Appendices for the West, Williams and Saxtons Rivers and adjacent Connecticut River Tributaries

Contents

For detailed information and explanation of the policy behind basin planning or the tools, activities, stressors and pollutants discussed herein please refer to the

Vermont Surface Water Management Strategy

Appendix A – Existing Uses

Contact Recreation

Waterbody	Site	Location of Use	Town	Documentation of Existing Use
West River Watershed				
West River	West River Park	Rte. 30, town rec area	Brattleboro	Swimming hole in town park
	Deyo's Hole	Rte. 30	Dummerston	Swimming hole off Rte. 30 ROW
	Brookline Bridge	West River crossing Newfane/Brookline town line	Brookline / Newfane	Swimming hole below bridge
	Dummerston Covered Bridge	Rte. 30 jct. of East-West Rd.	Dummerston	Swimming hole below bridge
	Dumplings	Jamaica State Park	Jamaica	Swimming hole in state park
	Jamaica State Park Beach	Jamaica State Park	Jamaica	Swimming beach in state park
	Salmon Hole	Jamaica State Park	Jamaica	Swimming hole in state park
	Scott Covered Bridge	USACE lands	Townshend	Swimming hole below bridge
	South Londonderry	USACE lands	South Londonderry	Swimming hole below bridge
	Townshend Lake Beach	USACE lands	Townshend	Swimming beach at USACE dam
	Tannery Brook Trail	West River Trail	Townshend	Swimming hole off trail access on USACE land
Winhall River	Winhall Campground Winhall & West confluence	USACE lands	Winhall	Swimming beach at USACE campground
Rock River	Rock River confluence to 1 mi upriver, including Indian Love Call	Town legal trail along Depot Rd. w/ access easement	Newfane	Series of swimming holes from mouth to 1 mile up river
Cobb Brook	Hamilton Falls	Jamaica State Park	Jamaica	Swimming hole in state park
North Branch Ball Mountain Brook	Pikes Falls	Jamaica Town Conservation Land	Jamaica	Swimming hole on town conservation lands

Waterbody	Site	Location of Use	Town	Documentation of Existing Use
Williams River Watershed				
	Rainbow Rocks	off Green Mountain Turnpike	Chester	Swimming hole off Green Mountain Turnpike, road ROW
Saxtons River Watershed				
	Saxtons River Falls	Below falls under Rte 121 bridge crossing	Saxtons River village	Swimming hole at end of town road
Connecticut River Watershed				
East Putney Brook	River Road Culvert	Below culvert crossing	Putney	Swimming hole off of town road
East Putney Brook	East Putney Brook Falls	At falls	Putney	Swimming hole off of town road
Sacketts Brook	Hickory Ridge Road South Culvert	Below culvert crossing	Putney	Swimming hole off of town road

Boating

Waterbody	Location of Use	Towns	Documentation of Existing Use
West River Watershed			
West River	Weston to Londonderry	Weston, Londonderry	Rated as IMPORTANT for boating (source: Jenkins & Zika, 1992) Put In: Bridge off Village Green Take Out: Rte 11 crossing at dam
	Londonderry to Ball Mountain Dam	Londonderry, Jamaica	Rated as HIGHLY IMPORTANT for boating (source: Jenkins & Zika, 1992) Put In: Rte 11 crossing at dam Take Out: USACE Ball Mountain Dam
	Ball Mountain Dam to Townshend Dam	Jamaica, Townshend	Rated as HIGHLY IMPORTANT for boating[1], nationally known whitewater releases, national team trials site Put In: USACE Ball Mountain Dam Take Out: USACE Townshend Dam

Waterbody	Location of Use	Towns	Documentation of Existing Use
West River	Townshend Dam to the Connecticut River	Townshend, Newfane, Brookline, Dummerston, Brattleboro	Rated as HIGHLY IMPORTANT for boating[1] Put In: USACE Townshend Dam Take Out: Retreat Meadows boat launch
Winhall River	Kendall Farm Road to the West River	Winhall, Jamaica, Londonderry	Rated as HIGHLY IMPORTANT for boating, continuous Class III run of over 4 miles[1] Put In: GMNF land at Arthur Court bridge crossing Take Out: USACE Winhall Campground
Wardsboro Brook	Wardsboro to Jamaica	Wardsboro, Jamaica	Rated as HIGHLY IMPORTANT for boating[1] (source: Jenkins & Zika, 1992) Put In: South Wardsboro Road crossing Take Out: Eaton Rd. crossing USACE property
Rock River	Penner Road to Williamsville	Newfane	National Whitewater Inventory, American Whitewater listing[3] Put in: Penner Road crossing Take Out: Williamsville Covered bridge
Rock River	Williamsville to West River	Newfane, Dummerston	National Whitewater Inventory, American Whitewater listing[3] Put in: Williamsville Covered bridge Take Out: Williamsville Station
Ball Mountain Brook	Metcalf Road to Jamaica State Park	Jamaica	National Whitewater Inventory, American Whitewater listing3 Put in: Metcalf Road crossing Take Out: Jamaica State Park

