burlington bikeway into Colchester and along Sunderland Brook to Sandbar State Park.
- Develop a nature trail from the Salmon Hole downstream.
- Develop a trail system and access points with WVPD and Burlington Parks and Recreation in Intervale area from Salmon Hole Park to the Ethan Allen Homestead; connect with the Burlington Bike Path to Colchester and Winooski.
- Establish a joint trail system between South Burlington and Williston along Muddy Brook; also along Winooski River.
- Bike path along Allen Brook.

- Establish trail system (bike path) along the entire river.

CHAPTER 6

SUMMARY

The Lower Winooski River Planning Project is a grass-roots, citizen-based process. All the values, issues, goals and actions have been put forth by river user interest groups, lower basin towns and regional planning commissions. Also, public comments have been incorporated from special projects and studies. The goals and actions were selected from literally hundreds. The selection process was guided by the results of the Alternative Futures Project's Vision Statement, 2010.

The State Water Quality Division, in a sincere effort to maintain this as a public process, has refrained from putting forth its ideas, other than to organize the inventory and public comments. Implementing will take a commitment of many individuals, groups and organizations. It also needs a lead organization to either assume responsibility or assign responsibility. The Lower Winooski river Basin Plan recommends that the Chittenden County Regional Planning Commission assume the lead responsibility. It may be that the Winooski Valley Park District would take the lead if they had more help and money. Funding from private business, such as Green Mountain Power Corporation could be requested to assist in this effort.

With total cooperation from all lower basin interests, the vision for the River and its tributaries could reasonably be achieved by the year 2010. The project is an exciting one, and will enhance everyone's goals of clean rivers and streams, with vegetated buffers, public access, good fishing, sufficient waste assimilation, power production, boating, natural area and agricultural land protection, public education and aesthetics.

A P P E N D I C E S

Appendix A

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APPENDIX B

Municipal and Interest Group Meetings

APPENDIX B

MUNICIPAL AND INTEREST GROUP MEETINGS

DATE	GROUP/MEETING
10/11/89	Project Kick-Off
10/19/89	Project Kick-Off
11/2/89	Boating Interests
11/15/89	Richmond Planning Commission
11/9/89	Fishing Interests
11/13/89	Colchester Planning Commission
11/28/89	Jericho Planning Commission
12/12/89	South Burlington Planning Commission
12/14/89	Essex Village Planning Commission
1/8/90	Duxbury Planning Commission
1/9/90	Burlington Planning Comm. Executive Committee
1/17/90	Winooski Planning Commission
1/23/90	Green Mountain Power Corporation
2/1/90	Williston Conservation Commission
2/8/90	Agricultural Interests

DATE	GROUP/MEETING
2/21/90	Open Space/Recreation Interests
2/27/90	Business Interests
3/8/90	Huntington Planning Commission
3/22/90	Essex Town Planning Commission
4/9/90	Bolton Planning Commission
4/16/90	Water Quality Interests
5/16/90	Landowners
5/21/90	Focus Group
1/14/91	Alternative Futures
1/17/91	Planner's Lunch
5/91	Landowner's Attitude Survey

APPENDIX C

Minutes and/or Summaries of Meetings With River User Groups

LOWER WINOOSKI PROJECT - MEETING WITH BOATING INTERESTS

HELD ON NOVEMBER 2, 1989

ATTENDEES:

Ray Gonda
Bob Schumacher
Jay Appleton
Jerome McArdle

NOTES:

Ray Gonda has identified 2,000 (+/-) acres along the Lower Winooski which should be in public ownership. About a year ago, he met with approximately 50 landowners and local, regional, and state officials to discuss acquisition opportunities. It was suggested that funds be requested from the Housing, Conservation and Trust Fund for acquisition (Follow up with a landowner list and the status of this effort).

Ray noted certain areas that should be acquired, including:

1. Vilas Swamp, owned by Hugh Fitzgerald
2. Half Moon Cove, owned by Audrey DeForge
3. Derway Island, optioned by Northshore Development
4. Upriver of Heineberg Bridge - Charlie Scribner wants land preserved
5. Near mouth - landowner wants to donate 1 acre to boy scouts.

Most of the meeting was devoted to identification of good boating areas on the Lower Winooski. These included:

1. 1 mile below Bolton Falls has Class II boating - to the Railroad Bridge in Duxbury.
2. A 7 -8 mile segment below the Railroad Bridge in Duxbury to a picnic area in Richmond has Class I boating - very popular with nice flatwater & riffles.
3. Between Richmond and Essex Jct. - flatwater, nice canoeing and fishing.
4. A short Class II segment below Essex Dam #19 is used for a kayak school

5. Below the Essex Sewage Treatment Plant to the Winooski Gorge is moving flat water
6. There is a short whitewater "play area" above Winooski Falls, but without access. Winooski I hydro project may impound this area.
7. Around the Salmon Hole, there are nice "play areas"
8. From Huntington Lower Village (Hanksville) to Huntington Gorge, there is excellent Class II springtime boating (approximately 10 miles).
9. Note: Excellent swimming at the "pot holes" on Joiner Brook.

ISSUES:

1. Access:

    a. There is no access upstream of the Winooski Bridge (below Gorge #18).
    b. Need better access on Essex Jct. side of river near Rte. 2A.

2. Water Quality:

    a. Poor water quality from Mill Brook to IBM plant.
    b. Essex Sewage Treatment Plant???
    c. Identify farms without manure storage

3. Hydro:

    a. Paddlers like peak operating modes because they like waves caused by discharges when generating.

VISIONS:

1. Provide/develop access at Essex #19 powerhouse like that at Bolton Falls (with parking). A road already exists behind the powerhouse.
2. Channelize the Winooski below Essex #19 and throw in boulders to create a white water run with a "wave"

Meeting with Richmond Planning Commission
Toby Duxton, Chairman
November 15, 1989

___ Send planning commission forms and maps.

Planning commission had 3 to 4 members present; about 10 public were there, and another 10 to 15 came in as I was discussing the Rivers Program (this many people were there for the town planning kickoff where they were to sign up for the committees).

Questions:

1. Will towns be asked to approve the plan?

   A. No. The plan is nonbinding on the towns. They will be given opportunities to review it before actions are implemented.

2. Should individuals fill out inventory forms or should the planning commissions?

   A. Anyone and everyone. If they want to get together as a group and fill out one form according to their interest area, that is fine.

3. If need for access is identified, how can they be acquired/developed?

   A. We would seek ideas from the public.

(There were a few other similar questions and I answered them all the same.)

One gentleman spoke of a canoe group that used an access (park) in Richmond every spring. He also mentioned a group of canoers (same one) cleaned the river banks every year.

After our discussion, the chairman then asked people to sign up for committees to start working on the inventory phase of the town plan. This is part of Act 200. Richmond essentially has no plan because the present one is very out of date. They are hopeful to have a plan done in a year.

They will send us a list of the people signed up for the natural resources committee so we can network with them regarding our needs.

Chittenden County Regional Planning Commission is assisting Richmond. The contact person is Brian Heir.

The Simendinger (oil storage) proposed development came up by Jeff Forward after the meeting. He claims they were denied a public building permit due to its being in a flood plain (septic system). Simendinger is appealing the decision. May or may not go through Act 250.

Raises questions regarding developing/not developing flood plains. Colchester, through zoning, does not allow it.

NOTES FROM MEETING WITH FISHING INTERESTS:

Trout Unlimited and the Lake Champlain Walleye Association were clearly at odds regarding their future stocking visions. However, they were clearly united regarding their major concern/issue, which was lack of flows. Secondly, they were concerned with water pollution.

LIKES:

1. Proximity of the river to home
2. "Wilderness" characteristics and abundance of wildlife
3. River is relatively unpolluted - and water quality improves upstream
4. Very pretty, especially along upper river
5. Lower Winooski is really two rivers - from Essex or Richmond upstream and then downstream from there
6. Tremendous potential for any fish
7. Could catch anything at one time
8. Good access and no problems with fishermen and landowners

DISLIKES:

1. Insufficient Flows - from Bolton Falls downstream
2. Dam operation destroys fish habitat, especially during July and August
3. Pollution, and nonpoint runoff, like manure, below the railroad bridge in Winooski
4. Sewer systems - don't take stuff out????
5. Excessive water temperatures - over 90 degrees at times
6. Siltation from runoff
7. Ponding behind dams causes stream erosion
8. No gravel should be removed during spawning season
9. Access points are crowded along the Lower Winooski
10. Suds from storm drain below the Salmon Hole
11. Cannot navigate boat beyond mouth (upstream) due to siltation

GOALS:

1. Increase flows and require minimum releases year round
2. Provide fish passages for spawning (trap and truck)
3. Need fish stocking
4. Steady flows to operate pending Winooski One Project
5. More law enforcement for fish and wildlife and pollution violations

6. Trout Unlimited wants river managed for trout and salmon on lower river and for resident brown trout on upper river.
7. Walleye Assocation - wants river managed for walleyes.

FISHERIES CONSIDERATIONS - Brian Chipman

1. Cannot manage the fishery on the Winooski until more flows are provided.
2. Steelhead and landlocked salmon are stocked downstream.
3. Brown trout and rainbows are stocked above Bolton Falls.
4. The Winooski is coming back (regarding water quality).
5. Walleyes that are caught are from the south end of the lake - they do not spawn in the Winooski. Walleyes that do spawn in the Winooski fail, because the eggs are affected by irregular flows.
6. No fish kills have occured on the Lower Winooski.

PROPOSED ACTIONS:

1. Release additional water out of Waterbury Reservoir (to provide colder water to Winooski).
2. No gravel removal during spawning.
3. Fence cows out of river.

OTHER:

1. Estimate that two dozen people fish the Lower Winooski daily
2. From 30 to 50 cars visit the Bolton Falls access daily???
3. Walleye fishermen fish from the Lake to Salmon Hole
4. Trout Unlimited members fish from IBM to Bolton Falls.

LOWER WINOOSKI PROJECT - MEETING WITH FISHING INTERESTS

HELD ON NOVEMBER 9, 1989

ATTENDEES:

Lee Roscoe	27 Holy Cross Rd., Colchester Lake Champlain Walleye Association 863-2021
Walter Pretty, Jr.	177 Porters Point Rd., Colchester Lake Champlain Walleye Association
Ron Beaudoin	North Ave. Extension, Burlington Lake Champlain Walleye Association 863-2071
John Warshow	26 State Street Montpelier, VT 223-7141
Brian Chipman	Vermont Fish & Wildlife 111 West Street, Essex Jct. 878-1564
Phil Kelleher	60 Manor Woods, S. Burlington Central Vermont Trout Unlimited 658-2307
Edmund Symula	RR 2, Box 2755, Underhill Trout Unlimited 769-8847; 899-3069
Derek Lorrain	34 Matthew Ave., Burlington 863-2011
Jerome McArdle	VT ANR-Water Quality Planning 103 S. Main, 10 North Bldg., Waterbury 244-6951

Meeting with Colchester Planning Commission
November 13, 1989

Most of the land in Colchester along the Winooski is zoned "wetland" and/or "flood plain", so there is no pressure to develop there.

An area on the west side of Heinenberg Drive is physically accessible but wet. They would like it developed as a park. Fish and Wildlife has proposed developing a boat launch for walleye fishing. However, the town is reluctant to okay it due to the potential for additional streambank erosion. (Although they admit they don't know how much boating contributes to the erosion problem.)

At least one planning member would like to see a greenbelt around the town with the Winooski River as a part.

Also, the town is promoting the extension of the Burlington bike way into Colchester, utilizing the old railroad bridge abutments for a bridge. If the bridge is rebuilt (there are other alternatives), sailboats wouldn't be able to go under it and get access to the river upstream. The town would also like to see a linear park utilizing the old railroad right-of-way.

They have an ad hoc recreation committee but their main focus is on Mallett's Bay. However, they recognize the near wilderness value of the lands and want to preserve it that way.

The town wants to see access areas but can't develop due to vandalism. They are really concerned about the popular one at Mallett's Bay and have been trying to negotiate with Fish and Wildlife to share the cost of building a new one and maintain it. Of particular concern has been the lack of toilet facilities and uncontrolled crowds. Joe Healy, Fish and Wildlife Business Manager, claims Colchester hasn't come forward with a specific, unified proposal. If and when they ~~do~~ town do so, they ~~will~~ department will seriously consider it.

Meeting with the Jericho Planning Commission

November 28, 1989

Present: Jackie Thompson; Town Planner; approximately 10 planning commission members; Mark Smith; Jerome McArdle; Albert Lindholm III; and the co-chair of the Conservation Committee.

The Jericho Planning Commission has not concentrated much attention on their 3 1/2 miles of Winooski River corridor. This is due to the fact that the river is on a border area of the town with few people in close residence. Most of Jericho's attention is centered on the Brown's River, which flows through the town's population center.

When asked their vision for the Winooski River, the planning commission wished to see the scenic beauty of the river corridor maintained on the west side of Route 117 while allowing or encouraging some light industrial development on the east side of Route 117. Commission members commented that the Route 117 corridor was an important greenbelt that should be maintained as such. Members also noted that in the future, Jericho may need a sewage treatment plant with a discharge to the Winooski River.

Jackie Thompson agreed to put the planning commission's vision for the river in writing for us. Additionally, other groups in town, namely the Conservation Commission, Jericho Land Trust, and Mount Mansfield River Watch groups, should be asked to do the same.

Jerome J. McArdle

LOWER WINOOSKI PLANNING PROJECT

Meeting with the South Burlington Planning Commission

December 12, 1989

ATTENDEES:

Joe Weith, City Planner
Seven Planning Commission Members
Michael Allen, Burlington Free Press
Sidney Poger, The Other Paper
Jerome McArdle, ANR
Mark Smith, ANR
Members of the Public

GENERAL:

After Jerome McArdle and Mark Smith presented the Rivers Planning Program to the Planning Commission, the Commission had several questions with respect to the process/program. There was no discussion of the City's present or future use of the river, however, Commission members did agree to fill out questionairre forms by January 15th or shortly thereafter. They will ask for input from South Burlington's Natural Resources Committee in completing these forms.

QUESTIONS/ANSWERS:

1. A Planning commission member asked who from South Burlington is on the Citizen's Advisory Committee.

   We responded that the Committee members were not selected on a geographical basis, but according to the river interest that they represented.

2. Mr. John Belter inquired why landowners have not been notified of the program and meetings to date.

   We responded that he and other landowners were on our mailing list of persons notified in September, both through the mail and by telephone.

3. A Commission member wanted to know our river planning goals.

   We responded that the process requests the public to determinte goals and actions, and that goals input from the South Burlington Planning Commission, as well as from other interested citizens and groups, would be incorporated to the Lower Winooski River Plan.

4. Another member wanted to know how the public can be informed about meetings and how interested persons could get involved with the process.

   We replied that in addition to the mailings, we are contacting people by telephone to attend meetings according to their interest. We agreed that we could improve communication by sending notices about future meetings to City or Town Planners, Planning Commissions, and to City/Town Clerks for posting. In addition, we are interested in adding to our mailing list as deemed necessary.

BURLINGTON PLANNING COMMISSION
149 CHURCH STREET
BURLINGTON, VERMONT 05401
Telephone: 802/658-9300 Ext. 165
802/655-9300 (TDD)

April 16, 1990

Jerome McArdle
Agency of Natural Resources
Dept. of Environmental Conservation
Water Quality Division
103 So. Main St.
Bldg. 10 North
Waterbury, VT 05676

Dear Mr. McArdle:

Thank you for inviting the City of Burlington to participate in the Comprehensive Rivers Plan of the lower Winooski River. This letter will update you on the city's involvements with the Winooski Riverfront.

For the past 12 months, the Waterfront Board has been working on a Winooski River Fronts Plan. This document will include the board's reservations, goals, and recommendations for the area from the Winooski bridge tot he mouth of the River. The report will divide this area into three sections; Riverside Avenue, the Intervale area, and the Howe Farm/Derway Island. While the Waterfront Board report has not been reviewed or adopted by the Planning Commission, it will represent a citizens' perspective on future goals for Burlington's Winooski Riverfront. This report will be available in April.

During the fall of 1989 the Planning Department was fortunate to have a UVM intern complete an inventory of Burlington's Winooski Riverfront. The inventory documents the natural, cultural and recreational resources of the land adjacent to the river on the Burlington side. The report includes the following: current landuse, ownership, present zoning, soil type, slope, public access areas, recreational values, and recommendations for future use and development. Enclosed is a copy of this report.

The Winooski River is a vital natural resource to the City of Burlington. Both the Planning Department and Planning Commission are deeply concerned about its future. The following is a list of our responses to River Values, Issues, Goals and Actions as you have requested:

In no particular order,

RIVER VALUES

Open Space	- Parks, wildlife, waterfowl, natural land corridor linking large tracts of land together for animal migration.
Water Quality	- Tributary to Lake Champlain/breeding waters for fish.
Recreational Resource	- Boating, shoreline fishing, sculling, picickng, hiking.
Aesthetic Value	- Enjoyment of open space, attractive natural environment, scenic vistas.
Waterfowl and Wildlife Habitat	- Provides habitat for numerous species/biological diversity.
Educational	- Nature programs for children and adults to learn about our natural environment.
Wetlands	- Provides flood protection, filters pollutants, provides habitat for plants, animals.
Plant Life	- Rare species native to Vermont exist here/diverse group.

ISSUES

Erosion	- Concern of erosion - who should be responsible to protect river banks?
Development Adjacent to River	- How much should we allow, if any, and where?
Wetlands Mitigation	- Proposed mitigation in intervale may work or not work. What will it do to the landscape if it fails?
Abandoned Areas/ Homeless Shelters	- Trash build up, unsightly, safety.
Public Access	- We need more access areas, including those that will be handicapped accessible.
Water Quality	- Concern over pollutants - we must <u>all</u> take responsibility - all towns and cities adjacent to river or tributary.

Maintenance - Who should maintain/patrol area - perform upkeep/provide safety?

Spreading of Sludge - Concern of metals in soils.

Hydropower at Winooski Falls - What will this do to the fish populations/spawning/temperature of the water?

Zoning - Will rezoning an area protect it from development? improve the area?

Visual Corridors - How to enhance and maintain views without disturbing bank stabilization.

Agricultural Use - How much should we allow and what kind.

Trails - What kind of trail system should be built? should it be paved? where should it go - do we link with Winooski and Colchester?

Acquisition of Land - How can we purchase land? Should we purchase land. If so which pieces and who will own it? Winooski Valley Park District?

Parking for Public Access - If we improve access areas or make additional ones, wherewill people park? bicycle racks?

Funding - Where will the money come from to make these improvements?

Education

GOALS AND ACTIONS

GOAL: Encourage protection of ecologically sensitive areas, discourage any sort of development in flood plains and areas that should remain in their natural state on Derway Island, parts of the Intervale.

ACTION: Create a new zone such as RCO - Natural Area for those areas that should remain in their natural state - no development of any kind.

GOAL: Maintain or improve the aesthetic quality of the intervale area and across the river - for better views from the new park (old dump site).

ACTION: Work with Colchester and Winooski on a Winooski River Plan - addressing visual quality.

GOAL: Improve public access.

ACTION: Create additional access points and make them accessible for those people with disabilities.

GOAL: Prevent unattractive/unnecessary development close to the Riverfront.

ACTION: Work with the Winooski Valley Park District and Burlington Parks and Recreation to purchase land or land rights.

GOAL: Improve Waste Water Treatment Facilities to help improve water quality.

ACTION: Upgrade treatment facilities (project in planning stage) and visual quality of plants.

GOAL: Encourage/promote quiet water sports and recreational opportunities.

ACTION: Develop trail system (and access points) with Winooski Valley Park District and Burlington Parks and Recreation in Intervale area from Salmon Hole Park to the Winooski Valley Park District, connect with the Burlington Bike Path and Colchester and Winooski.

GOAL: Provide Environmental Educational Opportunities for children and adults.

ACTION: Work with the Winooski Valley Park District, Conservation Board, School Departments, Burlington Parks and Recreation to create programs, self guided nature walks, etc.

We hope you find this to meet your needs. We look forward to reviewing the compilation of responses.

Sincerely,

Beverly S. Wool

Beverly S. Wool
Chair, Burlington
Planning Commission

C:MCARDLE.045

LOWER WINOOSKI PLANNING PROJECT

Meeting with Green Mountain Power Corporation
January 23, 1990

Attendees:
Eugene L. Shlatz, GMP
Michael A. Murphy, GMP
Terry Cecchini, GMP
Nancy Huelsberg, GMP
Jerome McArdle, ANR

Jerome McArdle briefly explained the state rivers program and the progress made to date on the Lower Winooski project. He then asked the group to identify their present use of the river, issues or concerns and their future goals for the river, identifying, where possible, actions to carry out their goals.

