

# **UPPER WEST RIVER BASIN WATER QUALITY MANAGEMENT PLAN**

**Vermont Agency of Natural Resources  
Department of Environmental Conservation  
Water Quality Division  
Waterbury, Vermont 05676**

UPPER WEST RIVER BASIN  
WATER QUALITY MANAGEMENT PLAN

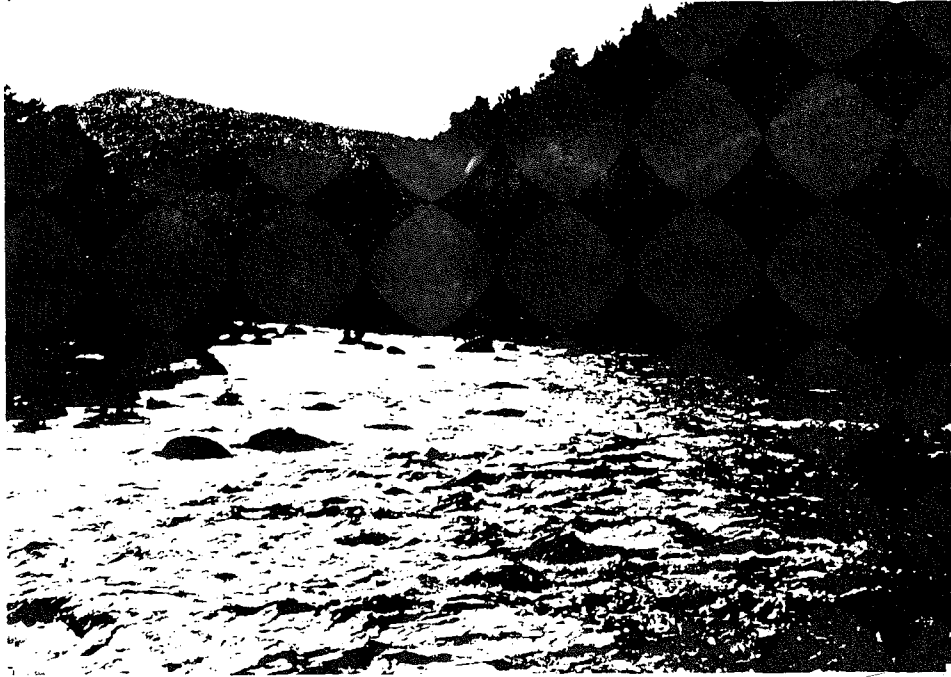
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February 1989



Agency of Natural Resources  
Department of Environmental Conservation  
Water Quality Division

This report was prepared to aid future regional and town planning and protection efforts in preserving the quality of waters, restore impaired segments and in planning future water-related activities to minimize conflicts. The Department of Environmental Conservation is indebted to the many basin residents who generously gave their time and knowledge to make the background information for this report complete and accurate.

The main findings and recommendations of this report are that:

. Much of the Upper West River Basin contains a natural landscape with unusual and dramatic water-related features. Some features have been protected by farsighted private and public conservation efforts. Protection for other features should be considered. Streams which have been suggested for a special conservation status include all of Cobb and Beaver Brooks and parts of Turkey Mountain, Jenny Coolidge, Kidder and Greendale Brooks. Persons interested in the protection of such streams could develop full and detailed descriptions of the important values. From this, the need for special designations could be evaluated. The need for increased enforcement of the existing Class B water quality standards should be given equal consideration as a method of water quality protection.

For its part, the Department of Environmental Conservation is promoting detailed field studies of stream segments to determine if any added protection is needed for the specific water-related values found. The Department also proposes a public forum to discuss the findings along with positive and negative economic aspects. Findings will be made available to basin residents and organizations for follow up.

. The headwaters of Styles Brook should remain Class A as long as the Styles Reservoir is used as an emergency source of drinking water.

. The watershed has a multitude of unusual and important natural features of state significance, including waterfalls, cascades, gorges, white water rapids, rare aquatic plants, rare aquatic animals, geologic features, and water-related archaeological sites. In view of this richness and diversity of interesting features the Upper West River Basin is one of Vermont's most important natural environments. There are important opportunities for individuals, organizations, and local and state governments to act to preserve these natural features.

. Soil erosion and the use of ineffective soil control techniques, especially in the ski areas, constitute the most serious water quality problem in the basin. Improved controls are recommended in the text such as diversion of off-site storm water and prompt mulching.

. Increased nutrient runoff from intensive land use has the potential to become a water impacting problem which should be resolved by nutrient control plans in heavily developed and rapidly developing areas.

. Elevated fecal coliforms were noted in the West River near Weston, South Londonderry, and Jamaica. Further studies should be undertaken during low flow periods to locate the sources.

. A majority of the towns in the basin lack adequate septic system regulations to prevent the installation of systems in poor soils. Unless these practices are upgraded, inattention will lead to avoidable septic system failures and the unnecessary expense for municipal collection and treatment systems.

. Instream impoundments are responsible for some water quality impacts. Small impoundments should be constructed off-stream.

TABLE OF CONTENTS

	<u>Page</u>
I. Purpose and Scope/General Description of the Basin. . . . .	1
II. 1975 Basin Plan Recommendations and Subsequent Follow-Up . . . . .	7
III. General Findings . . . . .	11
IV. Existing Classifications and Beneficial Uses . . . . .	13
A. Stream and Pond Classifications . . . . .	13
B. Catalog of Beneficial Uses of Surface Waters in the Basin; Swimming, Fishing, Boating, Drinking Water, and Irrigation . . . . .	14
C. Water-Related Areas with Public Value . . . . .	31
- pristine streams . . . . .	31
- water-related natural features . . . . .	37
- wetlands throughout the basin . . . . .	45
- water-related lands . . . . .	46
D. Recommendations of Town and Regional Plans for Water Use and Water-Related Municipal Bylaws . . . . .	50
V. Water Use Conflicts and Recommended Policies for Resolution . . . . .	58
A. Existing Water Use Conflicts . . . . .	58
1) Construction of Large Instream Impoundments . . . . .	58
2) Minimum Flow Requirements for Instream Impoundments and Water Withdrawal Sites . . . . .	59
3) Erosion and Sedimentation . . . . .	60
4) Large Parking Lots with Soil Surfaces . . . . .	64
5) Fishing and Boating . . . . .	65
6) Acid Precipitation . . . . .	67
B. Potential Water Use Conflicts . . . . .	70
1) Septic System Failure . . . . .	70
2) Aquifer Protection Areas . . . . .	74
3) Naturally Occurring Ground Water Contamination . . . . .	87
4) Nutrient Loading . . . . .	89
5) Exotic Aquatic Plant Introduction . . . . .	91
VI. Appendices . . . . .	A-1
A. Interaction Between Water Uses . . . . .	A-1
B. Fisheries Status . . . . .	A-7
C. Draft Class II Ground Waters. . . . .	A-19

	<u>Page</u>
D. Attendance at Public Meeting June 25, 1986. . . .	A-26
E. Summary of Comments from June 25, 1986 Public Meeting and Comments Received by Letter . . . .	A-27
F. Class A and Outstanding Resource Waters (Summary of Statutory Provisions) . . . . .	A-32
G. Boating Segments - Jenkins and Zika Report . . . .	A-39
H. Rules to Regulate the Uses of Stratton Pond in the Town of Stratton . . . . .	A-66
I. Laboratories Testing Air and Water for Radon . . . .	A-67
J. Excerpts of "The Waterfalls, Cascades and Gorges of Vermont" concerning Cobb Brook . . . .	A-68
K. Summary of Comments from June 23, 1987, Public Hearing and Comments Recieved by Letter . . . . .	A-71
VII. References . . . . .	A-81

## List of Figures

<u>Figure</u>		<u>Page</u>
1.	Upper West River Drainage Basin Location . . . . .	4
2.	Surface Water Classification . . . . .	15
3.	Swimming and Water Contact Boating Areas . . . . .	17
4.a, b	Winhall Brook Camping and Swimming Areas . . . . .	21
5.	Fishing Areas . . . . .	24
6.	Kayaking on the West River Below Ball Mt. Dam . . . . .	27
7.	Boating Areas . . . . .	28
8.	Cables Across the West River . . . . .	30
9.	Pristine Streams . . . . .	33
10.	Deep Pool on Turkey Mt. Brook . . . . .	35
11.	Unnamed Tributary to Turkey Mt. Brook . . . . .	36
12.	Water-Related Natural Features. . . . .	39
13.	Hamilton Falls . . . . .	44
14.	Water-Related Public or Private Lands and Specially Designated Areas . . . . .	47
15.	Under Cut Trees on Eroded Stream Channel . . . . .	62
16.	Ground Water in the Basin . . . . .	76
17.	Bedrock Supply Draft Class IIs . . . . .	78
18.	Wells Free Flowing at Time of Completion . . . . .	82
19.	Study Areas Showing Higher Than Average Radioactivity in Rock . . . . .	88

List of Tables

<u>Table</u>		<u>Page</u>
1.	Basin Population Figures and Projections . . . . .	5
2.	Housing Statistics . . . . .	6
3.	Protection Recommended in Town Plans . . . . .	51
4.	Sensitivity of Selected Waterbodies to Acid Precipitation . . . . .	68

## WEST RIVER BASIN PLAN

### I. Purpose and Scope

The basic purpose of this plan is to prepare a water quality management program for the Upper West River Basin that seeks to achieve water quality equal to or better than State water quality standards would provide. Where information is insufficient to develop elements of a program, this plan makes recommendations for needed data collection and monitoring. Recommendations are also included for future management of the waters and surrounding land to correct or avoid water quality problems.

This plan has been undertaken by the Department of Environmental Conservation (hereafter referred to as the Department) to identify existing and potential surface and ground water uses, to reveal and resolve conflicts among competing uses, and to determine public preferences in the future use of waters. A discussion of the analytical process for identifying existing and potential conflicts is described in Appendix A.

The need for this basin plan update and revision arises from an increasing potential for conflicts between the demand for water based recreation, potential water withdrawals and the possible need to use streams for the disposal of treated domestic sewage effluent. Through the river basin planning process, the Department is creating a forum for an open and broad public

debate on the basic question of how waters should be used, managed, and protected.

The Department will revise the river basin water quality management plans in accordance with the following guiding principles and objectives:

a. To provide guidance to State agencies and private concerns so that, through the various state and local permit processes, the water resources of the particular river basin can be managed over the long-term in the best public interest.

b. To give the public access to the process of formulating a basin plan and designating water management goals.

c. To produce a plan which the Water Resources Board can use in its consideration of future requests for reclassification.

The original basin plan concerned itself primarily with the correction of existing water pollution. Although some water quality problems remain to be abated and are addressed in this plan, the primary focus is shifted toward the possible impact of future activities in the basin and toward the manner in which the waters should be managed to maintain, and in some cases enhance, water quality in the long-term.

The information upon which this plan is based was obtained through field studies, interviews, and meetings in 1985 and 1986. The interviews are not to be considered a statistically reliable sample of public opinion. The comments were evaluated on their merits and in the context of existing Vermont water laws and

regulations. We continue to seek the public view on the contents of this draft plan.

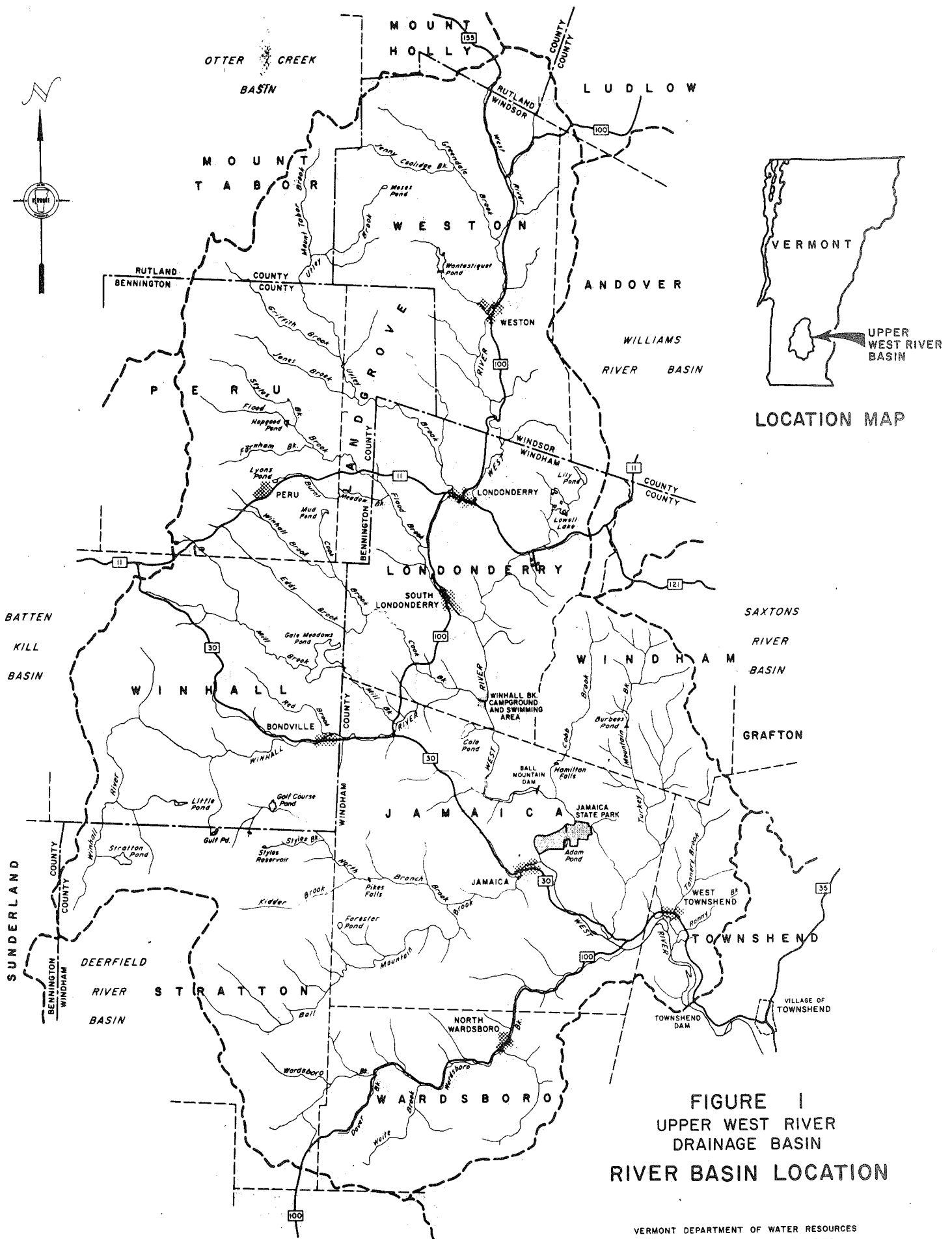
#### General Description of the Basin

The West River rises in the southeastern portion of Mount Holly, at an altitude of 2400 feet above sea level, flows southward across Weston and Londonderry and southeastward across Jamaica, Townshend, Newfane, and Dummerston into Brattleboro, where it joins the Connecticut River. The major tributaries in the Upper West River Basin are the Winhall River, Ball Mountain Brook, and Wardsboro Brook to the west, and Turkey Mountain Brook to the east.

This plan is concerned with the Upper West River drainage basin, which encompasses the West River and its tributaries from the headwaters in Mount Holly to the Townshend Dam (Figure 1). This drainage basin is located in the southern central portion of Vermont, and drains the eastern slope of the Green Mountains, an area of extensive national forest land.

There are a total of ten lakes and ponds in the Upper West River Basin 20 acres or greater, which total approximately 730 acres. The largest is Gale Meadows Pond (210 acres), followed by Townshend Reservoir (100 acres), and Lowell Lake (90 acres).

Most of the Upper West River drainage area is within Windham, Windsor, and Bennington counties. The population figures for the townships that lie completely or largely in this basin are supplied by the State of Vermont 1980 census (Table 1).



**FIGURE 1**  
**UPPER WEST RIVER**  
**DRAINAGE BASIN**  
**RIVER BASIN LOCATION**

VERMONT DEPARTMENT OF WATER RESOURCES  
 AND ENVIRONMENTAL ENGINEERING

SCALE  
 0 1 2 3 4 MILES

Table 1  
Basin Population Figures and Projections

<u>Town</u>	Population (1980 census)	Projections*			
		<u>1990</u>		<u>2000</u>	
		<u>High</u>	<u>Low</u>	<u>High</u>	<u>Low</u>
Jamaica	681	776	765	866	821
Landgrove	121	139	135	156	145
Londonderry	1510	1869	1821	2163	2049
Peru	312	374	361	429	399
Stratton	122	140	137	157	149
Townshend	849	1000	974	1131	1072
Wardsboro	505	598	583	678	642
Weston	627	704	687	771	732
Winhall	327	374	361	420	391
<u>Basin Total</u>	5054	5974	5815	6771	6400

\*Vermont Department of Health, and Vermont State Planning Office, 1985, 1983.

Townships with minor portions contained in the basin are Mount Tabor, Mount Holly, Ludlow, and Chester.

Population projections for the basin, based on low series figures, indicate a resident basin population of 5,815 in 1990, and 6,400 in the year 2000.

The following table shows the percent change in year-round and seasonal housing units between 1980 and 1985 by town.

Table 2

Housing Statistics

	Year-Round Housing Units	Seasonal Housing Units
Jamaica	-1.3%	25.6%
Landgrove	13.0%	-4.2%
Londonderry	1.6%	6.4%
Peru	19.9%	29.0%
Stratton	60.6%	117.3%
Townshend	20.9%	32.4%
Wardsboro	3.0%	13.7%
Weston	11.2%	11.5%
Winhall	11.0%	1.5%
<u>Basin Average</u>	15.5%	25.9%

The Basin lies within two planning areas: The Bennington County Regional Planning and Development Commission, and the Windham Regional Planning and Development Commission.

## II. 1975 Basin Plan Recommendations and Subsequent Follow-up

All recommendations from the 1975 plan applicable to the Upper West River Basin are listed by original number as follows with a description of measures taken.

1. In order to restore the waters of this basin to their full recreational potential, municipal as well as individual pollution must be abated as required by law by construction of secondary sewage treatment facilities or where appropriate by use of individual waste disposal systems.

Most known direct discharges of treated or untreated sewage into surface waters or to the ground surface have been eliminated. There are no municipal treatment facilities in the basin; however, large private facilities have been constructed at Stratton Mountain, Magic Mountain, and Bromley Mountain ski areas using land spray disposal.

2. An assessment of streambank erosion in the basin should be made to determine its significance as a nonpoint source pollutant and corrective action taken as appropriate.

3. Revegetation of disturbed stream bank areas associated with stream bank or channel projects should be accomplished whenever feasible.

No assessment of streambank erosion in the basin has been made. However, this is recognized as a serious problem and guidelines for preventing streambank erosion have been adopted by the Agency of Environmental Conservation via the Streambank Management Policy, March 26, 1982. The Agency follows this policy in management of State lands and encourages other land owners to do so as well. The Vermont Streambank Conservation Manual outlines procedures for preventing erosion and damage to stream environments, and is available free of charge from the Department of Water Resources. In addition, Act 250 requires certain streambank conservation and erosion control methods.

4. Where data is available on fish habitat, streams should be designated according to type (I, II, III, IV, or V) in order to set minimum water quality standards.

The Roman Numeral fish habitat typing system has been superseded by a two-category classification scheme comprised of warm and cold water fisheries. Cold water fisheries are managed for salmonids and other species with similar, more restrictive physical requirements, and warm water fisheries are managed for river and lake species with a wider oxygen tolerance such as bass and perch. All waters in the Upper West River Basin are classified as cold water fisheries except the following warm water fisheries: Burbees Pond,

Windham; Cole Pond, Jamaica; Lily Pond, Londonderry; and Lowell Lake, Londonderry. Specific criteria for warm and cold water fisheries are outlined in the Vermont Water Quality Standards.

5. An impoundment on Styles Brook, serving Stratton Corporation, is used exclusively as a water supply and has been classified Class A by legislative act. It is recommended that this watershed be reaffirmed Class A by the Water Resources Board.

The Vermont Water Resources Board order dated July 26, 1978 lists "all portions above Stratton Corporation water supply intake" (on Styles Reservoir) as Class A water, an area of one square mile. The reservoir is now used as a backup drinking water supply and the current Class A status will remain as long as the most recent board order remains unchanged.

6. The statewide flood contingency plan which is being developed should include procedures for coordination of the various State departments and agencies and local officials and should include guidelines for administration of flood repair work as advance preparation for the occurrence of another flood such as the one of June, 1973, or other major floods which could occur at any time of the year.

Procedures for coordinating State departments and agencies are set forth in the Vermont Emergency - Disaster

Preparedness Plan, Subsection C-1. While this document delegates responsibility for emergency response, flood control, stream alteration, and protection of aquatic biota to various officials, it does not include specific guidelines for flood repair work or stream alterations.

7. It is recommended that logging operations be carefully monitored by the State to assure that proper conservation practices are followed to safeguard water quality on a continuing and long-term basis.

A voluntary program was set up with the Vermont Timber Truckers and Producers Association whereby members would handle or report practices resulting in water quality violations to Water Resources Investigators. Recently, this program has faltered, although it is still potentially viable. At present, logging operations are monitored only on a complaint basis or as sighted during routine work by the Investigators. In accordance with legislation passed in the 1986 session (10 VSA Section 1259 (f)) the Department of Forest, Parks and Recreation has developed and promulgated acceptable management practices for silvicultural operations.

In addition, the Department of Forests, Parks and Recreation administers a monitoring program for whole tree harvesting. This is not currently applicable to the Upper

West River Basin as no whole tree harvesting programs are underway.

8. A State Ground Water Program should be established to monitor ground water quality, control discharges to the ground water, and further define and identify aquifers.

In 1980, the Department began development of the Vermont Ground Water Protection Strategy, and formally documented it in 1982. Major elements of that strategy, including a ground water classification system encompassing aquifer protection areas or public drinking water aquifers, was incorporated into a comprehensive ground water protection bill, passed by the legislature in 1985. For a more detailed discussion of this topic and its ramifications for the Upper West River Basin, see Section V.B.2.

### III. General Findings

The findings of the field work are summarized below:

The water quality is generally good; however, some of the minor pollution sources identified in the 1975 basin plan still persist. Streambank erosion and erosion from construction sites continue to have significant impacts on water quality.

The inception of off-stream waste treatment has eliminated direct discharges to the basin's waters, all of which are Class B or A, but has caused a new set of problems. Over-land flow of

treated effluent was found from two spray sites, and this effluent had reached surface waters. Remedial actions have eliminated these discharges to the surface waters. Many areas in the basin have high recreational importance. Swimming, boating, and fishing occur widely throughout the mainstem, tributaries, lakes, and ponds.

Interviews with numerous basin residents indicate a strong desire to maintain clean water to support fishing and swimming where appropriate. There is a significant segment of residents who are openly apprehensive about the effects of development near major ski areas on surface and ground water potability and availability. Generally, the ski areas have been quite interested in protecting the environment and cooperative with state and local government, both in adhering to environmental regulations and in working with community members on monitoring and planning.

The present A and B classifications of the basin's surface waters are to protect swimming, fishing, healthy aquatic life, and aesthetic enjoyment. These uses are intact over the majority of the basin. Conditions that are presently or potentially unsuitable for certain uses are described in Section V along with recommendations for resolving the problems.

The basin has remote, undeveloped areas with dramatic water courses in a pristine quality. There is local interest in the reclassification of some of these waters to Class A for their protection.

#### IV. Existing Classifications and Beneficial Uses

Vermont's Water Quality Standards are essentially management goals and criteria to protect the waters for various activities such as swimming, fishing and drinking. All of the State's waters are classified as either Class A, B or C, each of which defines the uses those waters should support and the chemical and physical characteristics needed to support those uses. Activities that are specified in the Water Quality Standards as goals for each class are termed "beneficial uses."

The following section documents these beneficial uses as they occur in the West River Drainage Basin. This information can be used to ascertain the appropriateness of present classifications and provide a basis for possible reclassification proceedings in the future. Water-related areas with unusual qualities or public value are also noted in the event that additional protection or public awareness is warranted.

##### A. Stream and Pond Classifications

All surface waters in the basin are designated Class B except the segment of Styles Brook upstream of the diversion to

Styles Reservoir, which is designated Class A, and waters above 2500 feet elevation (Figure 2). The reservoir is now maintained primarily for fire protection, although it also serves as an emergency drinking water supply for the surrounding development owned by the Stratton Corporation. Water from Styles Brook is usually siphoned only to compensate for natural water loss. The Class A watershed area occupies about one square mile.

The Class A segment of Styles Brook should retain its designation as long as it is relied upon as an emergency drinking water source.

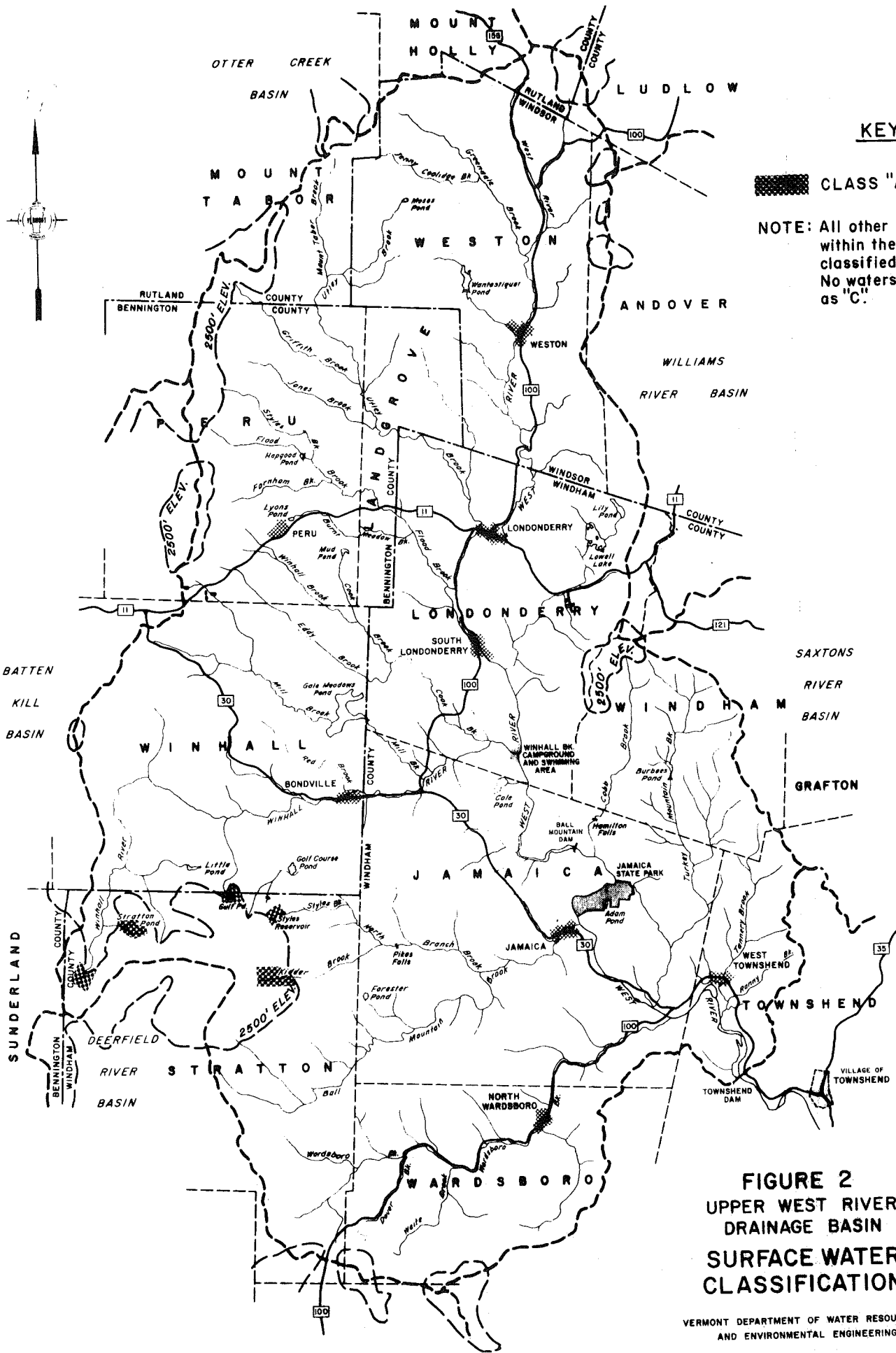
The Class B waters that comprise the vast majority of this basin's surface waters are managed to be suitable for swimming, public drinking supply with filtration and disinfection, and to provide high quality habitat for aquatic life.

B. Catalog of Beneficial Uses of Surface Waters in the Basin


This section describes water uses which are sensitive to other water uses which, by their nature, are more likely to be impacting.

Swimming

Swimming occurs throughout the basin in deep stream pools and in ponds. Wherever there is easy access to an inviting pool, someone is likely to take a plunge from time to time. The places mapped in Figure 3 are noteworthy since they regularly attract large numbers of people.



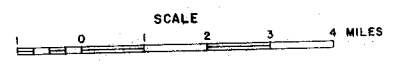
**KEY**

 CLASS "A" WATERS

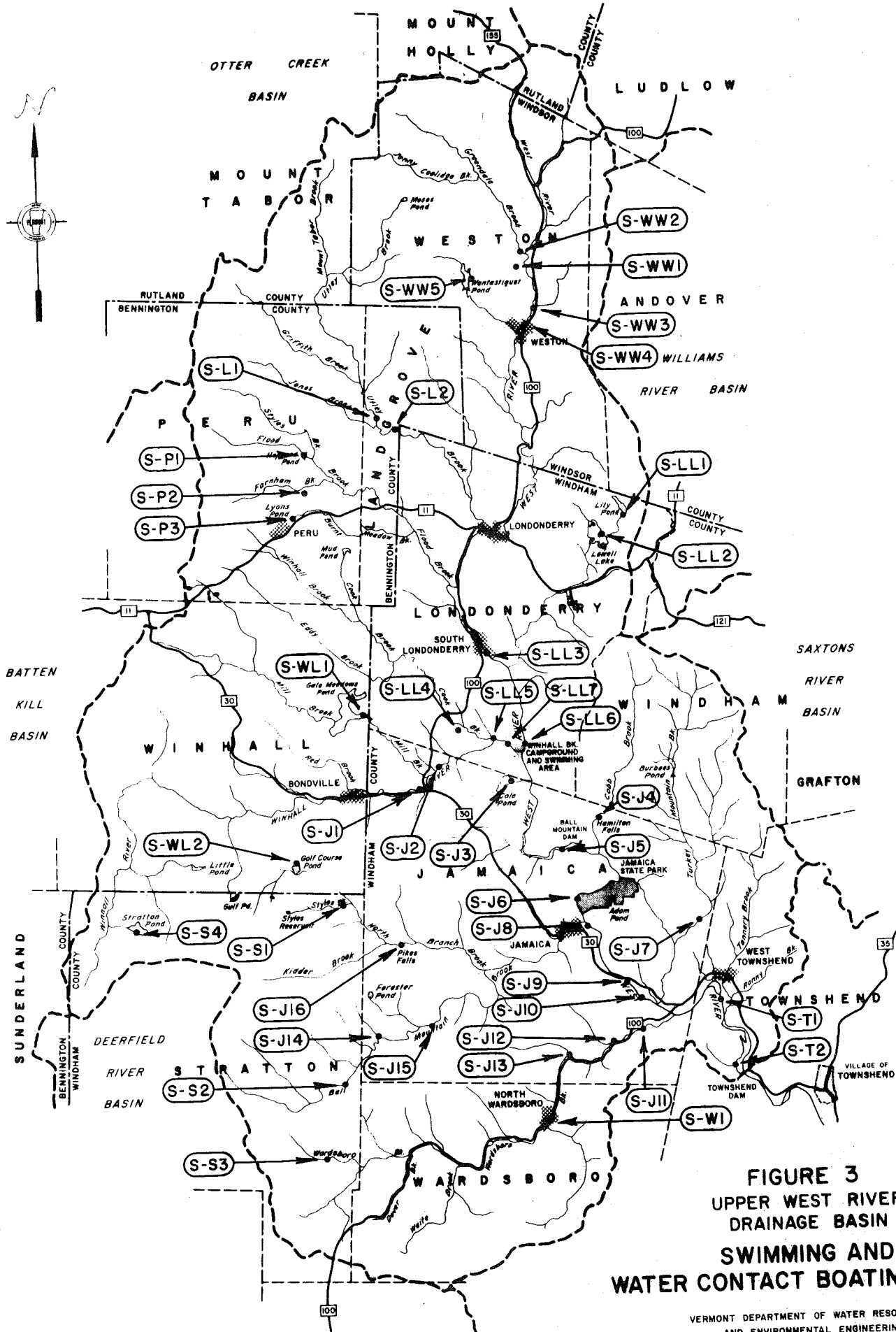
NOTE: All other surface waters within the basin are classified as class "B". No waters are classified as "C".

**FIGURE 2  
UPPER WEST RIVER  
DRAINAGE BASIN  
SURFACE WATER  
CLASSIFICATION**

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AND ENVIRONMENTAL ENGINEERING

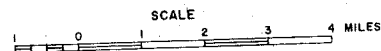


Although the majority of the swimming and wading is dispersed throughout the watershed, the developed swimming areas attract the most intensive use. Notable examples include Hapgood Pond in Peru with a beach and changing house, Winhall Brook campground and swimming area at the confluence of the West and Winhall Rivers in Londonderry (Figure 4a, 4b), beaches and deep pools at Jamaica State Park where swimming and tubing are popular, and a beach and bathhouse at the Townshend Dam Reservoir. Popular undeveloped sites include Lowell Lake in Londonderry; Cole Pond, Pikes Falls, and Hamilton Falls in Jamaica. Pikes Falls has a series of cascades and falls over ledge.