Williams River Watershed			
Waterbody	**Location of Use**	**Towns**	**Documentation of Existing Use**
Williams River	Chester to Brockways Mills	Chester, Springfield, Rockingham	Rated as HIGHLY IMPORTANT for boating Put In: VDFW Access jct. of Rts 10 & 103 Take Out: Above Brockways Mills Dam portage
		Rockingham to Connecticut River	Flatwater upstream to Parker Hill Rd bridge[2] Put In: Herricks Cove Take Out: Herricks Cove
Middle Branch Williams River	Five miles above Chester down to Chester center	Andover, Chester	Rated as HIGHLY IMPORTANT for boating[1] Put In: Rte. 11 bridge crossing east of Hill Top Rd. Take Out: Pull off at Jct. of Rte's 11 and 103
Saxtons River Watershed			
Saxtons River	Grafton to Saxtons River village	Grafton, Rockingham	Rated as HIGHLY IMPORTANT for boating[1] Put In: Town park on South Branch of the Saxtons River 0.5 miles up from confluence with the Saxtons mainstem Take Out: Rte. 121 left bank road pull off 0.3 mi. upstream of Pleasant Valley rd jct.
Saxtons River	Saxtons River village to Connecticut River	Rockingham	National Whitewater Inventory, American Whitewater listing[3] Put in: Pull off at Jct. of Rte's 11 and 103 Take Out: Trail above Blake-Higgins Dam below Rte 5 bridge

Connecticut River Watershed			
Connecticut River	Springfield to Brattleboro	Springfield, Rockingham, Westminster, Dummerston, Brattleboro	VDFW Access Areas: Hoyts Landing - Use Volume = Heavy Putney Landing - Use Volume = Light Dummerston Landing - Use Volume = Moderate Old Ferry Road - Use Volume = Heavy
			Other Official Access Areas: Herrick's Cove Picnic Area & Boat Launch Bellows Falls Bridge Portage Bellows Falls Historical Society River Access Retreat Meadows Broad Brook Access

[1] Source: Jenkins & Zika, 1992

[2] Personal Comm. M.L. Caduto

[3] American Whitewater:
http://www.americanwhitewater.org/content/River/state-summary/state/VT/

Fishing

Waterbody	Location of Use	Town	Documentation of Existing Use
West River			
- confluence	Confluence with the Connecticut River to Rte 5 bridge	Brattleboro	Special Fishing Regulation Area
- lower	Rte 5 bridge above confluence with the Connecticut River to Townshend Dam	Townshend, Jamaica	Special Fishing Regulation Area
- middle	Above Townshend Dam to Rte 100 bridge in Jamaica	Townshend, Jamaica	Special Fishing Regulation Area
- upper	Cobb Brook to Jamaica State Park entrance bridge	Jamaica	Trout Stocking
Williams River			
- confluence	Mouth to first Rte 5 bridge above confluence with the Connecticut River	Rockingham	Special Fishing Regulation Area
- lower	First Rte 5 bridge above confluence with the Connecticut River to above Brockways Mills Dam	Rockingham	Special Fishing Regulation Area
Saxtons River			
- confluence	Mouth to first Rte 5 bridge above confluence with the Connecticut River	Westminster	Special Fishing Regulation Area
Connecticut River			
	All waters of the river including the bays, set backs and tributaries, up to the first highway bridge crossing said tributaries on the Vermont and New Hampshire sides	several	Special Fishing Regulation Area

Water Supply

Waterbody	Town	Water Supply For	Documentation of Existing Use
West River			
Stickney Brook, above water intake	Marlboro, Newfane, Dummerston	Town of Brattleboro water supply	Class A2
Styles Brooks	Stratton	Stratton Corp.	Class A2, Emergency Use
Sunset Lake	Marlboro, Newfane, Dummerston	Town of Brattleboro water supply	Class A2
Williams River			
Chester Reservoir & the outlet stream	Chester	Village of Chester water supply - emergency	Class A2, Emergency Use
Saxtons River			
Signal Hill Brook (aka Bolles Brook)	Rockingham	Saxtons River & Vermont Academy	Class A2, Emergency Use
Connecticut River			
Ellis Brook, Farr Brook and Back Pond	Rockingham	Village of Bellows Falls – Minards Pond watershed	Class A2
Mill Brook and all waters above the intake in Westminster	Westminster	Kurn Hattin School	Class A2, Emergency Use

Appendix B. 1– Dams in the Basin

Stream	Dam Name	Town	Surface Acres	Dam Status	Purposes	Year Built/ Rebuilt	Hazard Class
Connecticut River							
Connecticut River	Bellows Falls	Rockingham	0	In Service	Hydroelectric		
Connecticut River-TR	Minards Pond	Rockingham	46	In Service	Water Supply	1900	Significant
Fullum Brook-TR	Westminster-1	Westminster	0.1	In Service	Recreation		Low
Sacketts Brook	Sacketts Brook	Putney	0.6	In Service			Low
Saxtons River							
Athens Brook-TR	Athens Pond	Athens	21	In Service			Low
Saxtons River-TR	Hamm Mine	Windham	8	In Service	Other	2012	Low
Weaver Brook	Holbrook	Grafton	7	In Service	Recreation	1978	Low
Saxtons River	Lawrence Four Corners	Windham	1.9	In Service			Low
West River							
Baker Brook-TR	Kenny Pond	Newfane	20	In Service	Recreation	1900	Significant
Ball Mountain Brook-TR	Cole	Stratton	5	In Service		1979	Low
Burnt Meadow Brook	Lyons Pond	Peru	3	In Service			Low
Burnt Meadow Brook	Newman	Peru	10	In Service	Recreation	1981	Significant
Eddy Brook-TR	Gale Meadows Dike	Winhall	204	In Service	Recreation	1965	Low
Farnum Brook	Farnum	Peru	7	In Service	Recreation	1973	Significant
Flood Brook	Hapgood Pond	Peru	4	In Service	Recreation	1939	Low
Flood Brook-TR	Hapgood Pond Dike	Peru	4	In Service	Recreation	1939	Low
Gulf Brook	Stiles Brook Reservoir	Stratton	0.9	In Service		1961	Significant
Gulf Brook	Gulf Brook Reservoir	Stratton	6	In Service	Other	1975	Low