Present Uses/Actions

- Green Mountain Power received a demonstration grant of $2.5M from D.O.E. in 1986 to re-develop Bolton Falls hydro.
- Bolton always passes at least 300 cfs, or whatever flow is in the river.
- In 1987, GMP, in cooperation with ANR, established minimum flows of 167 cfs, or 7Q10 at Essex #19 and #18. In actuality, 270 cfs has been passed 90% of the time, according to the USGS gage below Essex #19. Gorge #18 passes everything.
- GMP spills water when minimum flows are not occurring.
- Flow releases for kayakers if asked . . . on an ad hoc basis.
- GMP owns property along the river other than at their hydro facilities. Greg Morgan is compiling an inventory of GMP's land, including that which is leased to the Winooski Valley Park District.
- Nancy Huelsberg is working with the Heritage Program, identifying locations of threatened/endangered species.
- GMP is presently working on responses to requests for studies for relicensing.

Issues

- Loss of peaking power. GMP would like to generate at maximum capacity of 2000 cfs because hydro power is clean and half the cost of fossil fuel for peaking. However, they would not like to see a "dead river."

- GMP is concerned with proposals to build paths and other features in the flood plain due to potential liability.

- Trash in the river is a concern.

Goals

- GMP would like to see improved access, especially for heritage program-related areas.

- Have school tours of Essex #19, historical and archaeological sites along the river.

- Produce as much peaking energy as possible with minimal spillage and a balance of uses. This could be achieved by replacing the existing generators with more efficient ones.

- Enhance the river as a laboratory . . . particularly for children. Work with schools to develop river education programs. Need better access . . . where GMP already owns.

- Improve the flows (this has been done to some degree already).

- GMP wants to acquire more access areas and improve/ enhance existing accesses.

vlh

GREEN MOUNTAIN POWER CORPORATION
GREEN MOUNTAIN DRIVE • BOX 850 • SO. BURLINGTON, VT 05402 • (802) 864-5731

EUGENE L. SHLATZ
ASSISTANT VICE PRESIDENT

May 24, 1990

Mr. Jerome J. McArdle
Water Resources Planner
Department of Environmental Conservation
103 South Main Street, Building 10 North
Waterbury, Vermont 05676

Dear Jerry:

Your efforts to make the Lower Winooski River Planning Process successful are paying off. I want to thank you for the leadership and coordination you are bringing to the effort.

Attached is GMP's Use and Value Inventory and Management Goals and Recommended Actions that you have asked users and stakeholders to submit. Of course, Green Mountain Power's submission represents the view of the operator of hydro-electric facilities.

Please let me know if additional information would be helpful. Again I appreciate your work on this most important public planning program.

Sincerely,

Eugene L. Shlatz

Eugene L. Shlatz

Vermont Comprehensive Rivers Program
Management Goals and Recommended Actions

Name:	Eugene L. Shlatz, Assistant Vice President of Engineering & Electrical Operations
Address:	P.O. Box 850, South Burlington, VT 05402 Ph. # 864-5731
Affiliation:	Green Mountain Power Corporation
River:	Winooski
Segment and/or Tributary:	Lower Winooski
Use/Value:	Hydropower

River Issues and Opportunities:

The Lower Winooski River offers many things to Vermont. It is a source of recreation, providing boating, fishing and hiking opportunities. Striking mountain and forest views and green ways make the river corridor a true Vermont environmental treasure. And the Lower Winooski has been a working river, providing some of the state's lowest cost electrical energy, power to run mills, and a method to dispose of treated effluent.

Management Goals

Green Mountain Power's goal is to operate the company's two hydroelectric facilities on the Lower Winooski in a manner consistent with the biological integrity of the river and in response to its customers varying demand for electrical energy. Supplying the varying demand with renewable hydroelectric energy provides an economic advantage to all customers and avoids the use of more expensive and environmentally costly fossil fuels, which may lead to increased acidity in rain, air pollution, and changes in the atmosphere and climate.

Also it is a GMP goal to relicense Essex Plant 19 with the Federal Energy Regulatory Commission (FERC).

As participants in Vermont's Comprehensive Rivers Planing process and the Federal Relicensing process, GMP's goal is to work toward enhanced and efficient uses of the Lower Winooski Basin, which include power generation, fisheries and recreation. Toward that end, the Company is working to protect the environment of the river basin while maximizing generation of electrical energy from the hydro-electric plants.

Actions to Accomplish Goals:

- Continue to lease, donate or develop appropriate GMP property near the river for recreational purposes;
- Increase continuous river flows at Essex No. 19 above the current 167 cfs (7-Q-10) levels;
- Conduct appropriate studies of the Lower Winooski River surrounding Essex No. 19 to determine which actions will best balance electrical energy production with other uses;
- Actively participate in the Comprehensive Rivers Planning Process and any future planning and protection projects that emerge from the current assessment of the River;
- Establish and cultivate cooperative working relationships with groups that have an interest in the River and its various uses.
- Provide opportunities for the public to learn more about the Company's hydro-electric facilities and their relationship to the river's sensitive ecological system.

date prepared: May 1990

Vermont Comprehensive Rivers Program
Existing River Use and Value Inventory

Name:	Eugene L. Shlatz, Assistant Vice President of Engineering & Electrical Operations
Address:	P.O. Box 850, South Burlington, VT 05402 Ph.# 864-5731
Affiliation:	Green Mountain Power Corporation
River:	Winooski
Segment and/or Tributary:	Lower Winooski
Use/Value:	Hydropower

Green Mountain Power Corporation owns and operates two hydroelectric plants on the lower Winooski basin. Those two plants are known as Essex Plant 19, which is located on the Essex, Williston town lines and Gorge Plant 18, which is located on the Colchester, South Burlington town lines.

Plant 19 began operation in 1917 and was deeded to GMP by the Burlington Light and Power Company in 1928. The plant has four turbine-generators, each with a generating capacity of approximately 2 megawatts. The flood of 1927 brought 22 feet of water into the power plant but the dam itself suffered no permanent damage. The concrete dam is 494 feet long and 55 feet high and is situated at the head of the Williston Gorge. In 1988, the dam was resurfaced to eliminate minor water leaks. In addition, the plant is in the process of being completely automated so it can be operated remotely from the Company's dispatch center.

Plant 18 was built in 1928. It has one unit that is capable of producing approximately 3 megawatts of electric power.

Both of these facilities are operated as daily cycling plants and provide GMP 's customers with low-cost electricity.

In August 1987, GMP launched an environmental initiative which provided a minimum flow of water in the Lower Winooski River. Under the program, the operational procedures of both Plants 18 and 19 were changed to provide a minimum flow of water of 167 cubic feet per second (cfs) below both powerhouses whenever there is sufficient water in the Lower Winooski River.

GMP chose to pass 167 cfs because of the sewage treatment plants were decreasing water quality in the area. The 167 cfs flow was calculated to be the flow necessary to allow proper assimilation of the effluent from the treatment plants.

Two GMP owned parcels of land bordering the Lower Winooski are registered with the Nature Conservancy's "Natural Areas Registry Program" because they are home to rare plants. The "Twin Bridges" area in Colchester contains Slender Mountain Rice, Yellow Panic Grass, and Buffalo Berry, and land surrounding the Gorge Power House in Winooski harbors Low Bindweed. Through this voluntary environmental protection program GMP is cooperating with the Nature Conservancy to assure the continued protection and nurturing of these rare plant communities.

In December 1988 GMP donated the Salmon Hole, a parcel of land on the Winooksi River to the Winooski Valley Park District. The 5.6-acre site, is located off Riverside Avenue in Burlington. The Salmon Hole is Vermont's major spawning area for landlocked salmon and steelhead rainbows as well as walleye. The Company also maintains a picnic area and canoe portage on the river bank at Plant 19 to ensure public access to the river.

GMP leases 110 acres of land divided into nine separate parcels along the Lower Winooski River (four islands and five separate pieces fronting on the river) to the Winooski Valley Park District (WVPD). The parcels range in size from less than one acre to over fifty acres.

Detailed information on fishery resources, wildlife resources, botanical resources, historical and archaeological resources, recreational resources, and scenic and aesthetic resources relating to the Lower Winooski River can be found in GMP's Initial Consultation Document (ICD) for Essex #19 hydroelectric project. The ICD is dated June 1, 1989 and is available by calling GMP's main office in South Burlington.

date prepared: May 1990

LOWER WINOOSKI PLANNING PROJECT

Meeting With the Williston Conservation Commission
February 1, 1990

ATTENDEES:

Dick Park, Chair
George Little
Jim McCullough
Gail DeSorda, Planning Commission
Jeff Olson
Elaine Park, Staff
Jerome McArdle, Department of Environmental Conservation

After Jerome McArdle presented the rivers program and the work to date, there followed some discussion with respect to Winooski River, Mud Pond, and Muddy Brook.

Mr. Little wanted to know how to provide additional protection for the Class II wetlands on Mud Pond. I told him I would ask Lisa Borre to get in touch with him (which I did on my return to Waterbury).

The commission wants the town to be notified in the event the North Williston bridge over the Winooski is replaced. This could offer options for public access to the river. They would like to see commuter trains run between Burlington and Montpelier.

The problem of cows walking up and down the river banks, causing erosion, was mentioned. Fencing was suggested to prevent the cows from doing this, but commissioners felt it would be too expensive and would keep people out too.

Mr. Little suggested that we invite Senator George E. Little Jr. to be involved with the Lower Winooski project since he was involved with the Ethan Allen Homestead project.

Williston has a prime agricultural mitigation plan where developers are required to donate money to buy alternative prime agriculture land. They are working to implement transferable development rights (TDRs) in their town plan.

Dick Park stated that the commission believes that Muddy Brook is more significant than Allen Brook (gorge, rapids, etc.). He also suggested that the Park District should assist with a unified trail plan.

In closing, the commission was asked to fill out a questionnaire and return it to the department. We should request Williston's town plan and zoning regulations.

I. VALUES and USES

1. OPEN SPACE or SCENIC:

A. Land Use:
- The river is undeveloped and in a natural state.
- The river buffers farmland and open spaces from development
- Open land and scenic attributes along river.
- High scenic value of the river and tributaries, including the Huntington.
- Visual landscape.

B. Historic Features:
- There are archaeological sites and potential sites along the Winooski River.

2. NATURAL RESOURCES:

A. Soils (including gravel)
- The Winooski River Valley possesses some of Vermont's finest agricultural soils.
- Floodplain soils are some of the most productive in the northeast and offer unlimited agricultural potential.
- Gravel is a natural resource that we should use.

B. Water Quality:
- Some progess has been made in cleaning up the river.

C. Fish and Wildlife:
- Wildlife habitat.

D. General:
- The Winooski River is a great resource that should be protected at all costs.

VALUES and USES (continued)

3. RECREATION:

A. Opportunities and Use:
- The river offers recreational opportunities, including fishing and power boating.

B. Access:
- Good fishing access.

II. ISSUES

1. OPEN SPACE or SCENIC:

   A. Land Use:
   - Building encroachment on floodplains.

   B. Historic Features:
   None listed.

2. NATURAL RESOURCES:

   A. Soils (including gravel):
   - Development on floodplains is an issue.
   - Streambank erosion is an issue.
   - Flooding is an issue.
   - Should farm landowners and operators be allowed to remove river gravel beyond limitations imposed by state regulations? (rationale for gravel removal includes: a necessity to prevent streambank erosion; a supplement to farm income; farmers pay taxes and considerable money on streambank stabilization; and a needed commodity of the towns and other users).
   - Fishermen are opposed to gravel removal because it destroys fish habitat.

   B. Water Quality:
   - What about snow dumping in Montpelier? (Why allow it and not graveling?)
   - Farm manure.
   - Agricultural runoff; urban runoff; CSO's; salt pollution and other runoff from snow dumping; other nonpoint source pollution.
   - Water quality needs improvement.
   - Should water in Winooski River be swimmable?

   C. Fish and Wildlife:
   - Fishermen are opposed to gravel removal because it destroys fish habitat.

   D. General:
   None listed.

ISSUES (continued)

3. RECREATION:

A. Opportunities and Use:
- Powerboats on river (preferable or not?)
- Vandalism of landowner's property, for example, cutting fences and leave litter.

B. Access:
- Anglers and other recreational users trespass on farmers' land.
- Recreationists do not pay for use of private lands.
- Additional access areas are needed.

III. GOALS and ACTIONS

1. OPEN SPACE or SCENIC:

A. Land Use:

G Maintain greenbelt along the river; protect floodplains from development; keep river undeveloped.

A No private housing or industrial development.
A Utilize development controls.
A Institute stricter floodplain laws; reduce development impact on floodplains.
A Compensation for restrictions that would preserve a scenic corridor.
A Have town Conservation Commissions work on greenbelts and other open space actions.
A Work with farmers and landowners to purchase development rights.
A Contact Housing and Conservation Trust Board for assistance; increase funding to Housing and
A Conservation Board to allocate for purchase of development rights of agricultural land and other natural areas.

Historic Features — None listed.

2. NATURAL RESOURCES:

A. Soils (including gravel)

G Stabilize eroding streambanks.
G Permit gravel removal for sale to stabilize streambanks and to supplement farm income.

A Increase funding from federal and new funding from state and local governments for streambank stabilization.
A Improve cooperation between state and landowners on gravel removal to reduce erosion.
A Reform state laws on gravel removal.

B. Water Quality:
G Improve water quality; make river clean enough to swim in.
G Keep river available for effluent disposal.

A Reduce nonpoint source pollution and better enforcement of water quality statutes.

GOALS and ACTIONS (continued)

2. NATURAL RESOURCES (continued)

B. Water Quality:

A Clean up municipal sludge problems and STP problems.

A Prohibit Montpelier's salt dumping; fine City if practice continues.

A Monitor leachate from the dump along the river.

A Police river for cleanliness.

C. Fish and Wildlife:

G Manage river for better fishing.

D. General:

G More or improved dams to better control floodwaters.

G Protect resource at all costs.

3. RECREATION:

A. Opportunities and Use:

G Provide more recreation opportunities, including corridors, walkways, parks, and boating.

A Encourage development of public facilities, including canoe rentals.

B. Access:

G Develop adequate, possibly more, public access to the river.

A Encourage respect for private landowner rights.

A Develop information program to explain rights of landowners to the public and keep trespassing to a minimum.

A Develop more access for canoeing, boating, and fishing.

A Keep river open for boating.

A Reduce litter.

LOWER WINOOSKI RIVER
COMPREHENSIVE RIVERS PROGRAM

Summary of Small Group Discussion Results From
Open Space/Recreation Meeting on February 21, 1990

GROUP 1

- Vandalism/Parks
  - Regular Patrol
  - Close at Night
  - Lighting
  - Attitude Problem
- Trail, Williston, Burlington
- Green path
- Hire coordinator to oversee multi-town project (needs authority)
- Planning localized/regionalized
- Williston has four new river parks proposed
- River programs need staffing (farm issues, park maintenance, coordination. Possible assistance through the relicensing process)
- Create and maintain river focused plan. Link to Act 200 planning/regional planning
- Watershed focus for planning
- CCRPC adopt Lower Winooski Comprehensive Rivers Plan or portions of it
- Create rivers commission
- Use volunteer labor to maintain access to river
- Use Woodside residents to adopt project and maintain
- Encourage river watch programs
- Education programs for river conservation
- Williston:
  - Williston landfill near river, should be closed to look natural
  - Impact of reg. landfill site in Williston on river needs analysis
  - Coordinate river goals with highway projects (i.e., Circumferential Highway, North Williston Bridge)
  - Keep cons out of river
- Duxbury Natural Resources Committee:
  - Uneven water flow below Bolton Falls disturbs canoes and fishing (is cause Little River or Bolton?)
  - Good canoeing Duxbury to Jonesville because of limited access. Don't add access.
  - Add Jonesville access
  - Salmon used to come to Ridley Brook. Want fish back. (Trap and truck proposed from Chase Mill upstream.)
  - Ridley Brook needs zoning. Survey and declare Class A

- Huntington Conservation Committee
  - Don't forget tributaries
  - Need local septic regulations
  - Look at setbacks

GROUP 2

LIKES:

- Canoe route
  - Beginner rapids, close to population
- Recreational corridor--active/passive
  - Birding, hiking, fishing, skating, swimming
- "Wilderness" among urban setting
- Long Trail crossing
- Bird and wildlife habitat
- Sewage treatment
- Archeological importance
- Wetlands along river help cleanse/act as "sponge"
- Scenic corridor along '89
- Farmscape of barns, fields
- Tributaries/lakes

DISLIKES:

- Need to look beyond political boundaries
  - Need river basin-wide entity
- Inconsistent definitions of wetlands, flood plains
- Lack of public access
- Need to "buffer" industry, traffic, trash, incompatible uses
- "Gravelling"--taking gravel
- Nonswimmable--C
- Unlined landfills adjacent
- Management of recreation access, numbers
- Minimum flows maintained for recreation
  - Power production
  - Snowmaking from Mad River
- Nonpoint source pollution
  - Ag runoff/road salt/construction/sedimentation/septic tanks
- Loss of wildlife diversity

ACTIONS/GOALS:

- Environmental impact statements regarding new and existing access
- Green-up project
- Coordinated management of entire watershed--siting, management, funding, maintenance
- Public education/awareness
- Coordinated inter-municipal land use "regs" (planning, zoning, etc.)
- School participation--"adopt river"
- Citizens' organization to act as "watchdog"

- Limit development that infringes on habitat
- Additional conservation/public access, expand WVPD
- Limit nonpoint sources--ag practices, road salt
- Coordinate acquisition with towns, regional and national conservation organizations. Also private--GMP, IBM, etc.
- Ensure access at Bolton Falls Dam (i.e., railroad crossing)

ATTENDANCE AT THE
OPEN SPACE/RECREATION MEETING
WILLISTON, VERMONT
FEBRUARY 21, 1990

NAME	ADDRESS	TELEPHONE	AFFILIATION
Marcia Albert	35 Hillside Terrace Shelburne, VT	863-5744 985-8208	Winooski Valley Park District
Alan Quackenbush	RD 1, Box 150 Waterbury, VT	244-7512	Duxbury
Eric Hanson	RR 1, Box 866 Huntington Center, VT	434-2778	Huntington Conserv. Committee
Stephanie Lahar	118 Hayward Street Burlington, VT	656-0599W 864-6871H	Burlington Conserv. Board
Claire Park	293 Butternut Road Williston, VT	878-2151	Conservation
Debra Sachs	66 Pine Tree Terrace S. Burlington, VT 81 Main Street Essex Junction, VT	878-1343	Conservation Planning Economic Development Planner, Town of Essex
Heidi Krantz	Box 610 Waitsfield, VT	496-2409	Mad River Canoe/ Canoe USA
Dennis Bates	Williston, VT		Williston Conserv.
Steve Crowley	Montpelier, VT		VNRC
Tom Willard Andy Willard	Waterbury, VT	244-6951	VT Water Quality Division
Jerome McArdle	Waterbury, VT	244-6951	VT Water Quality Division

LOWER WINOOSKI RIVER
BUSINESS INTEREST MEETING

Valuable Uses of the River

1. Effluent disposal (direct and indirect)
2. Drinking water (community systems) (tributaries)
3. Industrial process water
4. Scenic value
5. Power generation
6. Industrial treated waste
7. Snowmaking water
8. Commercial boating/outfitter
9. Swimming (tributaries)

Ways to Improve the River

1. Hiking/bike paths along river
2. Cleaner water
3. Maintain the natural waterways
4. Control agricultural runoff
5. Improve erosion control (logging especially)
6. Stick to realistic environmental regulations
7. Control land development along river and tributaries (present subdivisions in Huntington cause 5-acre strip lots running from one side of the river and up the other) - encourage cluster zoning
8. Establish scenic corridors with setbacks - identify corridor both horizontally and vertically
9. Improve fish habitat and wildlife habitat
10. Use river as an urban amenity

What We Like About the River Currently

1. We like it as a transportation corridor (visual resource)
2. The river promotes tourism
3. We like fishing, boating, and swimming
4. We like the diversity of river types
5. We like the existing restrictions on development (like archeological regulations and flood plain)

What Actions are Needed

1. Ensure that there is a balance of uses (coordination of towns, land owners, special interests)
2. Education of towns to focus on rivers and river corridors (towns typically focus on the land)
3. Enforcement of regulations with municipal treatment plants
4. Financial incentives for agricultural users to control erosion and agricultural runoff
5. Adoption of river program's goals into the Chittenden County regional plan and into town plans
6. Establish a "River Basin District" to oversee river program's goals
7. Encourage public access/greenbelt

LOWER WINOOSKI RIVER
BUSINESS INTEREST MEETING
February 27, 1990

Attendance Sheet

NAME	ADDRESS/TELEPHONE	REPRESENTING
Betsy Gallagher	D726/B615-2 River Road Essex Junction, VT 05452	IBM
Brent Whitney	TWM Northeast PO Box 784 Williston, VT 05495-0784 879-7733	TWM Northeast
Terry Boyle	301 College Street Burlington, VT 05401	T.J. Boyle Assoc.
Dan Pryor	Bolton, VT 05477	Bolton Valley Corp

LOWER WINOOSKI PLANNING PROJECT

Meeting With the Huntington Planning Commission
March 8, 1990

ATTENDEES:

Judy Button, Clerk (434-2653)
Britt Cummings, Chairman
Joseph Spence, Planner
William Hegman, Planner
G. Tim Stone, Planner
Marg Taft, Planner
Gail Burachowski, Planner
Burton Shangraw, Planner
Lawrence Mitchell, Planner
Reporter for the "Huntingtonian"
Jerome McArdle, Agency of Natural Resources

After Jerome McArdle presented the rivers program and the work to date, there followed considerable discussion with respect to river issues.