**FIGURE 3**  
**UPPER WEST RIVER**  
**DRAINAGE BASIN**  
**SWIMMING AND**  
**WATER CONTACT BOATING AREAS**

VERMONT DEPARTMENT OF WATER RESOURCES  
 AND ENVIRONMENTAL ENGINEERING



Key to Figure 3  
Swimming Areas

Jamaica

- S-J1 Swimming hole on Winhall River, west side of Route 100 bridge. Large pool formed by rocks placed in fast flowing river. Occasional use.
- S-J2 Deep pools and gravel bars on Winhall River.
- S-J3 Cole Pond. Swimming from private docks. No public beach. Also, canoeing and fishing. Moderate use.
- S-J4 Hamilton Falls. A series of three pools in a spectacular waterfall. There have been ten deaths at this site. Swimmers should not attempt using the middle pool. Heavy use.
- S-J5 Swimming in Ball Mt. Dam Reservoir.
- S-J6 Swimming at beach at Jamaica State Park. Two deep holes known as Salmon Holes used for swimming; tubing and rafting are also popular. Large volumes of water are released from the Ball Mountain Dam for kayaking. There are two releases in the spring, one for recreation and one for racing. There is also one release in the fall during the last weekend in September. Swimming, boating, and tubing use heavy.
- S-J7 Many swimming holes located in this segment of Turkey Mountain Brook including beautiful deep pools and waterfalls. Moderate use.
- S-J8 Swimming at turn-off to Jamaica State Park. Heavy use.
- S-J9 Swimming in West River at bridge.
- S-J10 Swimming in this stream segment.
- S-J11 Good swimming hole on Wardsboro Brook.
- S-J12 Swimming hole in Wardsboro Brook where stones have been placed across the brook.
- S-J13 Swimming in natural pool on bend between ledges. Pool three feet deep. (Wardsboro Brook well known for numerous swimming holes between Wardsboro and East Jamaica).

- S-J14 Large, popular swimming hole on Ball Mountain Brook. Moderate use.
- S-J15 Swimming hole on Ball Mountain Brook.
- S-J16 Pikes Falls on North Branch Brook. A series of cascades and waterfalls ending in a large pool with clear blue water. Reported to be used by as many as 100 people on hot summer days. Heavy use. (Lepkoff, pers. comm.).

Landgrove

- S-L1 Dam blocking water for pool in Utley Brook near Landgrove School.
- S-L2 Swimming on Utley Brook near North Landgrove.

Londonderry

- S-LL1 Swimming at Lily Pond is reported in 1983 (State Outdoor Recreation Plan).
- S-LL2 Lowell Lake. State owned land and privately owned lake shore. Swimming and canoeing. Moderate use.
- S-LL3 Swimming just downstream of bridge in South Londonderry. Note: There is also swimming all along West River from Weston line to South Londonderry.
- S-LL4 Memorial Park. Swimming pond uses water withdrawn from Cook Brook.
- S-LL5 Swimming at Ball Mountain Dam picnic grounds.
- S-LL6 Deep swimming hole at Winhall Brook Camping area. Bath house and water owned by the Army Corps of Engineers.
- S-LL7 Swimming hole at bridge in Winhall Brook Camping area. Moderate to heavy use.

Peru

- S-P1 Swimming beach at Hapgood Pond. Swimming beach closed occasionally because water becomes "stagnant". Open June to Labor Day. Managed by the Green Mountain National Forest. Heavy use.

- S-P2 Private swimming pond.
- S-P3 Private pond used for swimming.

Stratton

- S-S1 Private swimming pond.
- S-S2 Private swimming pond.
- S-S3 Man made pond, privately used for swimming.
- S-S4 Swimming at Stratton Pond. Used by hikers.

Townshend

- S-T1 Popular swimming area.
- S-T2 Beach at Townshend Reservoir, swimming, windsurfing, and canoeing. Heavy use.

Wardsboro

- S-W1 Swimming hole in Wardsboro Brook downstream of the confluence of a stream from South Wardsboro.

Weston

- S-WW1 Swimming pond at Ken Haven Music Camp.
- S-WW2 Off river swimming pond. Town property, beach and bathhouse - water drawn from Greendale Brook.
- S-WW3 Swimming hole on West River Mainstem.
- S-WW4 Swimming in Mill Pond.
- S-WW5 Wantastiquet Pond

Winhall

- S-WL1 Swimming in Gale Meadows Pond, especially near outlet. (Note: Swimming is discouraged at Fish and Wildlife accesses.)
- S-WL2 Stratton Golf Course Pond. Some occasional sailboarding and swimming.

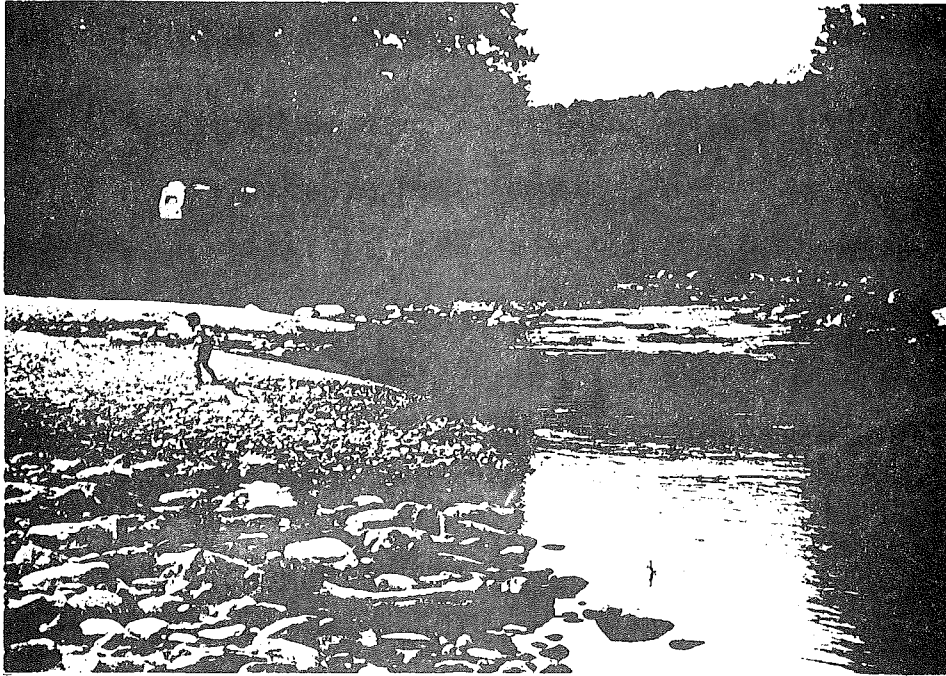


Figure 4a - Winhall Brook camping area and swimming area  
(7/10/85)

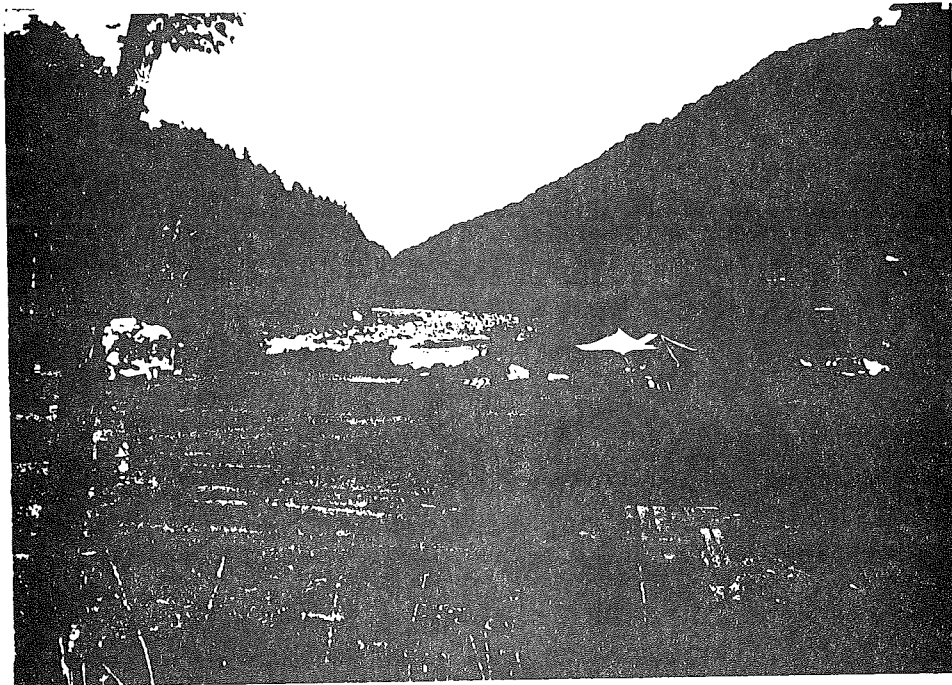


Figure 4b - Winhall Brook camping area (7/10/85)

The lower West River below the Townshend Dam is also popular and heavily used for swimming. Although this area is downstream from the drainage basin covered in this report, the swimming below the Townshend Dam is recognized because it can be affected by upstream water uses.

### Fishing

Although the Water Quality Standards designate the entire main stream of the West River as cold water fish habitat, the Department of Fish and Wildlife does not consider the main stream as prime trout water due to high summer water temperatures. However, pockets of trout populations occur where sufficient ground water or cool tributaries enter the stream, and a substantial trout fishery exists below Ball Mountain Dam.

Almost all of the tributaries have wild, reproducing trout populations. In general, the river system is characterized by the presence of brook trout in the headwaters and smaller tributaries, and brown trout in the downstream segments. (See Appendix B for a more thorough discussion of fisheries in the basin.)

Angling activity is scattered throughout the mainstem and its tributaries, aided by generally good access to the waters. The most highly used areas for fishing are the lakes and

reservoirs, and the segment of the mainstem between Ball Mountain Dam and Townshend Reservoir (Cox, pers. comm. 4/16/85). Ball Mountain Reservoir is stocked, and is a popular sport fishery along with the segments above and below. Gale Meadows and Lowell Lake are heavily fished for small and large mouth bass, perch and pickerel. Catchable size trout are stocked in Townshend Reservoir, West River (Weston, Londonderry, Jamaica), and Greendale Brook (McMenemy, memo, 7/31/87). The trend in recent years has favored lake fishing over stream fishing, directing the bulk of the basin's sport fishing to lakes and reservoirs (Cox, pers. comm. 4/16/85).

Known significant fishing locations are detailed on Figure 5 with accompanying descriptions. Since fishing occurs randomly throughout the tributaries, it is impossible to locate all fishing areas, but those illustrated should give an indication of concentrated use areas.



Key to Figure 5  
Fishing Use

- F-1 Jamaica State Park. Salmon Holes are popular fishing sites. Heavily fished, stocked with brown trout. Segment is good place for fish. It is cooler and deeper and more shady than much of the rest of the West River and is particularly favorable to trout and other cold water species.
- F-2 Fishing is popular on West River south of Londonderry.
- F-3 Lakes are popular fishing places. Gale Meadows Pond has good trout fishing at the head in the main channel (Gordon). Species include large mouth bass, brown trout, perch, pickerel, and blue gills.
- F-4 Lowell Lake has bass and pickerel (Gordon). It has become more popular in recent years.
- F-5 Stratton Pond has brook trout (McMenemy).
- F-6 Fishing is popular in Weston on mainstem (Chalmers). Fairly good trout fishing from Weston to Londonderry (Gordon).
- F-7 Mill Spring Park. Good fishing (Chalmers).
- F-8 Turkey Mountain Brook. Good trout but small (Gordon).
- F-9 Cole Pond. Large mouth bass (Gordon).
- F-10 Winhall River. Stocked with brook trout and Atlantic salmon but not productive, most likely due to high water temperatures (McMenemy).
- F-11 Ball Mountain Brook. Wild brook and brown trout present. Atlantic salmon fry and parr stocked from the mouth to the confluence with the North Branch (McMenemy).
- F-12 Utley Brook. Salmon fry stocked in small reaches.
- F-13 Wardsboro Brook. Salmon fry stocked from the mouth to West Wardsboro. Also stocked with brook trout and has wild brook and brown trout.
- F-14 Ball Mountain Reservoir. A popular, stocked fishing site. (Cox. pers. comm. 4/16/85)
- F-15 Winhall Brook Camping Area. Heavily used. Camping, swimming and fishing throughout summer.
- F-16 Hapgood Pond. Public swimming area. Some fishing. Stocked with brook trout.

## Boating

The West River is well known for boating, both kayaking and canoeing. Below Ball Mt. Dam flows are released on weekends in the spring and fall for racing and recreational boating (Figure 6). The entire mainstem of the West is used to some degree in the upper basin but there is far heavier use below the Townshend Dam. Several specific popular boating segments include whitewater boating between Weston and Ball Mt. Reservoir; whitewater boating on the Winhall River and Wardsboro Brook; and lake boating on Gale Meadows Pond and Lowell Lake. Some sailsurfing is reported on Stratton Mt. Golf Course Lake.

Figure 7 illustrates the sites where boating has been identified. Because all of Vermont surface water classifications recognize boating as a compatible use, this information is supplied mainly to help document the recreational value of the resource.

There is some controversy over the cables which are strung across the West River along the Jamaica State Park Land (Figure 8). Some feel they are an eye sore. Others claim that they interfere with fishing by snagging lures. The boaters who use the high spring releases from Ball Mt. Dam use the cables for suspending racing course gates. This group regards the cables as essential to this use. They claim it would be impossible to remove and replace the cables each year (Fisher, K., pers. comm., 1985).

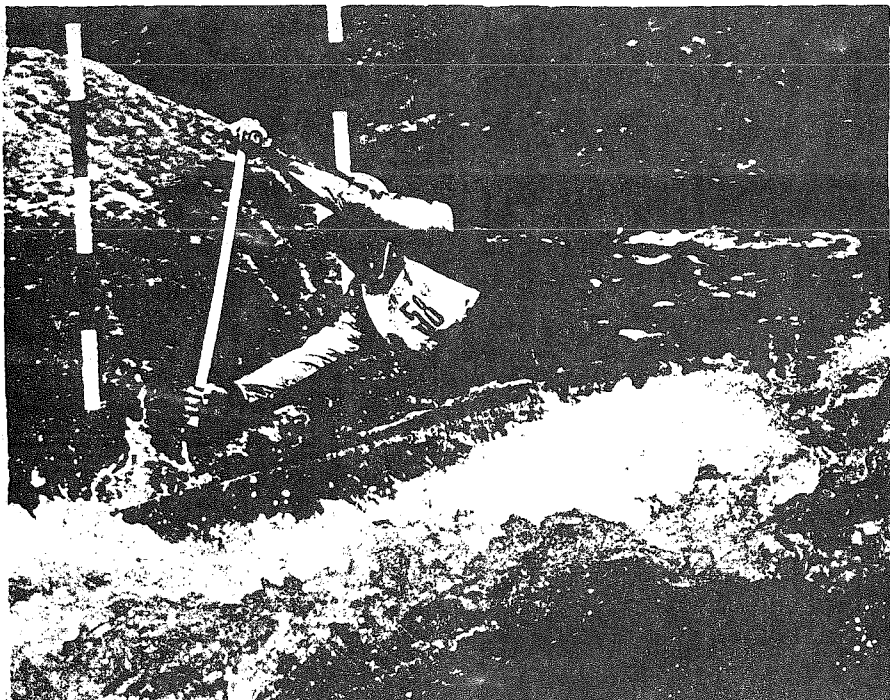


Figure 6 - Kayaking on the West River at Jamaica State Park just below the Dumplings.



Key to Figure 7  
Boating Areas

- B-1 Ball Mt. Dam to Rte. 100 Bridge. Boating, especially kayaking below Ball Mt. Dam during release of water for racing and recreation boating in spring and fall. There are two releases in the spring, one in the fall. Spring releases have been on the last weekend in April and on the first weekend in May. 1300 cfs is considered a safe release, 1500 challenging, and 1800 is a racing release. Segment of high state importance, famous race course that has been used for national team trials and championships. Suitable for both intermediate and expert boaters. (See Appendix G for a more detailed discussion by Jenkins and Zika).
- B-2 Weston to Londonderry. Suitable for open boats, rafts and kayaks, gradient is low and mild. Upper two miles are Class II-III, lower four miles are flatter (Jenkins and Zika, 1985).
- B-3 Londonderry to back water of Ball Mt. Dam. Small to medium sized upland stream, mostly Class III water with Class IV pitches at high water suitable for advanced open boaters and intermediate kayakers. Numerous boulders and ledges. Should be carefully scouted before running (Jenkins and Zika 1985).
- B-4 Gale Meadows Pond. Popular for canoeing and especially for fishing.
- B-5 Winhall River from junction of Rte. 30 and Kendall Farm Road to West River. Small to medium-sized stream, continuous Class III rapids, Class IV at high water. Suitable for expert open boaters and advanced and expert closed boaters. Difficult chute and rapids one mile below the Rte. 100 bridge in Rawsonville. High Importance for boating. One of the five rivers in VT with a continuous Class III run over four miles long (Jenkins and Zika, 1985).
- B-6 Wardsboro Brook. Wardsboro to Jamaica. Small steep upland stream with large boulders and tight difficult rapids Class III-IV very dangerous at flood. High Importance, the most difficult stream in South Vermont that gets any regular use (Jenkins and Zika, 1985).
- B-7 Lowell Lake. Canoeing popular use. Five islands, two owned by the State. There is also an interesting sphagnum bog at the south end of the lake. Plans to develop the state lands into a park are delayed due to the cost.

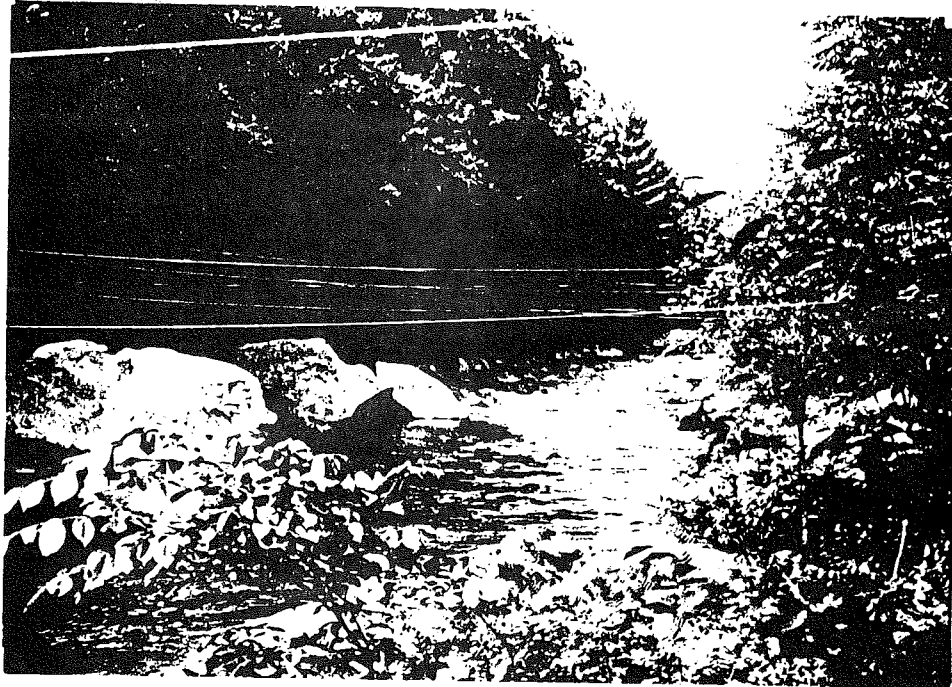


Figure 8 - Cables across West River at Jamaica State Park.

### Drinking Water

Drinking water is supplied almost entirely by ground water. All public water supplies rely on drilled wells and all private residences surveyed use wells or springs as the sole drinking water source.

Styles Reservoir, at the headwaters of Styles Brook, is an emergency drinking water supply for Stratton Corporation's Styles Brook Development. The Reservoir's primary function is now for fire protection. There are also some springs along Stratton Pond designated for drinking. These are the only known uses of surface water for drinking in the basin.

### Irrigation

Use of surface waters for irrigation is very limited due to the small amount of agricultural activity in the basin. Known uses of surface waters for irrigation are associated with golf course maintenance. A pond located at Stratton Corporation's Golf School is tapped to irrigate the 20-acre golf course.

### C. Water-Related Areas With Public Value

This section describes valuable water-related features which may have a direct influence on the future classification of waters. The features are also described here for consideration in future town planning or zoning.

### Pristine Streams

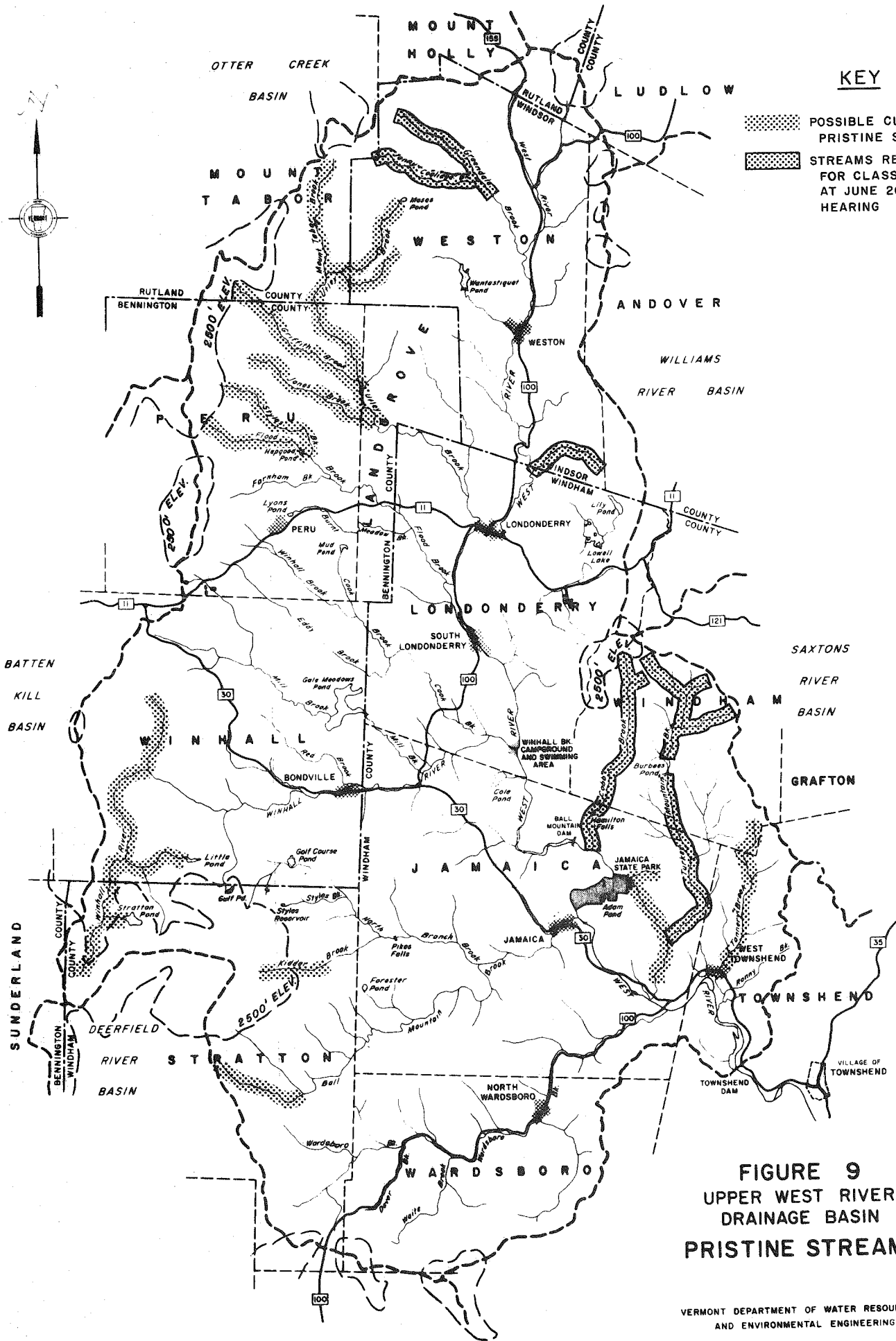
Several pristine streams are shown in Figure 9. These were selected mostly by direct observation and are those streams

showing little or no sign of human impact. These streams have watersheds which are undeveloped and in a natural state. They are presented to provide information on streams that may be worthy of future preservation in their present high quality. These streams were not selected by drainage area or elevation but by the inherent character of the water body.

Of these streams, Jenny Coolidge, Greendale, Beaver, Kidder, Styles, Cobb, and Turkey Mountain Brooks were recommended for Class A status at the June 25, 1986 public meeting. These would be in addition to the waters above the 2500 foot elevation already designated Class A by the General Assembly in 1986 (see Figure 2). If these streams were to be designated as Class A, it would be because they are "high quality waters which have significant ecological value" as stated in section 1252 (a) of 10 VSA Chapter 47, the definition of Class A waters. The consequence would limit indirect discharges to sewage systems of 1000 gallons per day or less.

Jenny Coolidge Brook to its confluence with Greendale Brook, and Greendale Brook to the point where it is no longer bordered by the Green Mountain National Forest, might be considered for Class A stream designation and are so marked in Figure 9. Because the watershed lies dominantly in the Green Mountain National Forest, the impact on private property would be slight.

Beaver Brook flows into the West River near the Weston/Londonderry town line from Cobble Hill. The watershed is

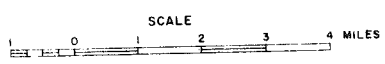


**KEY**

- POSSIBLE CLASS "A" PRISTINE STREAMS
- STREAMS RECOMMENDED FOR CLASS "A" DESIGNATION AT JUNE 26, 1986 PUBLIC HEARING

**FIGURE 9  
UPPER WEST RIVER  
DRAINAGE BASIN  
PRISTINE STREAMS**

VERMONT DEPARTMENT OF WATER RESOURCES  
AND ENVIRONMENTAL ENGINEERING



sparsely developed. We have not walked this stream however, and a more complete documentation of the water and adjacent environmental conditions would have to be completely described as part of a petition to the Water Resources Board for the reclassification of this or any other stream to Class A. This watershed is privately owned and such a designation would limit discharges to 1000 gallon per day septic systems.

Cobb Brook and Turkey Mountain Brook and their tributaries were suggested by the public as candidates for reclassification to Class A. We have walked Cobb Brook from the West River to Hamilton Falls, and we include an excerpt from "The Vermont Waterfalls, Cascades, and Gorges" as Appendix J. This report emphasizes the importance of the segment between Hamilton Falls and the West River. To protect the values of this stream, including a series of pools, cascades, and small falls over a distance of about a mile, it is suggested by the Department that the land use in this watershed take place with great care to prevent sedimentation and harm to the stream corridor. State acquisition of the stream valley should be considered.

Turkey Mountain Brook is also regarded by the public and the Department as a pristine watershed of great value for its remoteness, steep rock walls, pot holes, and cascades. We have walked portions of this stream and have noted deep pools (Figure 10) and rock walled tributaries (Figure 11). Again, Class A designation

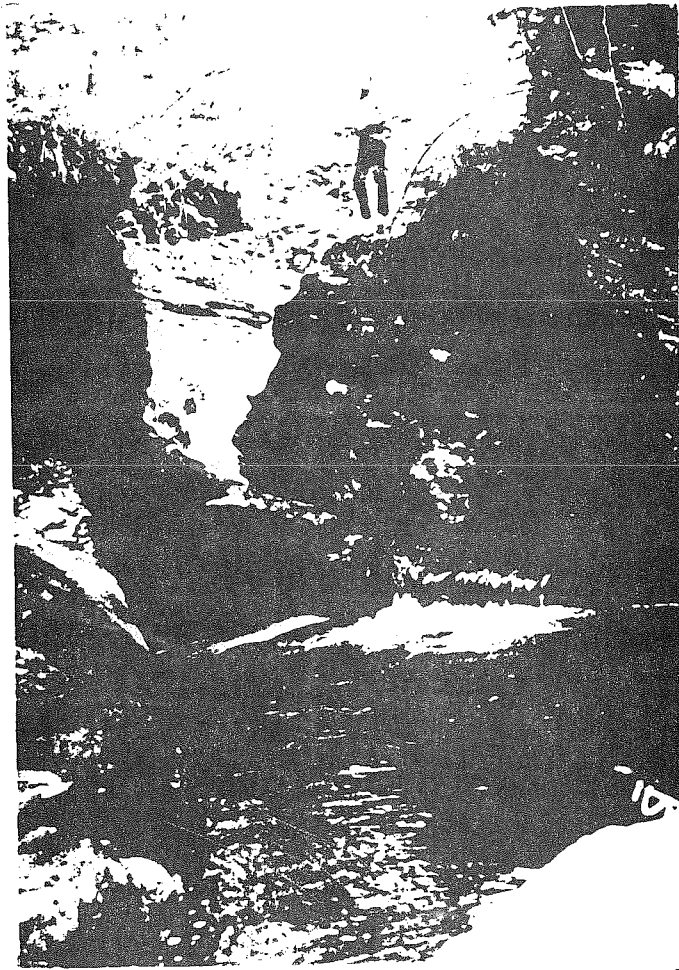


Figure 10 - Deep pool on Turkey Mountain Brook (7/2/85).



Figure 11 - Unnamed tributary to Turkey Mountain Brook (7/2/85).

has been recommended by basin residents who attended the public meeting (see Appendix E) from north of Burbee Pond to the confluence with Little Turkey Mountain Brook. State acquisition of the stream valley should be considered here as well.

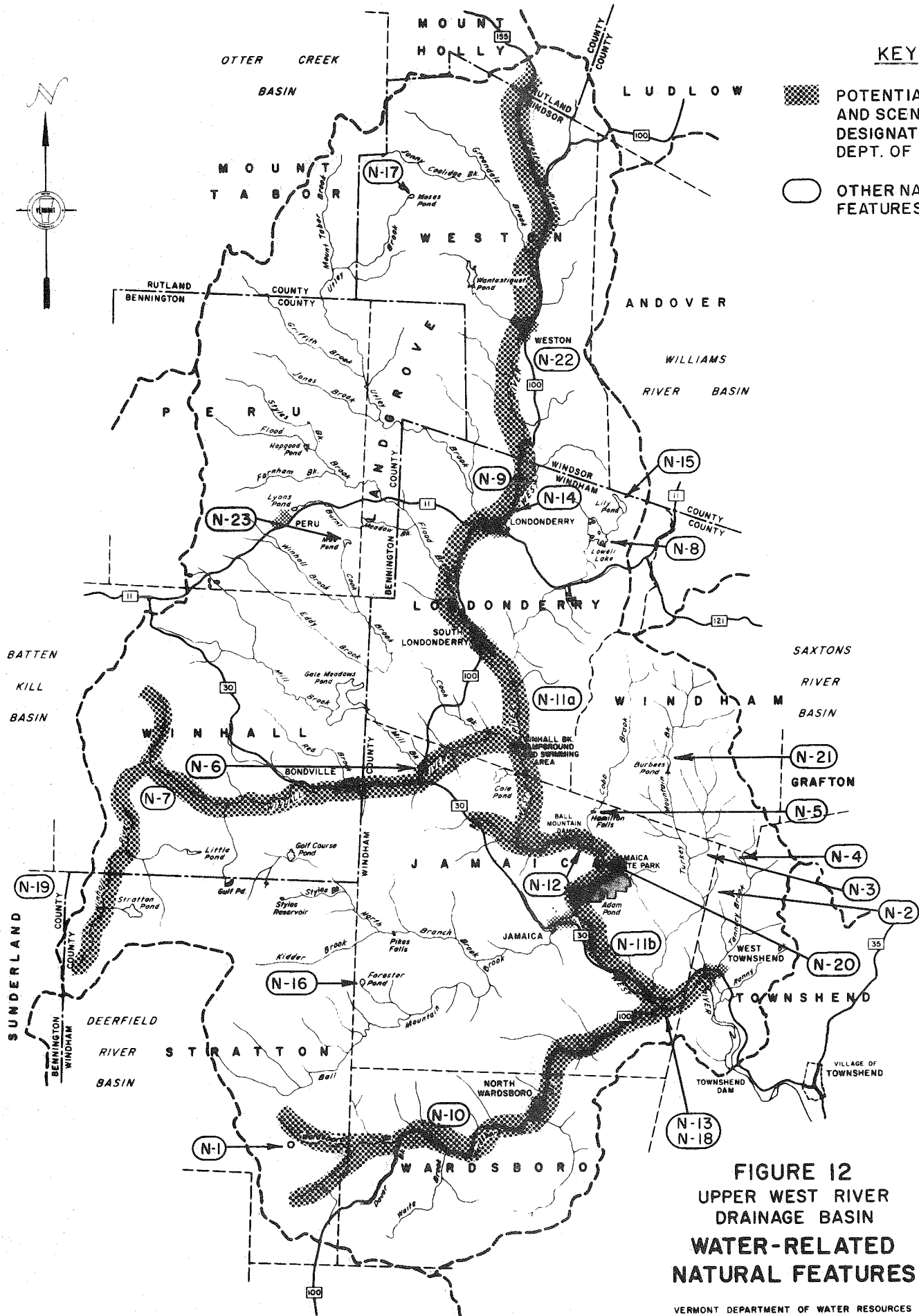
The designation of Styles Brook and Kidder Brook as Class A has also been recommended by basin residents who attended the public meeting (see Appendix E). Styles Brook is Class A upstream of the Styles Brook Reservoir. There is substantial development in this watershed above the road to Jamaica and there is drainage from the Stratton stump dump which impairs the quality of the lower portion of Styles Brook.