Stream	Dam Name	Town	Surface Acres	Dam Status	Purposes	Year Built/ Rebuilt	Hazard Class
Marlboro Branch-TR	Hidden Lake	Marlboro	19	In Service	Recreation	1850	Low
Marlboro Branch-TR	Ennis	Marlboro	0.6	In Service	Recreation	1970	Low
Mill Brook	Gale Meadows	Londonderry	195	In Service	Recreation	1965	Significant
Mill Brook-OS	Lords Prayer Pond	Peru	2	In Service		1966	Low
Mill Brook-TR	Bromley Snow Pond	Peru	5	In Service	Other	1984	Low
North Branch Ball Brook-TR-OS	Stratton WWTF Lagoon	Winhall	1.4	In Service	Recreation	1996	Low
North Branch Brook-TR	Stratton Mountain Lake	Winhall	18	In Service	Recreation	1977	Low
Red Brook	Strattonwald	Winhall	4	In Service	Recreation	1979	Significant
Stickney Brook	Sunset Lake	Marlboro	95	In Service	Water Supply	ca 1910	Significant
Turkey Mountain Brook	Burbee Pond	Windham	34	In Service	Recreation	1920	Low
Turkey Mountain Brook	Windham-3	Windham	0				
West Brook-TR	Magic Mountain	Londonderry	3	Breached (Partial)	Recreation	1968	Low
West Brook-TR	Magic Mountain Lagoon	Londonderry	3.2	In Service			Low
West River	Ball Mountain	Jamaica	85	In Service	Flood Control, Stormwater, Recreation	1961	High
West River	Williams	Londonderry	8	In Service	Other	1900	Low
West River	Townshend	Townshend	100	In Service	Flood Control, Stormwater, Recreation	1961	High

Stream	Dam Name	Town	Surface Acres	Dam Status	Purposes	Year Built/ Rebuilt	Hazard Class
West River	Weston Mill	Weston	4	In Service	Fire Protection		Low
West River-OS	Thomson	Londonderry	5	In Service		1973	Low
West River-TR	Brattleboro-2	Brattleboro	0				
West River-TR	Londonderry-3	Londonderry	0				
West River-TR	Lowell Lake	Londonderry	100	In Service	Recreation	1850	Significant
West River-TR	Weston (Upper)	Weston	0.1	In Service			Low
West River-TR	Wantastiquet Lake	Weston	45	In Service	Recreation	1880/2010	High
Winhall River-OS	Mahoney Pond	Winhall	15	In Service	Recreation	1997	High
Worden Brook-TR	Manley	Marlboro	3	In Service		1956	Low
Williams River							
Williams River	Brockway Mills	Rockingham	4	In Service	Hydroelectric	1988	Low
Williams River-TR	Tomasso	Chester	3	In Service	Recreation	1983	Low
Williams River-TR	Upper Chester Reservoir	Chester	5	In Service	Recreation, Other	1915	Significant

Appendix B. 2 – Coordination Plan

U.S Army Corps of Engineers & Vermont Agency of Natural Resources
Coordination Plan for
Operating Federal Flood Control Dams in Vermont

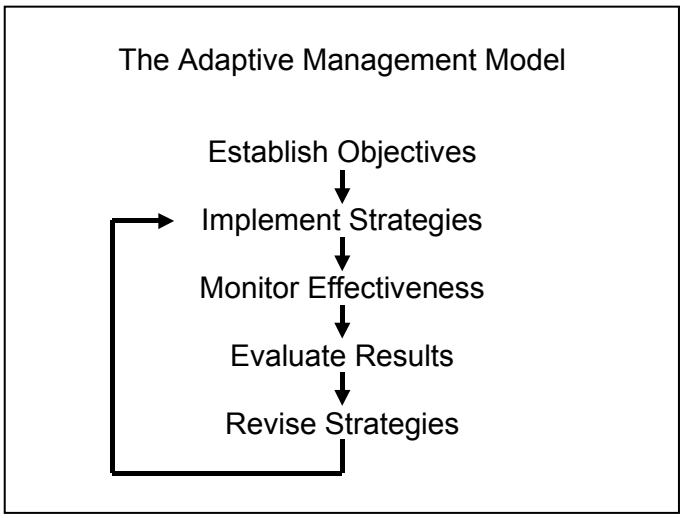
Background

In recent years, a number of concerns have been raised pertaining to the operation and maintenance of Federal flood control dams in Vermont and across the New England District. To address these concerns, the Vermont Agency of Natural Resources (VANR), U.S. Fish and Wildlife Service (USFWS), and U.S. Army Corps of Engineers (Corps) have engaged in collaborative discussions since 1999 to identify ways to improve operations at the five Corps' flood control projects in Vermont: Union Village, North Hartland, North Springfield, Ball Mountain and Townshend. As a result of these discussions, operational improvements have been enacted, including implementation of conservation flows and ramping standards.

To build on the work performed to date, the three agencies are implementing a three-year adaptive management process (AMP) to use as a framework for identifying and resolving issues of concern. The goal of the process is to evaluate current operational and maintenance practices and identify ways to maintain and restore the integrity of the downstream and upstream aquatic and terrestrial ecosystems while maintaining the projects' primary purpose of flood control and recognizing other recreation and natural resource management objectives.