Graveling - Riparian landowners should be allowed to "clean" the river by removing gravel that accumulates each spring after spring runoff. Several planners expressed this concern. Landowners claim that the gravel buildup causes the river to change course and erode the banks, which in turn causes loss of farmland and stream bank vegetation. Those present, with one or two exceptions, agreed that gravel removal will reduce the loss of riparian land and bank vegetation. This was probably the largest issue in the Huntington planners' minds.

Landowner Notification of the Rivers Program - This was the second largest concern expressed by the planners. They believe that before any actions are proposed along the river, riparian landowners should have a say, since they would be the ones most affected. I agreed, and asked them to set up a riparian landowners meeting, and I would be glad to come and make a presentation to them.

Hydroelectric Facilities Along the Huntington River - The planners said that there are presently no hydro plants on the Huntington. Mr. McArdle explained that any potential projects would require a water quality (401) certificate, however, that the ultimate decision to approve or disapprove a hydroelectric project would rest with the Federal Energy Regulatory Commission (FERC). However, FERC is required to consider Vermont's Comprehensive Rivers Planning initiatives, and to evalute state and local sentiments regarding the approval or denial of any licenses.

Water Quality - The planning commission members did not consider water quality as a major issue on the Huntington; in fact water quality was rated as good - an asset. They did acknowledge one or two instances where there were "straight pipes" to the river, but the town deals with them directly. They cited a case where a developer wanted to place a structure close to the river along with the septic system, which they did not allow. The planners believe the Huntington is one of the cleanest rivers in the state.

Greenway - I suggested that a good way to protect the river's water quality was to limit development along the river by the use of a greenway or setback. The commissioners explained that the river runs at floodstage every spring and cleans out everything in its path. This natural phenomenon keeps development back from the river since all the residents are aware of it and respect the river. Commission members questioned whether further (legal) protection was necessary.

Fishing - At least one planning member believes stocking by Fish and Wildlife should be improved. Instead of introducing fish at one place (a bridge), they should be put in all along the river. The problem is, everyone knows where the fish are put in (especially kids) and fish them out in two weeks.

Access/Public Ownership Along the Huntington - The Audubon Society owns about one mile along the Huntington, beginning at Horseshoe Bend. Therefore, the commission does not believe additional public access is needed.

Other - The Conservation Committee will be concentrating on the Huntington for Earth Day celebration. Tyler Hart is heading it up, along with Eric Hanson.

ESSEX PLANNING COMMISSION
MINUTES OF THE MEETING OF MARCH 22, 1990
SPECIAL MEETING: WINOOSKI RIVER CORRIDOR

Commission members present: Chairman Lee Stewart, Walter Adams, Martin Mara.

Absent: Kathy Ford, Ray Cota, Alan Nye, Michael Sirotkin

Administration: Debra Sachs

Others present: Jerry McArdle and Mark Smith, Agency of Natural Resources, Water Quality Division; Peter Keating, Chittenden County Regional Planning Commission; Nick Meyer, Essex Conservation Committee; Mark Keller, Winooski Valley Park District; James Baur, Land Use Committee; Mark Hunziker, Ronald Lemell and Carole Ann Greig, Essex Environment Resources Committee; Sheila Lemell and Doug Tamaresk.

Chairman Stewart called the meeting to order at 7:10 p.m.

Debra Sachs introduced Commission members and asked the public representatives to introduce themselves. She introduced Jerry McArdle of the Agency of Natural Resources, Water Quality Division.

McArdle discussed the goals of the Vermont Comprehensive Rivers Program for the Lower Winooski River and summarized what had been done to date. The goals of the Plan are to:

* Provide leadership and assist the public in completing coordinated river use plans and taking actions that protect and restore Vermont rivers and their environs.

The State of Vermont is asking for public input to determine which state rivers need an evaluation of natural resources. The State has identified four major rivers: the Lower Winooski, Deerfield, Passumpsic and the Clyde, all of which have electric company power plants that are up for relicensing in the near future. If a state has a comprehensive plan, representing all the river interest, then the Federal Commission has to consider that plan during the relicensing process. Green Mountain Power is watching the process closely.

* Seek to resolve river use conflict and establish public agreements in river management plans.

  -- guide state administration of the statutes;
  -- encourage consistency in municipal and regional plans policies, bylaws and projects along the river;
  -- guide private conservation and development projects; and;

-- influence federal decisions concerning Vermont river resources.

This process will help to resolve the conflicts between public uses and private uses. It will also help guide the state in interpreting statutes, in relation to the goals of Vermont citizens. The Chittenden Regional Planning Commission and the Winooski Valley Park District are cooperating. McArdle hoped that aspects of the River Plan would be incorporated in various Town plans.

The existing protection afforded river uses and values will not be preempted by the planning process. McArdle emphasized that the purpose was not to change the laws, but was to strengthen and guide river management.

* Seek to identify exceptional river values of regional and statewide significance.

McArdle offered the example that the Lower Winooski River is rich with suspected archeological resources. Waterfalls, gorges and endangered species were used as examples. McArdle emphasized that all parties with interests in the rivers, including fisherman, farmers, loggers, landowners and conservationists will be involved with the process.

In the inventory stage, the river resources will be identified. He showed a time frame. After the inventory stage, all information will be compiled. Then in May or June, the Workshop phase will begin, which will be partially funded by Green Mountain Power. The workshops will be "future scenarios", depicting the river from the air, given no controls, with existing controls and with future controls to show how the river was perceived to look in the future. After all the information from all phases is compiled, the Lower Winooski Plan will be devised and circulated for review. There is a committee of 20 private and publicly diverse citizens that serve as a citizens advisory board that serve as a "sounding board". Their main responsibility is to review the proposed plans to make sure that it represents a broad spectrum.

McArdle has met with several interest groups, including Green Mountain Power. Green Mountain Power has notified its customers of its participation in the river planning process. Some of the problem areas identified were: Poor water quality; Fluctuating flows; Agricultural runoff; Lack of public access; No fish passage; Public access vs. private access; stream bank erosion; Farmland development; Lack of effective flood plain zoning; Storm water runoff from development.

Positive factors identified included: Improved water quality from 20 years ago; Aesthetic beauty of the remaining farms along

the river; Recreational values; Low cost power due to the hydro plants. Agricultural and business uses (Bolton Valley Snowmaking); Year round play areas; Quiet/solitude.

McArdle asked those present to fill out the questionnaire in depth, to include all positive and negative aspects of the river; to include as much detail as to the reasons of why, where and how the participants used the river and to discuss how the river should look in the future. McArdle asked that the participants return the questionnaires by mid-April. Sachs informed McArdle that Essex was in the process of updating the Town plan and that there were sub-committees developing goals and objectives for the Town. Although final committee recommendations will not be complete by mid-April, drafts or informal recommendations will be provided.

Sachs distributed an excerpt from the Town Environment Plan that was adopted in 1973, that discussed the Winooski River and a copy of a memo from Dawn Francis that outlined the Winooski River Corridor Issues and Opportunities.

Adams questioned the minimum flow policies and the costs of the various results of the plan, such as increased fish ladders and asked what if the Power Company decided that the revisions were too expensive and abandoned the power plant, thereby increasing local electrical costs. McArdle stated that now was the time to inform the Power company out the various local desires. Adams asked how much silting had taken place and would the power company be asked to remove it. He wondered whether there were any studies comparing the river 60 years ago, when the plant was built, with the flow and erosion now. McArdle stated that the Green Mountain Power Company has assured him that they will allow flows to go through, because they are sensitive to the various issues. Green Mountain Power recognized their vulnerability, and recognizes the value of the inexpensive power, vs the costs of fossil fuels.

Adams asked if the Winooski River had reached its capacity to absorb effluent. Would part of the River plan going to suggest upgrade in sewer treatment plants? McArdle noted that the plan would include what was heard from the public. He described the waste allocation process and stated that if the plant were not functioning properly, the plan would address it. Theoretically, the river has the capacity to deal with the maximum capacity of the sewer flow. Smith stated that one of the plan recommendations would probably be that the sewerage treatment plants operate to peak efficiency. The river has designated "C" zones to receive effluent. Currently, no plant was at maximum capacity. The municipal treatment plants begin at Richmond and most people will acknowledge that people do not wish to swim in the river areas beyond the beginning of the treatment plants.

There are a lot of practical suggestions for improved water quality that encompass various agricultural concerns. There will be a Water Quality meeting of April 16. Several volunteer groups such as, "river watch" networks, conduct water samples. Carole Ann Greig asked if the public were aware of the dangers of swimming in the river or other water contact and whose responsibility was it to inform the public. The Green Mountain Power Company would like to see an environmental educational program started in the Winooski River area.

James Baur asked what would happen to the silt backup if the Power Company abandoned the dams. McArdle reiterated that he doubted that Green Mountain Power would abandon the dam, but if they did, they would be required by law to outline methods, that would least impact the natural resources. Baur questioned why accesses such as fish ladders should be required, since there was previously no access. McArdle stated that the fisherman desire natural restocking of the rivers and Smith interjected that it was questionable if there was access or not. Ronald Lemell noted that any fish that were allowed to pass, would be inedible, so why have the power company expend the money to build an access. McArdle stated that he believed that fish can assimilate the bacteria. Smith discussed the State "C" zones to assimilate waste. Half of the Winooski River is graded "C" and the other half "B". He stated that it is always desirable to have water quality that will sustain a fish habitat. The Environmental Protection Agency in 1972 stated a national goal that all U.S. waters shall be swimmable and fishable.

Mark Keller asked if the sewerage treatment plants were not operating to full capacity, would it be a possibility to downgrade the zoning to a "B" zone? McArdle reemphasized that the waste allocation process was designed for the proper assimilation of the waste and the key was to insure that there was enough oxygen for fish. Lemell asked if all sewer treatment plants were under capacity and if the problem with Burlington was that they were over capacity. The problems with the Burlington facility was discussed in great detail. Sachs stated that Essex's sewer treatment plant was under capacity. All questions regarding the water quality and sewerage treatment plants should be stated on the questionnaires, and the state biologists would be asked to respond to them. Sachs stated that she found it curious that the river changed classification north of the treatment plant, at the Alder Brook head waters.

Mara asked if the alleged improved water quality was based on statistical fact or just perception. Smith stated that facts would probably be available, but did not know. Mara stated that he felt the Winooski River is not attractive to him as a recreational area.

Smith stated that the river plan will be a result of what the

public and the interest groups response. The Department of Natural Resources, Water Quality Division would act as a facilitator to organize the meetings and to stimulate discussion. The Town of Richmond has requested help from the agency for shoreline zoning. The April 16 Water Quality meeting and the workshops will be the proper forum to discuss issues and to hammer out possible solutions.

Greig asked if there were any state statutes that protected the Winooski River corridor. Smith stated that several towns, including Essex had excellent flood plain zoning statutes, but that each municipality was different. If a town wished flood plain insurance, they have to meet minimum standards. Sachs stated that Essex had strict flood plain zoning regulations, but that they were not all conclusive.

Scenic protection and green belts were a major concern. Communities were encouraging farming as much as possible to keep a green corridor along the river. Sachs noted that lands outside the flood plain were zoned for higher densities and to keep them as farms was difficult as were too expensive outside the flood plain. In Essex, farm structures are a conditional use. There was a good deal of public ownership along the Winooski River. Smith stated that green belt concerns were a major concern for all area towns and stated that the Towns ought to get together to discuss them.

The sewerage treatment plants regularly test the water. "River watch" is a growing national non profit organization that helps local groups set up monitoring programs. Adams suggested that the National Geological Service be contacted as they have a 100 year history of the chemistry of some parts of the Winooski River. Smith said that if people wished to follow up with water quality, that the State had just completed a "305B" report to Congress.

Again the problems with the Burlington treatment plants were discussed. Lemell questioned encouraging agricultural uses, when agricultural uses were a contributing problem to poor water quality. Smith explained that enforcement of prohibiting the cows in the water and using proper manure and cultivation practices would alleviate most of the agricultural problems. Smith stated that there was a connection between good agricultural practices and good water quality. He said that literature was available regarding good shore line zoning and provided some national and local examples. Smith and McArdle will be meeting with land owners soon.

Sachs thanked everyone for participating and stated that the Town committees would discuss and complete the questionnaires.

Sachs provided the Commission members with the meeting agenda for

the month of April.

The meeting adjourned at 8:45 p.m.

Approved this _____ day of _____, 1990.

_____
Chairman, Planning Commission

ESSEX TOWN MEETING

P.C. MARCH 22, 1
Meeting
Winooski River PLAN
Initiative -ANR-

Sign Up

Name	Address	Affiliation
Peter Keating	P.O. Box 108, Essex Jct.	ECRPC
Jerry McGrath		VT. Fish
Nick Meyer	150 Chapin Essex Jct.	Essex Conservation
MARK KELLER	45 Greenwood Ave	Winooski Valley Park Distr
James Baur	71 Saybrook Rd	Land use committee
Carole Ann Green	184 TOWERS RD	Natural Res / Environ
Arnold Jamell	82A Jericho Rd	Essex Jct VT
Mark Hunziker *	P.O. Box 60/ Essex Jct 05453-0601	Essex Environmental Resources Sub-com
Sheila Jamell	82A Jericho Rd Essex Jct, VT.	local resident
M. J. MARA	166 LOST NATION Rd ESSEX 05452	ESSEX TOWN PLANNING COMMISSION
Debra Sachs	Town of Essex, 81 Main St. E.J. 05452	Essex Pla
Lee Stewart	6 Button Dr. Essex Jct, VT 05452	Essex Town Planni
WALTER M. ADAMS	60 INDIAN BR. RD. ESSEX JCT	TOWN PLANNER

* please send Mark Hunziker's contact name + address
for: River watch Network + Minn. or Wisconsin
agencies addressing river buffer zones.
Field Guide to Agency
State Shoreland Zoning.

Mark Smith, ANR.

LOWER WINOOSKI RIVER PROJECT

NOTES FROM WATER QUALITY MEETING
HELD ON APRIL 16, 1990
at the Williston Library

ATTENDEES:

NAME:	ADDRESS:	AFFILIATION:
Dori Barton	349 Nashville Road Jericho, VT 05465	Mt. Mansfield RiverWatch
Stephen Crowley	12 Pleasant Avenue So. Burlington, VT	VNRC
Pennie-McEdward-Rand	32 Brookes Avenue Burlington	Burlington Planning & Zoning
Alden Bartlett	6 Murray Road Essex Junction, VT	
Ed & Polly Whitcomb	South Street Essex Junction, VT	Dairyman
Jerry McArdle	Waterbury	ANR
Mark Smith	Waterbury	ANR

MEETING NOTES

The meeting was called to order at 7:05 pm by Jerry McArdle. Jerry suggested that, based on the small group in attendance, an informal discussion about water quality in the Lower Winooski Basin would be appropriate.

Penny:

Burlington is upgrading both its Winooski River treatments to tertiary treatment (to include phosphorus removal). How does this upgrading related to possible reclassification of the river?

Jerry:

Jerry explained that any river stretch below a wastewater treatment plant will be considered, by the Department of Environmental Conservation, as a Class C, or "waste management zone". Jerry explained some of the factors that were involved in modeling Class C zones, and also mentioned the processes for reclassification. These could include a petition to the Water Resources Board from either citizens or the Department of Environmental Conservation. He noted that many C zones on the Lower Winooski were established a long time ago, and that some classification upgrades may be possible. . . however that Vermont will not recognize waste management zones as swimmable (Class B) waters.

Steve:

The Department of Environmental Conservation is considering the development of standards for toxics in surface-waters. The DEC has been evaluating the concentration of toxics at 4 treatment facilities in Vermont to determine what toxics might be monitored.

Penny:

Are there monitoring programs for wastewater treatment plants? or for the river in general? What about UVM's new buildings (e.g. proposed microbiology building) that will generate chemical wastes? How can the City of Burloington control this better in their planning efforts?

Jerry/Mark:

All wastewater treatment plants, as part of the National Pollution Discharge Elimination System permit program, are required to submit monthly data, and quarterly reports on their effluent discharges and plant operations. Data from the Operations Division at DEC indicates that plants on the Lower

Winooski operate in good order. Regarding general river monitoring, there is not a current program in place by the Agency. The hydroelectric dams have made monitoring a difficult practice, because flow conditions, and therefore water quality conditions, are variable. Regarding toxics monitoring and what the City can do, there are options. Technical information is available from the State; literature may describe what subdivision regulations are available; and citizen watchgroups may be another option.

Steve:

The City of South Burlington Natural Resources Committee has incorporated some water quality recommendations to be added as part of the City's Master Plan. Stormwater runoff, besides point source wastewater discharges, is also a concern. Stormwater runoff can and should be treated before release to surface water bodies.

Alden:

I am concerned about IBM's release of potential toxics, for example arsenics and heavy metals. Are these chemicals being monitored?

Jerry:

It appears that there is a need for education on some of these water quality issues, so as that everyone has a good background understanding.

Steve:

In the LaPlatte and St. Albans drainage basins, development of manure storage pits has worked to limit agricultural runoff.

Dori:

The Mt. Mansfield RiverWatch organization has worked closely with farmers on the Mill Brook. A personal approach and willingness for our organization to do the work and reduce red tape is important.

Penny:

I am also concerned about the spreading of sludge in the Burlington Intervale, and expect there may be concentrated metals in the sludge. In addition, the leachate from the Burlington landfill is said to be 80% collected, but how can we be sure there are no remnant toxics?

Steve:

Our organization, VNRC, has noticed that the Winooski River is not a central feature of any town along its borders. If water quality was significantly better, ther river could be more of a regional resource to focus on. There is a negative perception regarding water quality of the river - which makes the resource less inviting.

Penny:

Even if the river is not brought up to swimmable standards, it is still, and can be even more, a valuable visual resource, even if for non-contact recreation.

Steve:

We must also remember that what goes into the Winooski River eventually ends up in Lake Champlain. With the new phosphorus loading study underway for Lake Champlain, it would be wise to also consider the (original) input from rivers, and in this particular case, the Winooski.

Polly:

My perception is that water quality in the Winooski River is better than it was 20 years ago. At the edge of our property, swimming should not be recommended anyhow because of the dangerous slopes and thick shrubs.

Ed:

Has (not) the water quality of the Winooski River improved?

The meeting was adjourned at 9:35 pm.

5/17/90

LOWER WINOOSKI RIVER PROJECT
SUMMARY OF COMMENTS FROM LANDOWNER INTERESTS

INTRODUCTION:

Comments from landowners in the Lower Winooski River Basin were received from landowners submitting written survey forms, from telephone surveys, and from landowners and other interested persons attending the landowner interest group meeting held on May 16, 1990 in Williston(1). Our original outreach to landowners including a mailing to approximately 200 property-holders and notice to local newspapers and town halls.

To improve understanding, and to expedite the grouping of information, comments received from the landowner interest group are compiled successively under major headings, including: I. VALUES/USES; II. ISSUES; AND III. GOALS and ACTIONS. Additionally, under each of these major headings are parallel subheadings to help organize and focus attention on subject-specific values, issues, and goals and actions. Note that not all headings and subheadings have responses, and that all comments refer to the mainstem Winooski River corridor, from Bolton Falls to Lake Champlain, unless a specific reference is made to a tributary stream. Also note that comments that are bracketed [ ] were specifically received from persons attending the meeting on May 16.

Finally, it must be mentioned that responses from all interest groups and citizens will be merged in a final VALUES-ISSUES-GOALS/ACTIONS summary, with appropriate grouping of subject-specific information, in order to focus attention on common findings, goals and ways to accomplish them.

(1) Eighteen persons attended the May 16 meeting, and to date, thirteen landowners have responded with written forms and to telphone surveys. There is some duplication.

INDEX

I. VALUES and USES

1. OPEN SPACE or SCENIC:

A. Land Use

- Some landowners have deeded parcels for conservation.
- Year-round views
- Value the scenery of the river.
- Appreciate land that is privately owned - because private landowners take good care and stewardship of their properties.
- Used to use property for pasture from the 1920s to the 1940s; very little use since.
- It has been logged twice, but not since 1962.
- Occassionally use property for firewood gathering.
- Scenic uses.
- Scenic beauty.

- Value tax-abatement option for being the last farm in town.
- The land is a generator of income.
- Private property rights and private land ownership, in effect, help to keep some lands open and well-cared for.
- Scenic beauty.

B. Historic Features

None listed.

2. NATURAL RESOURCES:

A. Soils (including gravel)

- Erosion control of banking.

- A very fertile valley.
- Best farmland.
- Gravel is a valuable commodity [and should be utilized].

B. Water Quality

- Good water quality.
- Water quality has greatly improved in the past 20 years.
- Water quality.