The upper segment of Kidder Brook is Class A since it is above 2500 feet elevation. There is extensive construction planned for this basin. As has already been noted, there is great importance of this stream in diluting the flows from existing development which drain into the North Branch Brook. It is recommended that a Nutrient Control/Erosion Control Plan be developed for existing and planned development to guide management actions for this drainage basin so that this stream will retain its present pristine character.

#### Water-Related Natural Features

This section describes valuable water-related features which may have a bearing on the future classification of the waters. Areas along water courses and water bodies are noted that are of

a character or value worthy of attention in future planning by the State, towns, and municipalities. These are described in the following pages of site descriptions. The sites are located in Figure 12. This is by no means an exhaustive list, and it is probable that there are other noteworthy water-related natural features of which we are unaware. In reviewing this list, one is struck by the number of outstanding water-related features which are of state-wide importance. These include Hamilton Falls (Figure 13), which is a state natural area described as an exceptional wild chain of pools and cascades including Cobb Brook to the West River; Mill Brook, where a rare clam is found; dramatic glacial features including eskers and a bog near the Londonderry dump; rivers including the Winhall and the West River and Wardsboro Brook appear on the federal inventory of wild and scenic rivers; a nationally recognized whitewater run below the Ball Mountain Dam; locations for rare plants and a rare clam on the West River; ponds with rare plants including Lily Pond, Forester Pond, and Moses Pond; beaver wetlands located in remote areas at the headwaters of the Winhall River frequented by bear and otter; and deep pools known as Salmon Holes on the West River at Jamaica State Park used in whitewater kayaking and by fishermen and where Indian artifacts are found, indicating a history of use for fishing. The Upper West River Basin is, indeed, one of Vermont's most important natural environments deserving great



**KEY**

- POTENTIAL WILD AND SCENIC RIVER DESIGNATED BY U.S. DEPT. OF INTERIOR
- OTHER NATURAL FEATURES

**FIGURE 12  
UPPER WEST RIVER  
DRAINAGE BASIN  
WATER-RELATED  
NATURAL FEATURES**

VERMONT DEPARTMENT OF WATER RESOURCES  
AND ENVIRONMENTAL ENGINEERING

SCALE  
0 1 2 3 4 MILES

Key to Figure 12  
Water-Related Natural Features  
Site Descriptions

- N-1 Ledgy stream, waterfalls, some pools.
- N-2 Cascade 150 ft. high which is reported to be beautiful in the spring.
- N-3 Gorge
- N-4 Gorge
- N-5 Hamilton Falls (Jamaica). Two acres, 1300 ft. elevation. Steep cascades with pools above, in the middle, and below. Very popular for swimming. Located on Cobb Brook. State owned. Downstream of falls there is about one mile of steep wooded ravine in which there is a series of small falls, pools, and cascades. None of these features is as striking as the main falls but taken together, they make a beautiful area that would be of State importance even without the Hamilton Falls. (Jenkins and Zika, 1985). The brook is an important spawning ground for native trout, having clear cool water in a shaded setting (VT Natural Areas Listing, 1972). Hamilton Falls is now designated a State Natural Area of the Vermont Department of Forests, Parks, and Recreation.
- N-6 Mill Brook between Rte. 100 and Winhall River contains a small population of a clam considered to be rare by the Nature Conservancy known as Margaritifera margaritifera, or the Eastern River Pearl Mussel. There are fewer than ten sites in Vermont where this species has been found.
- N-7 Winhall River. This river is on the federal inventory of wild and scenic rivers from the confluence with the West River to the headwaters. The inventory calls the Winhall highly used for recreation and a regionally unique river segment which includes sections of Class IV gradient. Scenic values are described as a unique and diverse juxtaposition and combination of land water and vegetation (U.S.D.I. 1981). Cleveland (1983) calls this one of the few remaining examples of an undeveloped Green Mountain Section lower order river. The river also bounds the Lye Brook Wilderness for about four miles. The first two miles of headwaters are dominated by wet areas and beaver ponds. The stream thereafter is in a V-shaped valley. The river is generally remote and fits the requirements for a wild river.
- N-8 Sphagnum bog at the south end of Lowell Lake.

- N-9 Sedge meadow overlying a deep peat deposit behind Londonderry dump. This site is adjacent to the West River in an area with abundant glacial eskers and pothole land forms.
- N-10 Wardsboro Brook. Included on the final list of potential wild and scenic and recreation rivers. Values include recreation; highly used and regionally unique river segment which includes sections of Class IV gradient. It is bordered by unusual density and diversity of spacial enclosures, topographic features, hydrologic and vegetative elements including a series of waterfalls, pools, and potholes.
- N-11a Ball Mt. Dam to headwaters. This river segment appeared on the final list of potential National Wild and Scenic Rivers in the Green Mountain National Forest (Cleveland, 1983). The segment is reported to be used highly for recreation. It is a regionally unique river segment which includes sections of Class IV gradient (U.S.D.I., 1981)
- N-11b West River from West Townshend to Ball Mt. Dam. Final list of potential National Wild and Scenic Rivers. "Highly used and regionally unique river segment which includes sections of Class IV gradient . . . A unique density and diversity of spacial enclosures, topographic features, hydrologic, and vegetative elements, including a series of waterfalls, pools and potholes" (U.S.D.I., 1981).
- N-12 The upper part of the stream below Ball Mt. Dam has two species (green alder, Alnus viride and dwarf bilberry Vaccinium cespitosum) that are rare in southern Vermont. It also has an orchid that may be the yellow rein orchid, Habenaria flava currently known in Vermont from one site about ten miles down the West River. In addition to the plant records there are two records of rare beetles from this section.
- N-13 Second site (see N-6) of Eastern River Pearl Mussel Margaritifera margaritifera on West River 4.5 km SE of Jamaica VT at Rte. 100 and 30. The Nature Conservancy lists this as state threatened and state endangered, and is planning to conduct a study of bivalves on the West River. N-14 Third site of Eastern River Pearl Mussel on West River 1.2 km north of Londonderry 0.75 miles north of Routes 100 and 11, along VT 100.
- N-15 Lily Pond (Londonderry) This is the site of two rare aquatic plants: Utricularia geminiscapa and Potamogeton

bicupulatus at scattered locations around pond, (Warren pers. comm. 3/86).

- N-16 Forester Pond (Jamaica). Rare aquatic plants including Utricularia geminiscapa which is scattered to common around pond and Potamogeton confervoides (Tuckerman's Pond weed). This species is rated as globally secure by the Vermont Natural Heritage Program and as state endangered and threatened. Any change in water chemistry can have an adverse effect on this plant (DesMeules pers. comm. 1986).
- N-17 Moses Pond (Weston). Twelve acres, 2230 ft. undeveloped pond used by waterfowl. Marshes bogs and swamps - inland. Statewide significance, moderate diversity, "small, undeveloped pond. Source of Utley Brook, with boggy edges".
- N-18 A Vermont endangered clam, Alas midonta Varicosa (bridge floater swollen wedge-mussel), was found just south of the junction of Rte. 100 and 30 at the VT Rte. 100 overpass in East Jamaica 4.5 km southeast of Jamaica.
- N-19 Bear Meadows (Stratton) - Beaver wetlands and headwaters of Winhall River - 250 acres, 2380 ft. elevation. Local significance. Marshes, bogs and swamps - inland. Habitat area of unusual significance. (Public/private ownership). "Series of former and active beaver ponds at various stages of succession that extends along headwaters of Winhall River. Bear and otter frequent area, which lies more than three miles from nearest road. The Long/Appalachian trail crosses area perpendicular to its north-south alignment" (VT Natural Areas Listing, 1972).
- N-20 Salmon Hole Rapids (Jamaica) - 50 acres, 700 foot elevation. State-wide significance, state and private ownership. Rivers and streams supporting anadromous fish. Whitewater stretches. "Scenic rapids of West River whose name derives from former spawning of Atlantic salmon especially in two pools, upper and lower salmon holes. With restoration of salmon in river, this area will become important spawning grounds. Discharge of silt from flood control dam upstream threatens gravel bottom required by salmon" (VT Natural Areas Listing, 1972).
- N-21 Burbees Pond (Windham) - 30 acres, 1610 ft. Pond with deep marsh used by waterfowl. Marshes, bogs and swamps - inland. State-wide significance - private individual ownership. "Pond with deep marsh on upper Turkey Mountain Brook. Area provides good food and cover for waterfowl, which use it moderately both for nesting and during migration" (VT Natural Areas Listing, 1972).

N-22 West River; Whitewater Stream (Weston) - 20 acres, 1300 ft. Local significance - State owned. "Two miles of whitewater for canoeists". South of Weston (VT Natural Areas Listing, 1972).

N-23 Mud Pond (Peru) - 100 acres, 1400 ft. elevation. Scenic shallow lake with broad marshes, bogs and swamps - inland. State-wide significance. Great diversity - federally owned. "Shallow lake abounding with wildlife in surrounding borders and forests" (VT Natural Areas Listing, 1972).



Figure 13 - Hamilton Falls on Cobb Brook

attention and care. There are good opportunities for individuals, organizations and local and state government to act to preserve important water related features in the basin.

#### Wetlands Throughout the Basin

The Vermont State Wetlands Inventory Map shows several hundred wetlands in the West River drainage basin. Many of these are small and seasonally saturated, but all are ecologically important, and many should be given special consideration when planning development. Wetlands are natural storage and recharge areas for ground water and help prevent erosion. They also have recreational value and increase habitat variety for birds, mammals, fish, and plants. Many diverse habitat types yield healthier and more abundant plant and animal life--a more stable ecological community. When examining a wetland site for development, all of these factors should be weighed.

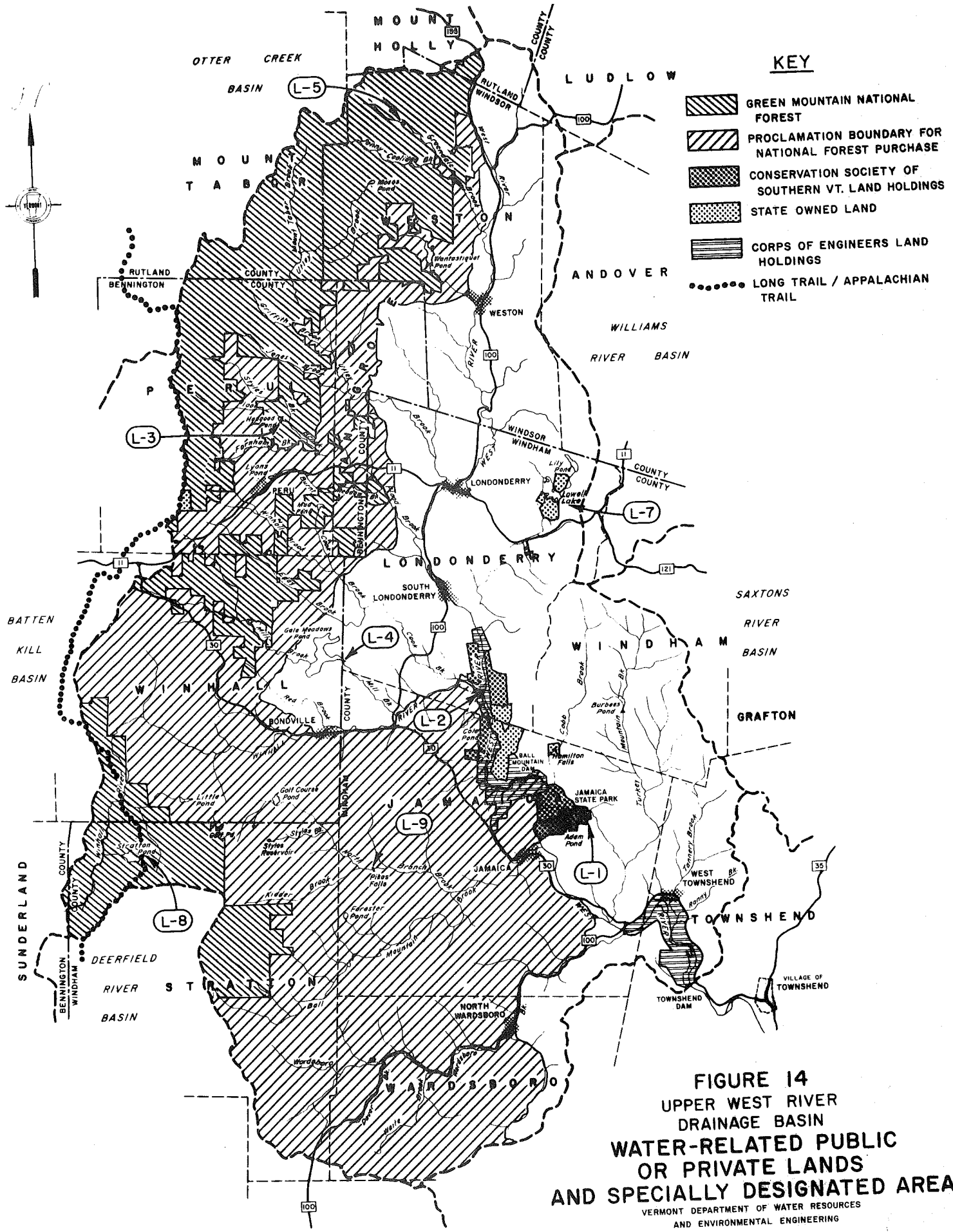
Along the West River mainstem, wetlands are generally small in size, but cumulatively help to retard flood waters. From the headwaters to Weston, most wetlands take the form of many small pools along the river. There are about ten other wetland types in this reach, with alder wetlands being the second most common. This pattern continues on to South Londonderry, where there is a dramatic change in wetland type. Below South Londonderry, most wetlands are within the river bed (riverine) and are accompanied by sand bars and small impounded areas. Between Jamaica and Townshend, alder patches predominate with eight other types present (Pagel, pers. comm.).

### Water-Related Lands

One aspect of our analysis is to determine whether the public has and will in the future have sufficient access to the surface waters. It is our conclusion that there is opportunity for public use for swimming, fishing and boating, for nature appreciation, water supply, and so on. There is widespread informal use of private lands for access to swimming holes. Boaters experience a similar degree of freedom of access.

At one time, the Conservation Society of Southern Vermont had a plan to develop a corridor of land along the West River which would ultimately be a chain of parcels across the state. Many of these parcels are in the area of Ball Mountain Dam and Jamaica State Park (Figure 14). Some parcels have been sold to the state, such as the lot around Hamilton Falls, while others, such as the land on the north side of Pikes Falls, are still retained by the Conservation Society of Southern Vermont. There is some interest on the part of the Conservation Society of Southern Vermont in selling parcels to the state such as the parcel at Pikes Falls and perhaps others (W. Uptegrove, pers. comm.). The opportunity which still exists for the state and towns to acquire important lands for future generations should be recognized and used to the best advantage.

Other public access points include undeveloped parcels for a state park on Lowell Lake, public access at Gale Meadows Pond for fishing, access at Hapgood Pond for fishing and swimming, camping and swimming at Winhall Brook Camping Area, and camping, boating, and swimming access at Jamaica State Park.



Key to Figure 14  
Water-Related Lands

Public Ownership

- L-1 Jamaica State Park (Dept. of Forest & Parks)
- L-2 Winhall Brook Camping Area (Army Corps of Engineers) and flood land.
- L-3 Hapgood Pond - Public facility - swimming, camping (U.S. Forest Service).
- L-4 Public Fishing Access at Gale Meadows Pond (Dept. of Fish and Wildlife).
- L-5 Greendale Camp and picnic grounds
- L-6 Townshend Dam picnic area, boat launch, and flood land (Army Corps of Engineers)
- L-7 Lowell Lake (Londonderry) - 100 acres, 1290 ft. elevation. Regional significance - private and State ownership. Two parcels State owned. "Scenic, mostly undeveloped lake with five islands and marshy areas at north and south ends. Beaver are active along shores of lake, which generally constitutes uncommon natural resource in southeastern Vermont. Area provides fair food and cover for waterfowl, which use it moderately for nesting and during migration" (VT Natural Areas Listing 1972).
- L-8 Stratton Pond - (Stratton) Hike-in camping, swimming. (Stratton) - 60 acres, 2555 ft elevation. "Scenic natural pond that remains undeveloped except for shelters along the Long-Appalachian trail, which passes pond. Heavy foot traffic on trail has degraded areas of shelters. Pond is largest body of water along Long Trail" (VT Natural Areas Listing, 1972).

Private Ownership with Public Access

- L-9 Pikes Falls (Jamaica) - 16 acres, 1420 ft. elevation. Several small woodland cascades on North Branch Brook. The stream flows past a ledge with an odd dike formation and then funnels into a narrow channel and splits into three cascades over a single broad ledge. A narrow chute follows and the water then spills into a large pool which is popular for swimming and receives heavy use. The north side of the site is owned by the Conservation Society of Southern Vermont.

Note: Proclamation Boundary shown in Figure 14 is land approved by Congress in which the U.S. Forest Service may purchase land with the approval of the Town and the State. There is no implication that the U.S. Forest Service will definitely purchase any particular land within this area.

D. Recommendations of Town and Regional Plans For Water Use or Water-Related Municipal Bylaws.

a. Town Plans

Certain sections of Town Plans for towns within the basin, and the Windham and Bennington Regional Plans, specifically address water resources. Through planning and zoning ordinances, the towns can provide protection to waters beyond the scope of State water quality laws. Town and Regional Plans can also give guidance concerning the desired uses of surface and ground waters for consideration by the Department and the Water Resources Board in establishing water classification and management policy.

All of the towns within the basin make some reference in their Town Plans to preserving water quality by regulating development or establishing review processes. The strength and specificity of these recommendations varies greatly from town to town, although formal recognition of resource protection is, in itself, a statement of the towns' intentions.

Table 3 provides a summary of water-related features that have been described as valuable resources in the various Town Plans. Also included are certain recommendations pertinent to preserving water quality. Although this table gives no indication of how thoroughly these items are covered, it does show which resources are most widely considered in the ten towns of the basin, and where there are gaps in overall planning. For example, wetlands protection is mentioned in only four Town

Table 3

Protection Provided Through Development Restrictions or Other Recommendations in Town Plans:

Town Plan Policy Summary	Jamaica	Land- grove	London- derry	Peru	Strat- ton	Town- shend	Wards- boro	Weston	Wind- ham	Win- hall
-Specific Surface Waters (designated for protection)			X	X	X			X		X
-High Elevation Lands				X	X					
-Upland Stream Watersheds	X				X	X	X	X		X
-Watersheds with Steep Slopes or shallow soils	X	X			X	X	X	X		X
-Aquifer Recharge Areas or Public Drinking Supplies	X			X	X	X	X	X	X	X
-Flood Hazard Areas	X	X	X		X	X	X	X	X	X
-Water Courses and Shorelines	X	X	X		X	X	X	X		
-Wetlands		X			X		X	X		
-Wildlife Habitat and Endangered Species	X	X	X		X	X	X	X		
-Scenic Resources	X		X		X	X	X			X

Table 3 (cont'd)

Town Plan Policy Summary Other <u>Recommendations:</u>	Jamaica	Land- grove	London- derry	Peru	Strat- ton	Town- shend	Wards- boro	Weston	Wind- ham	Win- hall
-Waste Disposal	X	X	X	X	X	X	X	X	X	X
-Water Supply Require- ments for Developments	X							X		X
-Public Access to Waters			X			X				

Plans, while protection of water courses and shorelines is mentioned in nine. This indicates that wetlands do not receive the same breadth of protection in planning as water courses and shorelines. Similar inferences can be made by comparing other categories.

b. Regional Plans

Windham Regional Plan

The Windham Regional Plan makes the following major points concerning water use and impact:

Natural Areas, Fragile Areas, and Wildlife Resources

Areas above 2500 feet in elevation are recognized as vulnerable to erosion and poor recovery due to thin soils, steep slopes, sensitive vegetation, important wildlife habitats, and greater than average precipitation.

Regional planning policies are to:

- Protect natural and fragile areas, especially those of State and regional significance.
- Local plans should sufficiently address natural and fragile areas in order to ensure protection and provide suitable opportunities for public use.
- Towns should strive to protect natural and fragile areas through public ownership.

General

- Development in flood prone areas is undesirable. Where necessary, it should be designed and located so as not to

impede the flow of flood waters or endanger the health, safety, and welfare of the public.

- Proposals which will alter the stream channel or its floodplain must identify and address any adverse environmental impacts.
- Water supply watersheds must be protected by restricting development to low densities and by proper forest and agricultural management, including but not limited to erosion control and measures to minimize runoff.
- The adequacy of waste disposal systems should be carefully evaluated in areas designated as Aquifer Protection Areas.
- Water courses, lakes, ponds, wetlands, and shorelines should be maintained in their natural state.
- Local regulations should provide buffer areas to maintain the scenic and recreational value of watercourses and shorelines.
- Wetlands should not be drained or filled for development.

#### Waste Disposal

- The standards for design and construction of sewage disposal systems, including septic tank leach field systems and alternative methods, should be directly and demonstratively related to public health and environmental quality.

- All towns are strongly encouraged to join the On-Site Sewage Program. The Windham Regional Commission will assist all towns in adopting sewage ordinances.
- On-site sewage disposal systems should be designed and constructed in consultation with a qualified professional.

#### Bennington Regional Plan

(includes the towns of Peru and Landgrove)

#### Land Above 2500 Feet Elevation

Land above 2500 feet is identified as a special planning district. Bromley Mountain (3260 ft.) is considered an important natural area by virtue of its aquifer recharge area and visual impact.

#### Natural Areas (as defined by State inventory)

The policies are to:

- Encourage the preservation of listed natural areas at all planning levels.
- Maintain appropriate buffer areas.
- Encourage acquisition of natural areas.
- Encourage developments to protect and accommodate natural areas through the Act 250 process.

#### Watersheds and Aquifer Recharge Areas

The plan recognizes the importance of protecting ground water aquifers because of the dependence on springs and ground water for public and private water supply systems. In Peru, housed springs and a reservoir are listed as a public water supply system.

Utley and Flood Brooks are listed as "major watersheds in uplands and intermediate uplands," with drainage areas of 5120 and 3520 acres respectively.

The policy of the plan is to

- Discourage land development that would endanger aquifer recharge areas.
- Encourage open air uses and conservation areas for lands within major watersheds.

#### Ground Water

- Avoid sewage and solid waste disposal in areas with high ground water favorability and a high water table to avoid ground water pollution.
- Protect uplands and intermediate uplands as recharge areas to maintain high ground water quality.

#### Water Bodies and Wetlands (over 10 acres)

- Maintain shorelands in a natural setting.
- Protect wetlands adjacent to shorelands as extensions of the waterbody for wildlife habitat and aquatic life.
- Discourage developments on lots less than one acre in shoreland zones where the potential for pollution exists.
- Encourage non-motorized forms of recreation on water bodies.
- Preserve the natural state of streams by:
  - Discouraging impoundments.
  - Maintaining existing vegetation.
  - Protecting natural scenic qualities.

- Protecting adjacent wetlands and natural areas.
- Public dedication of lands is encouraged for both main and feeder streams.
- Upland watersheds should be maintained in forest and recreation use to ensure high water quality of valley streams.
- The formation of regional park districts and town conservation commissions should be considered for establishing riverside parks and considering land acquisition.

#### River Use

Forested mountain sides: Encourage trails for hiking, riding, visits, camping and other similar uses with appropriate setbacks from the stream.

Rural Areas: Encourage access for various forms of recreation such as swimming, fishing, boating, and picnicking. Restrict intensive recreation uses from fragile areas along streams.

Settlements: Encourage the maintenance of river fronts as open space and as a local amenity.

#### Protection Against Flooding

- In floodways, encourage recreation and agriculture vs. structural uses, obstructions or fill.
- Restrict development and filling of wetlands along the main stream channels to protect their recharge and water

storage benefits as they relate to flooding and to protect them as wildlife habitats.

- Encourage appropriate setbacks for streams in areas where soil conditions might result in pollution, soil erosion, and sedimentation.

V. Water Use Conflicts and Recommended Policies for Resolution

A. Existing Water Use Conflicts

1. Construction of Large Instream Impoundments

In order to store sufficient water to meet snowmaking demands, several large instream impoundments have been constructed in the basin. This has resulted in several serious downstream impacts which probably would have been avoided had the impoundments been off-stream. The problems include discharge of higher temperature water and depletion of the cold water fishery. In contrast, the Styles Brook Reservoir and the Gulf Brook Reservoir are constructed off stream and these impoundments have not harmed the streams in these ways. Instream impoundments may also experience the phenomenon of continuous turbidity by re-suspension of sediments through wind and wave action.

Recommendations

It is the policy of the Department to encourage the design of impoundments which do not elevate stream temperatures, cause a chronic discharge of turbid water in violation of water quality

standards, or conflict with other beneficial uses of waters in the immediate area of the impoundment or downstream. Preference should be given to off-stream impoundments; i.e., impoundments where flows normally bypass the water body. This reduces the problems of siltation and increased water temperature and should, with proper precautions, preserve the stream type fishery habitat. Where the suspension of colloidal or fine particles by wind/wave action is a problem, off-stream water impoundment would prevent or reduce the discharge of turbid waters to streams. Constructing an impoundment with adequate depth to minimize the effect of wave action on bottom sediment can also be used to reduce turbidity within the impoundment.

2. Minimum Flow Requirement for Instream Impoundments and Water Withdrawal Sites

The withdrawal of water from streams can result in reduced or interrupted stream flow that is detrimental to fish, aquatic insects, and other stream life. This will diminish the value of the waters for fishing.

Since 1980, the Department has followed minimum stream flow guidelines based on the U.S. Fish and Wildlife Service's New England Stream Flow Recommendation Policy. This policy recommends base flows for sustaining indigenous aquatic organisms year-round, and prescribes seasonally needed flows for fish spawning and incubation. These are 0.5 cubic feet of water per second for each square mile of drainage area (cfsm) for the

summer low flow period, 1.0 cfs for fall spawning and incubation, and 4.0 cfs for spring spawning and incubation. In many cases, the summer base flow of 0.5 cfs is chosen as a year-round requirement.

When possible, the Department determines the natural flow for a specific site from 25 years of flow data or, in some cases, a recommended flow is determined by performing a "fisheries flow needs assessment" for a specific water body. In any case, a passage of minimum flow is required based on the best available method. Generally, an automatic, failsafe device must be installed to ensure that the specified minimum flow is passed.

### 3. Erosion and Sedimentation

The absence of effective erosion controls, the removal of vegetation, and the disturbance of the soil at construction sites results in erosion and the deposition of sediment in surface waters. This reduces fish reproduction and changes the species of aquatic insects which serve as a source of food for fish.

Sedimentation in North Branch Brook and its tributaries is the most serious water quality problem in the basin. The impact is evident at several locations downstream of the Stratton Golf Course Pond. A general decline in sport fisheries in impacted waters was found in fish and aquatic organism studies. Indeed, the most frequent water quality complaint voiced by area residents is the increasing color of North Branch Brook.

Most construction sites visited had some erosion control mechanisms in place which, although helpful, appeared to be inadequate and ineffective in controlling sediment loss during rainfall events. Sedimentation and algae growth were found at several locations along North Branch Brook and in the West River in Jamaica. This occurred despite the fact that erosion control requirements were contained in the Act 250 permits.

Severe stream channel erosion through the lower Stratton spray field has washed out the stream banks to the extent of toppling trees (Figure 15). This channel erosion is probably related to the new and extensive impervious surfaces near the base lodges. These flows, in addition to widening the stream channel, probably contribute to the sediment noted during biological studies downstream in North Branch Brook. This specific impact could be reduced by increased diffuse spreading of storm water flows and by the use of storm water detention basins.

There are other forms of erosion control, two of which, mulching and diverting upstream runoff around construction sites, emerge as the main ones to apply for greatest reduction of erosion and sedimentation.

#### Recommendations

A. The two most effective and most overlooked erosion controls are mulching bare soil and diverting flows away from the disturbed soil area soon after disturbance. Before erosion can be effectively controlled, it must be the local standard of

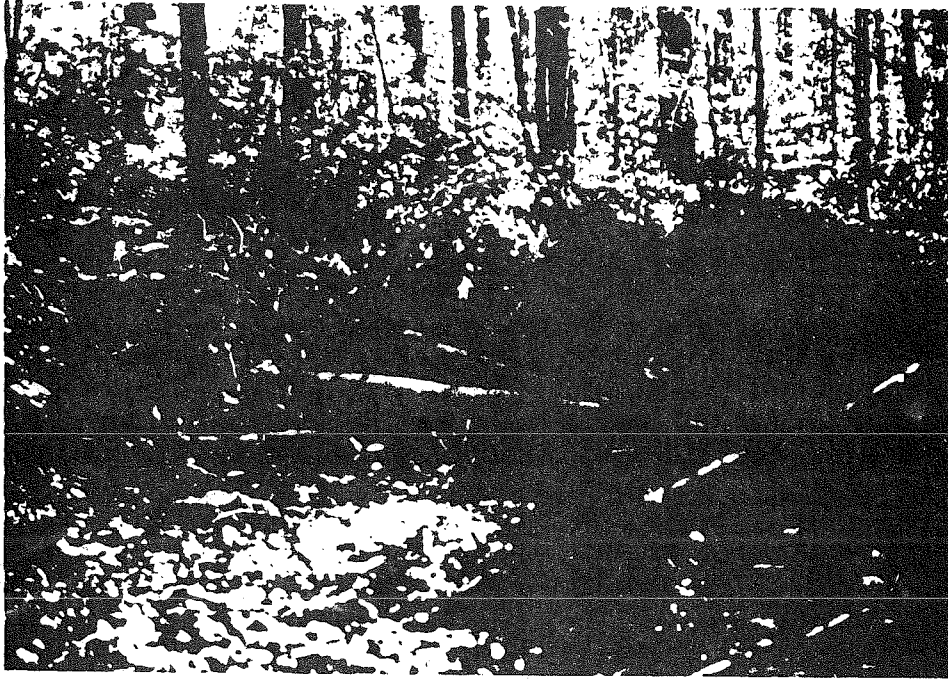


Figure 15 - Trees under cut by heavy storm water flows from impervious surfaces eroding the stream channel through the lower Stratton spray field.

environmental quality to cover bare earth "right away". Towns, civic groups, environmental groups, corporations, contractors, and engineers could make the covering of bare earth part of a local environmental ethic. This would do more for water quality than permit conditions which are largely disregarded or ineffectively applied.

We have heard the argument that disturbed soil will soon be reworked and that there is no point in mulching. Our field observations show that soil is frequently left bare for several weeks or months before being reworked. During this time, mulch would go a long way to reduce erosion to a negligible amount and at great benefit to fish life and water clarity.

Diverting water away from bare soil is frequently not done so that cloud bursts wash through construction sites. On large construction sites, even the cumulative flow originating from within the construction site can become a major erosive force. Daily mulching and water diversion is highly recommended. As a minimum daily requirement (MDR) "mulch and divert right away". Bare, unmulched earth at the end of a work day is a water quality "accident" waiting to happen.

B. Although there has been no evidence of concrete truck wash water discharge to surface waters in this basin, this practice has occurred in other areas of the state causing large fish kills. Concrete in surface waters causes a lethal "pH

shock". Contractors and their employees are strongly urged to keep concrete truck washing away from streams.

C. Re-routing of small upland water courses and seasonal streams can cause flows to erode new channels over a period of decades. Every effort should be made not to re-route streams or swales and, where re-routing is absolutely necessary, channels must be adequately armored and any aquatic habitat reproduced.

#### 4. Large Parking Lots with Soil Surfaces

Large parking lots in the basin have been constructed by clearing the land and spreading sand or gravel on the surface. During heavy rains, finer particles and sand are carried by run-off into adjacent surface waters. Accumulation of sediment in streams and ponds impairs fish reproduction, the natural diversity and quantity of benthic invertebrates, and aesthetic value. Sediment input from soil, or gravel and sand surfaced parking areas which are not vegetated or otherwise stabilized can continue to erode and produce significant sedimentation.

#### Recommendation

While erosion from parking areas is minor in comparison with construction and stream channel erosion, some attention is warranted since the effect of sediment on surface waters is cumulative. Parking areas adjacent to streams should drain through a grassed buffer strip. Where there are perennial streams, the buffer should be wide enough for adequate stream shading, to aid in filtering sediment, and to allow for adequate snow clearing without impacting the brook.

The following recommendations apply to existing parking areas:

Diversion ditches, check dams, filter berms, and sedimentation ponds should be employed as outlined in "The Vermont Handbook for Soil Erosion and Sediment Control on Construction Sites." Additional information on maintaining buffer strips and preserving stream banks is available in the "Vermont Streambank Conservation Manual". All owners of large unvegetated parking areas should implement appropriate practices from these documents to reduce erosion and sedimentation in surface waters. Implementing and maintaining control measures that follow these guidelines will also reduce siltation in downstream snowmaking reservoirs and reduce the need for dredging.

##### 5. Fishing and Boating

There is substantial controversy over the best use of the West River segment between Ball Mountain Dam and along Jamaica State Park. There is some discussion of the issue of fish health versus boating in Appendix G.

The use of this segment for boating races used to occur during the natural high water in April. There are high flows at times of water release later in the spring and there is anecdotal information that the fish reproduction is harmed by this later release. There are also complaints about cables across the river year round to hold markers for the canoe races. It is said that

the cables look terrible to some and that they interfere with the use of the favorite fishing holes since fly lines are easily caught on the cables. While it is beyond the scope of this plan to arrive at a definite resolution of the impact of late spring releases on fish, several general recommendations are offered below.

The whitewater release from Ball Mountain Dam is a clearly unique and important event which creates a recreational outlet to thousands of people. Such releases should continue.