The Adaptive Management Process

A basic tenet of adaptive management involves continued monitoring and evaluation leading to revised strategies that will achieve the desired results (see figure). This approach allows the participants to address problems and areas of uncertainty over time. In this case, issues related to the operation, maintenance and modification of the flood control projects will be addressed.



Each of the three participating agencies will designate representatives to a working group that will implement this plan. Other participants will be called in as needed to provide their expertise on specific issues.

A key part of the process is the annual interagency coordination meeting, to be held in January of each year. This meeting will provide the agencies with an opportunity to review the previous years' operations, revise operational and monitoring procedures, and raise new issues. Other meetings or site visits will be held as needed.

A number of issues identified and discussed in this plan require resolution or effectiveness monitoring. Adaptive management relies upon the collection of data that can be used to make appropriate adjustments. Assessment plans (for monitoring/assessment/evaluation) will be developed for each pending issue so that participating agencies have the information needed to move forward at each annual meeting.

Responsibility for administering the adaptive management process will rotate among the three agencies on an annual basis. The U.S. Fish and Wildlife Service will take the lead in the first year, followed by the Vermont Agency of Natural Resources, and then the U.S. Army Corps of Engineers. Administrative duties include organizing meetings (scheduling, preparing agendas, preparing meeting notes) and site visits. Each agency will be responsible for suggesting meeting agenda topics and preparing any necessary background material. Any modifications or operational changes agreed to by the parties will be incorporated into the operating and maintenance policies and practices of each project.

The Adaptive Management Plan

Regulation of flood control dams involves both flood control and non-flood control operations. In general, flood control operations involve the coordinated regulation of dams located on tributaries to reduce flood damages downstream of the dam and to reduce flood damages collectively on the Connecticut River. Flood control operations are authorized by Congress and implemented by the reservoir regulation manual for projects in the Upper Connecticut River Basin.

Non-flood control operations describe the scheduled or recurring regulation of the dams for other purposes. Flood control projects in Vermont are authorized to perform natural resources management activities and provide public recreational opportunities. A hydropower facility was added to North Hartland Dam at a later date.

Objectives:

- Maintain the dams' flood control function while mitigating the ecological impacts of flood control operations.
- During non-flood control periods, maintain downstream flows as close to instantaneous run-of-river as feasible, with outflow equal to inflow.

The following sections discuss a number of issues related to dam operation and identify those that will be addressed in the adaptive management process.

Flood Control Operations:

The Corps has maintained that it is necessary to maintain maximum operational flexibility during flood control periods. However, VANR and USFWS have expressed concerns about the ecological impacts of flood control operations. While the Corps has implemented ramping and conservation flow standards, the VANR and USFWS do not consider those standards protective of downstream resources and have advocated that more information be provided on how more protective standards would affect flood control capabilities.

Both ANR and USFWS have expressed an interest in learning when the projects are in flood control operations. The Corps will provide background information on how these decisions are made. Rather than try to define theoretically what may constitute flood operations at the dams, the Corps prefers to find a reliable way to contact and notify ANR and USFWS and incorporate this into the Communication Procedures.

Conservation flow, ramping, and reservoir release/refill standards for flood control operations will be addressed during the adaptive management period.

Routine Operations:

The Corps, ANR, and USFWS have agreed to the concept of routinely operating the dams in instantaneous run-of-river mode (outflow equal to inflow) outside of flood control periods. Differences remain on how closely releases from the dams should equal inflow. These differences are most evident at North Hartland and Ball Mountain, where pools are maintained year-round and outflow is controlled by the gate openings. It is also an issue, to a lesser extent, at Union Village, which has a pool in the winter only. VANR has identified problematic flow fluctuations and instances where flows fall below ABF during routine operations at these projects.

Over a 3-year period, the Corps will increase flow monitoring and gate adjustment frequency to twice a day during the work week and on the weekends if necessary, at Union Village (winter only), North Hartland, and Ball Mountain. Further, the parties will review the procedures used to monitor and adjust gate settings and develop procedures to improve routine daily flow management. The objective of this exercise is to develop procedures that will maintain outflow equal to inflow to the greatest extent feasible.

Non-Flood Control Operations:

While the general goal is run-of-river operation, the parties have identified circumstances, outside of flood control operations, when flow or reservoir stage manipulation is necessary or appropriate. Those circumstances are listed below and described in more detail in subsequent sections.

1. Whitewater boating releases
2. Periodic inspections
3. Beach maintenance
4. Major maintenance and rehabilitation
5. Emergency operations

As noted in the detailed descriptions, there is not consensus among the parties regarding when flow or stage manipulation is necessary.

During such periods, the Corps will employ conservation flow, ramping, and reservoir refill standards that serve to protect the ecological integrity of the downstream reach.

With respect to conservation flows, the Corps has implemented the USFWS Aquatic Base Flow (ABF) standard for non-flood control operations at all projects. The ABF standard is based on the drainage area at the dam and is expressed in cfs/mile or csm. The rates vary seasonally:

October – March: 1.0 csm (or inflow)

April – May: 4.0 csm (or inflow)
June – September: 0.5 csm (or inflow)

The Corps has agreed to maintain the seasonal ABF flow at all times when flows are being manipulated (i.e., non run-of-river) outside of flood control operations, provided inflows are equal or greater than ABF.

Similarly, ramping rates have been adopted at all projects for use during all operations (including routine) outside of flood control periods. The ramping rates are 0.5 csm/hr for flows up to 4.0 csm, and 1.0 csm/hr for flows greater than 4.0 csm.