VALUES and USES (continued)

C. Fish and Wildlife (including natural areas)
- Presence of wildlife (blue heron, snow geese, wood ducks, fox, deer, etc...)
- Plant life (including fiddlehead ferns).

D. General
- Annual flooding provides nutrient and sediments to the floodplain.
- Value the use of nature.

- Open lands are available, and used for, sludge disposal.
- Cattle use tributary for drinking water.
- Hydroelectric energy.

3. RECREATION:

A. Opportunities and Use
- Fishing all along the Huntington River.
- Fishing
- Sport fishing.
- Seldom use river recreationally.
- Year-round fishing
- Recreation, including hunting, fishing, trapping, etc. . .
- Value the use of nature.
- Recreational use.
- Recreational use, specifically canoeing.
- Accessibility of lake by river, especially by sailboat.
- Scenic appreciation and other recational aspects like ice-skating and cross country skiing.
- Summer swimming at mouth was once a delight.

- Fish from North Williston to Richmond for trout and bass.
- Duck hunting in Richmond and Bolton.
- Swimming at mouth of river.
- Boat accessiblity from the river to Lake Champlain.

B. Access
- River prevents/stops public from trespassing on our property (access is naturall restricted)
- Some private landowners permit access [if they desire] - permits other to enjoy the river

II. ISSUES

1. OPEN SPACE or SCENIC:

A. Land Use

- Landowners have more interest, and more at stake in the river corridor, than the general public.
- Property rights.
- Homeless people living along the banks of the river.
- Dumping of trash, appliances, and in past, junk autos, for which the Water Resources Department have caused actions against!
- Public resistance and bureaucratric restrictions make private development an uncertain enterprise.
- Landowners feel threatened by land use restrictions, including recommendations that may come from the current planning project.
- Landowners are not mentioned in the "Introductory Guide"
- Three landowners have not been told about interest in purchasing their lands or adjacent properties from the Nature Convervancy.
- Property rights are taken without compensation.
- Desire value of farm for retirement, however, land value is reduce by zoning.
- Floodplain zoning reduces value of lands, but it is necessary.
- Floodplain zoned areas from the lake upstream should be compensated.
- Not everyone wants a clean river (re: water quality) because it encourages more use and abuse of landowner rights.
- Landowners pay taxes but the public uses their land.
- Park and recreation areas need to be maintained.
- Garbage dump fees keep going up, so littering problem is getting worse . . . cars, septic tanks, etc...
- Dumping of refuse (i.e. household garbage) on private property.
- Cannot cross river - North Williston Bridge is unsafe.
- Streamside erosion.

ISSUES (continued)

B. Historic Features
None listed.

2. NATURAL RESOURCES:

A. Soils (including gravel)
- Fluctuating flows are dangerous and create soil erosion.
- Streambank erosion.
- Lack of ability to remove additional gravel.
- Too much red-tape (permits, etc..) required to remove gravel.
- 6,000 yards of gravel should come out on the Huntington River on one spot alone.

B. Water Quality
- Combined sewer overflows (CSO's)
- Pollution.
- Poor water quality (murky)

- Poor water quality.
- The Winooski is two different rivers; from IBM downstream and from IBM upstream.
- Battle of wasteload allocation between towns.
- North End sewer treatment plant, during low water, precipitates algal growth.
- Possible chemical pollution. Toxics from IBM?
- Agricultural runoff.

C. Fish and Wildlife (including natural areas)
- Lack of fish.
- Lack of stocking.

D. General
- Hydroelectric plants.
- Low water flows.
- Bank erosion from fluctuating flows and speeding boats.

- Low water in North Williston because of limited releases from Bolton Falls Dam.
- Mouth of river needs to be cleaned up. Trees, debris, etc. are damaging props, keels and cluttering beaches.
- No dredging has been done.
- Flooding.

ISSUES (continued)

3. RECREATION:

A. Opportunities and Use

- Fish at mouth of river about six times/year.
- Parties and the problems they entail.
- All terrain vehicles, etc...
- Concerned that recreational areas (e.g. a trail) might be abused with litter, trash, etc...
- Snowmobilers were a problem; not any more.
- Trapping with leg-hold traps - cruelty to wildlife.
- Can a river marina and river tranquility co-exist?
- Trespassing has safety, and therefore liability, considerations.
- Lack of deep water at mouth of river (i.e. navigational difficulties)
- Poor and improper conduct of motor boaters (buzzing by motorboaters and waterskiiers; high speeds create excess waves).

- Dangerous cliffs at Winooski Gorge and at Whitcomb Farm should preclude recreational use.
- Snowmobilers [have] cut fences.
- Mouth of river needs to be cleaned up. Trees, debris, etc. are damaging props, keels and cluttering beaches.
- No dredging has been done.
- There are no speed limit signs on the river. Docks and boats on moorings are being pounded, especially at the rivers mouth.
- Need additional law enforcement.
- Park and recreation areas need to be maintained.
- Landowners pay taxes but the public uses their land.
- Duck hunting and shooting is not safely practiced.
- Lack of enforcement of hunting, boating, and trespassing regulations.
- No good fishing.
- Landowner liability.
- Extension of Burlington bike path north with bridge across Winooski River could interfere with boat access from the river to the lake (especially sailboats).
- River areas are used for illegal activities (i.e. drug-dealing)

ISSUES (continued)

B. Access

- Trespassing
- Property rights.
- Trespassing and dumping refuse.
- Trespassing is a big problem.
- People would sometimes drive through cornfields.
- Potential of landowner liability and possibility of lawsuits.
- Landowner liability.
- No time to allow people access. . . as landowners are busy running the farm
- Dangerous cliffs at Winooski Gorge and at Whitcomb Farm should preclude recreational use.
- Extension of Burlington bike path north with bridge across Winooski River could interfere with boat access from the river to the lake (especially sailboats).
- Cannot cross river - North Williston Bridge is unsafe.

III. GOALS and ACTIONS
(G and A)

1. OPEN SPACE or SCENIC:

A. Land Use

G Keep corridor open and wild.
G Have land remain in natural state.
G Leave the river as it is.
G Permit developers to create livable environments for people (a specific reference of a developer seeking to build affordable housing in the Burlington Intervale and who is offering significant donation of conservation land in exchange).
G Great as it is; keep views as they are.
G Have development consistent . . . that is, keep commercial in commercial areas and residential in residential areas.
G Do not take away property owners rights.
G Develop property (someday) into a housing site.
G [Our] acreage is well-suited to nature-conservation . . .
G but also a natural for a riverbank marina with boats moored on land.
G Preserve the tranquility of the river.
G Create an airstrip for land and water [light] aircraft.
G Develop land for affordable housing and use scenic views for enjoyment of residents.
A I am in communication with Nature Conservancy at present.
A Are open to discussion.

G Keep farmland in farming.
A Reduce taxes to encourage agricultural uses.
A Public education regarding farming and its value (e.g. school kids tour farms).
A Institutie user fees.
G Pay for refuse disposal up front - so people do not litter on other's property.
A Increase penalties for illegal dumping.
G Preserve wild areas.

B. Historic Features

None listed.

GOALS and ACTIONS (continued)

2. NATURAL RESOURCES:

A. Soils (including gravel)

G Stabilize streambanks.

G Reduce streambank erosion.

A Post boat speed limits.

G Remove gravel to maintain river channel and river's natural course.

A Dredge out the gravel bars so that they would not continue to erode farm land.

A Change gravel legislation to permit more removal (i.e. increase 50 year limit).

A Change the law in regard to gravel removal.

A Reduce red-tape and permits necessary to remove gravel.

A Construct rip-rap to shore up river banks.

B. Water Quality

G Improve water quality.

G Better sewage treatment plants.

G Improve water quality.

G Keep manure runoff from river.

A Secure buffer strips along riverbanks.

A Improve manure management (e.g. storage pits)

G Keep salt from river.

A Secure buffer strips along riverbanks.

G Keep Ben & Jerry's waste from river.

C. Fish and Wildlife (including natural areas)

G More fish.

G Keep well-stocked with fish

G Preserve wild areas.

D. General

G Keep river under control (re: flooding) if possible.

G No hydros.

G Consistent water flows.

G Establish an economic balance between power production and river flows (i.e. consider possibility of more consistent flows).

GOALS and ACTIONS (continued)

3. RECREATION:

A. Opportunities and Use

G No boats with motors larger than 10 h.p.

G Boats with lower horsepower engines; smaller boats and motors.

A Control by Fish and Game.

A Water Patrol up to the Winooski Dam from the Lake.

G Develop a jogging and walking trail along the river.

G Discourage trespassing in unsafe areas.

G Improve river channel

A Dredge mouth of river.

A Remove large trees which are hazardous to boaters.

G Place spped limit signs at high traffic areas. (e.g. near Colchester Fish and Game Access)

G Continue to insure that all boaters, sail and power, may enjoy the river and lake by preventing the construction of a bridge at the mouth of the river.

G Increase communication between recreational users and landowners.

A Develop format/context for landowner-user contacts.

A Develop educational program regarding public access.

A Institute user fees.

G Consider dredging mouth of river.

A Research dredging option, including environmental impacts.

G Increase enforcement of hunting and boating uses.

A Post speed limit signs; enforce limits.

A Prohibit jet-skis.

B. Access

G Small boat access for fishing and canoeing.

G Town of Huntington is considering some public access areas

G Reduce trespassing.

A Have designated access areas.

APPENDIX D

Lower Winooski River Rare Plants and Animals

VERMONT NATURAL HERITAGE PROGRAM

State Rank

State ranks are assigned by the Vermont Natural Heritage Program based on the best available information. Ranks are reviewed annually.

- S1: very rare: generally 1-5 occurrences known or some factor(s) making it especially vulnerable to extirpation from the state; highest inventory and protection priority
- S2: approximately 6-20 occurrences believed to be extent or some factor(s) making it very vulnerable to extirpation in the state
- S3: rare or uncommon in the state; believed to be more than 20 occurrences, or there is some threat to it in the state
- SH: known from historical records only

State Status

Vermont Endangered Species Law (10 V.S.A. Chapter 123)

- E: Endangered: in immediate danger of becoming extirpated in the state
- T: Threatened: with high possibility of becoming endangered in the near future
- SC: Special concern: rare; status should be watched (information category only/ not established by this law)

Global Rank

Global Ranks are assigned by the international network of Natural Heritage Data Centers. The ranks are tracked by the Nature Conservancy and by the Natural Heritage Programs. They reflect the rarity and endangerment of the species worldwide.

- G1: Critically imperiled globally (on the order of 1-5 occurrences worldwide)
- Ge: Endangered globally (ca. 6-20 occurrences worldwide)
- G3: Threatened globally: rare and/or local
- G4: Apparently secure globally, though perhaps locally rare
- G5: Demonstrably secure globally

Federal Status

As per the Federal Endangered Species Law

- LE: Listed endangered
- LT: Listed threatened
- C2: Category 2B: currently under review
- 3B: Category 3B: no longer under review because of taxonomic question
- 3C: Category 3C: no longer under review because no threat demonstrated

LOWER WINOOSKI RIVER RARE PLANTS & ANIMALS*

(Listed first for the Mainstem Winooski Corridor - upstream to downstream - and then tributaries)
(Each listing is in alphabetical order)

PLANTS:

COMMON NAME	SCIENTIFIC NAME	HABITAT TYPE	STATE RANK	GLOBAL RANK	STATE STATUS	FEDERAL STATUS	LAST OBSERVED
Beach Pea	Lathyrus Japonicus	Sandy/gravelly/clay lakeshores		G5			1983
Black Gum Tupelo	Nyssa Sylvatica	Swamps, wet shores	S2	G5			1988
Broad Beech-Fern	Thelypteris Hexagonoptera	Rich woods	S2	G5			1988
Buffaloberry	Shepherdia Canadensis		S3	G5	SC		1984
Bur-Reed	Sparganium Androcladum	Damp shores, marshes	S1	G4/G5			1909
Creeping Love-Grass(3)	Eragrostis Hypnoides	Sandy shores	S2	G5			1983 1984 1988
Cursed Crowfoot(3)	Ranunculus Sceleratus	Open wetlands, pools	S1	G5			1982 1983 1984
Early Thimbleweed	Anemone Multifida	Riverside ledges	S1	G5	E		1893
Frank's Love Grass	Eragrostis frankii	Sandy shores	S2	G5			1983
Four-Leaved Milkweed	Asclepias Quadrifolia		S3	G5			1986
Hairy Sedge	Carex Trichocarpa		S1	G4	SC		1988
Hyssop-Leaved Fleabane	Erigeron Hyssopilfolius	River gorges, subalpine ledges	S2	G5			1981

COMMON NAME	SCIENTIFIC NAME	HABITAT TYPE	STATE RANK	GLOBAL STATUS	STATE STATUS	FEDERAL STATUS	LAST OBSERVED
Large Whorled Pogonia	Isotria Verticillata	Acidic, open woods	S1	G5		T	1988
Low Bindweed	Convolvulus Spithamaeus	Dry, open woods/sandplains	S1	G4/G5	T		1988
Many-Leaved Sedge	Scirpus Polyphyllus	Low wet areas	S1	G5	SC		1987
Meadow Horsetail(3)	Equisetum Pratense		S3	G5	SC		1981 1984 1987
Ovate Spikerush	Eleocharis Ovata	River, pond shores	S1	G?			1982
Plains Frostweed	Helitanthemum Bicknellii	Sandplains	S1	G5	T		1982
Quillback	Carpiodes Cyprinus		S1	G5	T		1985
Riverweed	Podostemum Ceratophyllum(4)	Rocky riverbeds	S1	G5			1982
Sandbur	Cenchrus Longispinus	Disturbed shores	S2	G5			1983
Slender-Leaved Goldenrod	Solidago Tenuifolia		S1?	G5			1975
Slender Mountain Rice	Oryzopsis Pungens	Dry rocky woods	S1	G5			1984
Small Bidens	Bidens Discoidea	Shores, marshes	S1	G5			1984
Smith's Bulrush	Scirpus Smithii	Wet flats	S1	G5?			1986
Smooth Draba	Draba Gabella	Calcareous outcrops/ Lake Champlain	S1	G4/G5	T		1988
Sora	Porzana Carolina		S2	G5			1988
Yellow Bartonia	Bartonia Virginica	Wet woods, sands	S1	G5			1988
Yellow Oak	Quercus Muhlenbergii		S3	G5			1988

COMMON NAME	SCIENTIFIC NAME	HABITAT TYPE	STATE RANK	GLOBAL STATUS	STATE STATUS	FEDERAL STATUS	LAST OBSERVED
Yellow Panic Grass	Panicum Xanthophysum	Sandplains, open disturbed sands	S1	G5	T		1984
Yellow Water-Crowfoot(2)	Rannunculus Flabellaris	Shallow water, marshes, pools	S1	G5			1894 1903
Wild Chess	Bromus Kalmii		S3	G5			1984
Wild Garlic	Allium Canadense	Alluvium, meadows	S1	G5	T		1983
Wood Lily	Lilium Philadelphicum		S3	G5			1983
ANIMALS:							
Beach-Dune Tiger Beetle (2)	Cicindela Hirticollis			S1	G?		1986
Black Tern	Childonias Niger			S2	G2		
Eastern-River Pearl Mussel	Margaritifera Margaritifera		S1	G5			1841
Eastern Sand Darter	Ammocrypta Pellucida		S2	G3	T	C2	1985
Lake Sturgeon	Acipenser Fulvescens		S1	G3	E	C2	1926
Least Bittern	Ixobrychus Exilis			S2	G5	SC	1988

F O R T R I B U T A R Y S T R E A M S

PLANTS:

COMMON NAME	SCIENTIFIC NAME	HABITAT TYPE	STATE RANK	GLOBAL RANK	STATE STATUS	FEDERAL STATUS	LAST OBSERVED
Blunt-Leaved Milkweed	Asclepias Amplexicaulis	Sandplains	S1	G5		T	1984
Buffaloberry	Shepherdia Canadensis		S3	G5	SC	1987	
False Cyperus	Carex Pseudocyperus		S2	G5			1985
Fries' Pondweed	Potamogeton Friesii	Alkaline lakes	S1	G4			1878
Hairy Lettuce	Lactuca Hirsuta	Sandplains, open woods	S1	G4?			1988
Plains Frostweed	Helianthemum Bicknellii	Sandplains	S1	G5			1988
Pod-Grass	Scheuchzeria Palustris SSP	Bogs	S1	G5/T5	T		1875
Yellow Panic Grass	Panicum Xanthophysum	Sandplains, open disturbed sands	S1	G5		T	1984
ANIMALS:							
American Brook Lamprey	Lampetra Appendix		S1	G5		T	1986
Four-Toed Salamander	Helianthemum Bicknellii		S1	G5	SC		1968
Great Blue Heron	Ardea Herodias		S2	G5			1987

* "Rare" plants and animals, as defined by the Vermont Natural Heritage Program, include those listed as threatened, endangered, and/or species of special concern as noted by state and/or federal programs. Glossary A, attached, defines the state rank and status and federal rank and status terms. This is not intended to be an exhaustive listing of potential rare plants and animals in the Lower Winooski River Basin; rather, it represents the best avaiable current infromation from Natural Heritage Program files, and is weighted toward those species found along the mainstem Winooski and tributary corridors.
Information sources include: Vermont Natural Heritage Program Data Maps, Waterbury, Vermont and Vermont's Rare, Threatened, and Endangered Plant Species, Vermont Natural Heritage Program, July, 1989, Waterbury, Vermont.

Appendix E

LOWER WINOOSKI RIVER BASIN

ALTERNATIVE FUTURES PROJECT

LOWER WINOOSKI RIVER BASIN ALTERNATIVE FUTURES PROJECT

PROJECT SUMMARY

Prepared for
WINOOSKI VALLEY PARK DISTRICT

Prepared by
HUMSTONE SQUIRES ASSOCIATES

March, 1991

The authors wish to acknowledge the generous contribution of time, information and effort by the following groups and individuals: focus group participants Bill Butler, Greg Morgan, Jeff Parsons, Dan Pryor, Ed Symula and Polly Whitcomb; town planners Tim Buxton, Kendall Chamberland, Gail Desorda, Dawn Francis, Frank McDanials, Joyce Ohlson, Carl Parker, Deb Sachs and Joe Weith; regional planners Herb Durfy, Brian Hehir and Peter Keating; from Green Mountain Power, Tom Boucher, Terry Cecchini , Mike Murphy, Dorothy Schnure, Gene Schlatz and Steve Terry; from the State of Vermont, Jon Anderson, Brian Chipman, Jeff Cueto, Larry Fitch, Mike Kline, Peter Laflamme, Jerry McArdle, Rich Sedano, Mark Smith, Rod Wentworth and Tom Willard; Don Hipes of the Extension Service; Jack Byrne from River Watch Network; Tom Horn from the Atlantic Center for the Environment; from the Winooski Valley Park District, Marcia Albert, Bill Bruihler, Jennifer Eli and Mindy Shepard; and the staff of the Essex Education Center and the Champlain Mills for providing meeting space. Finally, and most especially, we wish to acknowledge the other members of our project team:

Julie Campoli
Phillip Hagopian
Hanley Salzman Design
Huntington Graphics

A river serves well as the focal point for a regional planning process. It symbolizes the passage of time. Its waters are the life blood of nature. It provides both energy and solace. Its health can be a measure of the community's health. In good health, a river teems with a complex network of life forms, in a way mirroring the interdependencies found on land and among people. *Jeff Squires 3/1/91*

VISION STATEMENT
LOWER WINOOSKI RIVER BASIN
2010

The Lower Winooski River Basin, located as it is in Chittenden County, Vermont's most prosperous region, has enjoyed steady growth in its economy and its population. With this growth has come a demand for new housing, work space, shops and public facilities. Through far sighted planning and investment in the necessary support systems, the municipalities in the region have succeeded in channeling a large share of the new development to designated growth centers. These are compact areas where a mixture of uses support a wide range of activities, permitting high levels of pedestrian movement and supporting an efficient public transit system.

A major requirement of the compact settlement pattern has been an increase in the capacity of the Basin's sewage treatment plants. The plants discharge to the River, which has a limited capacity to assimilate waste. The public has supported the additional cost of Advanced Waste Treatment to insure that the water quality in the River is not diminished by the increased effluent discharge. Steps have also been taken, including education and regulation, to reduce the pollution caused by run-off from farms, roads, parking lots and other sources throughout the Basin.

The move to a more compact pattern of land use has relieved the pressure to develop rural areas. However, the public has recognized the need to compensate landowners in return for the conservation of desirable open space, and has therefore supported efforts to raise revenues for land acquisition and to relieve tax burdens on land owners. Key properties are held in trust and managed by the Winooski Valley Park District. In general, agricultural lands and wildlife habitat have been protected from development, but the principal focus of conservation efforts has been along the Basin's watercourses. A buffer has been protected along the River and its tributaries and retained in a vegetated state.