With respect to the fish, it seems likely that there is some harm done to the habitat by the scouring of the late season releases, but this is only based on discussions with fishermen and is not scientific conclusion.

#### Recommendation

To our eyes, the cables are also an eyesore, especially during lower flow periods when the function of the cables in holding race course markers is not apparent. This, though, may be the price for a truly remarkable and unique whitewater paddling which is a recreational outlet for thousands of people, whether racers or on-lookers. The effort involved in stringing the cables apparently is so great that it would be prohibitive to the continuance of whitewater racing if it were necessary to remove and replace the cables each year. We do not recommend this, however. We suggest that fishermen and paddlers get together and attempt to agree on the relocation of certain cables

or on the annual removal of certain selected cables at the best fishing holes. This compromise, although not satisfactory to all, might be a compromise that would facilitate fly fishing at the best sites and also further the interests of the whitewater canoeists.

Those who are interested in experiencing the majestic West River in an unspoiled natural setting free of cables need only walk up the old railroad grade to the stretch of river above the cables. Here one is struck by the power and wilderness aspect of a unique Vermont River free of visible man-made alterations (cover photo).

#### 6. Acid Precipitation

The impact of acidic deposition on aquatic ecosystems is determined by the capacity of the lake watershed to neutralize acidic inputs. The acid neutralizing capacity of a watershed is dependent on the chemical weathering process and the ion exchange process. The lakes most susceptible to acidic inputs are situated in geologic areas that are highly resistant to chemical weathering.

Most of the West River Basin overlies bedrock with little or no capacity to buffer acidity in the water. There is the potential for widespread impact from acid precipitation. Several water courses and water bodies have been studied for their sensitivity to acidification (Table 4). In general, there is no reduction of acid precipitation in sight so it is very possible

Table 4

Sensitivity of Selected Water Bodies  
to Acid Precipitation

Sensitivity is expressed in the following terms from low to high, NOT sensitive, moderately sensitive, extremely sensitive, critically acidic. Critically acidic water bodies contain few if any fish (Jim Kellogg, pers. comm., 1986).

<u>Water Body</u>	<u>Sensitivity</u>	<u>Remarks</u>
Forester Pond Jamaica	Critically Acidified	Clearwater, no alkalinity toxic levels of aluminum, only stunted population of brown bullheads. Median pH 4.70
Lily Pond Londonderry	Extremely Sensitive	Essentially completely undeveloped, has population of largemouth bass. Five to six species of fish. Aluminum not toxic yet. Median pH 6.12 (Kellogg, 1984)
Stratton Pond Stratton	Extremely Sensitive	Pond perimeter mostly owned by U.S. Forest Service. Median pH 6.07. Lake gets light pea green bloom of diatoms in summer. Fish have been noted dying for lack of oxygen. Heavy logging in watershed leading to sedimentation, this provides some buffering of acid (Kellogg, pers. comm., 2/85).
Cole Pond Jamaica	Extremely Sensitive	Very rapid development of shore during six year monitoring period. Uncontrolled growth is increasing nutrients. Increases in alkalinity and pH caused by releases in soil. Mean pH 6.20

<u>Water Body</u>	<u>Sensitivity</u>	<u>Remarks</u>
Little Pond (Winhall)	Extremely Sensitive	Native brook trout population. Extensive logging in watershed. Fishing reported to be poor.
Moses Pond (Weston)	Critically Acidified	Colored water. High and perhaps toxic levels of aluminum. Has a population of brown bullheads. No trout. Median pH 4.78 (Kellogg, 1983)
Winhall River IPCo Bridge Kendall Farm Rd.	Extremely Sensitive	Colored water. Alkalinity low, aluminum high. Extremely sensitive to acid rain. Some aluminum could be immobilized by humates. Total species sampled = 10. Stocked with Atlantic salmon.
Ball Mt. Brook in Jamaica At Stratton/ Jamaica Town Line	Extremely Sensitive	Clear. Total species sampled = 2. Similar pH to Winhall. Spring runoff would create more aluminum and lower pH, i.e., toxic shock. Aluminum more toxic without color. Stocked with brook trout. Mean pH 5.74 thought to be due to acid precipitation (Langdon 1985). State standard pH = 6.5

that the lakes which are close to having conditions lethal for fish will become further acidified. Annual sampling during the past six years is showing trends which support this conclusion.

It has been noted that ponds and streams colored with brown humic acids may bind aluminum with the humic acid, rendering it nontoxic to fish. This process may account for the survey of clear Ball Mountain Brook rendering two fish species while the colored waters of the Winhall River produced ten species (Langdon, pers. comm. 1986).

The study of acidity trends should continue, and if the trends continue, this data should be used to demand the control of acid forming compounds in regions of the country from which Vermont derives its air.

## B. Potential Water Use Conflicts

### 1. Septic System Failure

Failing septic systems can result in the discharge of untreated waste into surface waters. These discharges can impact several sensitive water uses, including drinking, swimming, and water contact boating. Untreated waste discharges can also alter the aquatic biota and create a public health hazard. Hence, such discharges are prohibited in all of Vermont's surface waters.

The manner of individual septic system installation, operation, and maintenance can have a substantial long-term influence on future demands for municipal funds to collect and treat wastewater. The serious consequences of multiple septic

system failure can be prevented by prohibiting the construction of septic systems in unsuitable soils, constructing systems where there is an adequate replacement area, and by correct system installation, operation, and maintenance.

Many towns in Vermont have elected to adopt the State minimum standards for septic system design, and they administer such programs through Town officials or consulting engineers. Other towns have become members of the On-Site Sewage Program, which is administered by the Vermont Association of Conservation Districts. The Town enters into a contractual agreement with the Program and a representative then examines the suitability of the site, the system design, and the correct installation of a septic system. The Town, on the advice of the Program, then issues or denies permits.

A number of untreated sewage discharges were identified during this planning study originating from domestic sources. There also were elevated fecal coliform counts in the West River mainstem near the villages of Jamaica, Londonderry, South Londonderry, and Weston. Some additional sampling is indicated in these areas to track down the sources. It would be premature to conclude that any of these villages is in immediate need of a surface water discharging municipal wastewater treatment system. Collection and treatment may be needed at some point in the

needed at some point in the future, but even then, off-stream disposal is a good possible alternative to direct instream discharges.

In the near term, the best insurance against the need for a discharging system is a high quality technical review of the installation of new and replacement septic systems. The status of the regulation for septic system installation as of 1986 is listed below by town indicating whether the rules conformed with the Health Department minimum state standards. It is our finding that even where towns have up to date health regulations, these standards may be ineffective if the town does not have a reviewer with adequate technical training and time. For this reason, many towns have subscribed to the State-subsidized On-Site Sewage Program which has technicians available to all member towns to supervise site analysis installation and maintenance of septic systems. As of 1986, only Andover, Townshend, and Weston

#### Septic System Regulations

Andover	New regs
Jamaica	Old regs
Landgrove	None
Londonderry	Old regs
Mount Holly	None
Mount Tabor	None
Peru	Old regs
Stratton	Old regs
Townshend	New regs
Wardsboro	None
Weston	New regs
Windham	New regs
Winhall	Old regs

subscribed to the On-Site Sewage Program. Towns are strongly urged to investigate all phases of their septic system installation supervision to assure that their technical review equals or exceeds the standards of the On-Site Sewage Program. A study performed in 1979 by the Windham Regional Planning Commission concluded that the Town of Winhall, because of a high probability of waste water problems in Bondville, should specifically consider the On-Site Program and an amendment to its On-Site Sewage Health Regulations (Sargent, 1978).

#### Recommendation

Many older septic systems in the basin will fail in the course of time. Newer systems, although presumably safeguarded by better design, are not immune to future failure, and growth in the basin increases this probability. The systems must not be forgotten once in the ground. Regular maintenance is recommended. In the future another water quality assessment of surface waters near Jamaica, Londonderry, South Londonderry, and Weston is recommended to locate septic system failures if they exist. The assessment should then be repeated at ten year intervals.

The towns should give careful consideration to whether their review of new and replacement systems is up to the standards used by the On-Site Sewage Program of the Vermont Association of Conservation Districts.

## 2. Aquifer Protection Areas (Class II Groundwaters)

Ground water is the primary source of drinking water in the Upper West River Drainage Basin. Therefore, the protection of the basin's ground water resources may be considered to be of prime importance.

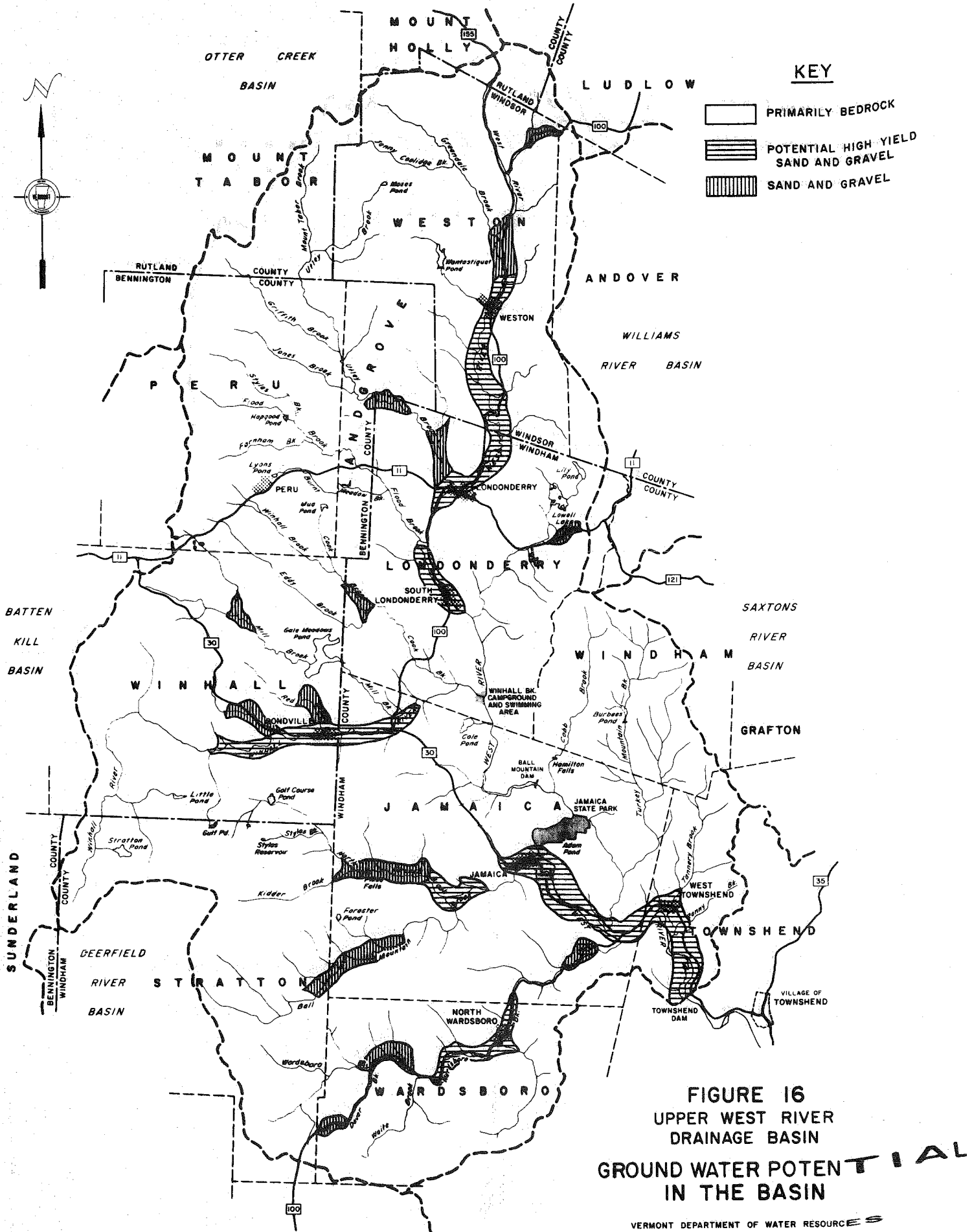
Under state law, an aquifer is defined as "a water bearing stratum of permeable rock, sand, gravel, or other alluvial soils" (10 V.S.A., Chapter 48). In this basin, ground water is available from three principal sources, the most common being wells drilled into fractured bedrock. While the bedrock itself is virtually impermeable, fractures throughout portions of the upper few hundred feet provide permeability. When these cracks intersect the surface, they can form a conduit for surface water, rainfall, or snow melt to percolate downward. Water is then retrieved from the subsurface by wells which intersect the water-carrying fractures. The reported mean yield of bedrock wells in the basin is approximately 14 gallons per minute (gpm). Yields range from less than 1/4 gpm to more than 200 gpm. The median yield, however, is only approximately 5 gpm to 6 gpm.

The second source occurs where saturated sand and gravel deposits are penetrated by wells, although less common than bedrock wells. A well intersecting a sufficiently thick and permeable saturated sand and gravel deposit of large areal extent may have a high yield. Typically, sand and gravel wells have much higher yields than bedrock wells. In this basin, sand

and gravel yields could range up to 200 to 300 gallons per minute if a large enough deposit were tapped by a properly constructed well. Figure 16 gives locations of potential sand, gravel, and bedrock aquifers as indicated by public comments and by the Agency of Natural Resources' Ground Water Management Section records.

The third source of ground water in the basin is from springs. Often found on hillsides, springs are formed where water-filled fractures intersect the land surface, or where water emanates at a break in slope or permeability change. Generally more susceptible to contamination than properly constructed bedrock or gravel wells, springs are also less dependable and can have great variations in yield throughout the year.

In the past, the land surface areas which encompassed the recharge, collection, transmission, and storage zones for a particular aquifer supplying a public community ground water supply (a water source serving ten or more units or 25 or more full year residents) were designated as "Aquifer Protection Areas". Commonly known as APA's, the boundaries were mapped by the Department's Ground Water Management Section. These areas were to receive special treatment with respect to planning and development to help assure the continued potability of the ground water supply. The above pilot project mapped APA's for only the larger municipal ground water systems.



The second phase of the project was to delineate draft APA's for other, generally smaller public ground water supplies. The draft APA's completed for the Upper West River Drainage Basin are illustrated in Appendix C. There are a total of nine public bedrock ground water supplies with draft APA's delineated. Figure 17 gives the approximate location of these. There are no municipally owned ground water supply systems in this basin.

#### Ground Water Classification

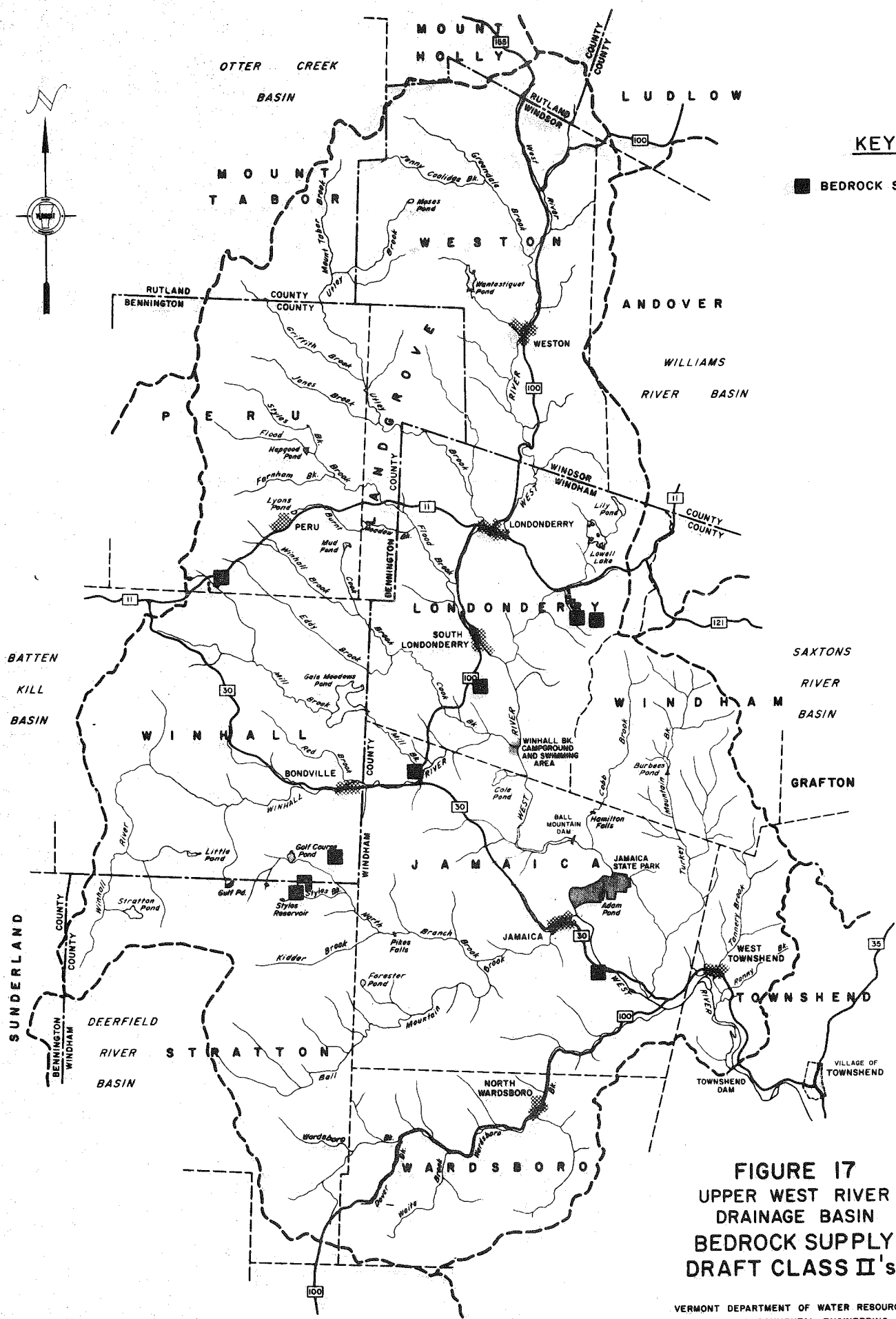
As of July 1, 1985 safeguarding ground water has become state law. All groundwaters are now placed into four classes, per 10 V.S.A., Chapter 48 Section 1394, Classification of Ground Water:

"The State adopts, for purposes of classifying its ground water, the following classes and definitions thereof:

Class I. Suitable for public water supply. Character uniformly excellent. No exposure to activities which pose a risk to its current or potential use as a public water supply.

Class II. Suitable for public water supply. Character uniformly excellent but exposed to activities which may pose a risk to its current or potential use as a public water supply.

Class III. Suitable as a source of water for individual domestic water supply, irrigation, agricultural use, and general industrial and commercial use.

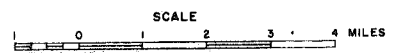


**KEY**

■ BEDROCK SUPPLY APA's

**FIGURE 17  
UPPER WEST RIVER  
DRAINAGE BASIN  
BEDROCK SUPPLY  
DRAFT CLASS II's**

VERMONT DEPARTMENT OF WATER RESOURCES  
AND ENVIRONMENTAL ENGINEERING



Class IV. Not suitable as a source of potable water but suitable for some agricultural, industrial, and commercial use."

Under the provisions of the new law (10 V.S.A., Chapter 48), the Secretary will designate the geographical limits of Classes I, II, and IV groundwaters. The balance of the state is designated Class III. Proposed Class I boundaries involving privately owned land will require legislative confirmation as will reclassification of a Class I area to any other class.

At present there are no proposed Class I areas in the Upper West River Drainage Basin. The existing draft APAs have been remapped and are tentatively proposed as Class II areas. The boundaries may be changed as a result of further hydrogeologic investigations. Any public ground water supply not studied under the APA project, or any ground water system developed since then, will be studied in order to properly classify it. For further information on ground water classification, interested persons may contact the Department.

#### Ground Water and Land Use Conflicts

Ground water users and persons with private or commercial land uses that pose a risk to the quality and quantity of ground-water should be aware that as of July 1, 1985 there has been new legislation in place concerning an individual's legal rights to the use of ground water. Ten V.S.A. Chapter 48, Subchapter 4, abolished the previous doctrine of absolute ownership of ground water and gives injured parties the right to recover

damages for harm "caused by another person withdrawing, diverting, or altering the character of ground water". A person now has grounds for legal action against a neighbor who has dried up or contaminated a private ground water supply. Everyone, including individuals, developers, resort owners, or any large water user, should be aware of their liability and responsibility to respect the ground water rights of others.

#### Ground Water Quantity

While in general most ground water users in the basin have reported adequate water supply, there is a rising concern over the continued availability of ground water. Increased construction of housing units for year-round occupancy and seasonal use will result in a corresponding rise in demand for ground water. There have been a number of cases of well interference documented by the Health Department during recent pump tests. Given the fractured-bedrock nature of the aquifers, it is inevitable that certain wells will share common aquifers, and interference can occur if the recharge rate is insufficient. It is not possible without an exhaustive and expensive hydrogeologic study to assess the amount of available ground water, and relate that to present and future demand.

A further potential problem may exist due to free flowing artesian wells. Within the basin there are a large number of wells which were free flowing at the time of completion. They were probably never capped to prevent the loss of water. Records

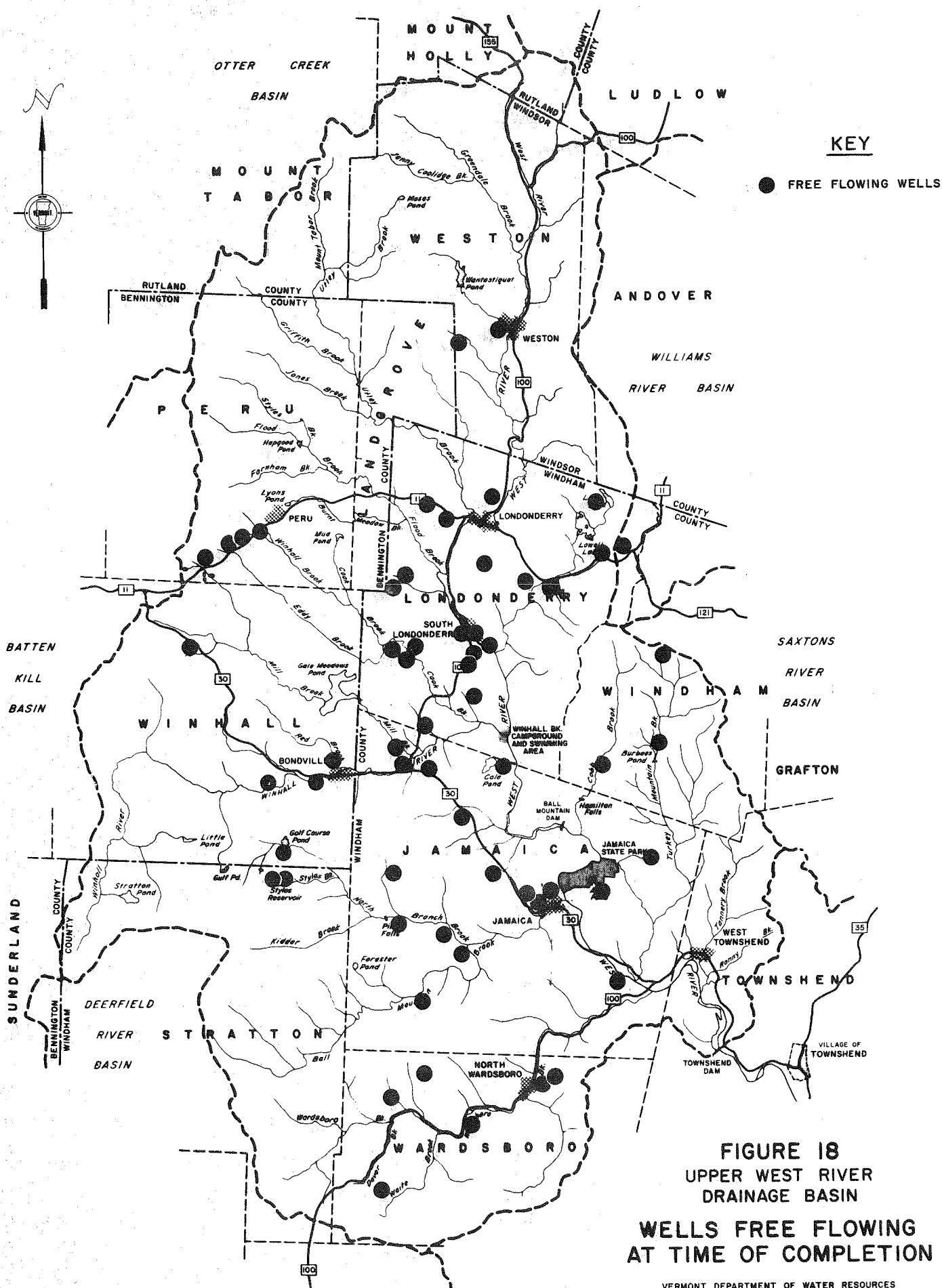
available to the Department indicate that over 50 free flowing artesian wells have been drilled within the basin.

Water flowing out of an artesian well will generally not re-enter the aquifer. Instead, it will discharge into a stream and flow out of the system. If free flowing wells are not capped, the aquifer can become partially dewatered and the artesian pressure diminished. Figure 18 indicates approximate locations of free flowing wells within the basin.

#### Recommendations

The problem of ground water supply throughout the basin should be closely watched for patterns and indications of interference. Following are some possible approaches to the problem:

- \* Maintain records of Health Department and other pump tests to illuminate areas of ground water supply competition. Places where the drain on ground water is excessive can be delineated and the zoning of these areas modified to guide development elsewhere or reduce the dewatering of wells.
- \* Pump tests are only required for new developments using a water supply for ten or more units or 25 or more individuals. However, the Environmental Protection Rules, (3-09.A.1.), state that if local well logs indicate a questionable ground water supply, the Department of Water Resources, Division of Protection, may require test wells, pump tests, or hydrogeologic studies.



\* A cut-off level requiring pump tests, lower than that used by the Health Department, could be required by the Town for new water supplies.

\* Projects can be evaluated on a case-by-case basis through the Act 250 process.

\* Towns can require the capping of flowing wells to avoid the dewatering of aquifers.

\* There are two aspects to capping flowing wells, legal and technical. Since flowing wells may dewater an aquifer and cause water shortages, they can be a threat to public health. Under Title 24, Section 2291, Chapter 61, the town could define flowing wells as a threat to public health and a public nuisance, thereby requiring capping. Alternatively, on a case by case basis, legal action could be undertaken in a lawsuit as defined in Title 10, Section 1410, Chapter 48.

In relation to the physical capping of flowing water wells, concern has been raised that capping would allow standing water to freeze in the casing. This is a valid concern and would probably happen if water was allowed to stand in the casing above the frost line. However, pitless adaptors for flowing wells are available. These are designed to be installed in the casing below the frost line. Other methods for capping flowing wells also exist. For more information, residents can contact local water well drillers

or the Ground Water Management section of the Department of Environmental Conservation.

Towns are encouraged to work with the Department of Environmental Conservation to develop local ground water protection strategies.

#### Ground Water Quality

Unlike surface water, ground water moves very slowly. Flow is generally laminar, not turbulent as in surface water. Very little mixing and dilution can occur. Contaminants introduced to the ground water may be present for many years.

Many human activities and facilities can pose potential threats to ground water if they are not carefully operated and controlled. Some of these sources of pollution are as follows:

#### Historical Land Uses

It is important to recognize that past land uses can have a continuing impact on the ground water today. Municipalities as well as private landowners should try to learn the details of past land use within the recharge area of any ground water supply they may contemplate using.

#### Road Salt

Road salt may be concentrated by the runoff from road surfaces, and several wells in the basin have shown elevated levels of sodium, which may be a risk to persons on sodium-restricted diets.

### Common Household Chemicals

Materials such as paint thinner, used automobile oils, antifreeze, pesticides, prescription medicines, and many other common household chemicals can contaminate ground water through septic tanks, if dumped in a ditch, or otherwise improperly disposed of. Materials must be disposed of correctly. Residents may wish to contact the department's Waste Management Division.

### Solvents

Solvents are used in drycleaning and other commercial and industrial processes. Many are toxic.

### Above Ground Fuel Leaks

Spills from trucks, or uncontained overflows at gas stations can introduce fuel into the ground water below.

Very small amounts of gasoline will taint large quantities of ground water, making it unsafe to drink.

### Underground Storage Tanks

If left underground long enough, underground storage tanks can eventually corrode, creating leaks which may introduce contaminants directly to the ground water. Underground storage tank rules have been adopted and are available from the Department of Environmental Conservation.

### Waste Disposal Sites

Another major category threatening ground water quality includes major waste disposal sites such as landfills, dumps, and junkyards. Jamaica operated a landfill from the 1950s until

1973. Londonderry presently operates a solid waste dump. Wardsboro operated a dump from 1967 to 1978 and Winhall had two dumps until 1980. The quality of water beneath and down-gradient from these sites is unknown but may be contaminated.

#### Lagoons

Both industrial and sewage treatment lagoons can be potentially threatening to ground water and are generally monitored for this reason.

#### Septic Systems

Improperly or poorly designed and operated systems can introduce nitrates, volatile organic compounds, viruses, and other contaminants to ground water.

#### Agricultural Chemicals

Materials such as pesticides and fertilizers have a potential to pollute the ground water. The Vermont Department of Agriculture is studying the problem of pesticides in shallow wells.

#### Spray Irrigation

This waste disposal method can potentially introduce nitrates and other contaminants to groundwaters but is generally less risky than subsurface injection.

#### Miscellaneous

Ground water users should also be aware that such things as leaking sewer lines, stormwater runoff, drains, low quality surface waters, temporary waste storage sites, and surface water

flooding, especially of springs, are situations that can possibly interact with and damage the ground water resources.

This list is not meant to be all inclusive but is intended to illustrate some of the variety of activities that potentially pose a threat to ground water purity.

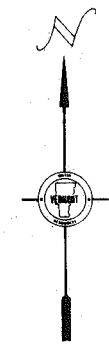
### 3. Naturally Occurring Ground Water Contamination

Naturally occurring poor quality groundwaters also exist. A potentially serious problem of this nature may exist in some places in this basin from radon contamination.

Radon is a radioactive gas formed through radioactive decay of naturally occurring uranium ore. Very mobile, radon is easily carried by ground water flow and can contaminate bedrock wells.

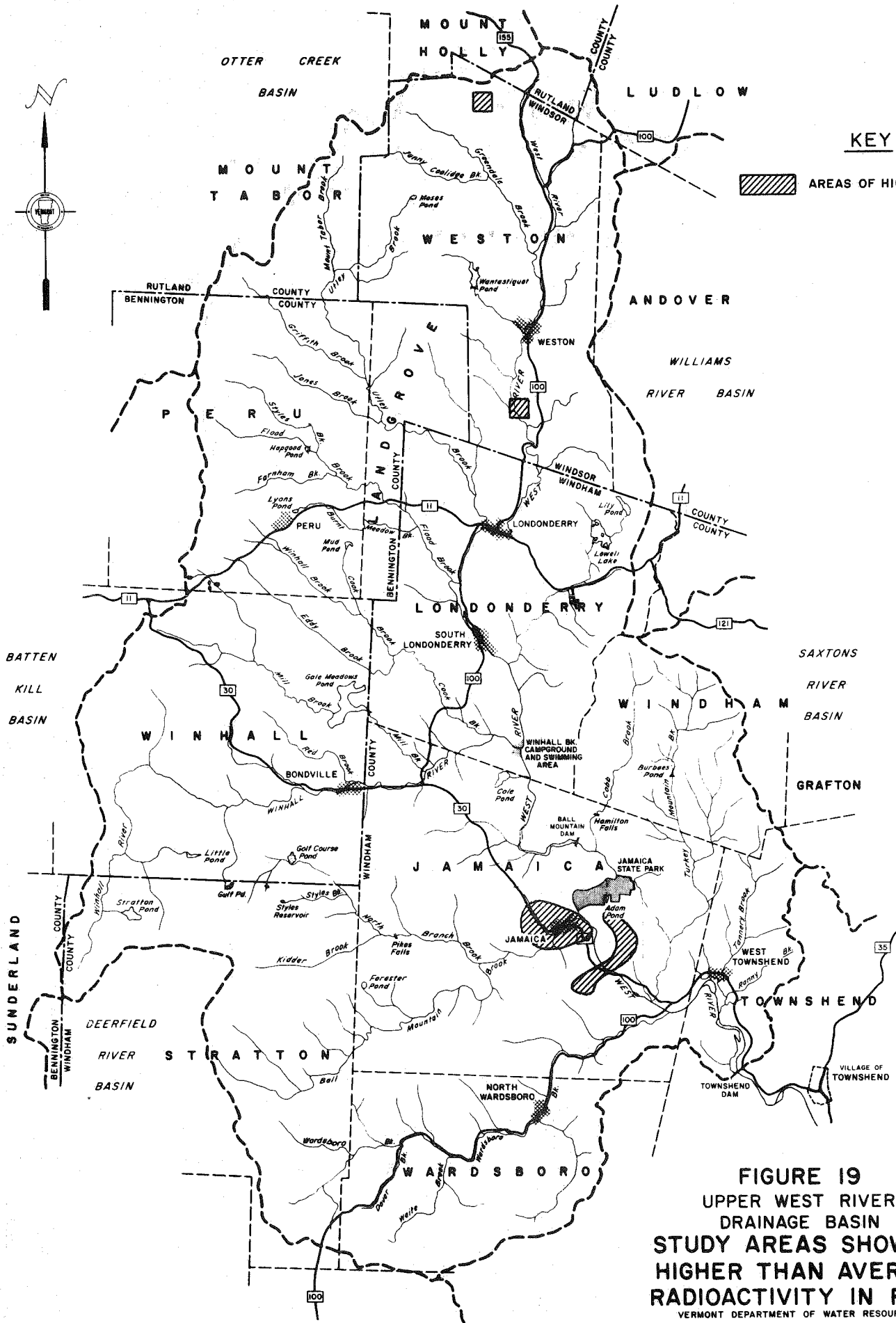
The primary risk from radon in ground water is not actually from drinking water but exists when radon is released into the air and is inhaled. Radon levels in water are one indication of the radon concentration which could be found in the air as a result of evaporating water releasing radon. Radon can also enter a building from the soil, especially where the bedrock has elevated radioactivity. Test kits for water and air radioactivity may be purchased from laboratories listed in Appendix I.