Reservoir water level management is the final water management issue. Reservoir refill standards have been implemented by the Corps. When refilling the reservoir or raising the reservoir to an increased target level during non-flood periods, the seasonal ABF will be maintained at all times except when flows are below ABF. If inflows are less than ABF, then a 70/30 rule will be implemented whereby the dam will pass at least 70 percent of inflow while storing no more than 30 percent.

The Agency of Natural Resources contends that the 70/30 rule does not provide adequate protection for downstream resources, and has proposed a 90/10 rule, with 90 percent of inflow being released downstream. Resolution of this issue will be a priority of the adaptive management process.

During the AMP, a clear statement of seasonal reservoir target elevations will be developed. Other issues related to reservoir water level management will be identified by the parties within the first year of the adaptive management process and addressed.

Whitewater boating releases

The Corps has provided releases to accommodate scheduled recreational boating events at many of its dams for over forty years. At present there are two whitewater release events scheduled at Ball Mountain Dam and Townshend Lake. These releases, which are timed to coincide with planned seasonal regulations of the conservation pool, are scheduled for the last weekend in April and again in late September. In recent years, the resource agencies have raised concerns about the ecological impacts of these releases. In response, beginning in 2003, the Corps adopted the minimum conservation flows and ramping rates recommended by the U.S. Fish and Wildlife Service for each project.

For the spring release on the West River, the Corps will follow the ANR/USFWS ramping and refill rates agreed to by the parties. In addition, an overnight flow of 4.0 csm will be maintained. The target pool elevation at the start of this release will be approximately 75 feet with a target pool elevation of 25 feet at the end. Releases beyond the last weekend in April will not be considered due to the need to pass salmon smolts downstream in the spring.

For the fall release on the West River, the Corps will follow the ANR/USFWS ramping and refill rates agreed to by the parties. Beginning in 2003, the Corps has released water to support a one-day event. A full two-day event may be possible under conditions ~~when~~ where there is sufficient inflow to support a second day while employing ramping and 4.0 csm flows overnight. The target pool elevation at the start of this release will be 65 feet with a target pool elevation of 35 feet at the end.

Periodic inspections

To assure the integrity and ability of a flood control dam to perform its authorized purposes, inspection of the entire dam and related structures is performed every five years. Periodic inspection is required for the continued operation of the dam. In the future, the Corps will perform conduit and outlet works and gate inspections without restricting outflows from the control structures if and when possible. During these inspections, the flood control gates must be operated for structural, mechanical and electrical performance. Minor fluctuations to the outflow could be encountered during periodic inspection; however, testing of flood control gates will generally not occur during low-flow periods.

The preferred time to conduct conduit inspections will be during low-flow periods when this can be completed without interrupting river flows. The Corps will attempt to perform conduit inspections both prior to and during the scheduled fiscal year of the periodic inspection. If this is not feasible, some reduction of river flows may still be required in order to conduct a satisfactory inspection. Periodic inspections of dams in Vermont are scheduled as follows:

2002 – North Springfield Lake, Townshend Lake
2003 – None
2004 – Ball Mountain Dam, North Hartland Lake, Union Village Dam
2005 – None
2006 – None
2007 – North Springfield Lake, Townshend Lake

The following monitoring and operational procedures will be performed to minimize impacts during the inspection event:

If the outlet works and conduit can be safely inspected without disruption of flow during low-flow periods, the periodic inspection, and/or the inspection of the conduit/flood control gates, will be conducted at that time. To increase the probability of being able to perform conduit inspections during low-flow periods, the Corps will conduct inspections, if possible, whenever these naturally occur.

If reductions of flow are necessary to perform conduit inspections, outflow will be reduced only to the extent needed to safely inspect the conduit (historically < 1 hour). Under extenuating circumstances, the inspections may take longer to complete. Prior to and during each conduit/flood control gate inspection, the Corps will have biologists evaluate the impact of any planned gate operation on the upstream and downstream communities and habitat. During any shutdown, biologists will be stationed downstream of the conduit to monitor river conditions and rescue stranded fauna. These monitoring activities and protocols will be coordinated with the VANR and USFWS. In 2002, monitoring protocols for performing conduit inspections were developed and implemented at North Springfield Lake. Further refinement of periodic inspection and monitoring procedures are a high-priority for the AMP.

Beach Maintenance

The Corps maintains public swimming beaches in Vermont at North Hartland Lake, Townshend Lake and at Stoughton Pond at North Springfield Lake. These beaches are maintained annually to inspect the public swimming area and to remove debris and sedimentation that collects on the beach over the winter and when flood storage events inundate the beach and swimming area. The Corps will attempt to perform maintenance of the public swimming beaches without drawing down the conservation pool. As

part of this AMP, the parties will develop a process to determine if a satisfactory and safe facility can be maintained without water level manipulation.

The Corps has prepared a draft beach maintenance SOP that addresses issues surrounding the timing and mechanics of performing beach maintenance to minimize impacts to both downstream and reservoir aquatic habitats and species. VANR and USFWS will review the SOP and provide suggestions and alternatives for maintenance activities. Upon review and finalization, the beach maintenance SOP will be submitted to the agency representatives for their review and concurrence.

Major Maintenance and Rehabilitation:

Major maintenance and rehabilitation of the dams and appurtenant structures are necessary for their continued operation. These are large-scale projects, so they will be planned and coordinated separately from other routine or recurring activities. Close coordination with VANR and USFWS will begin early in the planning process and continue through project completion.

Emergency Operations:

Occasionally, the Corps will need to operate the dams in response to unplanned emergencies. These emergencies include acts of God, casualties, disasters, national defense or homeland security emergencies. At these times it may become necessary to take immediate steps to contain, limit, or alleviate an emergency in order to protect human health, safety, and welfare prior to initiating any form of coordination or consultation with other agencies or individuals. In these instances, the Corps will contact VANR and USFWS, among others, as soon as practicable, if emergency modification or interruption of flows has occurred.