The size of the buffer, its function and the degree of public access varies throughout the Basin, depending on the role assigned to the particular watershed Segment through the Comprehensive River Planning process and in municipal plans. Responsibility for the process has been assumed by the Park District and Regional Planning Commission, which have assisted local governments and river users through a negotiation process aimed at resolving areas of conflict and developing acceptable approaches to river management. Uses and activities are assigned to specific portions of the watershed, resulting in some areas of high accessibility, with well developed recreation facilities and opportunities, and other areas maintained in a less accessible, more natural state. Land conservation targets have been coordinated with the land use and access objectives.

Consensus is well established for the management of a healthy fish habitat throughout the Basin. Impoundments have been prohibited in some Segments of the watershed. The licenses for those impoundments that do exist are conditioned to insure that a minimum stream flow is maintained, sufficient to support a healthy downstream fishery, consistent with the fisheries management strategy for each Segment of the Basin. Fish migration is enabled at all impoundments, and is selectively assisted at certain dams, again consistent with fisheries management plans. Buffers, access and fishing rules vary within the watershed, and are designed to provide a variety of fishing experiences.

In summary, the River and its tributaries support a diverse set of uses, including power production, waste assimilation and recreation. However, these uses defer to the primary role of the watercourses, namely, the support of native plants and animals. By showing this respect for its rivers and streams, the region has retained a balance and remained a desirable place to live.

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INTRODUCTION

What might the future hold for the Lower Winooski River and the land area that it passes through? This report summarizes a project, *The Lower Winooski River Basin Alternative Futures Project*, that begins to provide some answers to that question.

The Winooski River originates in the town of Cabot, Vermont and flows northwesterly to Lake Champlain. That portion of the river from Bolton Falls to the Lake is considered the Lower Winooski River. The Lower Winooski has a watershed of some 800 square miles, encompassing much of Chittenden County, Vermont. Chittenden County is the most prosperous and rapid growing part of the state.

To effectively plan for a river and its future, a wide and diverse range of issues must be addressed. The range includes the quality and character of the waters in the river, but also extends beyond the river's banks to embrace the many social, economic, natural and physical forces at work in the watershed that bare on the river.

There is a danger, however, that in an effort to be comprehensive, the planning process can become too complicated, to the point where citizens and officials are discouraged from participation. A means must be found to depict the issues, and their interactions, in a way that is clear and understandable.

The Lower Winooski River Basin Alternative Futures Project has provided such a means. Five major river characteristics serve as the Project's framework; Water Quality, Flow Regulation, Buffers, Access and Fisheries. In essence, the Project poses 'what if...' questions about each characteristic, (What if water quality standards are lowered? What if the degree of public access is increased?) and then provides descriptive answers. By describing the future of the River and its Basin in terms of these major characteristics, and by developing alternative assumptions for each of these, the Project offers a basis for discussion and debate about the future. In addition, the Project has used detailed illustrations to help citizens and planners develop a visual image of the Basin's future.

The purpose of the Project has been to provide the Vermont Department of Environmental Conservation with a planning tool for use in its Comprehensive Rivers Planning Program. The Department has selected the Lower Winooski Basin as one of its first planning areas. The Plan that emerges from the Department's process will serve as a policy basis for future

management decisions by federal and state government and as a resource for planning at the regional and local level, as well as for private entities such as hydroelectric developers and river advocates.

The Project was funded by the Green Mountain Power Corporation. As the operator of three hydroelectric power generating facilities on the Lower Winooski River, GMP has an important stake in public policy and river management. This interest is heightened by the fact that one of the company's facilities, Essex 19, will need to be relicensed by the Federal Energy Regulatory Commission in 1993, to continue operation when its license expires.

The Project was sponsored by the Winooski Valley Park District, a conservation organization serving its member municipalities, Burlington, Colchester, Essex, Jericho, South Burlington, Williston and Winooski. The Park District is developing a strategic plan for its operations, which include land acquisition and management, and hopes to draw on the results of the Project.

Cooperators in the Project include the Department of Environmental Conservation and the Chittenden County Regional Planning Commission. Like the Department and the Park District, the Regional Planning Commission is preparing a plan and hopefully will benefit from the results of this Project.

The Project team has been directed by the planning firm, Humstone Squires Associates. Huntington Graphics was responsible for the design and production of the original illustrations used in the Project. The illustrations were prepared by Phillip Hagopian. Graphic presentation was handled collaboratively by Julie Campoli and the firm, Hanley Salzman Design.

In the Project Summary that follows, the Project's methodology will be discussed, the five major characteristics will be enumerated and the resulting Alternative Future scenarios described. Based upon reaction to the scenarios, a vision statement is offered for the Basin's future. Finally, some general implementation strategies are outlined, and responsibilities for carrying out the strategies are assigned.

METHODOLOGY

The alternative futures technique involves the creation of scenarios, or descriptions of the future. These are contrasting conditions that might result, depending on the combination of policy choices selected. In this Project, the scenarios have been illustrated with detailed drawings to enhance their value as a planning tool for the citizen participants. The Lower Winooski River Basin Alternative Futures Project followed a series of steps, summarized below:

Collect Background Data: Existing information on river conditions was assembled, including water quality data, river classification zones, assimilative capacity data, recreation sites and facilities, dam locations, sewage discharge points, adjacent land use, including farmland, forestland, developed land, and roads, unique natural features, wildlife habitat and fisheries classification. Information on river uses and values was obtained from the the Department of Environmental Conservation's Citizen Planning Process. The Department's planning process involved meeting with over three hundred people, representing interests in boating, agriculture, hydropower, water quality, recreation, archeology, open space, fishing as well as landowners and business people. Also involves were representatives of each of the twelve communities in the Lower Winooski Basin. Existing regional and local plans were obtained from the towns and the Chittenden County Regional Planning Commission. A literature search was conducted, resulting in the collection of river basin plans from around the country.

Create the Scenarios: Based on the results from the inventory and compilation stages of the Citizens Planning Process, a list of areas of agreement and potential conflicts was developed. Existing trends in the quality and use of the river were identified. The consultants then convened a meeting with a Focus Group to develop the Alternative Future scenarios. The Focus Group was a small, brainstorming group drawn from the major users/parties interested in the future of the river. The meeting illuminated the contrasting perspectives of the various river users, but also brought the many areas of common interests. The consultants designed the meeting to develop three scenarios which represent different choices about the river's future. An outline for three scenarios emerged:

- *Scenario #1, Full Corridor Development;*
- *Scenario #2, Use with Stewardship;*
- *Scenario #3, Natural Systems;*

Illustrate The Scenarios: A bird's eye view illustration of the Lower Winooski River Basin was prepared, showing the river and its tributaries, prominent land forms, vegetative cover, roadways and land use patterns. This pencil drawing was then reproduced to serve as a base for illustrating each of the three scenarios. Color was applied to each base to show generalized future land use patterns. Inset drawings were used to illustrate typical shoreline settings under each scenario, including farming practices, shoreline development and hydroelectric development. Data regarding acreage of recreation/conservation land and the cost of municipal sewage treatment was displayed in graphs for each scenario. Three presentation boards were then prepared, one for each scenario, containing the base map, inset drawings, graphs and notes about the particular scenario.

Conduct Public Workshops: The Alternative Future scenarios were discussed at two public workshops. The first was an evening session, attended by nearly 100 people invited from the Department's list of participants in the Comprehensive Rivers Program in the Lower Winooski Basin. At this meeting, the scenarios were summarized in a slide presentation. Participants were then divided into small groups to discuss the different approaches to the major characteristics represented in the scenarios.The goal of the meeting was to stimulate discussion among the participants about the river and its uses. The Alternative Future scenarios provided a context for that discussion, helping people to see the effects that might come from their choices about the River, and the impact that those choices might have on other users of the River. For instance, if a person favored extensive buffering, how much land would that entail, what sorts of land uses might that preclude, and what effects might that have on farmers and other adjoining land owners. A facilitator directed the discussions, reading prepared statements about each characteristic. Following group discussion, participants were then asked to complete a response sheet concerning the major River characteristics and their preference among the scenarios in terms of each characteristic.

The second meeting was held as part of the Chittenden County Regional Planning Commission's monthly Planner's Luncheon Series. The meeting lasted two hours and was attended by about sixteen town and regional planners from the Lower Winooski River Basin, along with representatives of the Department, the Park District and Green Mountain Power. Once again, the scenarios were summarized in a slide presentation. The answers to the response sheets from the first meeting were also summarized. The group was then asked to identify strategies that might be used to achieve the vision for the future of the

Basin as described by the response sheet answers, and to distribute responsibilities for carrying out the strategies.

THE THREE SCENARIOS

The Alternative Future scenarios for the Lower Winooski River Basin were developed by varying the policy choices for five characteristics of the river and its use, as follows:

- *Water Quality:* The management standard for the quality of the water in the River and its tributaries, and the means by which that standard would be met, in terms of investment in sewage collection and treatment and the control of non-point source pollution;

- *Flow Regulation*: Policies regarding the management of existing dams or impoundments, water withdrawal, minimum flow requirements and the creation of new impoundments or diversions;

- *Buffers*:* The extent to which buffers would be maintained along water courses, the purpose of those buffers, the means by which such buffering would be accomplished and the types of activity that would be encouraged within buffer areas;

- *Access:* The degree to which the public would be provided access to the river and its tributaries, the nature or character of that access, the means by which the right of access would be acquired. Assumptions about recreation use were also incorporates in this characteristic;

- *Fisheries Management:* To what extent should people intervene in the life cycle of fish and other aquatic creatures. Will fish migration be assisted and, if so, how. Will the various reaches of the river, and the various tributaries, be managed differently for different fisheries types and for different fishing experiences;

The characteristics emerged from the data collection phase of the project, but were refined and clarified by the Focus Group process. The Focus Group participants were selected from a full range of river users/interests, including boaters, anglers, riparian land owners, naturalists, hydro operators, ski area managers, municipal officials and treatment plant operators. Also on hand for the Focus Group meeting were resource people with expertise

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* A buffer is a vegetated strip along a river or stream that is designed to lessen the impact on water quality of homes, farms, roadways or other developments. Buffer strips serve to filter sediment and other pollutants from runoff, stabilize banks, regulate water temperature and provide cover and habitat for animal life on or near the shore.

in the issues. Together, the participants and resource people identified and discussed varying approaches to each characteristic and commented on the implications of each.

Participants had been encouraged to take an advocacy perspective, looking out principally for their particular use or interest in the river. On that basis, they were asked to consider the River's future under the most ideal set of conditions, the most adverse set of conditions and under continuation of current trends. At the end of the day, the results of the Focus Group discussions were summed up under three Alternative Future scenarios, as shown on Table 1.

TABLE 1

LOWER WINOOSKI RIVER BASIN ALTERNATIVE FUTURES PROJECT

SUMMARY OF FOCUS GROUP RESULTS

ISSUE SETS	SCENARIO #1 FULL CORRIDOR DEVELOPMENT	SCENARIO #2 USE WITH STEWARDSHIP	SCENARIO #3 NATURAL SYSTEMS
Water Quality	Trade off desirable water quality for development needs	Abate non-point source pollution to improve water quality	Use best available technologies to improve water quality
Flow Regulation	Manage flows for peak power and snowmaking	Maintain minimum flows to support fisheries	Unregulated flow
Buffers	Defined by owner's needs and traditional minimum setback regulations	Encourage buffers throughout the watershed to maintain existing uses; target special areas for enhanced buffers	Define buffer by ecosystem needs
Access	Limited by market forces; recreation unmanaged	Provide high levels of access with education to encourage responsible use; target recreation types to specific areas to avoid conflicts	Limit access and recreation use to protect natural systems
Fisheries	Stock whatever species the habitat will support	Manage fisheries toward natural reproduction; vary techniques in different locations in the watershed	Non-intervention as fisheries management

Following the Focus Group session, a series of preliminary decisions were reached by the consultants and project sponsors concerning the nature of the scenarios. It was agreed that available population forecasts, to the year 2010, would be used as a common basis for growth assumptions in each scenario. A decision was also made to include effluent disposal from the existing sewage treatment plants and hydroelectric development from at least two of the existing power facilities in each scenario, due to the significant economic barriers to the elimination of either of these uses of the river. A decision was also made

regarding land conservation. For each scenario, the level of conservation assumed for the river and its shoreline would be extended to the watershed in general. In other words, Scenario #1, Full Corridor Development, would reflect limited emphasis on land conservation in its development patterns, while Scenario #3, Natural Systems, would reflect a very high level of land conservation.

Follow-up meetings with experts on the various issues were used to elaborate the scenarios and evaluate their implications. The results of those meetings included the following:

- By lowering the water quality standard for minimum concentration of Dissolved Oxygen, from 5.0 mg/l to 4.0 mg/l, an increase of about 45% in the waste loading from the sewage treatment plants that discharge into the Lower Winooski could be achieved.

- Population growth forecasts for the Basin through the year 2010 indicated a 28% increase. If the goal of the region is to channel future development into designated growth centers, this growth would exceed the capacity of the sewage treatment plants at current levels of capacity. Crossing the "capacity threshold" will vary in timing and degree in each town, depending upon current levels of excess capacity, actual rate of growth, rate of flow from new connections, and the degree to which a policy of compact settlement is followed by the particular town* . The demand from the projected growth could be accommodated if the plants were expanded by the 45% figure described above. To avoid water quality degradation, Advanced Wastewater Treatment improvements would be needed. (See Appendix A for support data on sewer capacity and growth in demand).

- Out of a total area of over one half million acres, roughly 5,000 acres of conserved land presently exists within the watershed, excluding Camels Hump State Forest and the National Guard Firing Range.

- The Fisheries Division identified four distinct river segments that, from a fisheries perspective, might be managed individually to achieve a variety of fishing opportunities (See Figure 1).

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* According to a January 3, 1991 Vermont Times article, Chittenden County will need to begin planning for new capacity, "...by the year 2000 if the new homes projected to be built by then actually appear, and if like now, about 40% of the homes use municipal sewers and if they continue to discharge between 250 and 450 gallons of waste daily."

- To support a diversity of wildlife and provide secure travel corridors as described under the Natural Systems Scenario, substantial restoration of the floodplain forest would be required, suggesting setbacks of five hundred feet or more in areas with limited topographic relief. Activities within the setback would need to be limited to avoid disturbance and degradation of water quality.

- Power company officials and representatives of the Public Service Department were consulted in an effort to gage the power output or power value implications of the various scenarios. This effort proved unsuccessful due to the complexities of the issue and its sensitivity in light of the approaching relicensing process.

Based on this research and consultation, the three scenarios were developed. They are described in narrative form below and depicted in a series of drawings that follows (Figure2 - 4). Note that the drawings illustrate typical settings along the river as they might appear under each scenario.

SCENARIO #1 - FULL CORRIDOR DEVELOPMENT

Under Scenario #1, the working potential of the River is exploited most fully. Flows are regulated at hydroelectric dams to maximize peak power production. The management standard for river water quality is lowered for minimum concentration of Dissolved Oxygen, from 5.0 mg/l to 4.0 mg/l, enabling an increase in the waste loading of about 45% from the sewage treatment plants that discharge into the river. This includes six plants, all of which currently require refurbishing, at an estimated cost of $20 million. The expansion of the plants to accommodate the 45% flow increase will add $40 million, for a total cost for sewage collection and treatment under Scenario #1 of roughly $60 million. The moderate-to-high density of development that is supported by this increase in plant capacity is distributed mostly to the suburbanizing communities of Williston, Essex and Colchester and to South Burlington, in a sprawling pattern, without concern for resource conservation. For example, setbacks along water courses are limited only by protection of the *floodway*, so that floodplain filling and development occur wherever the property owner sees fit. Because no attempt at efficiency in land use is assumed, development outside of the sewered areas would also occur along roads and on farmland. Only the existing inventory of conservation land, some 5,000 acres, is projected under this scenario, and public recreation access to the river is provided only at the few existing access points.

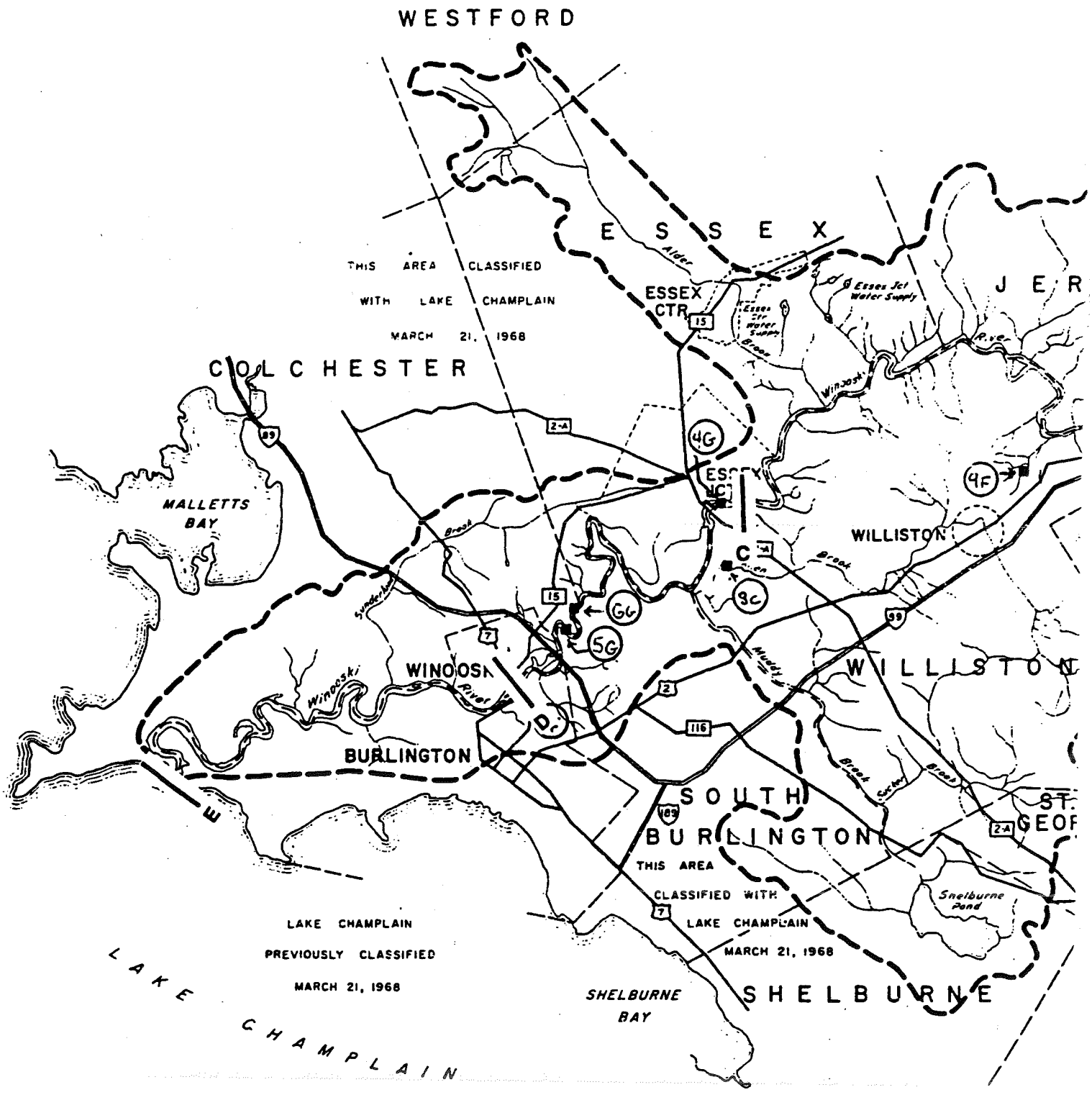
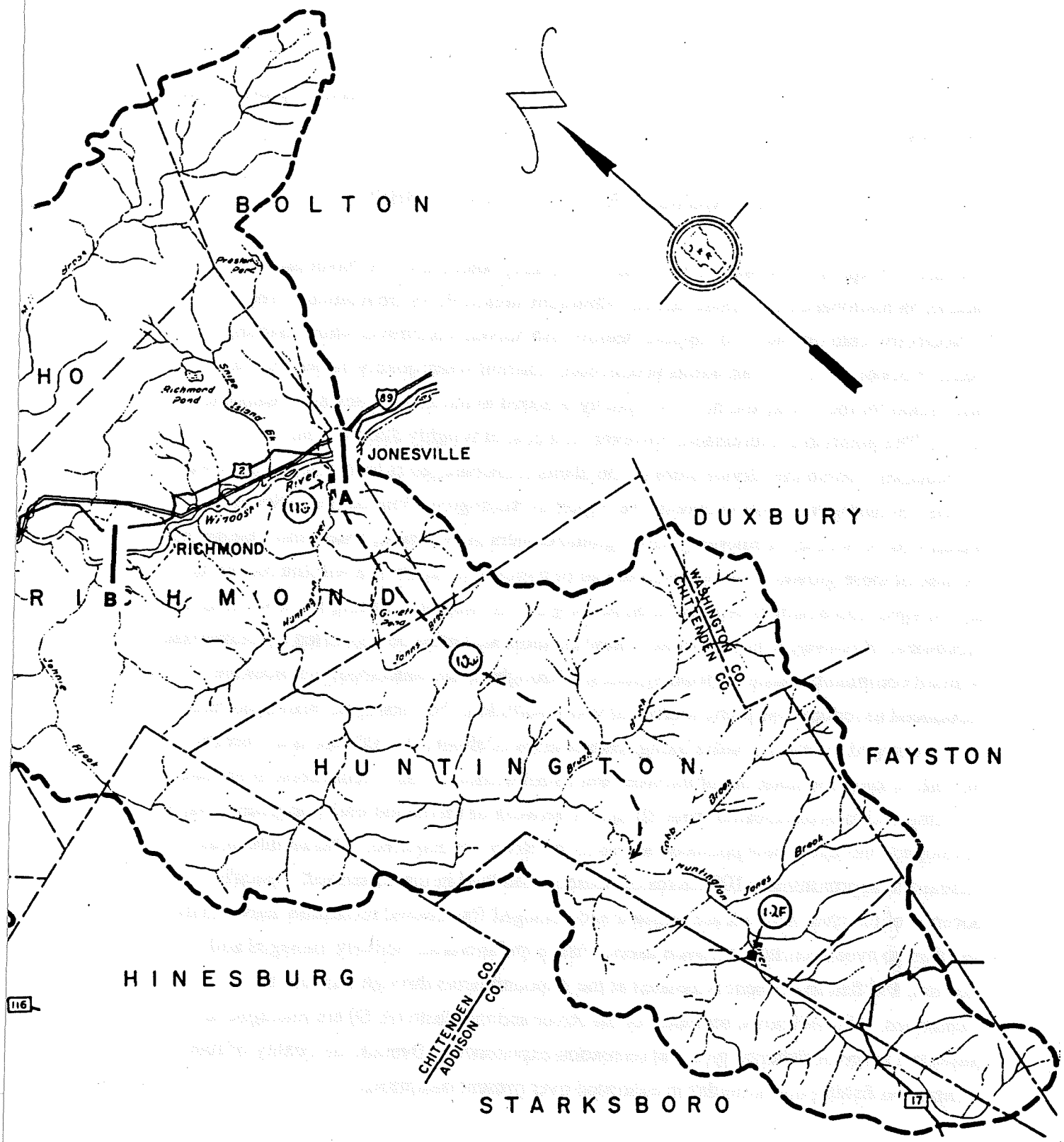


Figure 1

E LAKE CHAMPLAIN

D SALMON HOLE

C ESSEX JUNCTION DAM



LOWER WINOOSKI RIVER DRAINAGE BASIN

SCALE OF MILES

0 1 2 3 4

APPROVED:		1968
DRAWN BY	VERMONT STATE WATER RESOURCES BOARD MONTPELIER, VERMONT	SHEET 1 OF 1
CHECKED BY		

B RICHMOND SEWAGE TREATMENT PLANT

A BOLTON FALLS

LOWER WINOOSKI RIVER

Fish movement is precluded by impoundments, and the quality of fish habitat is diminished due to lower water quality.