Some of the bedrock in this basin was shown to have higher than average radioactivity by studies conducted in 1980 to 1981 (Figure 19). A study by the Vermont Department of Health of public water supplies released in May 1986 found no values within



**KEY**

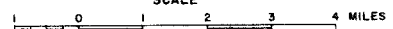
 AREAS OF HIGH RADIOACTIVITY



**FIGURE 19**  
**UPPER WEST RIVER**  
**DRAINAGE BASIN**  
**STUDY AREAS SHOWING**  
**HIGHER THAN AVERAGE**  
**RADIOACTIVITY IN ROCK**

VERMONT DEPARTMENT OF WATER RESOURCES  
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SCALE



this basin above the EPA suggested guideline of 10,000 pCi/l. However, as private wells generally pump at much lower rates than the public wells tested, it is conceivable that radon could be found in much higher concentrations. Interested persons may wish to contact the Vermont Department of Health for further information.

#### 4. Nutrient Loading

Water enrichment has been cited by the public as the cause of increased stream-bottom algae populations. Early signs of enrichment may take the form of increasingly slippery rocks. In more advanced enrichment, or where there is ample sunlight, conspicuous growths of green and brown algae are evident on rocks. The early signs of enrichment have been reported to occur at Pikes Falls swimming area on the North Branch of Ball Mountain Brook.

The cause of enrichment might be attributed to the many activities occurring in and around ski area development. These would include erosion of nutrient-rich sediment from construction sites; nutrient-rich runoff from the fertilized golf course and lawns of homes; and general increases in nutrient-laden overflow from paved and otherwise manmade impervious surfaces; and runoff and leachate from the Stratton stump dump. Similar enrichment

was noted at the Magic Mountain ski area (primarily from the discharge of domestic waste water which has been corrected) and Bromley (primarily related to the runoff of sprayed waste water effluent from an old spray site which has since been discontinued). Enrichment from overland flow from impervious surfaces and from construction is also occurring at these other ski areas, depending on the quantity of impervious surfaces and the level of construction. Ambient Biomonitoring Network stations have not been established for the collection of stream data at these areas.

There is a risk for further harm to the North Branch of Ball Mountain Brook, especially at Pikes Falls, as the land is developed around Kidder Brook. At the present, Kidder Brook, which enters the North Branch Brook just upstream of Pikes Falls, serves to improve the quality of the North Branch Brook at Pikes Falls.

#### Recommendations

The restoration of the North Branch Brook, and the protection of Kidder Brook and other streams in the basin, is dependent on close attention to the control of sediment and nutrient-laden runoff.

Construction should contain runoff on site; golf courses should contain surface runoff; spray systems should not exceed the infiltrative capacity of the soil; and so on.

It is recommended that the ski areas and large developments prepare comprehensive EROSION AND NUTRIENT CONTROL PLANS for existing and planned developments in the watersheds of headwater streams. Such plans would be implemented by the proper location and runoff control from large nutrient-producing areas such as golf courses and sewage spray irrigation sites. Erosion control plans would implement nutrient control at construction sites. Storm water management plans would guide the phase of nutrient control related to impervious surfaces. A "Nutrient Control Plan" would show where nutrient runoff control is possible and development would be allowed, as well as where nutrient control is physically impossible and the site would be left in its natural condition. Without such attention to details it is impossible to predict with certainty that Kidder, Thompsonburg, and Mill Brooks will not deteriorate in the future along with others and take on the characteristics similar to the North Branch of Ball Mountain Brook.

##### 5. Exotic Aquatic Plant Introduction

There is considerable concern about the introduction of exotic aquatic plants into Vermont's lakes. The most notorious exotic lake and pond weed is Eurasian milfoil, a densely-growing aquatic plant introduced into this country from Europe and Asia.

Because it lacks natural competitors here, it grows profusely into thick weed beds that impair recreational uses of fishing, swimming, and boating, crowd out native plants, and interfere with fish reproduction. Twenty Vermont lakes have already been colonized by Eurasian milfoil. Eurasian milfoil is spread from one lake to another when plant cuttings, snagged onto motor boat propellers, trailers, or other such surfaces, are released.

Of the Vermont lakes known to contain Eurasian milfoil, six are in the southern half of Vermont and relatively near the Upper West River Basin: Lake Paran in Bennington, Lake St. Catherine in Poultney, Lake Champlain, Glen Lake and Lake Bomoseen in Castleton, and Lake Hortonia in Hubbardton. These lakes may pose a threat of Eurasian milfoil introduction into lakes and ponds in the Upper West River Basin.

There is probably also a threat of several other species gaining hold in southern Vermont lakes, such as Fanwort (Cabomba caroliniana), which prefers low alkalinity waters, like those in Vermont, and is already present in New Hampshire and Massachusetts.

#### Recommendation

Precautions should be taken to halt the spread of all exotic aquatic plants. The risk of Eurasian milfoil introduction should not be taken lightly. All boat launchings and other access

VI. Appendix

APPENDIX A

Interaction Between Water Uses

The existing and potential water uses are grouped below into two categories: (1) those which may be impacted by other uses and (2) those which impact other uses. In order to analyze possible conflicts between existing and intended water uses, we have constructed a table (below) which illustrates the general river basin planning process. The vertical column on the left side of the chart gives the water uses that could be affected by the water uses described in the horizontal row at the top of the page. The numbers in the chart refer to the general descriptions of how water uses in the top row affect water uses in the left hand column. It should be understood that the impacts MAY NOT OCCUR. This chart is intended only to illustrate the analysis and to sensitize the planner to the possibility of interactive conflict. Certain physical conditions must exist to connect the impacting use with the impact-sensitive use and the impacting use must occur with sufficient intensity, singularly or in combination with other impacting uses, to have an effect.

points should be posted with signs describing protective actions.

These are as follows:

- All vegetation collected on propellers and other boat parts should be thoroughly removed and deposited in a dry area away from all waters.

- Boats should be inspected and cleaned before and after use on the lakes.

- Residents should watch for the appearance of exotic aquatic plants and report sightings immediately to the Department.

- Further information, including informational pamphlets and model signs, is available by contacting Aquatic Nuisance Control Program, Vermont Department of Environmental Conservation, Water Quality Division, 10 North, 103 South Main Street, Waterbury, Vermont 05676.

Water Use Interaction. The column on the left side of of the table lists water uses that could be affected by the water uses described across the top of the table. See following pages for a description of the numbers which show the potential effect of one use on another if these uses are physically interconnected and if they occur with sufficient intensity.

Water Use Which Affects Another Use Water Use That is Affected	Natural Areas	Swimming	Surface Water Withdrawal	Groundwater Withdrawal	Fishing	Hydropower	Instream Wastewater Disposal	Offstream Wastewater Disposal	Surface Water Supply	Groundwater Supply	High Quality Waters	Boating	Stockwatering	Gravel Removal	Stormwater	Nonpoint Source Discharge
Natural Area	0	0	1a	0	0	1c	2 (all)	2di j	1b	0	0	0	2ci, 6	2c,5	1f	8 2cd gi
Swimming	0	0	1a	0	4	1c	2 (all)	2di j	1a,3	0	0	4	4	2c,5	2cd j	2cd
Surface Water Withdrawal	0	0	1a	1e	0	1c	2 (all)	2di j	1a	1e	0	0	2c,6	2c,5	2cd j	2c
Groundwater Withdrawal	0	0	1a	1g	0	0	0	2di j	1d	1g	0	0	0	0	0	0
Fishing	2abcf 6,8	4	1ab	1e	0	1c (all)	2 j	2di	1a,3	1e	0	4	4,6	2c,5 g,j,	2abc cg8 7,25	2a
Hydropower	0	0	1a	0	0	9	0	0	1a	1e	0	0	0	0	24	24
Instream Wastewater Disposal	0	10	1b	1eb	0	1b	12	0	14	0	15	0	0	0	0	16
Off Stream Wastewater Disposal	0	0	0	1l	0	0	0	13	11	11	0	0	0	0	0	0
Surface Water Supply	0	0	1a	1e	0	1a	2,14, 17	19	1a	1e	0	3	3	2c,5	2cd ehj	2cd eij
Groundwater Supply	0	0	1d	1g	0	0	0	18	1d	1g	0	0	0	0	0	0
Pristine Waters	0	0	1a	1e	0	1c	2,20	2di j,21	1a	1e	0	0	6	2c,5 2c	1f, ei dgj	2cd j
Boating	0	4	1a	0	4	1c	0	0	3	0	0	0	4	0	0	0
Stockwatering	0	4	1a	1e	4	1c	0	0	1a	1e	0	4	0	2c,5	0	0
Gravel Removal	0	0	0	0	0	22, 20	0	0	0	0	15	0	0	0	0	0
Stormwater	0	0	0	0	0	0	0	0	0	0	15	0	6,23	0	0	0
Nonpoint Source Discharges	0	0	0	0	0	0	0	0	14	0	15	0	0	0	0	0

## KEY TO POTENTIAL WATER USE CONFLICTS CHART

0 - No or very slight effect on use.

1 - Change in stream flow

1a - Flow decreases by surface water withdrawal or impoundment for hydropower generation may restrict swimming and downstream hydropower and other water withdrawals due to lack of water. Flow decreases may affect fish habitat and aquatic life (less habitat area and depth and protection such as undercut banks); fish eggs and benthic stream organisms upon which fish and birds depend may be destroyed by drying out or freezing. Also flow decreases may affect aesthetics by restricting flow over waterfalls or through gorges and rapids; lack of water for boating may also be a problem.

1b - Flow decreases will affect the ability of the river or stream to assimilate organic wastes and cause lower dissolved oxygen levels.

1c - Flow fluctuations caused by hydropower generation. Effects of these fluctuations include those described in 1a and 1b above. In addition, increases in flow can cause streambank erosion and interfere with fishing (sudden increase in water depth and velocity).

1d - Stream flow decreases due to water withdrawal may restrict the water recharge for nearby wells or infiltration galleries.

1e - Large ground water withdrawals near a stream may decrease the flow in the stream. If the stream is small, even small ground water withdrawals may decrease stream flow and cause the problems cited in 1a above.

1f - Peak stormwater flows may be increased by development causing culvert washouts, stream channel erosion, and enlargement.

1g - Ground water withdrawals, if large enough and close enough to each other, may interfere and decrease the amount of water available to each.

2 - Risk of water quality degradation or violation of Water Quality Standards from:

2a - Dissolved oxygen depletion (stressful or lethal to fish and aquatic life) from decay of organic materials.

- 2b - Color changes affecting aesthetics.
- 2c - Increased turbidity will result in a decrease in water clarity making it less desirable for swimming, stress to fish due to particulates which damage or cover gills, sedimentation and resulting loss of habitat or suffocation of fish eggs and aquatic bottom life.
- 2d - Potential health hazard due to pathogenic (disease causing) organisms. Bacteria, viruses, and cysts may reach the waters due to treatment plant failure, improper dilution, or treatment resistant pathogens.
- 2e - Increased taste and odor.
- 2f - Changes in pH which may affect aquatic life or increase or decrease the toxicity of heavy metals on aquatic life.
- 2g - Increase or decrease in temperature which stresses or kills fish.
- 2h - Sludge, solids, oil, grease, and scum which affects aesthetics or habitat of aquatic life.
- 2i - Nutrients, phosphorus or nitrogen or other pollutants that affect aquatic biota or drinking water.
- 2j - Toxic materials (heavy metals, chlorine, ammonia, etc.)
- 3 - Local ordinances may prohibit swimming, boating, stockwatering, and fishing in waters designated as water supplies.
- 4 - Boating, fishing, swimming, and stock watering may interfere with each other if they occur at the same time and place.
- 5 - Gravel removal may increase turbidity if done improperly.
- 6 - Erosion and sedimentation from disturbance of streambanks, stream bottom, and vegetation by animals.
- 7 - Stormwater may contain heavy metals that are toxic to fish and which may affect water supplies.
- 8 - Removal of streambank vegetation causes increase in water temperature by solar radiation resulting in less oxygen in the water.
- 9 - By impounding water, an upstream hydropower generation facility affects the stream flow for downstream facilities.

- 10 - Instream disposal of treated sanitary wastes requires a Class C water. If the water is Class B (suitable for swimming), a reclassification by the Water Resources Board to Class C is required if a discharge of treated domestic waste is desired.
- 11 - Aquifer Protection Areas (APA's) designated to protect community water supplies may limit the area for on-land wastewater disposal.
- 12 - Where stream assimilative capacity is limited, discharges may need to be limited by a wasteload allocation to prevent water quality standards violations.
- 13 - Offstream disposal areas may interfere with each other due to land form and hydrogeologic connection.
- 14 - A surface water supply may be classified as Class A which would prohibit wastewater disposal.
- 15 - The Vermont Water Quality Standards prohibit domestic discharges to waters designated as Class B high quality waters.
- 16 - Where nonpoint source pollution has degraded water quality or violated Water Quality Standards, discharges may be restricted or prohibited to prevent further water quality degradation.
- 17 - Presence of wastewater in a stream may require high degrees of treatment before use as a water supply.
- 18 - Development of ground water supplies in land disposal areas are prohibited by the Health Department.
- 19 - Too many offstream disposal facilities in a limited area or failure of offstream disposal areas may contaminate nearby surface or ground water supplies.
- 20 - Once discharges are allowed to high quality waters following reclassification, the decision is irreversible due to the force of development investments which are incompatible with maintaining a pristine stream condition.
- 21 - Although offstream disposal of wastewater can be compatible with high quality waters, a risk does exist from failure due to poor system design, mechanical failures, lack of maintenance, operator error, and power outages.
- 22 - Fluctuations in stream flow and water level may disrupt gravel removal operations or make it possible to perform the removal in the dry.

- 23 - If animals have disturbed streambank vegetation, stormwater runoff may be more turbid.
- 24 - Accelerated siltation behind dams.
- 25 - Excessive stormwater from buildings, parking lots, mowed lawns, and other impervious surfaces may be collected in storm sewers and directed toward the nearest stream eroding channel banks and enlarging streams to as much as three or four times their natural width leaving the appearance of scoured trenches carrying small amounts of water during the interval between storms.

## APPENDIX B

### Fisheries Status

In 1971, fisheries biologists performed a study of the upper West River and selected tributaries above South Londonderry that is useful for historical comparison. It was reported then that "the water in the Upper West River is soft and generally has a pH of about 7.0. The main river and lower Utley Brook appear to have a problem with high water temperatures," (Biggins, 1971). Stream temperatures near eighty were noted in Weston and south Londonderry. In all streams sampled, brown trout were the predominant sport fish, followed by brook trout. Species diversity was fairly high, with fifteen different species present.

The 1971 study concluded that the mainstem of the Upper West River and the lower end of Utley Brook are "relatively poor" trout streams and must be stocked to provide sport fishing of any quality. Greendale and Flood Brook, however, were said to sustain natural populations capable of reproduction without stocking. Prior to the 1971 study, the Upper West River and its tributaries were "heavily stocked with brook and brown trout."

While the Upper West River Basin is not among the best sport fisheries in the state, it does have some healthy trout populations and a particularly fine area below Ball Mountain Dam, where the cool waters released below the reservoir are beneficial for trout. The most productive trout waters are in the smaller

headwaters and tributaries especially in beaver impoundments and where small streams cut deep stream channels through high mountain meadows (Allen, 1985). In general, the river system is characterized by having brown trout in the mainstem and brook trout in the headwaters and smaller tributaries, most notably Mt. Tabor Brook, Greendale Brook, and Flood Brook (A.E.C., 1975). The basin contains a variety of habitats and hence high species diversity. The following list (Table A) shows the different species that have been found in the basin.

A management program is now underway to re-establish Atlantic salmon in the Connecticut River basin, and four of the nine tributaries earmarked for re-introduction are located in Vermont. The West River is one of these, and most current data on fisheries in the Upper West River has been collected in conjunction with this program.

In 1981, the first Atlantic salmon fry and Parr were stocked in the West River mainstem and several tributaries with the hope of developing an imprinted adult population that would return to their release locations for spawning. In 1983, selected areas were restocked with fry, and populations sampled at summer's end. The summary report recommended that salmon fry and/or Parr "continue to be stocked annually into selected reaches within the West River drainage. Until such time that higher fry numbers become available, stocking will be directed at the Upper West River mainstem, Utley Brook, Winhall River, and Rock River,"

Table A

FISHES OF THE WEST RIVER BASIN ABOVE THE TOWNSHEND DAM, VERMONT

American Eel	<u>Anguilla rostrata</u> (LeSueur)
Atlantic Salmon	<u>Salmo salar</u> (Linnaeus)
Brown Trout	<u>Salmo trutta</u> (Linnaeus)
Rainbow Trout	<u>Salmo gairdneri</u> (Richardson)
Brook Trout	<u>Salvelinus fontinalis</u> (Mitchill)
Chain Pickerel	<u>Esox niger</u> (LeSueur)
Golden Shiner	<u>Notemigonus c. crysoleucas</u> (Mitchill)
Common Shiner	<u>Notropis cornutus</u> (Mitchill)
Blacknose Dace	<u>Rhynichtys a. atratulus</u> (Hermann)
Longnose Dace	<u>Rhynichthys c. cataractae</u> (Valenciennes)
Creek Chub	<u>Semotilus a. atromaculatus</u> (Mitchill)
Fallfish	<u>Semotilus corporalis</u> (Mitchill)
White Sucker	<u>Catostomus c. commersoni</u> (Lacepede)
Longnose Sucker	<u>Catostomus c. catostomus</u> (Forster)
Brown Bullhead	<u>Ictalurus n. nebulosus</u> (LeSueur)
Smallmouth Bass	<u>Micropterus dolomieu</u> (Lacepede)
Largemouth Bass	<u>Micropterus s. salmoides</u> (Lacepede)
Pumpkinseed	<u>Lepomis gibbosus</u> (Linnaeus)
Bluegill	<u>Lepomis m. macrochirus</u> (Rafinesque)
Yellow Perch	<u>Perca flavescens</u> (Mitchill)
Tessellated Darter	<u>Etheostoma olmsted</u> (Storer)
Slimy Sculpin	<u>Cottus cognatus</u> (Richardson)
Johnny Darter	<u>Etheostoma nigrum</u> (Rafinesque)

(Cox, 1984). Annual population surveys of salmon and trout are also being continued at established survey stations.

In 1987, higher salmon fry numbers became available. A total of 385,000 salmon fry were stocked in 1987 in the West River and its tributaries. Most of them were above Townshend. A stocking effort of this magnitude or greater is expected annually until salmon populations are established (McMenemy, memo, 7/31/87).

There has been concern over the suitability of the West River as spawning and nursery habitat for Atlantic salmon due to potentially acidic conditions. A substantial portion of the West River drains bedrock which is characterized as having little or no buffering capacity from acidic input. The Department conducted a sampling program in 1982 and 1983 to gain a further understanding of this problem (Langdon, 1983). The results showed that the Upper Winhall River and Ball Mountain Brook consistently had the lowest pH of all samples in the West River Basin. The study concluded that aluminum and pH values for the Upper Winhall River and Ball Mountain Brook may create substandard Atlantic salmon habitat.

There are four dams on the West River that are complete impediments to fish migration (see Table B). For the Atlantic salmon stocking program to be successful, trap-and-truck facilities or fish ladders will have to be employed. A fish ladder now in place in Vernon enables Atlantic salmon to migrate up to the Townshend Dam. A fish trap is proposed at the

Table B

PAST IMPACTS TO FISHERY HABITAT OF SELECTED  
STREAMS OF THE UPPER WEST RIVER

<u>Water Body</u>	<u>Impact</u>
Wardsboro Brook	Bulldozed after and widened during floods in 1970's from West River to West Wardsboro. Flows are low in summer with large boulders acting as heat sinks. Sediment from development. Extensive stream bank cutting of shading vegetation.
Ball Mt. Brook	Similar impacts to Wardsboro Brook.
Ball Mt. & Townshend Reservoirs	Fish passage obstruction, fluctuating water levels, sediment traps with periodic releases, heat sinks. Not productive fishery; shallow with small holding capacity.
West River, Londonderry Dam	Impassable to fish.
N. Branch Brook	Extensive sedimentation in stream from development around Stratton Mt. ski area.
Kidder Brook	Substantial impact from sediment, especially near Sun Bowl.
Stratton Golf Course Pond	Warms water flowing into North Branch Brook.
Thompsonburg Brook	Dam at Magic Mt. was removed to permit fish passage. Stream flows have recreated plunge pool and blockage to upstream fish passage.
West River	Weston Dam is a barrier to fish migration.

Table C  
 FISH SPECIES PRESENCE AND ABSENCE DATA  
 UPPER WEST RIVER BASIN  
 (X=1984 Y=1985)

SPECIES	SAMPLING STATION NUMBER															
	1	2	3	4	5a	6	7	8a	9	10a	11	12a	13	14	15	18
BKT	Y	X	XY	Y	XY	Y	X	Y	Y	XY		Y	XY	XY	XY	a
BNT	Y		XY	Y	XY	Y	X	XY	Y	XY		XY	XY	XY	XY	
ATS	Y			Y	X	Y	X	XY		XY	X	XY	XY	XY	X	
LND					X		X	XY	Y	XY	X	X	X	XY	XY	
BND	Y		X	Y	X		X	XY	Y	XY	X	X	X	XY	XY	
WS					X		X	XY	Y	XY	X	X	X	XY	XY	
CC					X		X	XY	Y	X	X	X	X	XY	X	
FF					X		X	X	Y	XY	X	X		XY	Y	
LNS							X			Y		X		XY	X	a
CS					X			XY	Y	Y	X	X		X	XY	
GS															XY	
SS	Y		X	Y	X			XY		XY		X	X	XY	X	
PS												X		X	Y	
LMB															XY	
BB					X			Y							Y	
BG															Y	
TD								Y	Y	Y					X	
YP															Y	

- |                        |                         |
|------------------------|-------------------------|
| BKT = brook trout      | CS = common shiner      |
| BNT = brown trout      | GS = golden shiner      |
| ATS = Atlantic salmon  | SS = slimy sculpin      |
| LND = longnosed dace   | PS = pumpkin seed       |
| BND = blacknosed dace  | LMB = largemouth bass   |
| WS = white sucker      | BB = brown bullhead     |
| CC = creek chub        | BG = bluegill           |
| FF = fallfish          | TD = tessellated darter |
| LNS = longnosed sucker | YP = yellow perch       |

See map (Figure 1) for sampling station location  
 Station 15 data for 1983 and 1984  
 Station 18 data from 1984 acid rain study (Langdon, 1984)  
 \*Stations sampled both years

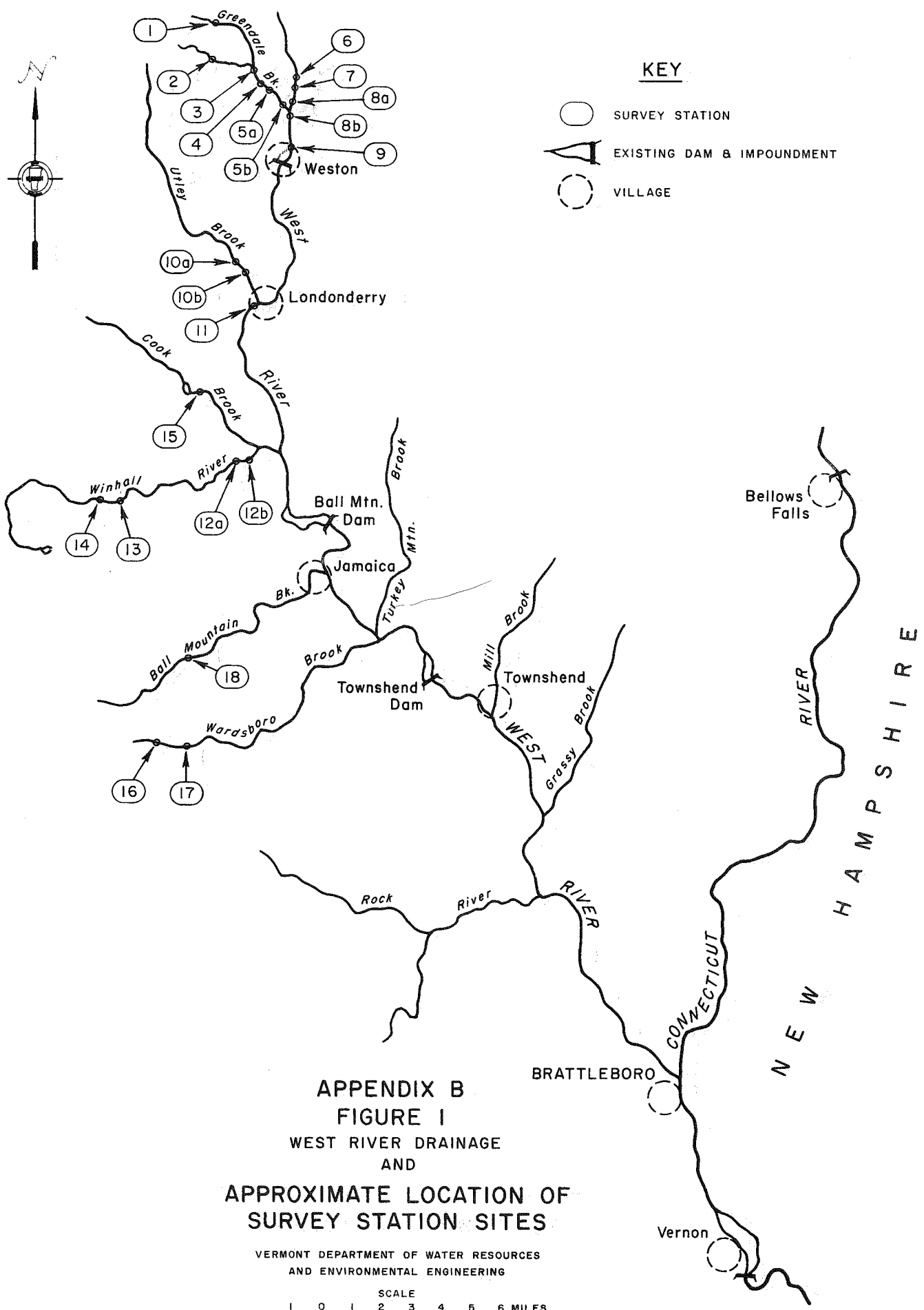


Table C-2

ADDITIONAL FISHES OF THE WEST RIVER BASIN  
BELOW THE TOWNSHEND DAM, VERMONT

Sea Lamprey	<u>Petromyzom marinus</u> (Linnaeus)
Carp	<u>Cyprinus Carpio</u> (Linnaeus)
Mimic Shiner	<u>Notropis volucellus</u> (Cope)
White Perch	<u>Norone americana</u> (Gmelin)
Rock Bass	<u>Ambloplites r. rupestris</u> (Rafinesque)
Walleye	<u>Stizostedion v. vitreum</u> (Mitchill)
Spot Tail Shiner	<u>Notropis hundsonicus</u> (Clinton)
Yellow Bullhead	<u>Ictalurus natalis</u> (LeSueur)
Banded Killfish	<u>Fundulus diaphanus</u> (LeSueur)

Townshend Dam to catch and truck salmon above Ball Mountain Dam, providing salmon access to the Upper West River (Cox, 1985).

The most recent fish species presence and absence data available is summarized in Table C1 and C2 and is provided to give an idea of relative species occurrence in different locations. Reliable population estimates are not available at this time. As a crude indication of relative salmonid abundance, raw numbers of trout and Atlantic salmon caught in the 1983 survey have been standardized to number per 500 feet of stream length, and are presented in Table D.

Lakes and ponds in the basin are productive and popular fisheries. Gale Meadows Pond, although presently drained for dam repairs, has had stable populations of largemouth bass, brown trout, perch, pickerel, and bluegill. Lowell Lake is fished for largemouth bass, perch, and pickerel. Ball Mountain Reservoir is stocked with trout and is an important and popular fishery. Other lakes and ponds in the basin, such as the Wantastiquet Trout Club, are important on a more local level.

The main threat to the health of the fisheries in the basin are construction practices resulting in erosion, stream channelization and the cumulative effect of private landowners who remove stream-side vegetation. Buffer strips are extremely important in maintaining cool stream temperatures favorable for trout and preventing erosion. Fisheries in the basin have been significantly impacted by a combination of all of these factors. Possible hydroelectric developments with resultant flow

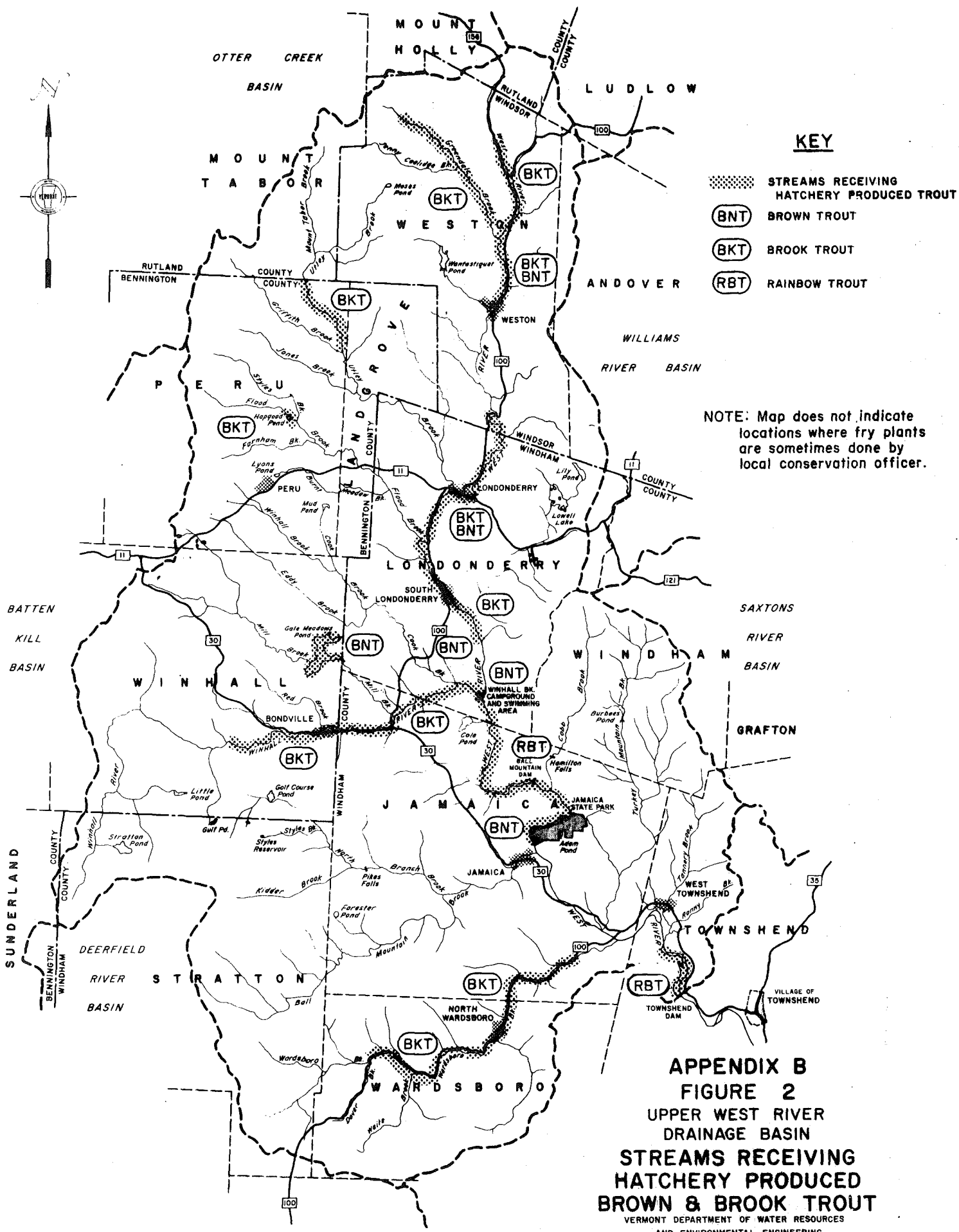
Table D

NUMBER OF FISH HANDLED (1983 DATA)

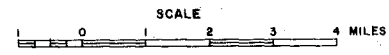
<u>MAP LOCATION</u>	<u>ATL. SALMON</u> (age, class <u>0+, 2+</u> )	<u>BROWN TROUT</u> (age, class <u>0+, 1+, 2++</u> )	<u>BROOK TROUT</u> (age, class <u>0+, 1+, 2++</u> )
Ball Mt. Brook			
18	0	0	11.4
West River Mainstem			
6	88.6	39.3	56.7
8b	134	35	19
11	70	12.5	2.5
Greendale Brook			
5b	9	4.3	6
Utley Brook			
10a	8	2.7	1.3
10b	130	9	5
Winhall River			
14	9.2	7.5	9.2
13	4.2	5.8	7.5
12a	17.6	8	0
12b	33.2	3.6	3.6
Wardsboro Branch			
16	23	0	7
17	10	9	4
Cook Brook			
15	2	15.5	2

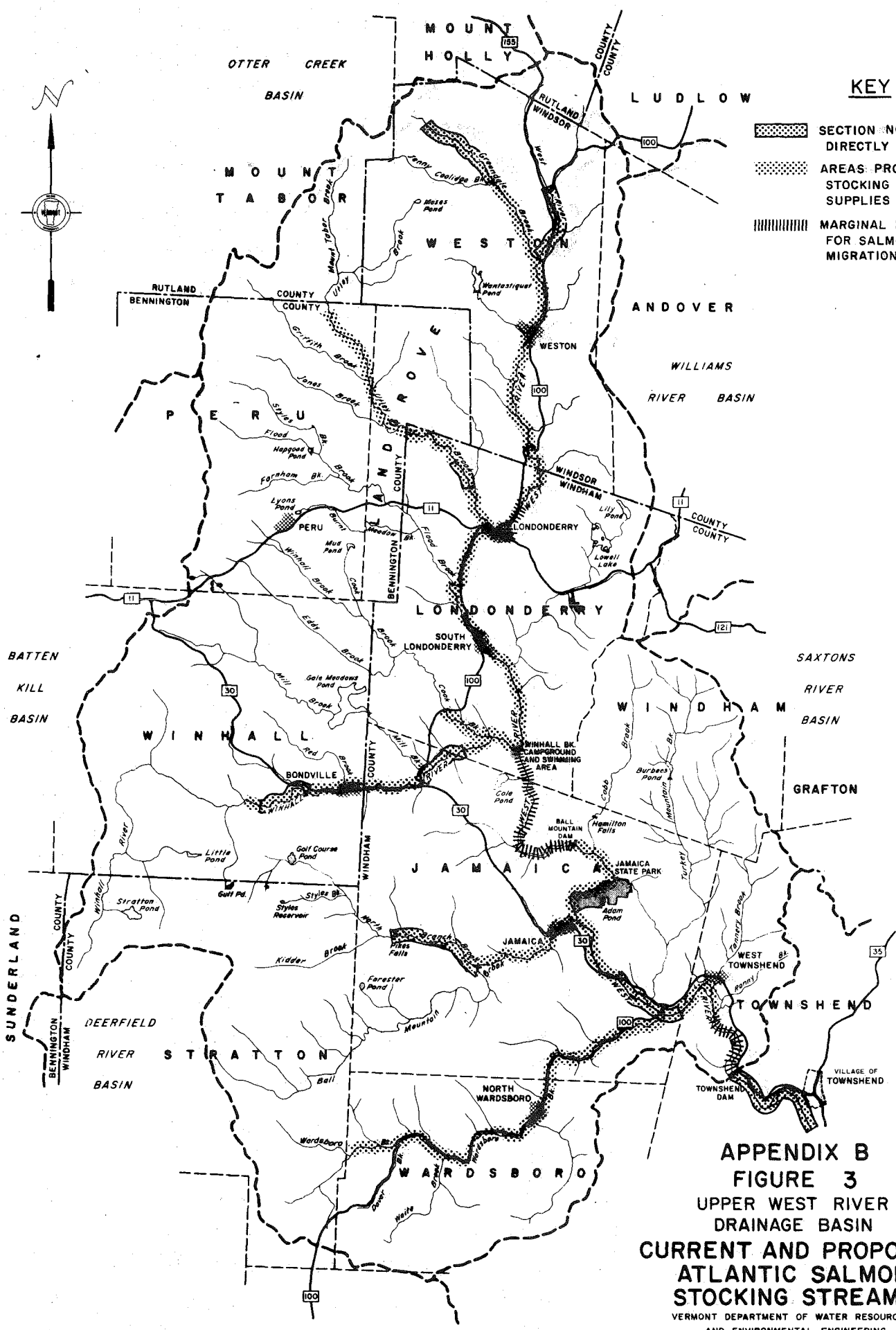
All counts standardized to number handled per 500 feet (152 meters) of stream length.

fluctuations, and the high flow releases during kayak competition below Ball Mountain Dam present possible future conflicts with the salmon program. The Townshend Reservoir must also be released in tandem with Ball Mountain Dam, creating similar flow conditions further downstream and possibly conflicting with salmon migration. To show the history and the future of the fish stocking programs, the reader is referred to Figures 2 and 3 of this appendix.