Fish Migration and Passage:

Ball Mountain Dam and Townshend Lake have been modified to allow for passage of Atlantic salmon. The facilities at Ball Mountain Dam consist of one automated gate and at Townshend Dam a modified weir to allow for outmigration of salmon smolts. A trap-and-truck facility was constructed at Townshend Lake in 1993 to allow migrating adults to be trapped from the West River below Townshend Dam and transported above Townshend Lake and Ball Mountain Dam to locations identified by Vermont Fish and Wildlife. In 2002, the trap-and-truck facility at Townshend Lake was upgraded to a variable array electric barrier that was designed, constructed and operated in a manner that has significantly reduced gate operations and minimizes impacts to the downstream aquatic habitat. North Springfield Lake also has a modified outlet pool to protect salmon smolts.

Project Modifications:

The Corps recognizes a need to study the performance of the outlet works at Union Village Dam, North Hartland Lake and Ball Mountain Dam. At these projects, the Corps ability to maintain permanent or seasonal conservation pools, as well as maintaining run-of-river conditions, without a weir or static flow control structure is difficult. Another related issue is the repair or modification of the outlet gates at Townshend Lake.

In 1995, the Corps prepared a sedimentation study for Ball Mountain Dam that identifies and evaluates structural alternatives to the project. The study addressed the prevention of unplanned silt discharges into the West River resulting from faulty gate operations or failure of the automated gate operators.

The Corps recognizes the need for further study to identify and implement structural changes to the Vermont flood control dams to alleviate flow regulation problems and enhance the aquatic habitat. Any future study to modify these dams would need to be conducted under existing authorities. If current authorities are not workable, the agency representatives will pursue other funding or authorities. As part of the adaptive management process, the Corps will investigate water temperature problems at North Springfield and Townshend Lakes to address potential warm water invasion created by shallow conservation pools and top-spilling weirs. The Corps Water Quality Team is available to prepare study parameters and provide an alternative analysis of possible solutions.

The agencies have prioritized their respective needs. The agencies will jointly prioritize the respective priorities and propose a plan to implement studies or improvements.

- Vermont Agency of Natural Resources priorities:
    - Flow regulation improvement at Ball Mountain
    - Flow regulation improvement at North Hartland
    - Winter flow regulation improvement at Union Village
    - Downstream temperature impacts at Townshend
    - Downstream temperature impacts at North Springfield

- U. S. Fish and Wildlife Service priorities:
    - Feasibility studies of weirs at all gate-operated projects
    - Feasibility studies of converting projects with conservation pools to dry bed systems

- Corps of Engineers priorities:
    - Feasibility of weirs at Ball Mountain and N. Hartland Lake
    - Instream flow study on West River downstream of Ball Mountain Dam
    - Instream flow study on Black River downstream of N. Springfield Dam
    - Instream flow study on Ompompanoosuc River downstream of Union Village Dam

Coordination:

The following agency representatives should continue to serve in the capacity of moderators for meetings and dispute resolution. This Adaptive Management Plan and attachments will prevail unless amended and agreed to by all agencies. All parties involved in the preparation, implementation and evaluation of this plan agree to present their recommendations to these representatives for resolution or implementation prior to elevating their concerns to other persons, offices or agencies.

Supervisor, New England Field Office
U.S. Fish and Wildlife Service

7/22/04
Date

Acting Director, Water Quality Division
Department of Environmental Conservation
Vermont Agency of Natural Resources

7/22/04
Date

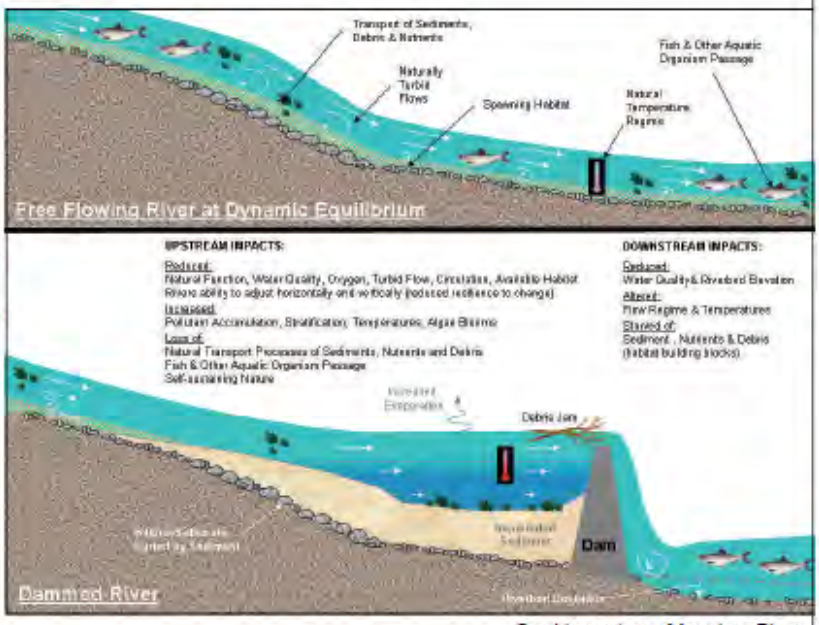
Chief, Construction/Operations Division
New England District
U.S. Army Corps of Engineers

7/22/04
Date

Appendix B – 3. How a Dam Affects a River

How a Dam Affects a River

Building a dam can affect a river in many ways. Fundamentally, the dam is a barrier that interrupts the natural river dynamics. The impoundment that forms behind the dam loses many of its riverine characteristics, impacting species that depend on river habitat for their survival.