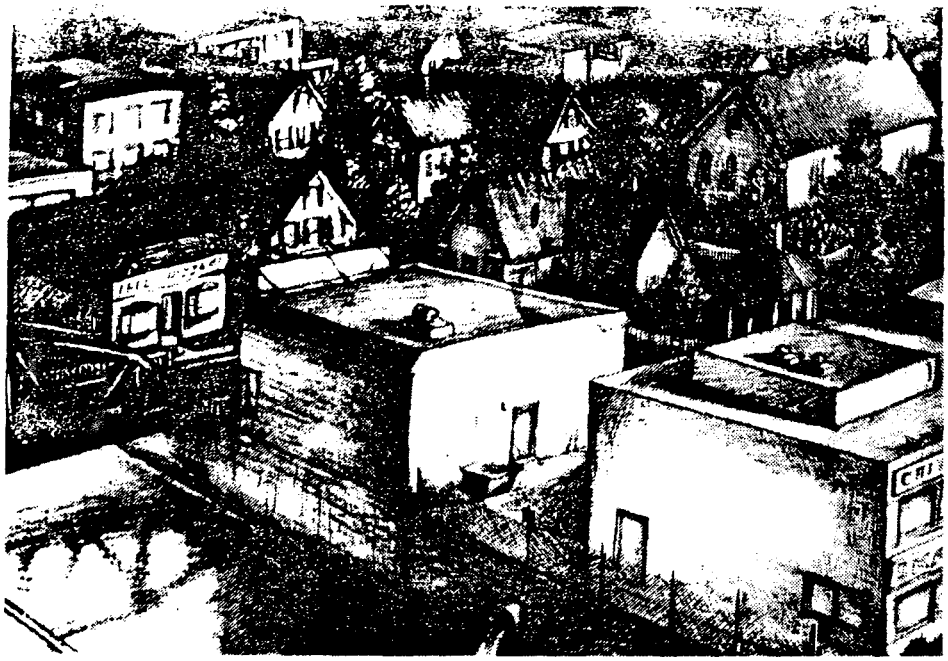
SCENARIO #2 - USE WITH STEWARDSHIP

Scenario # 2 represents a balance between the working potential of the River and its natural, recreational and aesthetic assets. Minimum stream flows are maintained by hydroelectric dam operators to support healthy fish habitat conditions while enabling a measure of control over peak power production. Current water quality standards are maintained for the River, and no new capacity is added to the existing sewage treatment plants. The plants are refurbished, however, at a cost of roughly $20 million. Development within the service areas of the plants is encouraged at high density in growth centers, including the existing core of the region in Burlington, Winooski and South Burlington, as well as in emerging sub-regional centers in Williston, Essex and Colchester. Outside of these growth centers, development of agricultural lands and wildlife habitat is discouraged, and a natural vegetative buffer of ± 50 ' is maintained along the River and its tributaries. However, a large portion of new development must be supported by individual or small community waste disposal systems. Throughout the watershed, practices are introduced to reduce non-point sources of water pollution. For example, farm operators are encouraged to retain a buffer along watercourses of about 50 - 100 feet as a filter for run-off, to keep livestock out of the river and its tributaries, to take precautions in manure handling and to avoid erosion from tilling. A network of recreation trails, or greenways, is developed, and many new points of access to the River are acquired. This results in an increase of approximately 1000 acres of conservation land in the watershed. Specific portions of the river network are targeted and managed for selected recreation activities in an effort to avoid conflicts between users. Fish populations are actively managed and stocked, and fish movement is assisted at the impoundments through trap and truck techniques. The individual segments of the River and the Basin (A-D) are managed to provide a range of fisheries type and recreation experiences. Overall, the quality of fish habitat and fishing opportunities is enhanced over present conditions.

SCENARIO #3 - NATURAL SYSTEMS

Scenario #3 envisions a setting less dominated by people; one governed by a policy of deference to nature. While the River's working potential continues to be drawn upon, extra care is taken to minimize harmful effects. For instance, hydroelectric dams are operated as

run-of-river, enabling continuous flow to pass through the impoundment, with sufficient spillage over the dam to maintain wet conditions in the area between the dam and the powerhouse. The dam at Winooski Gorge is eliminated in favor of a natural condition. Advance Waste Treatment improvements have been made to the sewage plants, enabling a 45% increase in the capacity of the plants without any decrease in water quality management standards. The cost for this measure is estimated to be about $70 million dollars, and reflects refurbishing and plant expansion along with the $10 million cost of advanced treatment. This increased capacity supports a highly compact settlement pattern in designated growth centers in each of the region's communities. An aggressive effort to encourage efficiency in land development is assumed under this scenario, with development of agricultural lands and wildlife habitat discouraged. To support wildlife, reemergence of a more natural floodplain is encouraged through land acquisition and other conservation measures, providing a natural buffer hundreds of feet in width along the river and its tributaries. Farm activities within the buffer would be limited to annual cover crops, with row crops, grazing and chemical applications discouraged. This substantial buffer adds an estimated 4,000 acres to the stock of conservation land in the Basin. Management practices are employed throughout the watershed to minimize non-point source water pollution. Fish movement is enabled, but not assisted, at the remaining impoundments. Access to the river is limited to reduce disturbance of natural conditions. While the improved water quality provides enhanced fish habitat, the limited access tends to diminish the recreation use of the River and its tributaries.



- Floodplain filled and developed
- River channelized and bank buttressed
- Limited public access
- Tributaries in culverts
- Storm water discharged directly to river

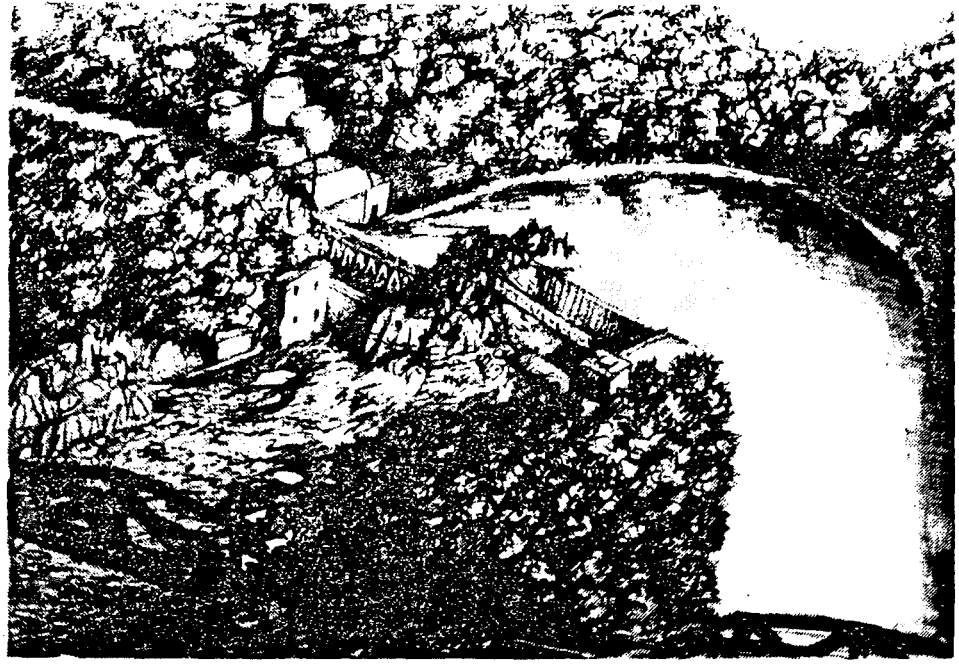
- Natural stream bank and channel
- Moderate buffer; undeveloped floodplai
- Generous public access; recreation improvements
- Tributaries in natural state
- Storm water filtered through buffer vegetation

- Natural stream bank and channel
- Extensive buffer; undeveloped floodpl
- Limited public access to minimize disturbance
- Tributaries in natural state
- Storm water filtered through buffer vegetation

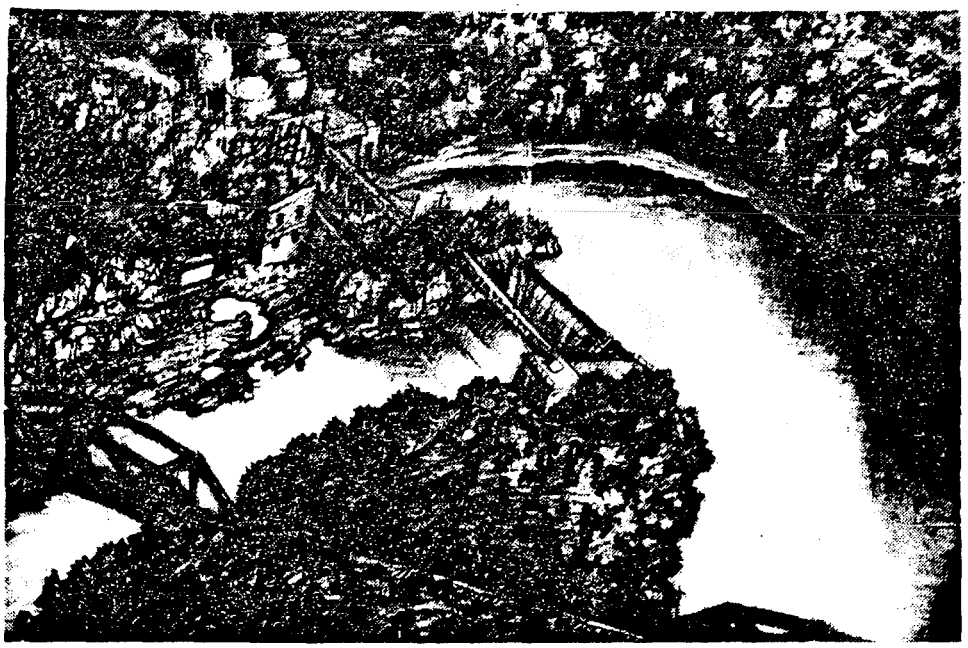
- No buffer; floodplain intensively farmed
- Livestock have access to river
- Unconfined manure storage
- Run-off form tillage
- Shoreline erosion

- Moderate stream buffer of cover crops an woods
- Livestock fenced out of buffer; away from stream
- Tillage patterns managed to reduce run-off
- Stream bank stabilized with rip-rap

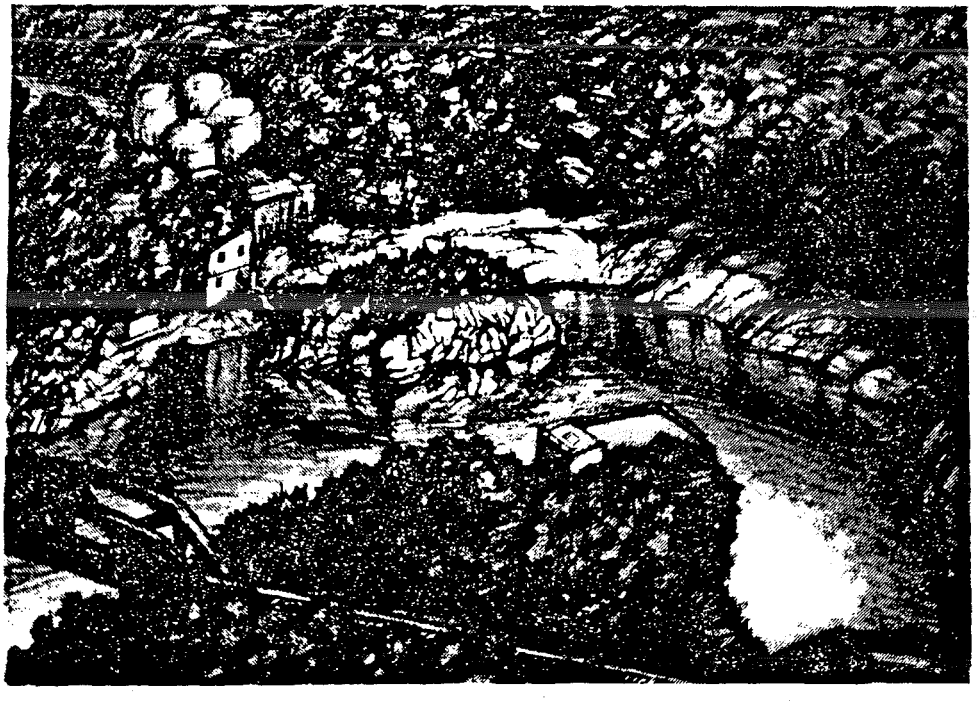
- Extensive stream buffer of cover and wo
- Livestock fenced out of buffer; away fro stream
- Tillage patterns managed to reduce run-o
- Stream bank vegetated but unmanaged



- Developed for hydroelectric production
- Flows regulated to maximize peak powe
- Minimum flows below dam based on "leakage" only
- No provision made for fish migration
- Access to shoreline prohibited to avoid owner liability



- Developed for hydroelectric production
- Flows regulated to balance power prodi tion with other uses of the river
- Minimum flows below dam of 350 cfs maintained
- "Trap & Truck" measures used to aid fi migration
- Access to shoreline permitted but limite to avoid owner liability



- Dam removed
- Flows unregulated; minimum flow fluctuates widely
- No fisheries management
- Access to shoreline permitted but limit to avoid disturbance

RESPONSE TO THE SCENARIOS

Based on the response sheets used at the first workshop, the reaction to the Scenarios reflects consensus around many issues, but divergent views on others. Agreement appears broad based on the following:

- Water quality in the River and its tributaries should not only be maintained, but should be improved, through public investment in Advanced Waste Treatment and through control of non-point sources of pollution, with buffer areas as a technique.
- Regulation of the River's flow should be managed to insure that other uses of the River can be enjoyed, and particularly to insure healthy fish habitat.
- A degree of public access to the River and its tributaries is important. To minimize conflict and unwanted impacts, however, the level of access should be carefully managed.
- The current patterns and trends of land development in the Basin are undesirable, and should be redirected toward a more compact and efficient pattern. Sewage plant capacity should be increased to enable greater compactness of development.
- The River and its tributaries should be managed differently in the different segments to provide for a variety of uses and a variety of fisheries and to reduce conflicts between users.
- Private landowners should be compensated as needed to maintain buffers and other desirable open land.

Differing positions were taken on the following issues:

- The function and extent of buffer areas; should they function as filters for run-off only or as wildlife habitat, recreation areas or other uses? Should they be modest in width, or should be broad enough to encompass the remaining undeveloped floodplain?
- Should the current degree of public access to the River be increased, or is it adequate as is?
- Should any buffer system created along the water courses be active and highly accessible to human use, or limited in its accessibility.

Table 2, below, summarizes the responses received from participants in the first workshop to the question, "Which of the Scenarios comes closest to reflecting your views of how the Basin should be managed with respect to..." each characteristic:

Table 2
SUMMARY OF RESPONSE SHEET REPLIES
FIRST WORKSHOP

Characteristics	Scenario #1	Scenario #2	Scenario #3
Water Quality	0%	44.6%	39.3%
Flow Regulation	0%	69.6%	19.6%
Buffers	0%	55.4%	26.8%
Access	5.4%	55.4%	28.6%
Development Distribution	0%	39.3%	39.3%

There was no significant support among the respondents for Scenario #1, Full Corridor Development, for its treatment of any of the characteristics. Scenario #2, Use with Stewardship, was preferred by 70% of the respondents in its overall depiction of Flow Regulation. A majority (55%) preferred Scenario #2 overall in its treatment of Access and Buffers, although strong minority sentiment (27%,29%) was expressed for the approach described under Scenario #3, Natural systems. The respondents were equally split between Scenarios #2 and #3 on the overall depiction of Water Quality and the implications of the scenarios on Development Distribution. However, as detailed above, when presented with specific questions on these topics, a consensus emerged.

A goal of the Project is to develop a vision statement for the Lower Winooski River Basin, drawing on the reaction to the scenarios. The Vision Statement appears in narrative form at the beginning of this report. It incorporates the following conclusions and recommendations:

- Population growth and associated development are inevitable in Chittenden County. This growth should be channeled to designated growth centers or otherwise located in a manner that preserves open space and protects the environment.
- Over the twenty year planning horizon of this project, to the year 2010, it will be necessary to invest in additional capacity in the Basin's existing sewage facilities if compact patterns of settlement are to be supported. Any increase in capacity should incorporate advanced waste treatment technologies to insure that water quality standards are not lowered.

- Buffer areas should be maintained along the River and its tributaries. Property owners should be compensated, or provided with other economic inducements to maintain open space and provide public access to the River and its tributaries.
- The Lower Winooski River differs from place to place as it travels from Bolton Falls to Lake Champlain. To most effectively manage the River and watershed for a variety of fishing and other recreational experiences, management segments should be designated, and management strategies should be developed for each segment.
- The fact that disagreement exists between sometimes competing users of the River is to be expected, and the process of resolving those remaining conflicts is part of the vision. Specifically, the Regional Planning Commission, the Park District or some other entity should convene a process of discussion and negotiation to reconcile differences and find ways to enhance coordination between river interests.

IMPLEMENTATION

Change occurs in small increments, and is influenced by decisions made at many levels of both the public and private sector. To achieve a desired outcome from the complex network of change requires communication, coordination and cooperation. A successful strategy must begin with some level of consensus on the desired outcome. A good start will have been made toward that consensus on the Lower Winooski River Basin through this Project and the Department of Environmental Conservation's Comprehensive Rivers Program. As pointed out above, a few important issues remain to be resolved, and should be addressed, perhaps through a facilitated process of negotiations between the parties. The Regional Planning Commission might be the right party to sponsor such a process. The Regional Plan would be a good place to record the goals and objectives for the Basin.

There are some basic policy hurdles that must also be surmounted if the Vision for the basin is to be realized. The compensation of property owners may require cash contributions from local governments that are already struggling to set spending priorities. The emphasis on a growth center-based pattern of future land use will involve tough choices at the local level that will in turn effect individual property interests. There may also be significant regional implications of a growth center policy, leading to tax base conflicts between towns. The management of river flows will have energy production consequences, which must be reconciled within the larger context of state and national energy policy.

Implementation should be pursued at all levels of government. Local plans and bylaws should provide the primary guidance on land use issues. The Winooski Valley Park District and the Regional Planning Commission, in conjunction with local planning and conservation commissions, should take responsibility for targeting and managing the land conservation efforts. State government should insure that in-stream conditions, such as water quality and minimum flow, are managed properly. The Fisheries Division will have been a key player in the negotiations described above, and should then work to translate the outcome of those negotiations into a Segment -by-Segment fisheries management plan for the Basin.