**APPENDIX B**  
**FIGURE 2**  
 UPPER WEST RIVER  
 DRAINAGE BASIN  
**STREAMS RECEIVING**  
**HATCHERY PRODUCED**  
**BROWN & BROOK TROUT**  
 VERMONT DEPARTMENT OF WATER RESOURCES  
 AND ENVIRONMENTAL ENGINEERING

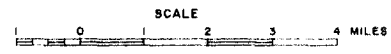




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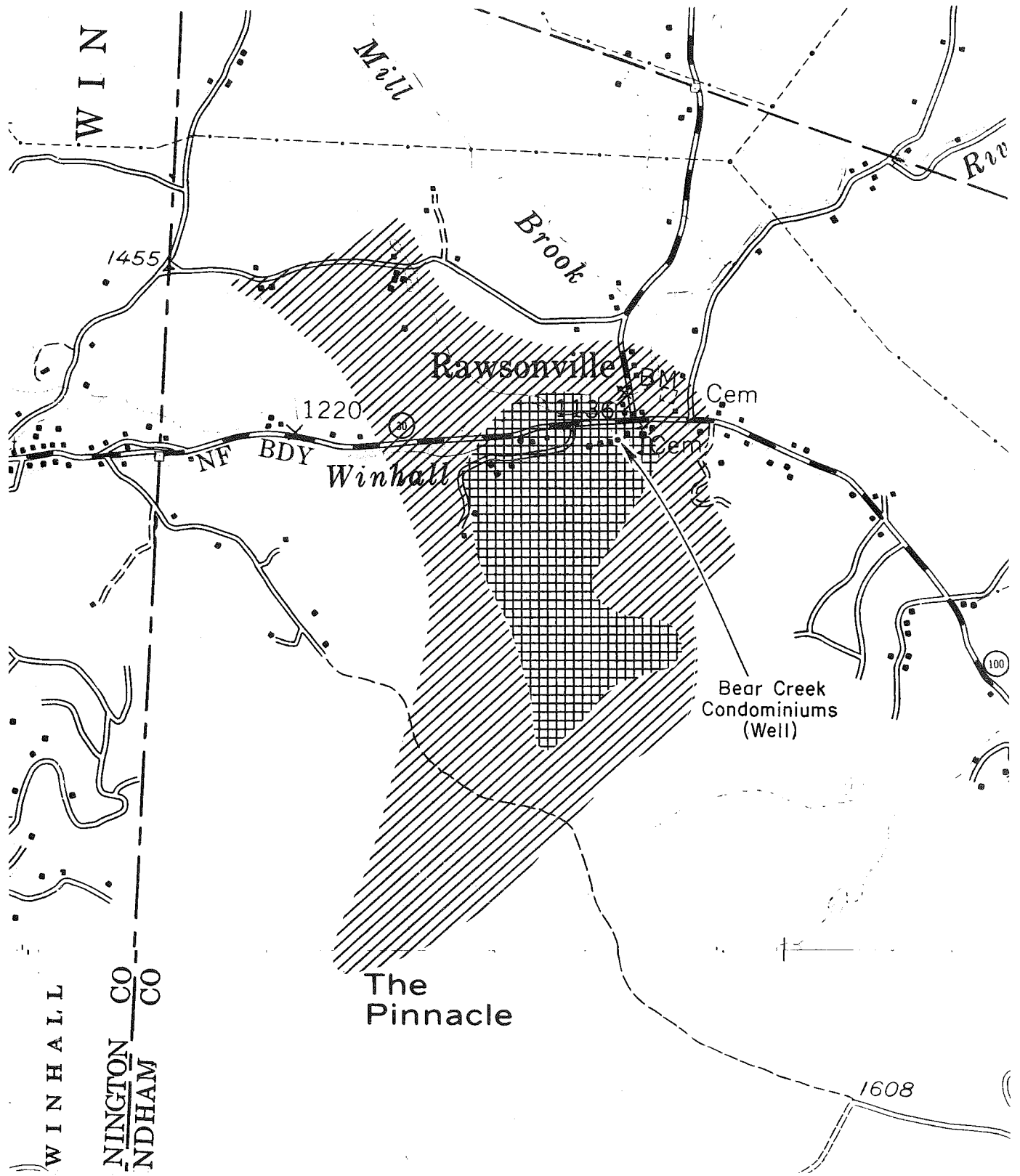
-  SECTION NOW BEING DIRECTLY STOCKED
-  AREAS PROPOSED FOR STOCKING ONCE FRY SUPPLIES INCREASE
-  MARGINAL HABITAT FOR SALMON BUT MIGRATION ROUTES

**APPENDIX B**  
**FIGURE 3**  
 UPPER WEST RIVER  
 DRAINAGE BASIN  
**CURRENT AND PROPOSED**  
**ATLANTIC SALMON**  
**STOCKING STREAMS**  
 VERMONT DEPARTMENT OF WATER RESOURCES  
 AND ENVIRONMENTAL ENGINEERING

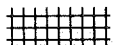
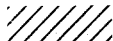


APPENDIX C

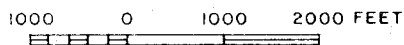
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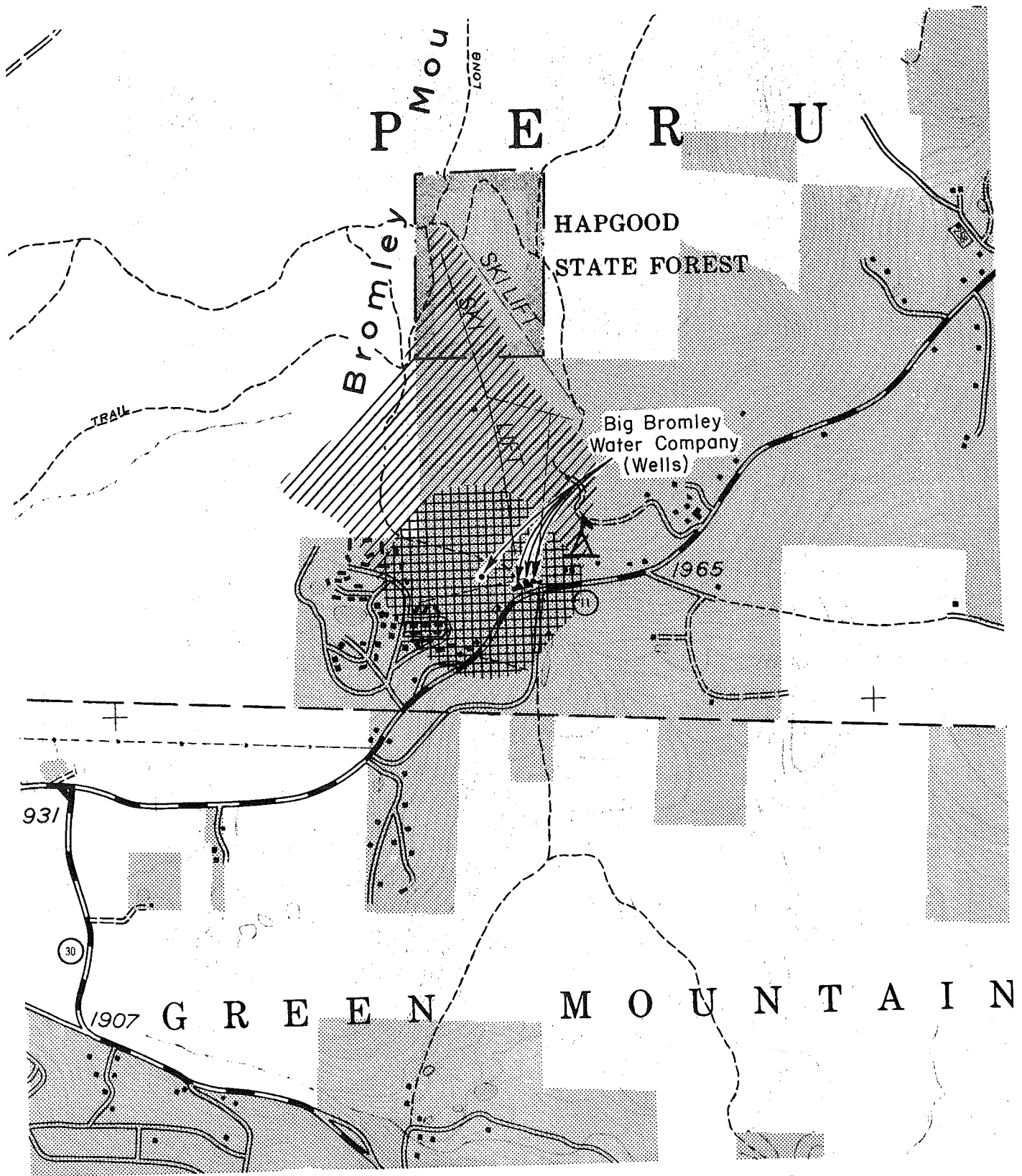
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-  SECONDARY ZONE

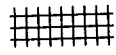
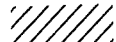
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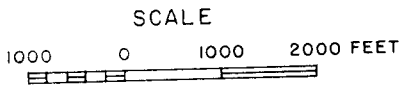


APPENDIX C  
 FIGURE I  
 DRAFT CLASS II ZONE  
 GROUND WATERS  
 OF THE  
 UPPER WEST RIVER  
 DRAINAGE BASIN

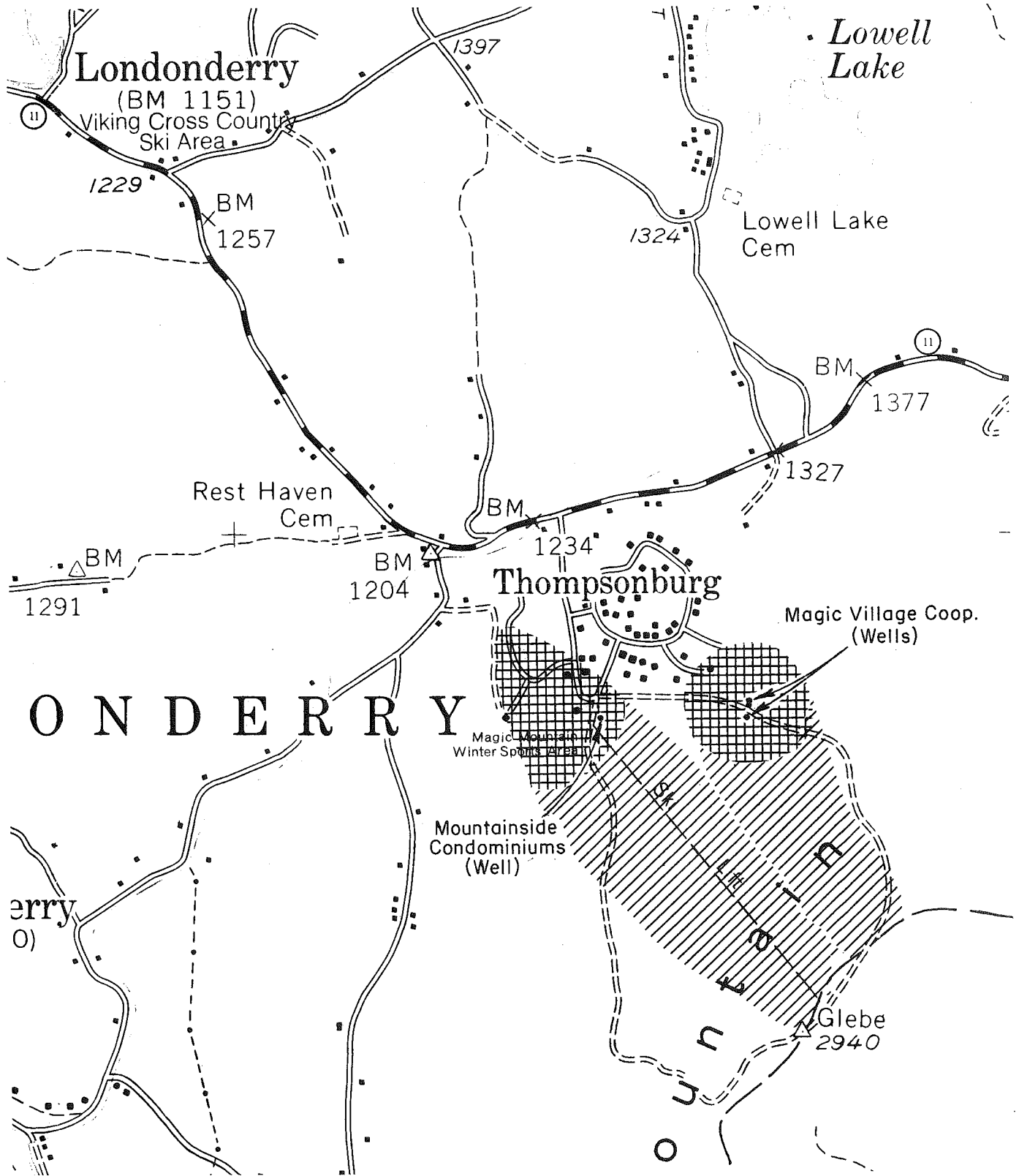


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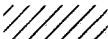
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-  SECONDARY ZONE



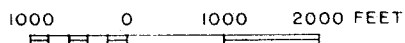
APPENDIX C  
 FIGURE 2  
 DRAFT CLASS II ZONE  
 GROUND WATERS  
 OF THE  
 UPPER WEST RIVER  
 DRAINAGE BASIN



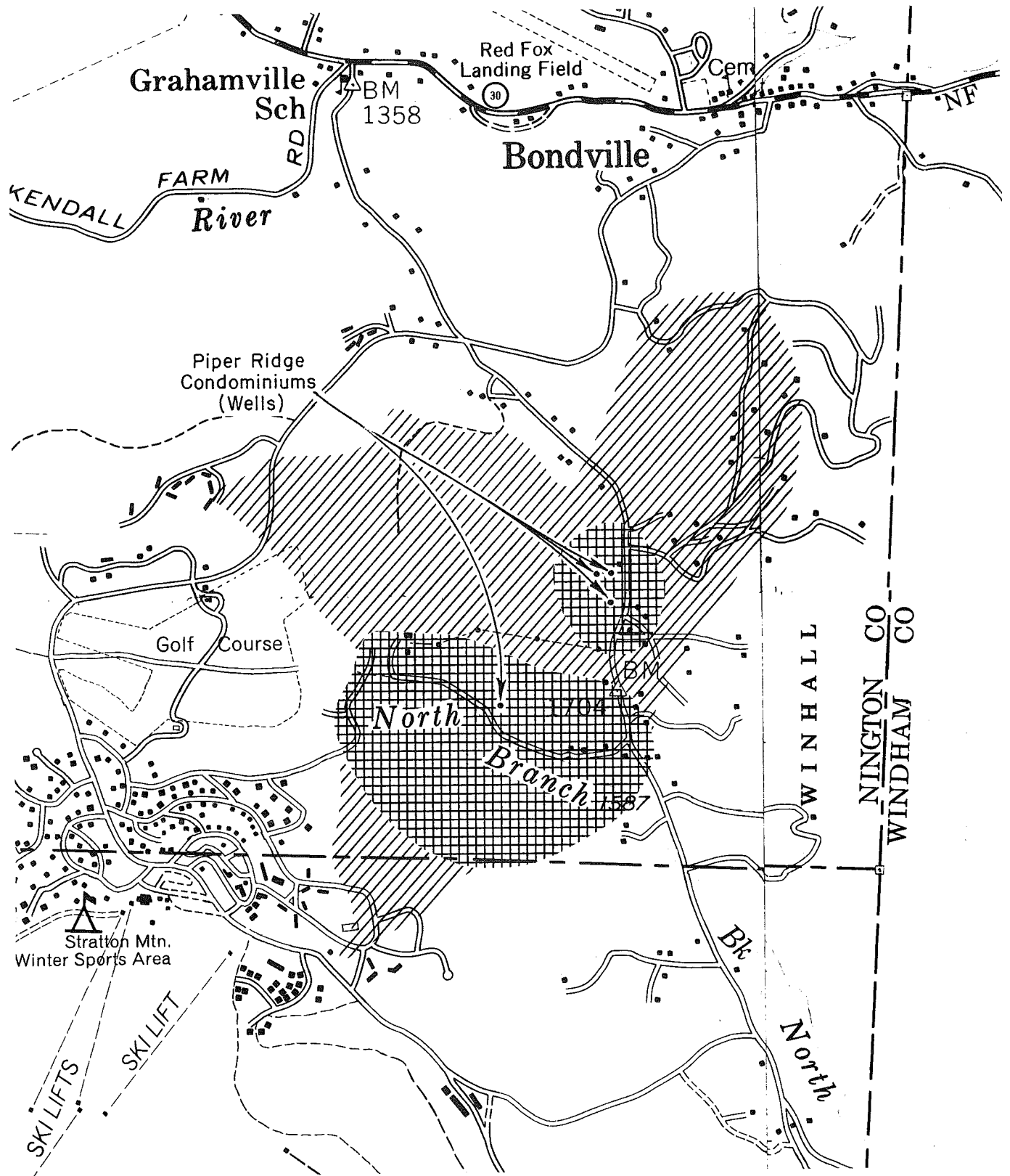
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-  SECONDARY ZONE

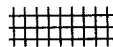
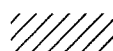
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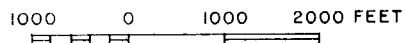
APPENDIX C  
 FIGURE 3  
 DRAFT CLASS II ZONE  
 GROUND WATERS  
 OF THE  
 UPPER WEST RIVER  
 DRAINAGE BASIN



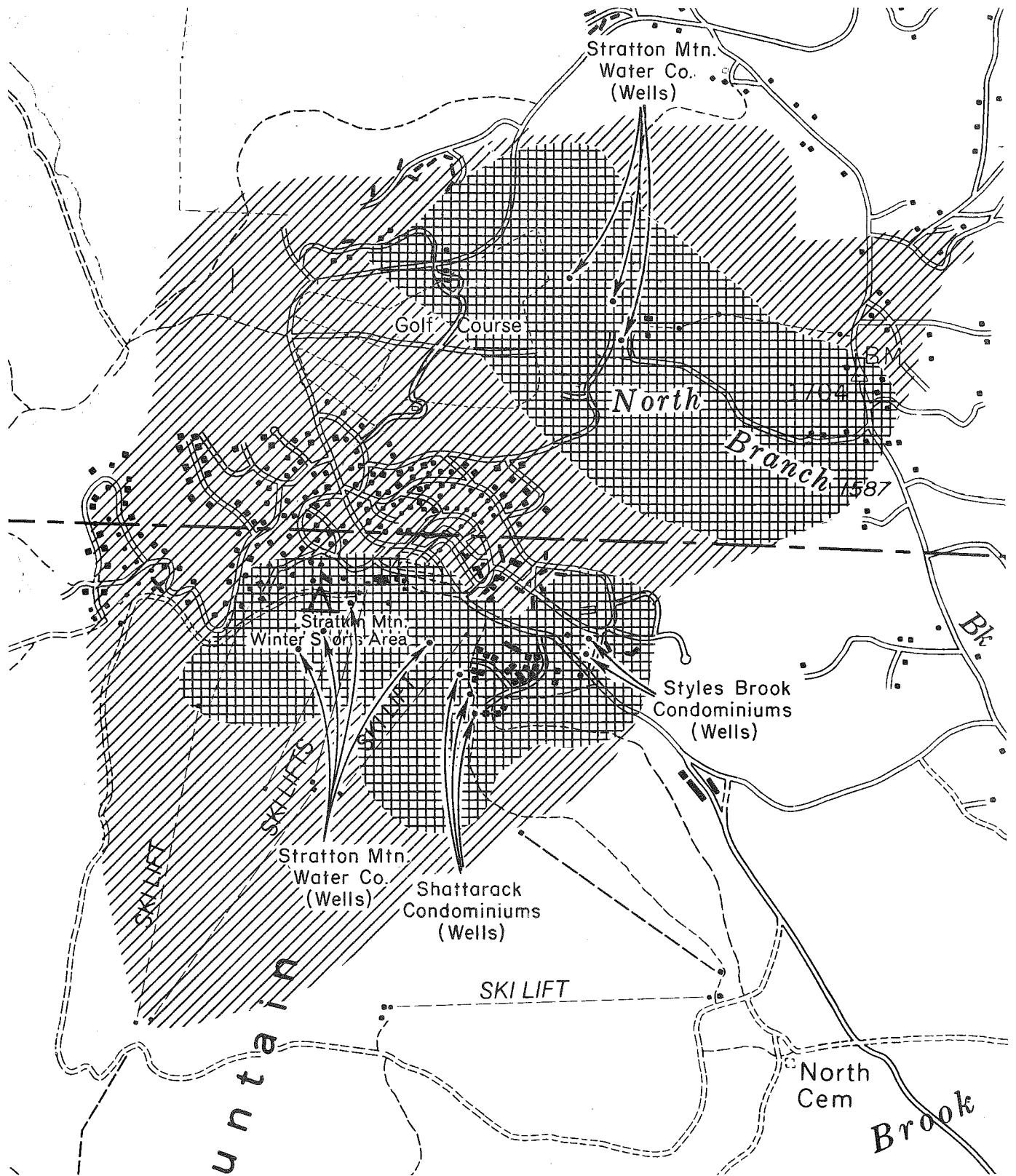
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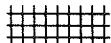
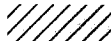
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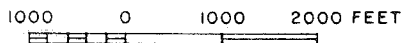
APPENDIX C  
 FIGURE 4  
 DRAFT CLASS II ZONE  
 GROUND WATERS  
 OF THE  
 UPPER WEST RIVER  
 DRAINAGE BASIN



**KEY**

-  PRIMARY ZONE
-  SECONDARY ZONE

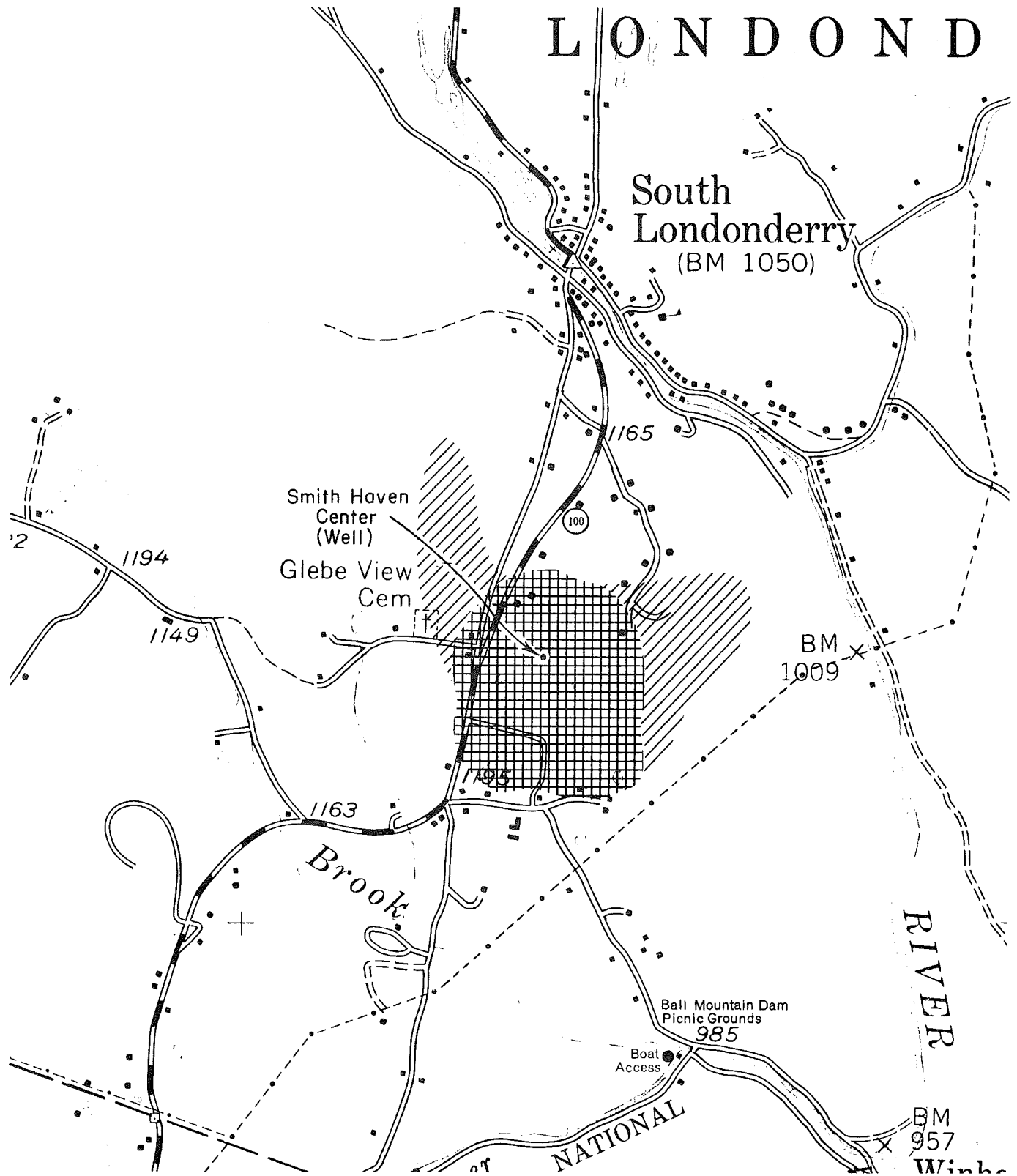
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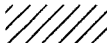
**APPENDIX C  
FIGURE 5**

**DRAFT CLASS II ZONE  
GROUND WATERS  
OF THE  
UPPER WEST RIVER  
DRAINAGE BASIN**

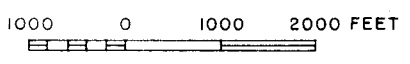
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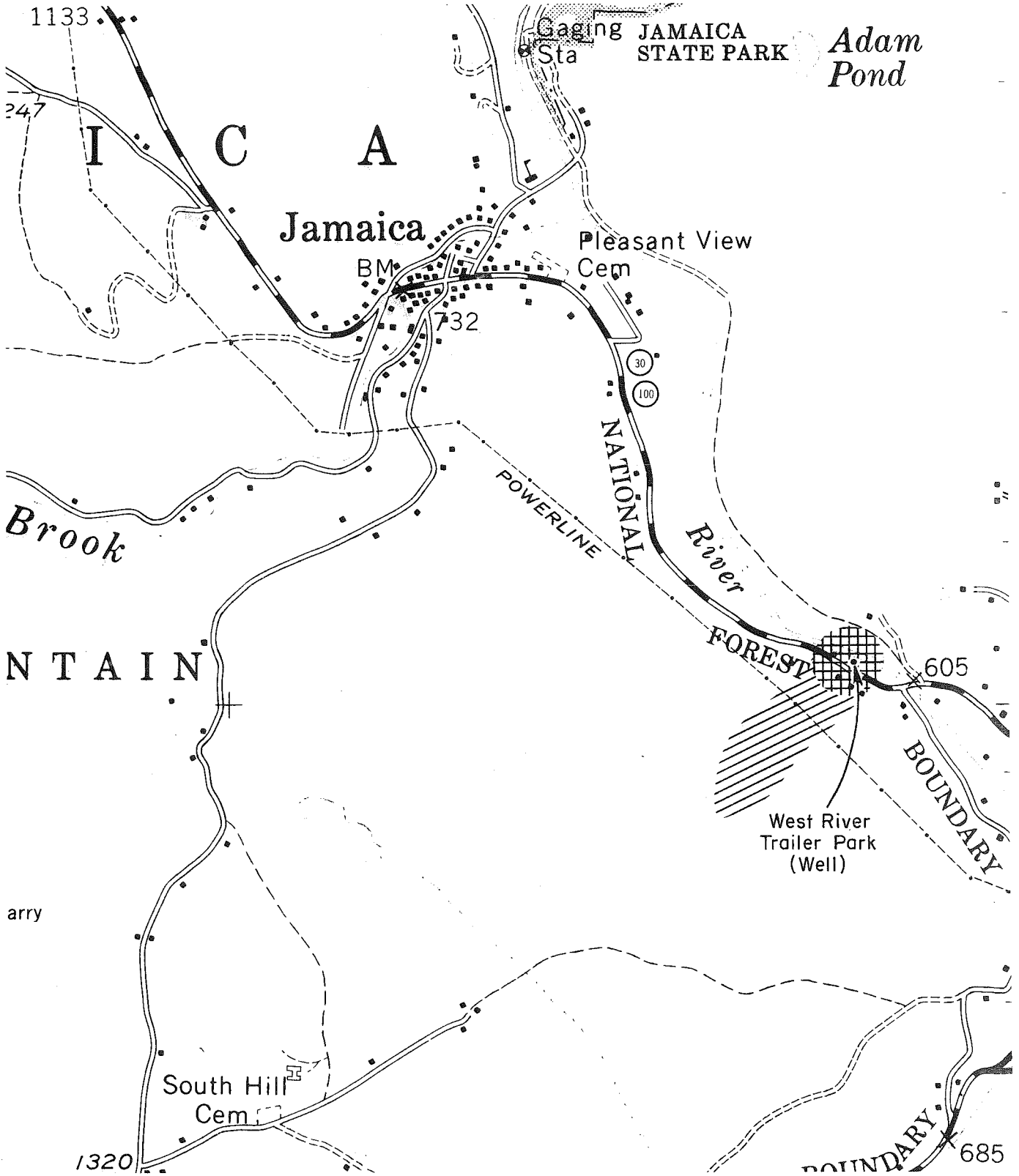
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-  PRIMARY ZONE
-  SECONDARY ZONE

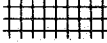
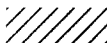
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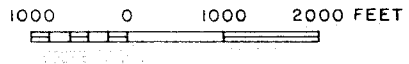
APPENDIX C  
FIGURE 6  
DRAFT CLASS II ZONE  
GROUND WATERS  
OF THE  
UPPER WEST RIVER  
DRAINAGE BASIN



**KEY**

-  PRIMARY ZONE
-  SECONDARY ZONE

**SCALE**



APPENDIX C  
 FIGURE 7  
 DRAFT CLASS II ZONE  
 GROUND WATERS  
 OF THE  
 UPPER WEST RIVER  
 DRAINAGE BASIN

APPENDIX D  
Attendance at Public Meeting June 25, 1986

<u>Name</u>	<u>Address</u>
Mark Rosenthal Mike Curran	Corps of Engineers, 98 Reservoir Road, Springfield, VT
Ruth Chaskel	Rutland Herald
Jill Fox	Londonderry, VT
Jim Twitchell	Londonderry Town Clerk, South Londonderry, VT
Malvine Cole	Stratton Area Citizens Committee, Stratton, VT
Rebecca Lepkoff	Stratton Area Citizens Committee, Jamaica, VT
Joan Price	Windham Regional Planning and Development Committee, Brattleboro, VT
Greg Burke	Bennington County Regional Commission, Arlington, VT
William Uptegrove	West Townshend, and representing Conservation Society of Southern Vermont
Elizabeth Uptegrove	West Townshend, VT
Robert L. Davis Charlotte W. Davis	RD 1, Box 96, Londonderry, VT
Charles Goodwin	Planning Commission, PO Box 61, Weston VT 05161
Eric Sven Eklof	Associated Consultants, Inc. Rte. 100, RFD, South Londonderry VT 05155
John Cueman Rolf Van Schaik	Bromley, Inc.
Steve Holmes	Windham Regional Commission
Kenneth Cox	VT Department of Fish & Wildlife
Richard Czaplinski Stephan Syz Geoffrey Poister Michael Smith	VT Department of Environmental Conservation

APPENDIX E  
Summary of Comments from June 25, 1986 Meeting and Comments  
Received by Letter

Swimming

Comment: There is swimming all along the West River from the Weston line (near "the islands") to South Londonderry, not just below the South Londonderry Dam as shown on the map. R. Davis

Response: Map to be changed accordingly.