Graphic courtesy of American Rivers

	Free-flowing river	Dammed river
Temperature	Natural temperature regime	Greater surface area of impoundment and surface release often results in higher water temperatures in impoundment and down-stream
Dissolved oxygen	Turbulent flow and shallower water depths result in high dissolved oxygen concentration	Loss of turbulent flow may reduce dissolved oxygen concentration; impoundment may stratify, further reducing dissolved oxygen
Habitat	Riverine coldwater habitat	Habitat is more lake-like and often unsuitable for coldwater fish species
Fish movement	Fish and other organisms free to move up-stream and downstream, including migratory fish such as Atlantic salmon	Access to habitat blocked or fragmented
Flow regime	Natural flow regime	Modified flow regime
Sediment	Natural transport processes maintained	Trapped in impoundment—natural substrate buried by sediment in impoundment, down-stream channel erosion may result to "replace" trapped sediment
Pollutants	Metals and organics are distributed down-stream	Metals and organics are concentrated in fine sediments trapped in impoundment
Nutrient transport	Nutrients are transported downstream	Portion of nutrients trapped in impoundment
Woody debris	Woody debris is transported downstream to create habitat	Portion of woody debris trapped in impound-ment

B.T. Fitzgerald
VANR Watershed Management Division
April 2010

Appendix B – 4. Whitewater Paddling Releases on the West River

Whitewater Paddling Releases on the West River

Vermont Fish and Wildlife Department; September 2004

What is the concern associated with the whitewater paddling release?

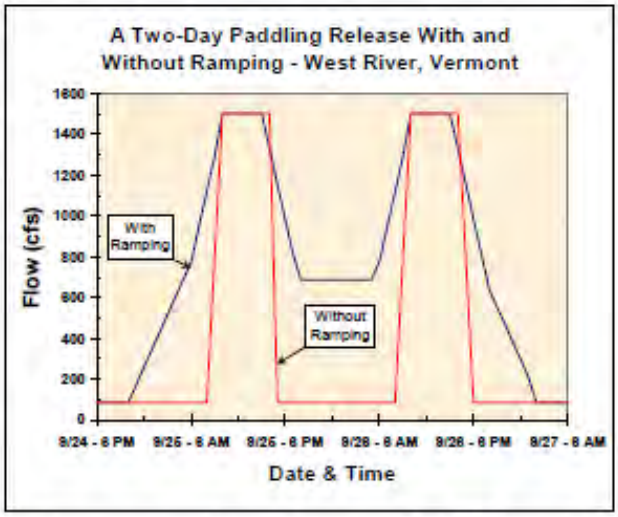
In the past, the paddling release has been turned on and off like a faucet, resulting in very rapid increases and decreases in the river flow. These abnormally rapid changes create problems for fish and other aquatic life in the river because they cannot react quickly enough to the changing conditions. Perhaps the most obvious impact is stranding. Fish get stuck in the rocks and left high and dry when the water levels drop rapidly (such as upon completion of the paddling release). The rapid increase in flow associated with the beginning of the paddling release is also a concern. Aquatic insects and mussels living on the bottom become dislodged, and along with smaller fish, are dislocated. This situation is not unlike the difficulty a paddler experiences when faced with an unexpected swim down a rapid. It's hard to find and get to shelter, and it saps your energy.

What characteristics of the release are of concern?

The magnitude of the 1500 cfs paddling release is acceptable. Natural river flows of this amount are not unusual during the spring and fall. The concern is with how fast the river flow is increased and then decreased again. To lessen the extent of the disturbance to aquatic organisms caused by a two-day release (a rapid flow drop at the end of day 1 followed by a rapid increase just hours later), the overnight flow should not be lowered beyond a certain point.

What is ramping?

In order to address the problems associated with overly rapid transitions on each end of the paddling release, the release can be changed in small steps over a specified period of time. This is called "ramping," because the flow is ramped up to the paddling release and then ramped down afterward.



Has the Agency of Natural Resources recommended ramping protocols to minimize the negative impacts of the paddling release on aquatic organisms?

Yes, ANR developed ramping rates that mimic the rates at which flows change naturally before and after a heavy rain. Flow data from a gage on the nearby, unregulated Williams River were used to develop the protocol. The logic is simple: aquatic organisms have become adapted to the dynamic character of the natural flow regime, so ramping that is similar to what occurs in nature should be fine.

Why is a two-day release in September no longer assured?

The second day has always been weather-dependent, although the need for ramping means that enough water will only be available in years when a lot of rain falls within a few days prior to the release. It takes more water to change flows at a slower, environmentally sound rate, and that means less water is available for

paddling releases. Ball Mountain Reservoir is much smaller in size than Army Corps reservoirs that support famous paddling releases in other parts of the country, such as the Gauley River in West Virginia.

If there isn't enough water for the release with ramping, why can't more water simply be stored in the reservoir?

There are a couple problems with trying to fill the reservoir up more. The reservoir is lowered in the spring to provide the spring paddling release. Refilling the reservoir is problematic when natural flows into the reservoir are low. The second problem is that filling the reservoir to higher levels floods out more of the river upstream, as well as upland areas, negatively affecting those resources.

Doesn't the U.S. Army Corps of Engineers manipulate river flows year around to such an extent that the whitewater paddling release represents little additional impact?