The following general implementation categories should be combined in the effort to manage the Basin:

- *Education and Public Discussion:* Beginning in the schools, but extending through the media and into town meetings and other public forums, the importance of the River and its tributaries should be a frequent topic of discussion. The measures being taken to protect and use the resource should be monitored and evaluated for effectiveness and appropriateness. Individuals and private groups should be encouraged to work towards a healthy watershed.

- *Incentives:* Economic and other incentives should be provided to implement goals for the Basin. Tax incentives and development density bonuses are examples of such incentives. Where needed, public funds should be raised to purchase important land, either in fee or through acquisition of a conservation easement. Farmers should be provided financial incentives to employ management practices that reduce non-point source pollution.

- *Regulation:* The regulatory process should be used strategically to implement Basin goals. Local zoning should limit uses in conservation areas to only those activities that are compatible with conservation objectives. If necessary, a Transferable Development Rights system should be employed to permit the owner of conservation land to realize a profit from development in growth centers. A 'no-build' policy should be employed throughout the flood hazard area. At minimum, stream setbacks and shoreline protection measures should be included in all zoning ordinances.

The Regional Plan should be sufficiently specific on the Basin management issues to be useful in the Act 250 process. The Regional Plan should be developed in consultation with the localities to maximize consistency. It should identify areas desirable for conservation, public access and for varying types of recreation use.

State government should continue to manage and protect the in-stream integrity of the River and its tributaries. The municipalities should be assisted and encouraged in the expansion of their sewage treatment facilities, but only in combination with Advances Waste Treatment improvements. The existing hydroelectric facilities should be required to operate in a manner the provides a minimum flow of water at all times sufficient to support healthy downstream fish habitat, in accordance with a fisheries management plan for the particular river Segment. While the power produced by the facilities is important, it is not more important than the health of the river and the wildlife that it naturally

supports. Any additional impoundments should be permitted only if they are compatible with a fisheries plan and the goals for the basin.

The regulatory efforts must be coordinated, so that they are predictable and consistent. Where conflict arises, it should be seen as the responsibility of the various governmental officials to work toward its resolution. The citizens, landowners and users of the River, its tributaries and shorelines must be treated fairly, equitably and with respect.

APPENDIX A

To evaluate the need for additional sewer capacity in the future, the following information was reviewed:

First, projected housing demand data was obtained from the Regional Planning Commission, which had been derived by applying an assumed future household size of 2.6 persons per household to population forecasts for each town. Total future housing demand was then compared to the current housing stock to derive a forecast for new housing demand for the year 2010:

TOWN	1990	2010	# NEW
BOLTON	507	646	139
BURLINGTON	15214	19395	4181
COLCHESTER	6121	7793	1672
ESSEX	6299	8020	1721
RICHMOND	1436	1828	392
SO. BURLINGTON	5613	7147	1534
WILLISTON	1917	2441	524
WINOOSKI	2832	3639	807

The other part of the equation, sewer capacity, was calculated by determining the current capacity of each of the municipal sewage plants that serve the effected towns, and the current demand on , or average flow to, each plant. The difference between capacity and current demand is excess capacity. Of that excess capacity, the share available to support future housing growth was estimated, based on two assumptions:

- That residential land use would be allocated 50% of excess capacity, leaving 50% to support commercial, industrial, institutional and other needs.
- That residential demand would be calculated using a design flow of 450 gallons per unit per day.

This process yielded the following:

PLANT	DESIGN CAPACITY (GPD)	CURRENT DEMAND (GPD)	EXCESS CAPACITY (GPD)	FUTURE RES. UNIT CAPACITY	FUTURE COMM. GPD CAPACITY
BURL MAIN	4,000,000	3,350,000	650,000	722	325000
BURL NORTH	2,100,000	980,000	1,120,000	1244	560000
BURL RIVER	1,000,000	765,000	235,000	261	117500
COLCHESTER	310,000	170,000	140,000	156	70000
ESSEX JCT	2,750,000	1,130,000	1,620,000	1800	810000
RICHMOND	222,000	95,000	127,000	141	63500
SB AIRPORT	2,300,000	1,110,000	1,190,000	1322	595000
SB BARTLETT	800,000	630,000	170,000	189	85000
WINOOSKI	1,200,000	698,000	502,000	558	251000

Finally, future housing growth demand was compared to sewer plant capacity, both under current conditions and assuming a 45% increase in total plant capacity, as anticipated under Scenarios #1 and #3. Note that the capacity of two or more plants are combined by town, in the case of Burlington and South Burlington, and that the housing demand for two

communities, Essex and Williston, are combined to correspond to their shared sewer plant facility:

TOWN	PROJECTED RES. UNITS	RESIDENTIAL PLANT CAPACITY	UNSEWERED RES. UNITS	PERCENT UNSEWERED
BURLINGTON	4181	2227	1954	47%
COLCHESTER	1672	156	1516	91%
ESSEX/WILLISTON	2245	1800	445	20%
RICHMOND	392	141	251	64%
S. BURLINGTON	1543	1511	23	2%
WINOOSKI	807	558	249	31%
TOWN	PROJECTED RES. UNITS	RES PLANT CAPACITY @+45%	UNSEWERED RES. UNITS	PERCENT UNSEWERED
BURLINGTON	4181	5777		
COLCHESTER	1672	311	1361	81%
ESSEX/WILLISTON	2245	3175		
RICHMOND	392	252	140	36%
S. BURLINGTON	1543	3061		
WINOOSKI	807	1158		

As the data show, the towns vary widely in their ability to accommodate future housing demand within their sewer service areas. In fact, availability of sewer capacity will be one of the more significant factors in determining the distribution of housing growth among the various towns in the region.

Appendix F

Comprehensive Rivers Program

CITIZENS ADVISORY COMMITTEE

Appendix F
Comprehensive Rivers Program
CITIZENS ADVISORY COMMITTEE

Throughout the comprehensive river planning process, the Agency has sought the assistance of a Citizens Advisory Committee which represents a wide range of river users and conservationists to ensure a complete inventory of river attributes, a broad perspective and a balanced approach in the selection of river management goals. More specific roles of the Citizens Advisory Committee have been (are) to:

- Create a process by which comprehensive rivers planning would take place in an orderly, fair and legal manner.
- Establish the priority in which river basins have received attention.
- Encourage a balanced representation of river use and conservation interests in local river basin planning.
- Through the Agency of Natural Resources, provide technical support to local river planning groups.
- Promote a goal-formulation process that assists the public in identifying opportunities for achieving their common vision of the river and resolving outstanding use conflicts.

The Citizens Advisory Committee will review all draft comprehensive river plans to ensure that all river interests that have participated in the process are represented by the plan. Public hearings will also be held in the basin for which the plan has been completed to allow final comment from the public before the plan is finalized.

Once a comprehensive river plan is finalized, the Agency of Natural Resources and Citizens Advisory Committee will promote the implementation of the recommended actions agreed upon in the plan. The Agency may provide technical assistance to the public or directly implement state statutes for which it has authority.

The following page lists the members of the Citizens Advisory Committee.

Comprehensive Rivers Program

CITIZENS ADVISORY COMMITTEE

Alan Erdossy Minister Brook Road Worcester, VT 05682	Trout Unlimited, Atlantic Salmon Task Force
Jack Byrne 153 State Street Montpelier, VT 05602	River Watch Network
Jennifer Ely Ethan Allen Homestead Burlington, VT 05401	Winooski Valley Park District
Joe Parkinson P.O. Box 368 Montpelier, VT 05602	Vt. Ski Areas Association
John Mullen CVPSC 77 Grove Street Rutland, VT 05701	Central Vt. Public Service Corp.
Jonathan Wood Bell-Gates Lumber Co. P.O. Box 279 Jeffersonville, VT 05464	Silviculture, Lamoille County Regional Planning Commission
Jud Babcock Rte 100, Box 40-2 Waitsfield, VT 05673	T.H.A., Inc., citizen, real estate developer
Nancy Burt P.O. Box 519 Rutland, VT 05701	Green Mt. National Forest
Peter Basta P.O. Box 518 Dorset, VT 05251	Trout Unlimited
Peter Richardson Box 1005 Norwich, VT 05055	Connecticut River Watershed Council
Ray Gonda 10 Cardinal Woods So. Burlington, VT 05403	Northern Vermont Canoe Cruisers
Rep. Harry Pickering, Sr. RR 1, Box 1375 Arlington, VT 05250	State Representative - House Natural Resources Committee

Stephen Crowley 9 Bailey Ave. Montpelier, VT 05602	Vermont National Resources Council
Tom Horn Box 217 Montpelier, VT 05602	UPRIVER Program, Atlantic Center for the Environment and Two Rivers\Ottauquechee Regional Planning & Development Commission
Tom Lauritsen RR 2, Box 557 Perkinsville, VT 05151	CT Community Recreation Project Weathersfield Town Selectman (Committee Chair)

Appendix G

RESPONSIVENESS SUMMARY

Appendix G

The Preliminary Project Report

for the

Lower Winooski River Basin

An Inventory of Uses, Values and Goals

RESPONSIVENESS SUMMARY

The Department received several comments on the Draft Report, both at the August 6, 1991 Public Hearing and in subsequent letters. As a formal way of responding to these public comments, the Department has prepared this Responsiveness Summary. Certain comments required some corrections and additions to the report, which have been made. Others will be incorporated into the Final Plan.

The format used summarizes the public comments or questions under "Comment." The person making the comment is given, including whether it was taken at the Public Hearing or as a letter. The Department's response, or answer, is summarized under "Response."

Comment: *The description of the natural community in the Intervale (pp 48-49) is totally inaccurate. The natural community has been altered or destroyed due to: (1) leachate from the old Burlington landfill (2) the trapping of 1' - 2' of water on the west side of the Northern Connector by construction of this road (3) the discharge of extra stormwater to the Intervale as the result of Burlington's stormwater separation project, and (4) the construction of an earthen dam on the east side of the Northern Connector, which holds back water and which influences the water level on the west side of the road.*

All this was done without my permission (or compensation) over whose land some of this now-contaminated water flows. Also, the state had no right giving a permit to the City of Burlington for the increased stormwater discharge. The year-round impounded water (which used to be there only in the spring before the Northern Connector was built) has caused the bank below my house to become unstable. This has become a liability to my property and has resulted in its not being saleable. I want the natural drainage restored. (Morton Bostock, 420 North Ave. Burlington. Hearing 8/6/91).

Response: The Department has discussed Mr. Bostock's concerns with many people. According to Jeff Parsons, who assisted with the original natural community survey in 1988 for the City of Burlington, there has been no change to the wildlife as a result of leachate, stormwater, the road and the earth berm. With respect to the water level and wetland impacts on Mr. Bostock's and his neighbor's properties, Mr. Parsons did a special study which ruled out increased water levels as the main cause of the de-stabilization of Mr. Bostock's bank. This study is available from the Water Quality Division or the Burlington Parks and Recreation Department. According to Julie Hackbarth, Solid Waste Division, the leachate is collected in back of earth berms, treated and piped to the Burlington waste water treatment facility. The uncollected leachate receives natural treatment as it passes through a green filter composed primarily of cattails.

The stormwater discharge did not require a permit because the two discharge points in the Intervale were existing. Also, Burlington was under federal mandate to separate its sewers. According to Nopadon Sundarabhaya, Public Facilities Engineer, legal public notice was given for Burlington's sewer work and public hearings were held, giving residents ample opportunity to be heard.

Comment: *The City of Winooski acknowledges and respects the need for green space and open space. (John Braddock, Winooski Resident. Hearing 8/6/91).*

Response: With regard to the documentation of Winooski's need for green space and open space, it will be added to the Summary Matrix of Town/Regional Plans on page 25A.

Comment: *What will be the comprehensive regulatory authority for development in the watershed? Will there be increased requirements for monitoring? For example, VT Integrated Waste Systems has written a letter of intent to have a composting facility off Malletts Bay Avenue....as close to the river as you can be in Colchester and Winooski. Apparently it is a 150 ton-per-day facility dealing with everything that can't be recycled or incinerated. There will be runoff from it. This is an example - there will be more like it. I would request that the plan call for increased monitoring for industrial facilities. (Tim Asten, Winooski resident. Hearing, 8/6/91).*

Response: The plan may call for more State monitoring than takes place now. Any development (over 10 acres in size in a town with permanent zoning and subdivision regulations), including the composting facility, must receive Act 250 approval, solid waste or other appropriate permits. The permits, in

certain cases of large developments, require monitoring or sampling to be done by the owner. If there is a suspected pollution problem that the State is aware of, water resource investigators or other enforcement officials would do monitoring or take water column samples. It is hoped that the final comprehensive plan will sensitize and inspire riparian communities or private groups to contact River Watch to help them set up a local River Watch Group. This group (often composed of high school students) takes water column samples on a regular basis and at pre-designated locations in order to establish a monitoring network. The results of this work help to locate pollution sources and to correct the problem. The recommendation to establish River Watch Groups will be in the final plan.

Comment: *The Colchester boat access area (to the Winooski River) is the scene of many loud, late-night parties. The biggest problem however, is big speed boats with 150 HP motors that speed past my property, disobeying the 5 MPH speed limit, eroding my bank, scaring the nesting birds at Derway Island and washing our docks onto the shore. After repeated calls, the State Police finally come to enforce the speed limits, but they usually don't patrol the river due to limited resources. I suggest the police use binoculars, park in the access area and pick up the speeders when they come ashore. Don't dredge the mouth for the speed boaters. There's no reason for them to be up there anyway.*

The water quality isn't as good as they say it is, as evidenced by oily, sludge-like material on the shore. Not as much garbage coming down the river, but there still is some, especially during spring snow-dumping reason.

I'd be interested in participating in any kind of administration of the river in my area. Better enforcement and education of the boaters is needed to make them aware of the no-wake rule. I'd like to see the boat access area kept closed until after the nesting birds leave in the spring. (Ronald Harding, Colchester. Hearing 8/6/91).

Response: The Department will include in the final plan a request that the Water Resouces Board address the question of designating different river reaches for motor vs non-motor water craft and/or restricting motor boat use based on motor size, no-wake speed limit or time of year restrictions. Also, the Department will recommend that the mouth of the river not be dredged.

Your offer to participate in administration of the river in your area is appreciated. With respect to the sludge-like material on the shore, it is hoped that the river's water quality will improve once the comprehensive river plan has been adopted and implemented.

Comment: *You need to allow for adequate policing and enforcement in your plan if you are going to encourage more natural and undeveloped areas be set aside. If you don't, you will turn it into a place for drunken parties. (John Derway, Burlington. Hearing 8/6/91).*

Response: This comment will be included in the report's inventory of public views.

Comment: *Do people empty their household waste in the river? If I went canoeing, I'd want to swim in the river. What is the quality of the water? I don't understand when you said we're going to upgrade from a Class C to Class B. (Ellen Black, Burlington. Hearing, 8/6/91).*

Response: The Department does not believe there is domestic sanitary waste being discharged to the Winooski River. The river is not managed for water contact recreation, including swimming. Recently passed legislation will require much of the Lower Winooski River to be reclassified to Class B, which will require it to be managed for swimming, among other Class B uses. The long-term goal of Class B will be to eliminate pollution sources which prevent swimming from taking place.

Comment: *Do any sewage treatment plants provide tertiary treatment to their discharges to the Lower Winooski River? (Henry M. Farmer, So.Burlington. Hearing, 8/6/91).*

Response: The Essex Junction, Winooski and South Burlington treatment facilities provide high levels of treatment and remove phosphorus. During 1992, phosphorus removal will be constructed at the Burlington North and Burlington Riverside plants.

Comment: *The phosphorus is removed from the discharge to the river (via treatment plant upgrades) only to be spread on agricultural land to get back into the river (during flooding) and I very strongly oppose the spreading of sludge with high phosphorus in it in the Intervale. Also, the Winooski Natural Resources Conservation District will be writing a letter stating we're very concerned about the location of the proposed dump on Redmond Road. It's sand. The lining will leak someday and leach right to the river. Why do we feel we've got to make our dumps right on the edge of rivers? (Tom Bushey, Shelburne. Hearing, 8/6/91).*

Response: Burlington's permit for sludge spreading requires the sludge to be spread no closer that 100' to the river and that it be cultivated into the soil. In

addition, no sludge is to be spread on frozen ground. If these conditions are adhered to, no sludge should enter the river due to the permitted sites' ability to treat applied sludge. With respect to landfills, the criteria require the landfill to be located no closer than 100'. Leachate traveling this distance should have its contaminants removed, if in fact, the liner should leak.

Comment: *A cumulative impact assessment should be done with regard to potential impacts to wildlife and natural systems before proposed access areas and trails are installed. Derway Island is an example of an ecologically-sensitive area where access should be limited (Lars Botzojorns, Burlington Conservation Board. Hearing, 8/6/91).*

Response: Environmental assessments will be recommended to be performed before riparian trails and access areas are installed. However, most of the land riparian to the lower Winooski River is not under State control. The identification of sensitive areas of concern in the plan hopefully will insure their protection/proper stewardship by those responsible for development of trails and access areas.

Comment: *There is an over-emphasis of the relicensing of Essex #19 in the introduction of the plan. Most of the public comments are not related to the relicensing project. Also, Essex #19 only impacts one short segment of the river. We recommend a new chapter dealing with public policy and procedures. How the plan will deal with the issues raised would be in that Chapter. Issues include agricultural runoff, sewage treatment, landfill siting, industrial pollution, buffers, public access to private land and others. The plan looks to the future, 2010, and Essex #19 relicensing will be over in 1993, which is another reason why the plan should not emphasize relicensing. Another problem has to do with delineating between opinions and findings of fact. We found a number of contradictions, some of which make it difficult to operate a generating plant. An example is found on page 77 with regard to the amount of fish in the Lower Winooski. Twenty to thirty years ago it says that fishermen used to catch wheelbarrows of fish. This is in conflict with fisheries biologist, Brian Chipman, who says the fishing cannot be managed due to low and fluctuating flows caused by the hydroelectric facilities. The Statement which talks about "wheelbarrows full of fish" implies there were higher flows 20-30 years ago. In actuality, the flows were more restricted 20-30 years ago. It was only in 1987 that GMP increased flows to 7Q10 and greater. Since the plan will become a document for the relicensing of #19, we'd like the conflicting statements removed for clarity.*

We feel that Chapter 5 needs clarification. We believe the plan should tell how the synthesis was arrived at. Many of the statements are conflicting and if the plan is trying to resolve conflicts you're starting with conflicts already built in. For example, on page 97, it says all dams should go to run-of-river operation. Page 99 calls for high summer flows for boating opportunities. You cannot have both run-of-river and high summer flows at the same time. High summer flows require a ponding-and-release-type operation. Someone needs to make a judgement as to which it should be. Will the Citizens Advisory Committee make this judgement at the preliminary point or the final point?

The run-of-river flows requested would reduce the value of the energy produced which may have to be replaced by fossil fuels. At the public meetings I attended, no one called for run-of-river. The only place this is mentioned is in the "Full Conservation" alternative scenario. If you recall, 70% of the people at the Alternative Scenarios meeting voted for the Use with Stewardship" scenario. This scenario called for higher Winooski River flows to protect the fishery, not run-of-river.

I strongly recommend that you include the summary of the Alternative Futures "voting" in the appendix of the report. (Greg Morgan and Gene Shlatz, Green Mountain Power Corp. Hearing, 8/6/91).

Response: The Department believes the relicensing of Essex #19 is an important issue that will influence the river for the next 30 years. It is agreed that most of the comments were not directly related to the relicensing process. However, the meetings were structured to focus on particular areas of interest which were not necessarily hydro relicensing. Farmers, for instance, were more interested in gravel removal than water levels. On the other hand, those whose activities were directly related to the river, did have comments on relicensing. These included boaters, fishermen and the open space/recreation interest group.

With respect to the short length of river that is influenced by Essex #19, the Department's position is that all three hydro-electric facilities are interrelated. Therefore, the Department believes 20 miles of the Lower Winooski will be directly influenced by the relicensing of Essex #19 and the remaining 20 miles will be indirectly influenced by relicensing.

Your suggestion for a Chapter dealing with how issues raised by the public will be dealt with is a good one. It is thought that this had been covered in the introduction. The issues, with proposed actions, will be presented in the final plan, after another round of public meetings. As explained in the introduction, the findings of Green Mountain Power's studies need to be

incorporated into the report as well as subsequent Agency staff research results before definitive actions and strategies are recommended in the final plan. This information will be added to the introduction.

You stated that the plan should delineate between opinions and findings of fact, and the contradictions should be removed. As has been stated before, the final plan will have fact and opinion delineated and will have all the contradictions resolved. With regard to the example of "wheelbarrows of fish," that was from a book by Ralph Nading Hill, published in 1949. this was not stated in the text. If it had been it would have made the date of the wheelbarrow-full somewhere about 1919.