Comment: Down the road Weston may need a municipal waste water treatment system. C. Woodward

Response: In the short-term, and perhaps the long-term too, careful installation and maintenance of septic systems will help.

Comment: Stratton golf course and spray fields drain into North Branch Brook which flow to Pikes Falls, a popular swimming area. The water quality is worrisome. The rocks have become slippery. How will this be in the future? R. Lepkoff

Response: The Department with the cooperation of the Stratton Corporation has worked to prevent sprayed effluent from entering the stream. More work remains to be done to retain golf course fertilizers on the land and to control nutrients from leaving constructing sites and impervious surfaces. A comprehensive Nutrient Control Plan for existing and future areas of development is suggested in the text of this plan.

Comment: The streams of this area are a priceless resources enjoyed by very many people. It is hard to express the value and importance of these waters. Preservation of the water quality to make swimming safe should be the top priority of this plan. The Conservation Society of Southern Vermont has invested funds for preservation of Pikes and Hamilton Falls to promote swimming at these locations. W. Uptegrove

Response: All waters are presently Class A or Class B which is managed for swimming. A Nutrient Control Plan is recommended for the areas of existing and proposed development which drains toward Pikes Falls.

Comment: Has there been any attempt to collect information on the numbers of swimmers at each location?

Response: Numbers have not been collected; however, wherever the information is available, we have noted the relative intensity of use (i.e., slight, moderate, and heavy use).

Comment: The Fish and Wildlife Department does not allow swimming at the outlet of Gale Meadows Pond.

Response: This activity is not being promoted or condoned. The inventory is merely recording observations of facts. It is correct that swimming is discouraged at Fish and Wildlife fishing accesses.

### Boating

Comment: Dams are not necessarily dangerous. Some aspects of dams are beneficial. They can provide excellent downstream kayaking, such as at Ball Mountain Dam, and they can also be a scenic resource, for example. E. Eklof

Comment: Townshend Reservoir gets considerable boating pressure. M. Rosenthal

### Sanitary Domestic Discharges

Comment: Some day the Londonderry community will create a need for a Class C zone. The plan should recognize this and not preclude a direct discharge. E. Eklof

Comment: Although we would all like to avoid a direct discharge, it must be considered in the future as a replacement to septic tanks if off-stream spray is considerably more expensive. The economic burden on a small community of maintaining Class A or B could be beyond the economic means of long-term residents. Lowering water quality is of deep concern but I dislike seeing Vermonters driven from their homes. The plan should provide for exceptions to a blanket classification. O. Goodwin

Response: At this time only further investigation of possible domestic discharges is discussed in the plan. These investigations are recommended at ten year intervals. Strong health regulations concerning septic system installation are strongly encouraged throughout the basin to prevent avoidable on-site waste water disposal system failures. Both the regulations and the unbiased technical implementation of the regulations are necessary.

### Hydropower

Comment: There once was a water power site on Turkey Mountain Brook. The plan should oppose a revival of power generation on Turkey Mountain Brook because this would be harmful. Turkey Mountain Brook is one of the most precious water resources in the basin. It flows 3.5 miles from Burbee Pond in a natural condition without any development on its banks. Eventually it reaches a town road. W. Uptegrove

Response: We recognize the importance of Turkey Mountain Brook. Any proposed hydroelectric facility would be opposed by the Department if such impoundments would conflict with the ecological, aesthetic, or recreational values.

Comment: There is a tremendous potential for hydropower in the basin and this clean source of energy should be strongly favored.  
M. Cole

Response: Hydropower is not always clean power. It can seriously harm fish life and other ecological and aesthetic values unless adequate flows are passed at certain times of the year.

Comment: The plan should be flexible to provide for other ideas of water use. E. Eklof

#### Exceptional Natural Features

Comment: A pond southwest of Moses Pond merits investigation for designation as an exceptional natural feature. C. Goodwin

Response: The Department has not studied this area which appears to now be protected within the Green Mountain National Forest.

Comment: Turkey Mountain Brook should be given special recognition from the confluence of Little Turkey Mountain Brook north to Burbee Pond. There is no development along the brook, there are no nearby transportation routes (roads or railroads), and in many places the brook flows over bedrock forming smaller falls, cascades, and pools. W. Uptegrove

Response: We understand your interest in this segment, and the Department would be willing to assist in analyzing this segment.

Comment: Land is owned by the Corps of Engineers up to the 100 year flood level. It is land in public ownership and use.

Response: This is added to the map of publicly owned water-related lands.

Comment: The State owns two parcels around Lowell Lake, and the State might consider whether additional land should be purchased by the State if available to expand the existing land holdings for a park. W. Uptegrove

Response: At this time, funds are short for land purchases. No recent offer has been received from the owner of this land. The proposal is logical to add to existing and widely separated

parcels of land already in public ownership to make them more useable if they become developed as a park sometime in the future.

### Pristine Streams

Comment: Turkey Mountain Brook from the confluence of Little Turkey Mountain Brook to Burbee Pond is an excellent candidate for a Class A designation. W. Uptegrove

Response: This proposal would preclude any development using septic systems which exceed 1000 gallons per day.

Comment: Cobb Brook from Hamilton Falls to the West River has no development. It is a beautiful steep brook with cool water and falls. It should be preserved in this condition forever.  
W. Uptegrove

Response: We are compiling information on this stream.

Comment: Styles Brook should be pristine from the withdrawal point downstream to the confluence with North Branch Brook.  
M. Cole

Response: This stream is already impacted by the stump dump and runoff from ski area development and it is doubtful, in our view, whether Class A would be an appropriate designation below the segment presently Class A for water supply.

Comment: Kidder Brook should be considered for a Class A designation. Kidder Brook has a major effect of bringing up the quality of North Branch Brook just before it reaches Pikes Falls. Kidder Brook should be kept as pure as possible to preserve swimming at Pikes Falls. R. Lepkoff and W. Uptegrove

Response: The North Branch Brook has apparently been impacted by erosion in the Stratton Mountain area, heating from the golf course pond, and probably a lack of low flows. At a minimum, these impacts should be abated in the area of the North Branch Brook and, as the region near Kidder Brook is developed, the above impacts should be avoided as ski areas, golf courses, and water withdrawals are developed. We strongly encourage development of a Nutrient and Erosion Control Plan prior to further development on Kidder Brook to prevent impacts similar to those which have already occurred on the North Branch of Ball Mountain Brook.

Comment: "Beaver Brook" flowing into the West River near the Weston/Londonderry line from the east (Cobble Hill) is now "pristine" and supports natural trout. It should be designated as Class "A" if it is not already. R. Davis

Comment: Jenny Brook flow into Greendale Brook and Greendale Brook should be maintained as pristine streams. C. Goodwin

Response: The response to the previous comment applies to Jenny Coolidge and Greendale Brooks as well.

#### Ground Water

Comment: There are several areas in the basin including directly under the Londonderry town offices where it is difficult to find ground water. E. Eklof

Comment: There is septic dumping in the vicinity of the West River beyond Weston Island - Venture's Gravel deposit in Weston.

Response: Sites should be certified to help prevent the pollution of the ground water. There are presently interim guidelines which will help prevent ground water pollution if they are followed carefully. Existing health regulations require that the material is covered to control disease.

APPENDIX F  
Class A and Outstanding Resource Waters  
(Summary of Statutory Provisions)

I. Class A Waters

A. Definitions (10 V.S.A. 1252):

- (1) Suitable for public water supply with disinfection when necessary: character uniformly excellent.
- (2) High quality waters which have significant ecological values.

Definition (1), public water supply, is the old definition used for decades to protect public water supplies before water treatment plants were utilized by municipalities. Definition (2) was added by 1986 legislation which designated all waters above 2500 feet in elevation as Class A and additional waters as may be classified A by the Water Resources Board (10 V.S.A. 1253).

B. Process to Designate Additional Class A Waters

The Water Resources Board is authorized by statute (10 V.S.A. 1253) to reclassify state waters. It may hold a public hearing convenient to the area concerned to obtain evidence on its own motion, and it shall hold a public hearing upon petition by a state agency, municipality, or 30 or more persons in interest alleging that it is in the public interest to reclassify waters to Class A (10 V.S.A. 1253f). In determining the question of public interest, the Water Resources Board must give due consideration to ten factors (10 V.S.A. 1253e) as stated below:

- (1) existing and obtainable water qualities;
- (2) existing and potential use of waters for public water supply, recreational, agricultural, industrial, and other legitimate purposes;
- (3) natural sources of pollution;
- (4) public and private pollution sources and the technological means of abating the same;
- (5) need for and potential use of mixing zones;
- (6) suitability of waters as habitat for fish, aquatic life, and wildlife;
- (7) need for and use of minimum stream flow requirements;

(8) federal requirements for classification and management of waters;

(9) municipal, regional, and state plans; and

(10) any other factors relevant to determine the maximum beneficial use and enjoyment of waters.

To date, no high quality waters, (i.e., those with significant ecological value) have been reclassified by the Water Resources Board to Class A, and the term significant ecological value has not been defined.

In reclassifying waters, the Water Resources Board has promulgated Rule 13 which sets the procedures for petitions. Rule 13 is reproduced in Section II at the end of this summary.

### C. Restrictions in Class A Waters

1. No direct (piped or channeled) discharges of any wastes that prior to treatment contained organisms pathogenic to human beings are allowed to Class A waters (10 V.S.A. 1259c).

2. No new indirect (on-site, land disposal) discharges of any kind are allowed in the watershed of Class A waters except for sewage from systems with a capacity of 1000 gallons per day or less that are either exempt from or comply with the environmental protection rules for sewage disposal (10 V.S.A. 1259d).

3. All existing indirect sewage disposal systems with a capacity of 6500 gallons per day or more in Class A watershed are required to obtain a permit no later than July 1, 1991. A permit shall be granted by the Secretary of the Agency of Natural Resources if he or she finds that the discharge meets the Water Quality Standards.

Although the intent of the concept in paragraph C-2 above is to control domestic discharges near streams, it also has the effect of limiting or controlling development back from streams in a manner similar to zoning. The importance of this rule is that it can protect streams in areas of fragile soils and other areas where there is a risk of effluent reaching the stream.

## II. Outstanding Resource Waters

There are two categories of Outstanding Resources Waters. One was established in 1985 by rule by the Water Resources Board

in the Water Quality Standards. The other was established legislatively in 1987. Both are discussed below.

A. Outstanding Resources Waters Per Section 1-03C of the Water Quality Standards

Section 1-03C reads as follows:

1-03C. Protection of Outstanding Resources Waters

The Board may by rule designate certain waters as Outstanding Resources Waters. Outstanding resource waters are those Class A or B waters which constitute an exceptional state or national resource or which have exceptional recreational or ecological significance. The existing high quality waters so designated by the Board shall be protected and maintained.

This provision for Outstanding Resource Waters is part of the antidegradation policy. It states that once designated, the high quality of the Class A or B waters so designated cannot be degraded at all for any purpose; e.g., lowered in turbidity, dissolved oxygen.

To date, no Outstanding Resource Waters have been designated by the Water Resources Board nor have rules been promulgated petitioning the Water Resources Board for such designation.

B. Outstanding Resource Waters Per 1987 Legislation

1. Definition (10 V.S.A. 1422[9])

"Outstanding resource waters" mean waters of the state designated by the Board as having exceptional natural, recreational, cultural, or scenic values.

2. Process to Designate Outstanding Resource Waters (from 10 V.S.A. 1424a)

(a) The board, on its own motion, or upon petition by a state agency, a municipality, or 30 or more persons who can demonstrate an interest under subsection (c) of this section, shall hold a public hearing, in a timely manner, on the question of whether particular waters should be designated as outstanding resources waters, or whether an existing designation should be amended or repealed. The hearing shall be held convenient to the waters in question, or in a county where the waters are located.

(b) Notice and a copy of the petition or board motion shall be provided to the municipality, the municipal and regional planning commissions where the waters are located, and the secretary of the agency of natural resources. The board shall request the clerk of the town or towns where the waters are located to post a copy of the notice. The board may forward the notice and a copy of the petition or motion to any state agency, municipality, organization, or person the board deems appropriate. Notice shall also be published in a newspaper generally circulating in the area where the waters are located not less than 21 days before the date of the hearing. The hearing shall be conducted as a contested case under 3 V.S.A. chapter 25.

(c) In addition to parties in interest, as determined by board rule, the following shall be parties:

(1) those required to receive notice;

(2) those owning property adjoining the waters who, within 21 days of the publication of notice, request to be heard;

(3) those organizations or groups which, within 21 days of the publication of notice, request to be heard and which can establish:

(i) that their members have used or enjoyed the waters in question;

(ii) that designation clearly is of interest to their membership; or

(iii) that they may be affected by a decision on designation.

(d) In making its decision, the board may consider, but shall not be limited to considering the following:

(1) existing water quality and current water quality classification;

(2) the presence of aquifer protection areas;

(3) the waters' value in providing temporary water storage for flood water and storm runoff;

- (4) the waters' value as fish habitat;
- (5) the waters' value in providing or maintaining habitat for threatened or endangered plants or animals;
- (6) the waters' value in providing habitat for wildlife, including stopover habitat for migratory birds;
- (7) the presence of gorges, rapids, waterfalls, or other significant geologic features;
- (8) the presence of scenic areas and sites;
- (9) the presence of rare and irreplaceable natural areas;
- (10) the presence of known archeological sites;
- (11) the presence of historic resources, including those designated as historic districts or structures;
- (12) existing usage and accessibility or the waters for recreational, educational, and research purposes and for other public uses;
- (13) studies, inventories, and plans prepared by local, regional, statewide, national, or international groups or agencies, that indicate the waters in question merit protection as outstanding resource waters;
- (14) existing alterations, diversions, or impoundments by permit holders under state or federal law.

(e) Upon consideration of the evidence, the board shall designate the waters as outstanding resource waters if it finds that they have exceptional natural, recreational, cultural, or scenic values. Designation as outstanding resource waters shall not invalidate the terms of existing permits issued by the state or federal government.

C. Restrictions in Outstanding Resource Waters

a. If located on an outstanding resource water, a riparian owner may remove no more than ten cubic yards of gravel per year and must notify the secretary at least 72 hours prior to removal of any gravel (10 V.S.A. 1021d). This is in difference to 50 cubic yards allowed per year for riparian owners bordering on water courses not designated as Outstanding Resource Waters.

b. For any stream alteration permit issued under 10 V.S.A. 1023, the values sought to be protected by the Outstanding Resource Water designation must not be adversely affected (10 V.S.A. 1023a4).

c. Hydroelectric dams are strongly limited on waters designated as outstanding resource waters (30 V.S.A. 248b7).

d. For any dams built under the jurisdiction of 10 V.S.A. Chapter 43 (nonhydroelectric dams), the values and activities sought to be protected by the Outstanding Resource Water designation must be preserved or enhanced (10 V.S.A. 1086b).

It should be noted that an Outstanding Resource Water can be any class, A, B, or C, and is a designation in addition to a water classification.

III. Rule 13 - Petitions for Rules Reclassifying Waters\*

A. General

The reclassification of waters is governed by the provisions of 10 V.S.A. 1253 and 1254.

B. Petitions

Petitions for rules reclassifying waters shall include the following information:

1. Identification of the waters (including the particular segment at issue) for which the petitioner seeks reclassification by name and location on a topographic map prepared by the U.S. Geological Survey.
2. A narrative providing a detailed summary of the circumstances prompting the petition and the specific action requested by the petitioner.
3. Copies of all documents which the petitioner intends to submit in support of the petition including

any applicable state or local permits, engineering reports, and site plan drawings.

C. Additional Information

The board may require additional information from the petitioner, including but not limited to the names and mailing addresses of all persons owning property adjacent to waters for which the petitioner seeks reclassification.

D. Distribution

The petitioner shall file one complete copy of the petition with each of the following:

1. The Board;
2. The Secretary;
3. The clerk of each Vermont municipality in which the waters for which reclassification is sought are located;
4. Each regional planning commission serving the area in which the waters for which reclassification is sought are located; and
5. Such other persons as the Board may direct.

\*From Water Resources Board, Rules of Procedure, June 10, 1983

## APPENDIX G

### Jenkins and Zika Whitewater Survey, 1985

#### CONNECTICUT RIVER WATERSHED

The largest watershed in the state, running the whole length of eastern Vermont from Canada to Massachusetts and draining the eastern slopes of the Green Mountains and their associated uplands. The watershed has much whitewater, and it tends to occur in similar geographic settings. Many of the rivers run southwards for some distance in inter-montane valleys and then have accumulated watersheds of considerable size, turn eastwards toward the Connecticut River. As they do so, they encounter rocks of high metamorphic grade and considerable structural complexity, and steepen their slopes. The resulting whitewater segments are typically four to eight miles long, with slopes anywhere from 20 to 50'/mile. They are never as steep as the mountain streams on quartzite gneiss, but because they often have larger volumes and more reliable flows, they are on the whole more important for boating.

The watershed includes:

Connecticut River*	N. Branch of Ottauquechee+
Nulhegan River#	Bernard Brook+
Passumpsic River	Lulls Brook+
East Branch of Passumpsic*	Mill Brook+
Wheelock Branch/Passumpsic	Black River*
Miller Run+	Williams River*
Sleepers River+	Saxtons River*
Moose River*	West River*
Stevens River+	Winhall River*
Wells River	Wardsboro Brook*
Waits River*	Mill Brook
Tabor Branch of Waits+	Wardsboro Brook II

South Branch of Waits+	Grassy Brook
Ompompanoosuc River*	Rock River+
W. Branch/Ompompanoosuc*	Whetstone Brook+
White River*	Green River*
1st-3rd Branches of White	North River#
West Branch of White+	Deerfield River
Tweed River+	West Branch I/Deerfield*
Brandon Brook	East Branch/Deerfield*
Ottauquechee*	North Branch/Deerfield*
	West Branch II/Deerfield*

The Connecticut, Williams, Wells, and lower West are excellent touring rivers with occasional whitewater. The Passumpsic, Waits, White, Ottauquechee,, middle West, Green, and Deerfield West Branch are good Class II runs. The Moose, Ompompanoosuc, Black, Saxtons, upper West, and Winhall have strong Class III sections. The portion of the West below the Ball Mountain Dam is the biggest Class III river in Vermont, and one of the best loved in all of New England. The Wardsboro is a violent, dangerous Class IV.

As is the case in other watersheds, a number of small streams, indicated by a + above, have the proper combination of slope and watershed to be potential whitewater runs, but have not been explored. See Table 3-3 for details. We lack information on two runs at extreme ends of the state, the Nulhegan and the North River, and these are briefly noted in Appendix 1. And there are also a number of isolated rapids which are summarized in Appendix 2, and much good water for general touring, particularly on the Connecticut, Wells, and White Rivers.

WEST RIVER (Basin 11)

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Segment	Weston to Londonderry
Length	ca. 7 miles
Towns	Weston, Londonderry
Counties	Windsor, Windham
Quadrangle	Wallingford 15', Londonderry 15'
Access	Rte. 100

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Elevation	1290'-1140
Average Slope	20'/mile; 1st two miles slope 40'/mile
Description	small upland stream, Class II-III above, Class I below
Surroundings	farmland, second growth woods, occasional houses
Water Quality	good
Flow Regulation	none
Geology	Precambrian gneiss
Hydrology	no gauge data: watershed at Londonderry ca. 180 sq. km.
Biology	no rare plants known; brook and brown trout
Known Use	no users known
Season	? snowmelt and after storms
Suitable For	open boats
Interruptions	none; ends at a dam in Londonderry
Importance	LOCAL IMPORTANCE for boating and fishing; general biological importance UNKNOWN

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This, the uppermost section of the West, is a small winding stream with scattered rocks and tight bends in an agricultural valley. Pretty countryside, some nice views down the valley, and from the road at least a pleasant looking river.

The watershed is of fair size here but the gradient is low mild; the stream has the same slope as the upper Mad River but only about half the volume. We would expect it to be a pleasant mild whitewater at moderate water and a fast but not powerful run at high water. We have not encountered anyone who has boated it; the AMC guide says that the upper two miles are Class II-III and this accords with the slope and general look of the stream. The lower four miles are flatter, and probably at most Class I except in flood.

No botanical information from this part of the watershed. Has native brown and brook trout; the fish are reported to be small but the fishing generally good.

Rated LOCALLY IMPORTANT as a mild whitewater run, and of UNKNOWN importance for general biology.

WEST RIVER (Basin 11)

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Segment	Londonderry to backwater of Ball Mtn. Dam
Length	ca. 7 miles
Towns	Londonderry, Jamaica
Counties	Windham
Quadrangle	Londonderry 15'
Access	from Rte. 11

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Elevation	1150'-850'
Average Slope	40'/mile; steepest two miles is 50'/mile
Description	small to medium-sized upland stream; mostly Class III water with Class IV pitches at high water
Surroundings	second-growth woods, road, occasional houses
Water Quality	good; some domestic waste in Londonderry
Flow Regulation	none
Geology	Precambrian gneiss and schist
Hydrology	no gauge data; watershed in South Londonderry ca. 200 sq. km., and at the confluence with the pool of the Ball Mtn. ca. 360 sq. km.
Biology	brook and brown trout of unknown quality fishery; no botanical data from this segment
Known Use	moderate use by local and visiting boaters
Season	snowmelt and after rain
Suitable For	advanced open boats, intermediate kayaks
Interruptions	none
Importance	MODERATE IMPORTANCE for boating; a short, difficult, popular ledge run

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A small to medium stream with lots of boulders and ledges; parallels Rte. 100 from South Londonderry to Londonderry, then follows a dirt road into the valley south of Shatterack Mountain and meets the backwater from the Ball Mountain flood control dam. Countryside mostly second growth woods but with some nice view of the mountains; views of Shatterack and Ball Mountain as you enter the backwater are very fine.

A steep tricky river, similar in slope to the Moose, Saxtons, and upper Lamoille but with a somewhat larger watershed than any of the others. Generally a Class III stream but made additionally difficult by sets of closely spaced small drops and their associated waves, and by a tight and serious set of ledges in South Londonderry. Wet and not too demanding for kayaks, except at very high water; challenging in open boats because there is no way to avoid the waves, and though no single drop is particularly bad, you can easily take too much water and swamp.

The first mile is Class II; then about 1/2 mile of Class III above and below the Rte. 100 bridge; then easy rapids to South Londonderry (old dam site); then Class III ledges again for perhaps a mile; then mostly Class II to the backwater. Scout it carefully before you run it.

The description in AMC guide is garbled. Read first Rte. 100 bridge for Rte. 11 bridge in line six and second Rte. 100 bridge for the unnamed bridge in line ten.

The lower part of this run, into the backwater of the Ball Mountain Dam, has some very nice water but makes for a difficult takeout. If you run to the dam you have the choice of a steep portage up to the access road by the dam or a very hard portage over the dam and down again to the next section of river.

Before the Ball Mountain and Townshend Dams were built, you could run continuously from Londonderry to Townshend and have nearly 20 miles of Class II-IV whitewater, surely the finest run in Vermont. The Ball Mountain Dam interrupts the run and makes it difficult to run continuously, while at the same time providing water releases that have made the section of the West below the dam nationally famous. The section above the dam is less popular, but it is still used and people find it a demanding run. Ledgy runs are unusual in Vermont, and for this reason the Upper West, like the Saxton's, is especially popular with kayakers and boaters who enjoy staircases and drops.

\* \* \*

No rare plants known, and no recent botanical information from this segment. Brook and brown trout occur; quality of the fishery is unknown.

\* \* \*

Rate MODERATELY IMPORTANT for boating because it is a popular and interesting run of a type that is not common in Vermont. General biological importance UNKNOWN.

WEST RIVER (Basin 11)

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Segment	Ball Mountain Dam to Route 100 Bridge
Length	ca. 6 miles
Towns	Jamaica, Townshend
Counties	Windham
Quadrangle	Londonderry 15', Saxton's River 15'
Access	1) difficult carry from parking lot at Ball Mtn. Dam 2) dirt access road up north side of the river through Jamaica State Park; normally closed to vehicles; Park Dept. provides shuttles during water releases
Elevation	800'-480'
Average Slope	ca. 50'/mile above Jamaica, 30'/mile below
Description	medium to large river, in a narrow valley above and then developing a floodplain below; superb Class II-IV water above the bridge in Jamaica and Class II-III below the bridge
Surroundings	upper part: hemlock hardwoods in steep mountain ravine, some ledges. Lower part: low wooded banks, some houses, some alluvial woods, finally swampy woods or flooded woods at flood control pool
Water Quality	good
Flow Regulation	Ball Mountain Dam, immediately above this segment
Geology	Precambrian gneiss and schist; small amounts of lime occur locally near the foot of Ball Mountain
Hydrology	gauge at Jamaica State Park: watershed 464 sq. km., mean flow 17.9 m <sup>3</sup> /sec, max/mean 3.4; watershed at Townshend Dam ca. 700 sq. km

Biology	good brown trout fishing reported below the dam; formerly had runs of Atlantic salmon; salmon restoration project currently underway; records of several rare plants
Known Use	upper segment used heavily during whitewater releases, both for recreation and competition, rarely used otherwise; lower segment gets much use throughout season
Season	snowmelt, sometimes after rains and during water releases, which are currently held on two weekends in April and May and one in September or October
Suitable For	upper section, intermediate to expert open and closed boats; lower section, novice to intermediate open and closed boats
Interruptions	none
Importance	HIGH IMPORTANCE for boating: famous race course that has been used for national team trials and championships; superb water suitable both for intermediate and expert boaters; annual water releases popular with boaters from all over the Northeast; possibility of a world championship here. HIGH IMPORTANCE for biology: good existing fishery, important for the salmon restoration project, several rare plants

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A big deep stream; upper part in a steep wooded valley, waterfalls coming in on the sides, rocky ledges and gorges, many large rocks in the stream bed; lower part in an alluvial valley, mountains set back, fine views, bars and chutes and islands, few big rocks. Beautiful surroundings all along, and as you enter the backwater of the dam at Townshend the views of Rattlesnake and Bald Mountain are breathtaking.

Hydrologically unique in Vermont because both the upper and lower parts of this segment have twice the watershed of other

Vermont streams of comparable slope. The large watersheds give them big waves and very exciting water, and also make them more roomy (and hence safer for those of us whose boats don't always go where we aim them) than smaller streams of similar intensity.

The upper part of this segment is from Ball Mountain to the Jamaica Bridge; access is through Jamaica State Park; a dirt road extends up the north bank from the bridge to just below the dam; cars are not normally allowed up it but during releases the Park Department runs a shuttle service. It's possible to carry boats up the road on foot, or to carry them down from Ball Mountain Dam.

This is one of the famous whitewater runs in the northeast; it begins with a mile of big waves and holes, then two sharp bends with cross currents and a very big hole, then a bit of a rest, then the Dumplings. These are three great big rocks with drops above and below, and (for open boats at least) a single clear channel involving an S-turn with a rock and a big wave waiting if you don't get into the turn and usually a mess of spectators on the banks watching to see if you make it. Then below the Dumplings some more big waves and then 3/4 of a mile of easier water from there to the bridge at Jamaica.

The lower five miles of this segment, from Jamaica to West Townshend, are milder but can be mean when the river is in flood. There are only a few rocks and holes, but the river has some

steep pitches that develop big waves, and several channels around islands that have tight bends and strong rips where they rejoin the main channel.

During snowmelt the dam releases 2500-4000 cubic feet per second (ca. 72-130 m<sup>3</sup>/sec). At these levels the upper segment is probably mostly Class IV and the lower segment mixed II and III. For races and water releases, the dam releases 1500-1800 cubic feet per second (43-52 m<sup>3</sup>/sec) and the upper segment is most Class III, with the Dumplings perhaps Class IV, while the lower segment is mixed I and II. BOATERS SHOULD NOTE THAT THE MEAN APRIL FLOW (66 m<sup>3</sup>/SEC = 2300 cfs) IS CONSIDERABLY HIGHER THAN THAT ENCOUNTERED DURING RACES, AND PLAN THEIR SCOUTING AND PRECAUTIONS ACCORDINGLY.

Both of the parts of this segment are almost perfect whitewater runs. As mentioned above, they are spacious compared to some streams of similar intensity. The upper segment has difficult water but enough room to maneuver and enough time to think, and it has lots of eddies to rest in and safe places to roll or recover below the difficult places. Hence it doesn't hurry you and you can work down it gradually and enjoy the water and experiment with it, unlike some of our smaller and more pushy streams.

The lower part has substantial rapids but few drops and holes, and is very sunny and wide and open and scenic. At medium water levels it is a good place for learning about waves and current without having to battle rocks, and is a wonderfully

relaxing run after you have been in the upper part. At high water, it is a formidable run in its own right: fast current and big waves, especially where side streams come in, two wild cutoffs behind islands. The senior author was thrown out of his boat here one day in early April, with Ball Mountain Dam releasing 2800 cfs. He remembers that for a moment or two all he could see around him were waves, and that he had the momentary sense of being overboard at sea. He also remembers that the hole that did it looked fully capable of swallowing a pickup truck, or perhaps several.

Races and water releases on the West are a New England institution. There may be anywhere from 100 to 500 boaters, and total crowds may be over 1000. People come from all over the East, and come back year after year. They say they love the river and the clean water and clean park, and excellent facilities and service. Many of them say that though there are bigger and more demanding streams elsewhere, the West River weekends are the most fun and most satisfying of any, and their favorites of the whole whitewater season.

Considering the rivers that the West must compete with, this is remarkable praise, and there can be no doubt that the West is one of the State's whitewater treasures: a beautiful river with varied, safe, and extremely exciting water in a beautiful setting. Equally the Vermont Park Department (who arrange the releases and handle the crowds and camping and shuttles) should share in the praise: they provide excellent facilities and

service, handle large crowds with a minimum of restrictions and delays, and have impressed virtually every boater I have talked to by their friendliness and hospitality.

\* \* \*

The upper part of this segment is of considerable biological importance. Because of the small amounts of lime in the soil, it is botanically interesting: it has two species (green alder, *Alnus viride*, dwarf bilberry, *Vaccinium cespitosum*) that are rare in southern Vermont. It also has an orchid that we have not seen in flower, but which could easily be the yellow rein orchid, *Habenaria flava*, is currently known in Vermont from one site about ten miles further down the West River.

In addition to the plant records, there are two records of rare beetles from this section. See the discussion on rare insects in Chapter 5 for details.

It also is important for fish: it supports a good brown trout population and was formerly an important spawning stream for the Atlantic salmon. In many respects it is a choice place for fish: it is cooler and deeper and more shady than much of the rest of the West, and so is particularly favorable to trout and other coldwater species.

Since 1981, young Atlantic salmon have been stocked in the West with the hope of establishing salmon runs here. (This is part of a salmon restoration project jointly undertaken by the federal government, Vermont, New Hampshire, Massachusetts, and Connecticut. The project began in the early 1970's, and has

involved growth studies in a number of watersheds, the stocking of a number of million young salmon, and the construction of bypasses or fish ladders on all the dams on the Connecticut from Bellows Falls to Long Island Sound.) The high flood control dam at West Townshend is a difficult obstacle: current plans call for netting returning fish in the spring run and carrying them over the dam.