The conflicting statements regarding run-of-river and high summer flows will be removed from the preliminary report. Also, at your suggestion, how the synthesis was derived will be explained. Finally, the summary of the Alternative Futures Scenarios public survey will be included in the appendix.

Comment: *Is there any systematic monitoring of the river? The report says the water quality has improved, but I didn't get the sense that it was fact-driven or research-driven. Also, rhetorically, would that be beneficial to the other parties that have spoken tonight who are concerned with Lake Champlain? (Tom McAuliff, Burlington Waterfront Board. Hearing, 8/6/91).*

Response: Each of the wastewater treatment facilities is required to monitor its discharge in order to comply with the requirements of its permit. Every two years, the Department is required to do a water quality assessment. This entails interviewing technical people who are familiar with the water quality of the river, researching hazardous waste files, complaint files, solid waste files, etc. If water quality monitoring and/or bio-monitoring has been done on the river, this information is utilized as well. All this data provides reliable water quality information which has been included in the water quality section of the inventory report. Also, a wasteload allocation was recently done for the Lower Winooski River. These studies showed that the dissolved oxygen in the river had improved to the point where the water quality standards were being met. This improvement was the result of the voluntary release of flows at the dams. This water quality data is also reflected in the inventory report

It would be ideal to have more systematic monitoring on the Lower Winooski River. This Lower Winooski Planning project may inspire a

River Watch Group to be established to do monitoring on the Lower Winooski. There are already groups established on Mill Brook and the Huntington River.

Comment: *Could you tell us about the Citizens Advisory Committee? How was it formed? Who sits on it? As they are the committee that makes a lot of the decisions on the Plan, I'd like to know how they form them. (Michael Murphy, Green Mt. Power. Hearing, 8/6/91).*

Response: The Citizens Advisory Committee was appointed by the Secretary of the Agency of Natural Resources. There are 16 citizens on the Committee, each representing a river interest group. Their purpose is to insure that each of the plans being prepared has included comments from all the groups that may have an interest in the particular river. The committee does not make decisions on the content of the plan. These decisions will be made by the citizens themselves with assistance of the Agency of Natural Resources. A listing of the members has been added to the Report as Appendix F.

Comment: *Did the Citizens Advisory Committee have any participation in the review of the draft report that we have before us now? (Michael Murphy, Green Mountain Power Corp. Hearing, 8/6/91).*

Response: The Citizens Advisory Committee received copies of the draft report; however, they received it too late for the Department to receive their sign-off.

Comment: *I expected to see a plan. It's a collection of ideas. There's nothing here that tells anybody what you're planning to do. (Agnes Mitchell, Town of Huntington Employee. Hearing, 8/6/91 and Brian Chipman, Fisheries Biologist. Letter, 8/19/91).*

Response: Page 6 explains that this document is a collection of ideas. The next phase, or step, will develop the final Plan with recommendations.

Comments: *Regarding landowners, mostly you have addressed large landowners and farmers. There are an awfully lot of small landowners and they don't seem to be addressed anywhere in the plan. (Agnes Mitchell, Town of Huntington employee. Hearing 8/6/91).*

Response: Written responses were received from owners of small riparian lands. Also, the landowner attitude survey included several small riparian landowners. Their comments have been incorporated into the report.

Comment: *If you fence off the river, you will have to provide water for farmer's cattle by trucking it or pumping it, which would cost thousands of dollars. (Agnes Mitchell, Town of Huntington employee. Hearing 8/6/91).*

Response: The State cannot tell farmers to build fences or pay for their construction.

Comment: *The access points to consider for purchase (pg. 101) are not shown on the map. Also, the owner (Fred Aldrich) of the small field along Dugway Rd. might be upset knowing this land shall be acquired for access to the Huntington River. (Agnes Mitchell, Town of Huntington employee. Hearing, 8/6/91).*

Response: The reference to a map showing proposed access points was an error. Regarding the suggested Aldrich purchase, this was a recommendation from a boater. This and other specific points recommended for purchase will be removed from the inventory unless the owner is a willing seller.

Comment: *The time frame for reviewing the plan was too short. Also, all the riparian landowners should be notified, because not everyone sees the newspaper (legal notice). (Agnes Mitchell, Town of Huntington employee. Hearing, 8/6/91).*

Response: Finalizing the document and having the copies made took longer than anticipated. As the legal notice had already been published, it was too late to change the date. Therefore, the inventories got mailed less than one week before the hearing. That was unfortunate. However, the public had 14 days from the hearing to make written comments. (by August 20, 1991).

The Department sent copies of the document to all the town clerks of the riparian towns two weeks before they were sent to individuals. Also, the documents were sent to most of those who had attended previous public meetings. In addition, many riparian landowners were contacted during the riparian landowner attitude survey. It is believed, at this point, that notifying all the riparian landowners in the basin would be extremely difficult and not necessary. Notifying riparian landowners about buffers, access areas, trails, etc. should be the responsibility of the town or interest group that is interested in discussing this area of the inventory report.

Comment: *If you open up that whole river (The Winooski River), the river is never going to be the same again. You want landowners to give people public access, but you've got to educate them to treat us like people too. (and not trash our property). Are you going to provide somebody to direct the public to where they're going? Are you going to keep them from dumping their garbage in the river? (Agnes Mitchell, Town of Huntington employee. Hearing, 8/6/91).*

Response: The inventory report articulates the public's desire for buffers and public access to the basin's river. It will be the responsibility of towns and local groups to work with landowners if, in fact they decide to initiate greenway actions. It will be up to those who initiate greenways to consider methods or strategies to control and educate the greenway-using public. There are greenway organizations that would be willing to work with towns and local groups to suggest ways to educate and control public use of greenways.

Comment: *It's not clear what the criteria will be for selecting actions or action plans for the final plan. Ultimately, it seems that the Water Quality Division is going to have to assume some type of role in terms of coming up with a list of actions based on, not only the public input, but also based on their own expertise, studies and known data to resolve these conflicts in order to come up with an actual plan that would be a usable document. (Gene Shlatz, Green Mt. Power Corp. Hearing, 8/6/91).*

Response: The Department will select a list of recommendations and actions based on what the public has told us, as well as utilizing facts from studies and known data and our own expertise. If the public process does not resolve conflicts, then the Agency will have to make the final choices.

Comment: *Do we have any signs in Chittenden County saying "Canoe Access"? (Ellen Black, Burlington. Hearing, 8/6/91).*

Response: The Winooski Valley Park District has marked canoe access points. There are maps that direct people to those points. The Park District is in the process of updating the canoe guide for the Winooski River. Signing privately-owned access points would have to be up to the owner.

Comment: *I own about 200 acres of land and 1 1/2 miles of the Huntington River runs through my property. I see a big concern with gravel removal and I'm getting no help at all from the state. When we were allowed to take it out, we had no trouble with bank erosion and there was good fishing. The state has got to let the towns take the gravel out. If you people (state) own the water, then*

control it. I'm sick of losing my property. (Joe Spence, Huntington. Hearing 8/6/91).

Response: The graveling law allows up to 50 cu. yds. of gravel to be taken from a river per year provided it is removed above the high water level and approval is received from the Secretary of this Agency for the amount over 10 cu. yds. As a farmer, you should be able to get financial assistance from the Agricultural Conservation Stabilization Service (ASCS) for streambank stabilization. The Soil Conservation Service will provide technical assistance. If there is severe imminent threat to life or property, protective measures may be taken with prior approval from a member of the municipal legislative body and if the Agency Secretary is notified within 72 hours.

Comment: *What sorts of things do you monitor for at the sewage treatment plants? (Tim Kasten, Winooski. Hearing, 8/6/91).*

Response: Pollutants generally monitored include: nutrients, BOD, bacteria, chlorine, e-coli, and suspended solids. Each plant's permit may be a little different as to what is tested, depending upon the type of industries discharging to it.

Comment: *I would propose that the list of substances being monitored be expanded to include medical wastes, particularly, like dioxins and heavy metals. (Tim Kasten, Winooski. Hearing, 8/6/91).*

Response: The Department has recently implemented the federal EPA mandated "Toxic Discharge Control Strategy". This involved collecting samples from 32 waste water treatment facilities (including all the WWTFs on the Lower Winooski River). The samples are being analyzed for priority pollutants including metals and organics. If priority pollutants are found in WWTF discharges, monitoring for these pollutants will be required when their discharge permits come up for renewal.

Comment: *I'm very concerned about the greenway which is promoted in the plan. Do I have any say in the matter as it affects my land? How wide will it be? 50'? 500? If you take 500' of my land along the river, I'll have to sell 100 cows. I don't mind people using my land, but it's a financial concern. (Sumner Farr, Jr., Richmond farmer. Hearing 8/6/91).*

Response: The inventory report reflects what people in the basin want to see by the year 2010. One of the goals is to insure there are greenways along the basin rivers and streams to protect the water quality and to enhance

wildlife habitat, recreation opportunities and aesthetics. Riparian landowners made it very clear that they would need to be willingly involved in any greenway proposal. Any greenway proposals would have to be initiated by the towns, landowners or a local conservation group - not the State.

Comment: *What effect will this plan have on the town's plan? (Sumner Farr, Jr., Richmond farmer. Hearing, 8/6/91).*

Response: The intent of this inventory is to notify towns and others of people's desires for the future of the Winooski River and its tributaries. There is nothing legally binding about the inventory. Hopefully, it will help to coordinate local planning and encourage such things as greenways to happen by inclusion in town plans.

Comment: *I talked to the UVM student (Larry Warshaw) about greenways and I gave him my comments but I'm not sure what came of it. (Sumner Farr, Jr., Richmond farmer. Hearing, 8/6/91).*

Response: The summary results of Warshaw's thesis are included in the inventory document (See page 26). Warshaw's final thesis, when received, will be sent to you and any others who would like it.

Comment: *I'd like to know specifics as to what a greenway ought to be. (Sumner Farr, Jr., Richmond farmer. Hearing, 8/6/91).*

Response: A greenway is an undeveloped vegetated strip of land along a water course. A report, "A Greenways Plan" by Julie Campoli and Peter Otis, landscape architects, defines three different kinds of greenways as they view them:

1. Conservation Greenway - a vegetated buffer, primarily composed of trees.

2. Community Greenway - contains a bike path system, which would link a subdivision to a school or a school to a playground, etc.

3. Transportation Greenway - might be a bike lane along an existing road for commuting to work, to school or to another town.

Copies of the"Greenways Plan" are available from the Winooski Valley Park District.

Comment: *Are you going to take his (Mr. Farr's) land? Is eminent domain going to be involved? Is this voluntary? (Henry Farmer, South Burlington. Hearing, 8/6/91).*

Response: It is all voluntary. There will be no taking of land. The use of eminent domain will not be involved here.

Comment: *The goals and recommendations of the Duxbury Town Plan may not be consistent with the Lower Winooski Plan's goals of increased River recreational opportunities and access due to the town's wish to protect the undeveloped nature of the River and adjacent lands. Also, Duxbury would like the economic benefits of hydropower projects to be given greater consideration in the Lower Winooski Plan. The town is concerned about not having input into the plan if the Chittenden County Regional Planning Commission assumes the lead coordinating responsibility. (Alan Quackenbush, Duxbury Planning Commission. Letter, 8/20/91).*

Response: The Lower Winooski River Basin Comprehensive Plan will be sensitive to potential conflicts with these recommendations, particularly with respect to more recreational access desired by Winooski River users.

The Lower Winooski River Basin Comprehensive Plan's goal, as well as Green Mountain Power's goal, will be to balance all the uses as much as possible.

All towns in the Lower Winooski River Basin will have input into the process, regardless of what group assumes the lead.

Comment: *Bolton Valley would like the Plan to implicitly recognize our future snow-making - water withdrawal use of the Winooski River. Also, Table 6, page 68 refers to Bolton Valley's "failed septic system." This should be corrected because our tertiary treatment plant is in compliance with our permit. (Dan Pryor, Bolton Valley. Letter, 8/9/91).*

Response: Absent details of Bolton Valley's Winooski River water withdrawal plans, we cannot "implicitly" recognize this use. The Department can, however, recognize it as a possible future use. With respect to the report's mention of a future threat to water quality from a "failed septic system" (from "ski

area development"), it has been revised to remove the potential for the public to misconstrue the statement to mean that Bolton Valley's treatment system is presently failing.

Comment: *I have made comments and corrections on the fisheries - related issues on the enclosed pages of the Plan. (Brian Chipman, District Fisheries Biologist. Letter, 8/19/91).*

Response: Regarding your additions and corrections to the "Summary of Values and Uses for Fish & Wildlife" (page 17), "Fishing" (page 22, and "Access" (page 23), please note that these were comments that the public provided to us during the public participation phase; therefore, they cannot be changed or added to. Your changes and additions have been made in the main body of the report in the appropriate section.

Comment: *The Green Mountain Club is working to secure a permanent, protected crossing of the Winooski River in the Bolton area. The crossing will also provide public access to both sides of the river for canoeists. We believe our efforts here will help meet some of the public access needs as mentioned as a goal in the Plan. (Brian T. Fitzgerald, The Green Mountain Club, Inc. Letter, 8/19/91).*

Response: This updated information has been added to the preliminary project report.

Comment: *I am concerned that increased recreational use of the river will cause bank erosion. Hopefully, vegetation will be used to control it rather than rip rap. Also, large power boats should either be prohibited or slowed down with an enforced speed limit. (Alice Cook Bassett, State Rep., Chittenden District 7-3. Letter, 8/4/91).*

Response: The State cannot dictate what people do with their river banks (except through stream alteration permits). However, people can be encouraged to start a River Watch group or conservation commission in their community. River Watch groups, for example, can work with riparian landowners to repair eroded streambanks. The River Watch Network Annual Report for 1990/91 reports that the Mt. Mansfield River Watch Group "recently worked with farmland owners to plant willows on devegetated river banks." This group is "also planning to establish their own nursery to provide stock plants for streambank stabilization plantings."

Comment: *The Plan's "Summary Matrix of Town/Regional Plan Recommendations for Natural Resources Protection/enhancement" (page 25A) representation of the Central Vermont Regional Land Use Plan is both outdated and inaccurate. (Chris Walsh, Central Vermont Regional Planning Commission. Letter, 7/25/91).*

Response: The inaccuracies in the summary matrix for the central Vermont Regional Planning Commission have been corrected.

Comment: *The purpose of the Report should extend beyond satisfying the Federal Energy Regulatory Commission requirements for relicensing Essex #19. Specifically, it should serve as a useful document for local and regional planning efforts. Also, the goals and actions section has conflicting recommended actions. (Tom McAuliffe, Burlington Waterfront Board. Letter, 8/15/91 and Pennie M. Rand, Winooski Valley Park District. Letter, 8/20/91).*

Response: Please refer to our response to Greg Morgan and Michael Murphy (Green Mountain Power Corp.) regarding the Plan's emphasis on the relicensing process and also the concern with conflicting actions. Regarding local and regional planning groups, we believe the plan will assist their efforts. The studies required as part of the relicensing process will help to respond to several of the goals as articulated by the public, including towns and regional planning commissions.

Comment: *I would urge your group to present a model of use which aligns more with full conservation of the river and surrounding flood plains (Third Alternative Futures Scenario). Also, the Plan should encourage Green Mountain Power Corp. to develop more efficient plants which avoid embankment damage and which preserve the river's ecosystems. The Plan should include guidelines for eliminating stormwater run-off and sludge disposal. Finally, the Plan's overarching philosophy should be to give needed direction to individual communities by showing how to protect their section of the river. (Janet Bossange, Burlington Waterfront Board. Letter, 8/15/91).*

Response: It would be difficult to recommend the full conservation model considering the majority of people at the futures scenario meeting opted for "Use With Stewardship" scenario. It is suspected that one of the main reasons they chose this scenario rather than full conservation was because of the wider buffer that was suggested for full conservation. Trying to implement a 500' wide buffer would be very difficult on private land, given some of the feelings expressed by landowners at the various meetings that were held. Green Mountain Power Corp. has been requested to study the effect on

fluctuations caused by their proposed increased flows. Hopefully, increased flows will cause a leveling off of fluctuations, and enhance the river's fishery as well as the entire ecosystem, which should resolve your concerns in this area. In addition, we have requested Green Mountain Power Corp. to study bank erosion caused by water level fluctuations and to propose mitigative measures.

Comment: *I am concerned about (low) dissolved oxygen (D.O.) in the river as the result of the proposed Winooski One Development (Chace Mill) hydro project in Winooski due to loss of the rapids (loss of re-aeration) caused by the new impoundment. The water quality certificate issued by your Agency for this project may indirectly require increased flows from Essex #19 to allow Winooski One to meet their D.O. standards. This would be unfair to Green Mountain Power Corp. since it could impact adversely on their ability to generate electricity especially at peak times. Also, the Chase Mill project description on page 91 should be revised as it is inaccurate (John M. Braddock, Winooski. Letter 8/15/91).*

Response: The 401 water quality certificate requires the Winooski One partnership to undertake a two year water quality study to determine if additional measures (spillage greater than 7Q10) must be taken to maintain dissolved oxygen standards. Essex #19 and Gorge #18 are considered independent of Winooski One in terms of operating requirements to meet dissolved oxygen standards. The Green Mountain Power projects must spill sufficient water to insure that standards are met above Winooski One. The Winooski One project is then required to maintain standards below Winooski. Green Mountain Power has already proposed to maintain 340 cfs below their projects; they will not have to augment flows or increase spillage in order to enable Winooski One to maintain standards.

Regarding the description of the Chace Mill project on page 91, it has been revised to accurately reflect the present proposal.

Comment: *Clarify the overall purpose/goals of the Plan in the introduction. Also, consider having a separate section just for the hydropower relicensing issue. These ideas would help to de-emphasize the hydro aspect of the introduction.*

The plan should reflect the concept of Winooski River management segments, including: Bolton Falls to the Richmond wastewater treatment plant; Richmond to the IBM plant; IBM to Gorge 18; Gorge 18 to the mouth of the River. This approach would make the plan easier for the Park District and towns to implement.

The plan should focus on instream issues since the state regulates such things as water flow, discharges and temperature. This would provide guidance and encourage local entities and other state agencies to implement such actions as buffers, public access and recreation. (Pennie M. Rand, Winooski Valley Park District. Letter, 8/20/91).

Response: The Department will include your ideas as much as possible in the final Comprehensive Plan.

Comment: *There is no "Federal statutory mandate" to undertake comprehensive river planning, as you have asserted. Also, you say this is the public's Plan when, in fact, the Plan includes the Agency's position on the 401 permit requirements for relicensing the Essex #19 hydro project. You should not include this due to the lack of public input on the 401 issue.*

GMP is concerned that what the Agency will be filing is not actually a "plan" but a "Draft Preliminary Plan." GMP would like to see the Plan finalized before filing. There are already four "comprehensive" plans on file at FERC which apply to the Winooski River. GMP recommends that the Agency also file the Vermont Comprehensive Energy Plan (January, 1991) when it files the Lower Winooski River Plan. (Michael A. Murphy,Green Mountain Power Corp. Letter, 8/20/91).

<u>NOTE:</u> Mr. Murphy also made many specific comments about the document, most of which have now been incorporated into the final preliminary report or have been responded to directly by letter to Mr Murphy. If readers desire a copy of Mr. Murphy's specific comments and the Agency's response to them, they should contact the Water Quality Division.

Response: You are correct in stating that there is no Federal mandate to do comprehensive river planning. It was unfortunate that this was put forth as a fact in the news release we issued July 29, 1991.

Your assertion that a discussion of the 401 permit requirements and the Agency's position on the 401 permit are not consistent with the Plan's being a "public Plan" is interesting, but the Department does not agree. This is an inventory, not only of public comments, but also of information available in-house. The 401 permit requirement is information that the public should have (like any other regulatory information) in order to aid informed decision making. However, in response to your and others' comments, the Department will eliminate discussion of the 401 certification process on page 4 and will include it elsewhere in the report.

The Department acknowledges your concern about our filing the final Preliminary Project Report with FERC now instead of waiting to file the final Comprehensive Plan. As stated at the public hearing, obvious corrections or additions will be made to the draft Project Report and the responsiveness summary will be appended to it before sending the report to FERC. It will then become the final Preliminary Project Report. The Department is filing the Preliminary Project Report with FERC at this time to ensure they have this preliminary information (including the public's comments) as early as possible in the process.

The final Comprehensive Plan will not be ready for submission to FERC until final study results are received and are incorporated in the Plan, plus another round of public hearings and final Plan adoption by the Citizens Advisory Committee. This second phase will not be completed until December 1992. The Department believes that there is value in filing the preliminary report now.

You inferred that, because the Department already has "four comprehensive plans on file with FERC which apply to the Winooski River," it's not necessary to file the Preliminary Project Report, but can wait to file the final Plan with FERC. In response to this, we understand that FERC considers all plans it receives as "comprehensive." The plans on file with FERC, although certainly valuable in helping to protect river values, do not go far enough. The Preliminary Project Report represents all data to date on uses, features and goals. The Preliminary Project Report ties in or utilizes information in a comprehensive way from the four plans already filed. Therefore, the Department believes that FERC should have the benefit of this effort as soon as possible.

jm\response.sum