There has been considerable discussion by boaters and fishermen about potential conflicts between whitewater releases and the salmon project. Fisheries biologists feel that late spring, summer, or fall releases endanger adult fish (which are not feeding and hence are weakened), disturb spawning grounds by siltation or scouring, and kill young fish. Boaters feel that salmon breed by their own choice in streams liable to spates, and are smart enough to choose spawning sites that aren't disturbed by short periods of high water. They also feel that because of the obstacle presented by the Townshend Dam that the upper parts of the West are never going to be a major salmon stream, and that perhaps the Upper West should be devoted to whitewater use and the salmon restoration focus on the Lower West and on undammed streams like the White.

This is both a technical argument and a partisan one, and we have neither the space here to do justice to the issues involved nor the expertise to decide between conflicting factual claims. But we might mention two observations which bear on the discussion. The first, somewhat in favor of the boaters, is that

the river levels used for water releases are actually considerably the average levels encountered in April, and so the releases are, in natural terms, not very dramatic or unusual events. The second, in favor of the biologist's concerns, is that natural high water of any kind is rare in September and October, it is quite possible that even medium high water causes a lot of mortality among young fish whenever it occurs, but that natural populations are not much effected because it doesn't occur every year and because natural populations tend to be organized into cohorts anyway because of predator-prey cycles. If this was the case, annual fall releases, even if fairly mild, could be an unnatural and damaging stress.

\* \* \*

Rated as HIGHLY IMPORTANT as a fishery, for rare plants, and as a regionally and nationally known whitewater run.

WEST RIVER (Basin 11)

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Segment	Townshend Dam to Connecticut River
Length	ca. 18 miles
Towns	Townshend, Newfane, Brookline, Dummerston, Brattleboro
Counties	Windham
Quadrangle	Saxton's River 15', Brattleboro 15'
Access	Rte. 30
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Elevation	440'-220'
Average Slope	ca. 12'/mile
Description	large alluvial river; mostly flat water and scattered Class I rapids; few low Class II stretches
Surroundings	varied, hardwoods forest, some farms, occasional houses; no trash, nice views
Water Quality	good
Flow Regulation	Ball Mountain Dam and Townshend Dam
Geology	Cambrian quartzite granulite, gneisses, and schists; Ordovician gneiss and schist; Devonian slate-phyllite; Devonian limestone; granite pluton (near West Dummerston)
Hydrology	gauge at Newfane: watershed 798 sq. km., mean flow 17.9 m <sup>3</sup> /sec, max/mean 3.7; watershed at mouth 1100 sq. km.
Biology	good bass fishery, mostly too warm for trout; several records of rare plants
Known Use	very popular for general touring and mild whitewater
Season	mild whitewater in spring and after rain, can be run much of the year
Suitable For	general open boat use, novice kayaks

Interruptions	none
Importance	HIGH IMPORTANCE for boating, a popular river for general touring and mild whitewater; HIGH IMPORTANCE for rare plants; MODERATE IMPORTANCE as a bass fishery, also IMPORTANT for water quality

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A large, mild, clean, pretty river: separate from the road and private for the first ten miles, close to Rte. 30 for the last half; fine views of farmland and mountains; easy to run and much used for sport, picnics, family outings, etc.

This is basically a low-gradient touring stream, somewhat like a rockier version of the Batten Kill, but it does have some interesting light rapids which are fun in the spring and early summer.

At low water, you pick your way among the rocks; at high water, there are mild rapids and some waves and lots of fast water. The rapids are Class I to low Class II; the most continuous stretch of rapids is just below the big covered bridge in West Dummerston, where the river crosses a granite outcrop. Typically, major rivers dislike granite outcrops and circle them rather than crossing them. When, as here, they have to cross one, there are almost invariably ledges and boulders and interesting water.

The rapids are not hard enough to attract experienced whitewater boaters, but are a pleasant practice run nevertheless, are good for teaching beginners, and are easy and safe enough that they can be enjoyed by canoeists without whitewater

experience. It might also be a nice run in early winter or in thaws. Altogether a very attractive stretch of river, with cleaner water than on many other rivers this size, and always providing an enjoyable experience.

\* \* \*

Botanically a most interesting stream: we have records of the river weed *Podostemum*, the yellow rein orchid *Habenaria flava* (only current Vermont site), the rush *Juncus marginatus*, and the milkwort *Polygala sanguinea*. They occur together on cobble shores in the Dummerston area. The surrounding bedrock is granite but the presence of these plants hints that there may be limy strata or inclusions nearby. All of these plants are more widely distributed south of us. They make an interesting contrast to the rare plants of the Upper West River, all of which are northern species. There are also several interesting species characteristic of alluvial woods near the mouth of the river, and several interesting historic records that have not been relocated. Taken altogether, the West is one of our most interesting streams botanically and has only begun to be explored.

It is also a good fishery. This segment is too warm to be a good trout stream but supports an excellent bass population and is a very popular stream.

Because the stream is shallow and warm in the summer, and because it receives nutrients from settlements and farms in the

watershed, we consider the rapids here important for water quality.

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Rated HIGHLY IMPORTANT for boating, fishing (because of the amount of use), and for rare plants. Also IMPORTANT for water quality.

WINHALL (Basin 11)

Segment	Grahamville to West River
Length	ca. 6 miles
Towns	Winhall, Jamaica, Londonderry
Counties	Windham
Quadrangle	Londonderry 15'
Access	Rte. 30
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Elevation	1360'-960'
Average Slope	ca. 60-70'/mile
Description	small to medium-sized upland stream; continuous Class III rapids, Class IV at high water
Surroundings	second-growth woods, bridges, buildings, some junk
Water Quality	good
Flow Regulation	none
Geology	Precambrian gneiss and schist
Hydrology	no gauge data: watershed 160 sq. km. at mouth
Biology	brook and brown trout; quality of fishery not known, no botanical data
Known Use	moderate; known to many canoeists who visit the West River
Season	snowmelt and after rain
Suitable For	expert open boats, advanced and expert closed boats
Interruption	difficult chute and rapids one mile below the Rte. 100 bridge in Rawsonville

Importance

HIGH IMPORTANCE for boating; one of the five rivers in Vermont with a continuous Class III run over four miles long. Biological importance UNKNOWN.

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A bouldery upland stream in a post-agricultural valley, paralleling Rte. 30 and then following a dirt road to the West River. Largely in second-growth woodlands, unremarkable for scenery or wilderness.

A steep stream: gradient 65'/mile. Comparable in drainage to the Saxton's but steeper, generally similar to the Ompompanoosuc West Branch; less steep but with half again as much drainage area as the Wardsboro. Tight bends, many boulders three to four feet high, a few large rocks, no ledges.

Boaters say it is an exciting, technical stream, pushy and fast, that gives you little time to see what's coming and not much chance to recover if you make a mistake. With streams of this steepness, the water level is critical; with a 2' variation in level it can go from barely runnable to solid Class III. In flood it is very fast and there are the added hazards of opaque water and debris; it is definitely Class IV in flood and probably suitable only for experts in closed boats, and then with caution.

Since it has no ledges and derives all its roughness from boulders, we have been using it as a sort of hydrological bench mark for the upper limits of Class III water. We assume that any stream of comparable steepness and drainage will have at least Class III water; and that where, as in the lower New Haven,

comparable steepness is augmented by increased volume and sharp drops, the difficulty will become Class IV.

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Little biological data: listed as a brook and brown trout stream; no botanical information at all.

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Rated HIGHLY IMPORTANT for boating; an excellent Class III run. Biological quality UNKNOWN.

WARDSBORO BROOK\* (Basin 11)

Segment	Wardsboro to Jamaica
Length	4 1/2 miles
Towns	Wardsboro, Jamaica
Counties	Windham
Quadrangle	Londonderry 15', Saxton's River 15'
Access	Rte. 100
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Elevation	980'-560'
Average Slope	ca. 90'/mile
Description	small steep upland stream with large boulders and tight difficult rapids; Class III-IV, very dangerous at flood
Surroundings	second-growth hardwoods, road, houses, some hemlock; pretty ravine for last mile
Water Quality	good
Flow Regulation	none
Geology	Precambrian gneiss, Cambrian schist and gneiss
Hydrology	no gauge data: watershed at mouth 96 sq. km.
Biology	reported to have brook and brown trout; quality of fishery unknown; no botanical information
Known Use	much talked about but very few people have actually run it
Season	snowmelt and after rain
Suitable For	experts in closed boats
Interruption	none

Importance

HIGH IMPORTANCE: the most difficult stream in south Vermont that gets any regular use.

\* There are two Wardsboro Brooks in the West River watershed, this is the one that joins the West River in Jamaica

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A small upland stream paralleling Vermont Rte. 100; watershed under 100 sq. km. but slope near 100' per mile; hence comparable to the New Haven Gorge in hydrology but structurally different in that it has a boulder-filled channel rather than a ledgy one. Because of the steepness and the big boulders, when it is deep enough to run at all it is very fast. It has many obstacles and very narrow passages with no alternate routes; tight turns, very strong currents, big waves and holes. Class II-III above, Class IV below; brush and trees may dam up channels; water very murky when the stream is in flood; last mile is most difficult and may be Class V in flood.

Jim Northup, who gave us information about a number of Class IV streams, said that this was one of the most threatening small streams he had ever been in; he tried it at flood, and said that the combination of great speed, small size, limited visibility around corners, and limited maneuverability because of the narrow channel made it both very difficult and very dangerous.

There are two points where the stream goes under Rte. 100. Above the first bridge it is fairly small and mostly Class III in flood. Below the first bridge it becomes mostly Class IV. Below the second bridge it gets steeper and then enters a narrow

ravine. This is the most difficult part of the run: at high water it is sometimes prohibitively dangerous, even for an expert party.

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Rated HIGHLY IMPORTANT for boating, as a uniquely difficult high gradient stream. Biological importance UNKNOWN.

DEERFIELD RIVER, NORTH BRANCH (Basin 12)

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Segment	West Dover - Harriman Reservoir
Length	ca. 7 miles
Towns	Dover, Wilmington
Counties	Windham
Quadrangle	Wilmington 15'
Access	Rte. 100
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Elevation	1660'-1500'
Average Slope	20-30' per mile
Description	small to medium sized upland stream; Class I-II
Surroundings	meadows, condominiums, bars, ski shops, village of Wilmington, some trash, etc.
Water Quality	good above Wilmington, receives wastes in town
Flow Regulation	none
Geology	Precambrian gneiss; Cambrian gneiss and schist
Hydrology	no gauge data: watershed at Wilmington ca. 95 sq. km.
Biology	brown and brook trout present; quality of fishery unknown; no botanical information
Known Use	very little; not in guides
Season	snowmelt, spring, and after rain
Suitable For	open boats
Interruptions	none
Importance	LOCALLY IMPORTANT for boating. General biological quality UNKNOWN.

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No firsthand information. Reported to be a pleasant and not very demanding small stream with more consistent flow than the other branches and so useful later in the season. Passes through some moderately flat agricultural country, and probably one of these streams with slow straight parts and fast bends. Watershed and slope are small, and it probably has mostly Class I or mild Class II water. Parallels Rte. 100 through the Mt. Snow valley and so not the quietest nor the most countrified stream in the state. Views of the mountains are nice, but the valley is getting pretty cluttered. Rated LOCALLY IMPORTANT pending more information.

APPENDIX H  
Rules to Regulate the Uses of Stratton Pond  
in the Town of Stratton

- Rule 1. No motors shall be used to power boats on the pond.
- Rule 2. No houseboats or boats with living facilities are permitted on the pond.
- Rule 3. No docks or floats, whether permanent or temporary, are permitted on the pond.
- Rule 4. Boats owned or operated by agencies of the State of Vermont shall comply insofar as possible with the rules promulgated herein by the Vermont Water Resources Board except in cases of law enforcement, emergencies, or the performance of official duties.
- Rule 5. The Agency of Environmental Conservation shall make every reasonable effort to post visible and legible signs in the area stating these rules for the information of the public.
- Rule 6. These rules supplement and are not intended to modify other applicable laws and regulations except as provided herein.
- Rule 7. To the extent they have the authority to do so, the Selectmen of the Town of Stratton may make ordinances to amplify or enforce these rules, in a manner consistent with them, as the public interest of all the citizens of the State may warrant.
- Rule 8. The Vermont Water Resources Board retains jurisdiction over the subject matter of these rules and may modify them in accordance with applicable statutes.

Adopted August 15, 1974, by the  
VERMONT WATER RESOURCES BOARD

Filed August 28, 1974

Catharine A. Bothwell  
Executive Secretary  
Vermont Water Resources Board

APPENDIX I

Laboratories Which Perform Radon Analysis

<u>Water or Air</u>	<u>Approximate Cost</u>
Maine Public Health Lab 221 State Street State House Station 12 Augusta, ME 04333 207/289-2727	\$22-30
<u>Water</u>	
New Hampshire Water Supply and Pollution Control Commission 6 Hazen Drive Box 95 Concord, NH 03301 603/271-3445	\$15
<u>Air</u>	
Air Check Box 100 Penrose, NC 28766 704/862-4037 or 1-800/257-2366	\$20
Terradex Corporation 460 North Wiget Lane Walnut Creek, CA 95498 415/938-2545	
New England Environmental Counsel Box 1313 Scranton, PA 18505	
Accu-Labs Research Inc. 11485 West 48th Avenue Wheat Ridge, CO 80033	

APPENDIX J

Report 68, Hamilton Falls, Cobb Brook, Jamaica, Windham Co., VT  
Site 518, described from ten visits (1973-1983) by J.C. Jenkins.

Steep cascade with pools above and below, very popular for swimming; chain of cascades in the woods with falls and pools.

Atlas Map 7, USGS Londonderry 15' quadrangle. Main cascade is just south of bridge where Turkey Mountain Road crosses the bridge.

\* \* \*

The site is in the woods, about 50 yards from a dirt road and 1/4 mile from a house and small sawmill. It is undisturbed except for trampling.

Cobb Brook is a small mountain stream, averaging 10 to 15 feet wide. The water is very clean.

The main falls are on a mountain slope, in pine-hemlock woods. They are more or less in the open and get a lot of sun. From the bridge going down stream there is a small ravine with low rock walls and pools, then a small falls about five feet high, then a pothole 25 feet across and 25 feet deep with about eight feet of water in it. At the edge of a pothole is a lip directly overlooking the main falls. The main falls are a steep cascade 40-50 feet high. Below it are two more pools.

Below the falls there is about a mile of steep wooded ravine in which there are a series of small falls, pools, and cascades. None of these features is as striking as the main falls but taken together they make a beautiful area that would be of state importance even without the main falls.

The falls probably occur at the contact between the Hoosic and Cavendish schists, both garnet containing schists of Cambrian age. The contact is not visible (at least to a botanist) in the field. The rock is brown and blue schist with nice but not extravagant sculpturing, and is easy to climb and makes good potholes.

No rare plants occur. The main falls have very few plants, but the lower cascade is a good moss and liverwort area; no list is available yet, and so far the diversity is good but not exceptional. No lime occurs and the species all seem to be the reasonably standard ones expected on wet acid rocks.

The falls are much used for swimming and picnicking. They were formerly owned by the Southern Vermont Conservation Society, and now by the State, and the site is now a designated State Natural Area of the Vermont Department of Forests, Parks, and Recreation.

There have been a half dozen or so deaths there in the last 20 years. A sign warns of the danger. We suggest that the sign would have greater effect if it listed the names of the people killed there and the dates of the accident. The present warning is fairly meek, and since the danger is serious, the sign ought to be as scary as possible.

A fine place; the main falls are big and sunny and pretty--we know of few places like them; the lower chain of pools and cascades is hardly used and not as spectacular but rates high for beauty, privacy, length, and botany.

Summaries:

1. Upper falls: woodland setting, fine to spectacular rocks, average botany, no seclusion and wildness, clean site, very clean water, great swimming, very popular for parties and swimming, dangerous steep rocks, history of fatal accidents.

2. Lower chain of cascades and pools: woodland setting, fine rocks, exemplary botany, wild and private, no use, no trash, very clean water.

HIGH IMPORTANCE: exceptional wild chain of pools and cascades, major recreational site, impressive large cascade, State Natural Area.

APPENDIX K  
Summary of Comments from June 23, 1987, Public Hearing  
and Comments Received by Letter

General Findings

Comment: Vermont Natural Resources Council (VNRC) applauds the plan's strong emphasis on water quality problems and conflicts and "endorse the plan's recognition of stream segments which deserve additional protection thru either Class A designation or specific pollution management strategies." Eric Palola, letter, 7/3/87.

Comment: Include "potential stream segments that are eligible for Outstanding Resource Waters designation." Eric Palola, for VNRC, letter, 7/3/87.

Response: Any stream has this potential depending on the individual values at specific locations. The Department is conducting a detailed study of selected streams and it urges others to conduct similar studies to document important functions and values.

Gravel Removal

Comment: Towns should be able to remove gravel from streams. Clyde Prouty, Londonderry selectmen, 6/23/87 hearing.

Comment: Gravel removal has been greatly restricted by new Rivers Bill. J. McMenemy, memo, 7/31/87.

Reclassification to Class A

Comment: How do you reclassify a stream to Class A? (e.g, Beaver Brook.) Robert L. Davis, 6/23/87.

Response: See Appendix F for an outline of the procedure.

Comment: The Conservation Society of Southern Vermont (CSSV) supports, in general, the idea of reclassifying a number of streams below 2500 feet to Class A. This is necessary for maximum protection because there are practically no streams above 2500 feet in this basin. CSSV statement, 6/23/87.

Comment: VNRC strongly endorses the possible classification of certain streams to Class A, including:

- Upper reaches of the Winhall River, particularly in the areas of Stratton and Little ponds.
- Kidder Brook.
- Flood Brook, starting at Hapgood Pond and above.

VNRC, by Eric Palola, letter, 7/3/87.

Response: As stated in the plan, any petition to the Water Resources Board for special designation (Class A or Outstanding Resource Waters) should be based in fact about the particular functions of the waterbody.

Comment: Reclassifying the streams to Class A may affect our capacity for future growth. Instead, an analysis of our sewage treatment plans needs to be done. T. J. Nash, letter, 7/4/87.

Response: See response to preceding comment. The Department does routinely consult with municipalities on water treatment and sewage treatment plans.

Comment: "I strongly oppose reclassification of the streams and brooks to Class A . . .", which may affect future growth in the region. "I favor a plan which includes goals for clean water, not a document which creates a zoning map for this region." S. Specter, 7/6; A. Simmonds, 7/2; J. Burke, 6/30; E. L. Flanders, 7/3; P. A. Kuchn, 7/2; R. P. Hoffman, 7/1; D. Dyinban, 7/2; B. L. Whitney, 7/3; B. L. Shattuck, 7/2; K. Blomback, 7/2; J. Austin, 7/1; Z. Toth, 7/1; C. W. Swenson, 7/2; F. Pailley, 7/2; T. D. McG., 7/2.

Response: The Department of Environmental Conservation defers recommendation of reclassification pending detailed field studies of stream segments to determine if any protection is needed for the specific water related values found. The Department also proposes a public forum to discuss these findings.

Comment: We oppose the reclassification of streams which would slow regional growth and would not significantly improve water quality. We would like to see more publicity about these important matters, and we would like to see the problem of sewage from Burlington in Lake Champlain addressed more vigorously. Letter signed by 16 people dated 7/3/87.

Response: See response for preceding comment.

Comment: As a resident of the basin, "I strongly oppose reclassification of the streams and brooks without the benefit of a study of the economic impact on the community. I therefore request no further action be taken on reclassification of streams without such a study." Michael J. Keemar, letter, 7/3/87; Floyd R. Hunger, Jr., letter received 7/6/87; Greg Boyd, 7/3; Richard Lechthaler, 7/6; Daniel Gilbertson, 7/1; James Shultz, 7/2; Richard Eastman, 7/2; David Dressel, 7/2; Jim and Jean Cavanagh, 7/7; Thomas Wilson, 7/2; Clyde Prouty, 6/6; James Twitchell, 7/6; Harlan K. West Jr., 7/7; Bill Polk, 7/3; Everett B. Yelton 3rd, 7/6; Donna M. Griswold, 7/2; Leopold Fillion, 7/2; Reginald Cyr, 7/2; Pascal J. Wilkins, 7/2.

Response: See response above.

Comment: Reclassification of Cobb Brook and Turkey Mountain Brook to Class A will preclude further development of Timber Ridge Ski Area. Our most realistic sewage treatment alternative is spray irrigation and this would produce indirect discharges which would be inconsistent with Class A status. The plan seems to punish Timber Ridge for the noncompliance sins of others. The plan fails to balance the recreational use of the ski area, public access to the brooks, and compatible economic growth with continued Class B status and long-term water quality goals. Issac Davidov, Timber Ridge Ski Area, letter received 7/9/87.

Response: See above response regarding reclassification. The uses of the water specified in the Vermont Water Quality Standards for Class B must be protected. Ski areas can be developed with careful planning to preserve waters for Class B water uses and values which include public water supply with filtration and disinfection, irrigation and other agricultural uses, swimming and recreation, good aesthetic value, and high quality habitat for aquatic biota, fish, and wildlife.

Comment: Magic Mountain strongly opposes reclassification of streams to Class A, which "would probably bring a complete halt to Magic's expansion plans . . . and a potentially adverse result to the local economy." ". . . The basin's waters appear to be fully protected by the 'B' standards." Simon Oren, Magic Mountain, letter, 7/3/87.

Response: See responses above.

### Swimming

Comment: Plan should delete all references to swimming at Hamilton Falls because the state has posted it as no swimming due to ten people having been killed there. Simon Oren at 6/23/87 hearing.

Response: The primary danger is at the upper and middle pools. There is a flat stretch of water above the upper pot hole with pools as well as a large pleasant pool at the base of the falls. These areas are both used for swimming and there are no unusual risks here. We agree that there are dangers in swimming in the two pools within the rock falls.

Comment: Pollution from the mountain is endangering the health of those enjoying Pikes Falls and the swimming there. Rocks at the falls are getting slippery and slimy (didn't used to be). If nutrients can be prevented from getting in, that should be addressed. Eugene Lepkoff, Rebecca Lepkoff, letter, 7/23/87.

Response: The Department is concerned with the growing problem of nutrient enrichment and sedimentation in North Branch Brook. It is collecting data by which to determine an appropriate remedy.

Comment: The word "sporadically" (page 15) in reference to the occurrence of swimming in the basin does not give the right impression because it is widely dispersed throughout the basin. W. Uptegrove.

Response: We agree--sentence rewritten to read "Swimming occurs throughout the basin in deep stream pools and in ponds."

Comment: Swimming in the West River occurs right down to the Brattleboro town line. It goes far beyond the Dummerston and Newfane town lines (page 24). W. Uptegrove.

Response: We agree and we have clarified this in the text.

Comment: S-WW5 (page 21) is Wantastiquet Pond, not Wardsboro Brook. W. Uptegrove, letter, 6/26/87.

Response: So noted in the text.

Comment: S-J1 (page 17) should be S-T1. W. Uptegrove, letter, 6/26/87.

Response: So noted in the text.

Comment: "At times in the swimming area itself (Pikes Falls), a bubbly froth collects and stays." R. Lepkoff, letter, 7/23/87.

Comment: On hot weekends, there have been over 100 people (at one time) enjoying the cool waters and poetic setting (of Pikes Falls). Rebecca Lepkoff, letter, 7/23/87.

### Enforcement

Comment: Plan should recognize that designating waters as Class A or Outstanding Resource Waters will not clean up existing problems. Enforcement is needed. Simon Oren, discussion at 6/23/87 hearing.

Response: This is an important point that has been emphasized in the plan.

Comment: Act 250 and water quality provisions of development permits should be enforced, but a serious shortage of enforcement personnel appears to make enforcement impossible. (SACC) R. Lepkoff, letter, 7/23/87.

Response: The staff shortage has been hampering enforcement. Those who have an opinion in this matter could contact their representatives to the General Assembly.

Comment: A development moratorium on or below Stratton Mountain should be instituted until developers comply with their permits. Stratton Area Citizens Committee (SACC).

Response: Development permits are the jurisdiction of the Environmental Board and the District Environmental Commission. Water quality considerations are among the Act 250 criteria. This concern should be addressed to these two bodies which were established by statute to review and permit land development.

Comment: "Any pollution problems to the streams should be fixed under the law. Don't confuse people by reclassifying to Class A . . . just enforce the existing laws for the B." Simon Oren.

Response: There is considerable merit to this point of view. Please refer to responses under the section "Reclassification to Class A" above.

#### Fishing

Comment: Winhall River is stocked with brook trout and Atlantic salmon. Likely reason for "not productive" is high water temperatures. Upper Winhall has an abundant wild brook trout population. Salmon fry have been stocked in the Winhall from its mouth to the IPC bridge off the Kendall Farm Road. J. McMenemy, memo, 7/31/87.

Comment: Page A-15--In addition to impacts listed, hydroelectric facilities cause mortality to downstream immigrating salmon smelts (and other fish) by turbine passage. J. McMenemy, memo, 7/31/87.

Comment: Page A-10--Congress has authorized construction of a trap and truck facility at Townshend Dam by the Corps of Engineers . . . to be operating by 1991. J. McMenemy, memo, 7/31/87.

#### Alternative Methods of Waste Disposal

Comment: Board should publicize and carry out a program of education and demonstration re alternative methods of waste disposal. Elizabeth A. Ferguson.

#### Nutrient Loading

Comment: North Branch Brook is a "disaster" due to violations of development permits by Stratton Corp., Piper Ridge, and others. Effluent from sewage plant and spray operations and road construction over brook turned water turbid, rocks slimy, and cause growth of algae. SACC.

Comment: Contamination from Stratton's stump dump is still leaching into Styles Brook. Court order of 12/6/63 called for a

diversion dam to divide Styles Brook equally between the corporation's off-stream reservoir and downstream users. Styles Brook above reservoir was maintained Class A, but state downgraded brook below the dam to Class B. SACC.

Comment: On page 93, change next to last sentence, beginning ". . . and Bromley (primarily related to the flow . . .)" to ". . . and Bromley (primarily related to the runoff of sprayed waste water effluent from an old spray site which has since been discontinued)." John Cueman, letter, 6/22/87.

Response: So noted in text.

Comment: Also on page 93, change last sentence beginning "Undoubtedly, enrichment . . ." to "Depending on the quantity of impervious surfaces and the level of construction, enrichment from overland flow may also be occurring at these other ski areas, but ambient biomonitoring network stations had not been established for collection of stream data at these area." John Cueman, letter, 6/22/87.

Response: We agree with the intent of this wording. See text.

Comment: Would support the Department doing nonpoint source assessment and implementation plan under the recently passed federal program. W. Uptegrove.

Comment: After reading in the plan about the North Branch water quality, one wonders whether the developers have kept their promises under their Act 250 permits. W. Uptegrove.

Comment: The plan should be revised to include "developments" in addition to ski areas that should develop nutrient control plans (page 94). Eric Ekloff.

Response: This is the intent of the Department's recommendation. Headwater streams are fragile and changes in land use can significantly influence water quality. The text has been adjusted according to your suggestions.

Comment: VNRC supports development of nutrient control plans by ski areas and others; however, the plan is bereft of information about what such plans should consist of, guidance on basic parameters in a plan, and specific places in the basin where these plans are needed. VNRC, by Eric Palola, letter, 7/3/87.

Response: Such plans illustrate the sources of sediment and nutrients before, during, and after construction and adjust to scope, extent, location, and phasing of land use change to ensure that the water quality of adjacent waters is preserved.

Comment: The Department should make every effort to eliminate water quality degradation from the Stratton spray field and gold course. VNRC, letter by E. Palola, 7/3/87.

Comment: As suggested, a nutrient control plan should be implemented. Rebecca Lepkoff, letter, 7/23/87.

#### Pristine Streams

Comment: Future development of the Sun Bowl slope will spoil Kidder Brook, a pristine stream, which presently dilutes the polluted North Branch. Without Kidder Brook high quality water, "Pikes Falls is doomed as a recreation area." SACC and E. Lepkoff, Rebecca Lepkoff, letter, 7/23/87.

Comment: The CSSV is interested in the measures suggested for protection from further degradation, or possible restoration of the North Branch to its former pristine condition. CSSV statement, 6/23/87.

Comment: A plan may be of high quality, but if not implemented, it is a wasted effort. I suggest that a letter be sent to specific town officials in each town, point out water quality problems of the town being addressed, recommending corrective actions, citing relevant law, and referencing specific sections of the report in order to encourage implementation of the report's recommendations. Donald S. Bradshaw, letter, 6/24/87.

Response: The Department recognizes the importance of contacts with municipalities and it will attempt to expand its program to include discussions and correspondence on the points contained in this plan.

Comment: VNRC appreciates the work that has gone into the study and hopes that the plan receives "wide circulation so that many people and organizations can participate in achieving the objectives of the plan." VNRC, by Eric Palola, 7/3/87.

#### Septic System Failure

Comment: Would like to see septic system design standards, particularly soil types, distance from streams, flood plains, etc., referenced in the plan. Don Bradshaw.

Response: 24 V.S.A. 102 requires all new local septic system ordinances to follow the 1983 health regulations for individual on-site sewage systems. This technical document is complex and it is beyond the scope of this plan to quote it in full. To reference the document in part could be misleading.

Comment: Leland and Gray High School West River Project has been testing for coliform regularly at mouth of Ball Mountain Brook in Jamaica, above it, and at the bridge below Jamaica. Never found a violation (over 200 fecals per ml) but Jamaica is one of the highest spots of all the sites--between 20 and 50 fecal coliforms. Margaret Stearns.

#### Outstanding Resource Waters

Comment: "I wish you would explain the process by which citizens can petition for a Class A reclassification of waters and also the process for designation of Outstanding Resource Waters." Harvey Carter, VNRC, letter by E. Palola, 7/3/87.

Response: The process is outlined in Appendix F.

Comment: The final plan should mention the 1987 rivers protection act and describe its main provisions. W. Uptegrove.

Response: The major points are outlined in Appendix F.

Comment: The following streams are suggested as first candidates for Outstanding Resource Waters:

- West River, except for the two flood control dams;
- Turkey Mountain Brook between Burpee Pond and Little Turkey Mountain Brook;
- Cobb Brook; and
- North branch of Ball Mountain Brook, from the Golf Course Pond to below Pikes Falls. W. Uptegrove.

Comment: Reevaluate recommendations to reclassify streams to Class A or as Outstanding Resource Waters. There is a significant difference to the landowner in the types of activities they can undertake...very significant. Craig Heindel.

Response: Protection must correspond to the values that are at risk. A survey of the streams will reveal whether the present classification is adequate to protect the values. It should be recognized that the water quality standards specify that

"Class B waters shall be managed to achieve and maintain a high level of quality which is compatible with the following beneficial values and uses:

1. Values--Water which is of a quality which consistently exhibits good aesthetic value and provides high quality habitat for aquatic biota, fish, and wildlife.
2. Uses--Public water supply with filtration and disinfection, irrigation, and other agricultural uses. Swimming and recreation."

The concept of reclassification should not be used as a substitute for proper enforcement of existing water quality standards for Class B waters.

Comment: VNRC, in concurrence with CSSV, recommends the following segments as potential Outstanding Resource Waters candidates:

- West River, below Ball Mountain Dam to Townshend Dam;
- West River, between South Londonderry and headwaters of Ball Mountain Dam;
- a segment of North Branch Ball Mountain Brook (Pikes Falls);
- Cobb Brook including Hamilton Falls to the West River;
- segments of Turkey Brook or tributaries, especially in the gorge and waterfall areas; and
- Wardsboro Brook.

#### Wetlands

Comment: The plan should indicate wetland areas that may deserve protection. Examples may include the areas around Forester and Moses ponds or Bear Meadows at head of the Winhall River in Stratton (as shown in Figure 12). VNRC, Eric Palola, letter, 7/3/87.

Response: The Water Resources Board is developing rules for protecting wetlands. As proposed in draft, the rules would provide protection for the wetlands mentioned and many others in the basin with significant values.

Comment: I, we (SACC) are concerned with the quantity and quality of the drinking water. Stratton Corporation, Piper Ridge, and many other developments have taxed the water level. We had to go very deep with our well and only got a minimum amount of water. This was after our spring was contaminated two years ago. Rebecca Lepkoff, letter, 7/23/87.

#### Wild and Scenic Rivers

Comment: Regarding Figure 12, explain "Potential Wild and Scenic

River--Designated by U.S. Department of Interior." Does "potential" mean it hasn't been designated? Don Bradshaw.

Response: A draft list of Wild and Scenic Rivers was once prepared; however, there was no follow-up to formally designate any segment in Vermont.

Comment: Regarding potential wild and scenic rivers, then there is no real potential to control development in that area? Don Bradshaw.

#### Fishing and Boating (Existing Conflicts)

Comment: Cables should stop downstream of the Upper Salmon Hole for aesthetic purposes. No reason to cable at the Upper Salmon Hole as it is a placid area and no challenge for kayakers. W. Uptegrove.

#### Miscellaneous

Comment: Outboard motors (small, 2-cycle) on boats at Lowell Lake, Lily Pond, and Gale Meadows Pond cause contamination of waters and wetland (at end of Lowell Lake) with spilled gas and oil. Plan should recommend that motor boats be banned from these lakes. Robert Davis.

Response: The Water Resources Board can specify limitations to the use of waters. A local petition to the Board would initiate the process. This would lead to a public hearing to determine whether such a change is in the public interest.

Comment: The regional plan is consistent with the basin plan. Joan Price.

#### General Description of the Basin

Comment: Regarding the population figures in Table 1, Stratton's summer population of 5000 and the winter population of 8000 has been ignored. H. Chachinger.

#### Exotic Aquatic Plant Introduction

Comment: Does the Department want people to report sightings of milfoil or fanwort? If so, this should be encouraged and a phone number provided. VNRC, letter by E. Palola, 7/3/87.

Response: Yes, it is absolutely vital to catch infestations at an early stage. These should be reported to the Department as soon as they are observed.

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