There have been a number of flow-related problems associated with Ball Mountain and other Vermont dams operated by the U.S. Army Corps of Engineers. However, the Corps, Vermont Fish and Wildlife Department, Vermont Department of Environmental Conservation and U.S. Fish and Wildlife Service are working cooperatively to resolve them. The paddling release is only one of a number of areas being worked on. For example, the same ramping protocol used during the paddling release will now be applied at all times, unless the project is in flood control mode, which generally happens a few times a year and is still under discussion. Other issues include low flow management, flow maintenance during conduit inspections and more.

Have site-specific studies been done that document environmental damage to the West River?

These studies have not been conducted, because they would be very expensive, requiring considerable field work to be done over a period of years. But, we are not inventing the wheel here. Many studies have been done elsewhere in the U.S. and in other countries. There is a large body of scientific evidence about the relationship between flows and aquatic resources. The effects of rapid changes in stream flows are known. An expensive study could be done but it is unrealistic to expect that it would show "no impact." Typically, the burden of proof is on a water user to demonstrate that the proposed activity will not harm the public resources.

Is there a concern about the spring release too?

The concerns are the same but because the river flow is much higher in the spring, there is almost always enough water for a two-day release with proper ramping.

Is this a choice between the paddling release and the environment?

It must be recognized that special releases are not without their harmful effects. However, an attempt has been made to enable the paddling releases to occur in a way that reduces their environmental impacts. This means that in most cases the spring paddling release will be a two-day event and the fall paddling release will be a one-day event. In addition to enjoying their sport, most paddlers are river stewards and support natural resource conservation.

Appendix B – 5. VDFW Whitewater Release Memo

VERMONT

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Agency of Natural Resources

Memorandum

TO: Jeff Crocker, River Ecologist
Eric Davis, River Ecologist

FROM: Lael Will, Fisheries Biologist

DATE: 10/26/2015

SUBJECT: Ball Mountain White Water Release

It is well known that impoundments and their associated dams can have detrimental impacts to water quality and aquatic habitats by altering the physical, chemical, and biological processes within, as well as downstream of the waters that they impound (Baxter 1977). With respect to regulated rivers, maintenance of the natural flow regime has often been the focus for managers as flow is a major determinant of the physical habitat in rivers and is a key driver for conserving biological resources native to these river ecosystems (Bunn and Arthington 2002). For example, aquatic species have evolved life history strategies that are in direct response to the natural flow regime. The impacts of altered flow regimes are evident across broad taxonomic groups including riverine plants, invertebrates, and fish (Bunn and Arthington 2002).

The Agency has recognized the value of managing regulated rivers to mimic the natural flow regime while incorporating the needs of other users (e.g. flood control). As such, the Agency and the Army Corps of Engineers (Corps) have historically worked collaboratively to develop outflow guidance for each project in Vermont that established conservation flows and ramping rates intended to protect aquatic resources. The outflow guidance for each project is based on best available information in order to meet water quality standards and other state environmental laws, and to fulfill the Corps mission of flood control. The overall goal of the adaptive management process that the Corps, Agency, and the U.S. Fish and Wildlife Service have been involved in over the past decade is to adopt and expand opportunities for run-of-river operation at District flood control dams that would protect the aquatic resources and meet requirements under the federal Clean Water Act.

In regards to whitewater releases at Ball Mountain Project on the West River, the current outflow operations for whitewater releases were developed in 2003 in order to reduce the environmental impact of whitewater releases and to better protect aquatic resources. The outflow guidance defines acceptable ramping rates, and overnight flows during these events. Time-shift releases have not been promoted.

While native biota are well adapted to natural high flow events, the duration, frequency, timing and magnitude at which they occur can cause negative impacts (Young et al. 2011). It has been well documented that erratic changes in flows without providing appropriate base flows and

ramping rates can have negative consequences to aquatic resources. The literature documents a reduction in species richness of benthic macroinvertebrates, reduction in standing crop of benthic macroinvertebrates, and stranding and displacement of macroinvertebrates and fish (Bunn and Arthington 2002) due to rapid flow fluctuations.

Over the course of 35 years, researchers have observed effects on fish at all life stages which have consequently affected fish populations (Young et al. 2011). In addition to stranding and displacement of fish, high flow fluctuations can cause behavioral changes in spawning activity, nest dewatering, nest scouring, and reduced survival and growth of juvenile fishes (Young et al. 2011). Juvenile fish are most vulnerable to due to weak swimming ability and typical habitat preference (Young et al. 2011). It should be noted that stranding of juvenile sized fish was observed in the West River after the two-day whitewater release in 2014.

Storing of water and reducing adequate base flows poses additional impacts to aquatic resources. Storing of water leads to a reduction in stream flow than would naturally occur. This was evident during the 2014 white water release where flows were well below the 62 year median for weeks prior to the release (Figure 1). These abnormal low flow conditions can pose added stress to fish (e.g. trout), during a time that they are particularly sensitive. Providing adequate base flows which mimic the natural hydrograph is recommended to insure that aquatic resources are provided with the necessary habitat to meet their biological needs.

Impoundments are known to cause elevated water temperatures (Lessard and Hayes 2003) within the impoundment as well as the receiving waters below. Lessard and Hayes (2002) found that increased temperatures downstream of an impoundment coincided with lower densities of several cold-water fish species, specifically brown trout (*Salmo trutta*), brook trout (*Salvelinus fontinalis*) and slimy sculpin (*Cottus cognatus*). Storing of water prior to a release likely exacerbates the thermal impacts and should be avoided.

Overall, the Department has concerns regarding the Corp's recent management of flows to provide white-water kayaking opportunities. The storage of water and rapid flow fluctuations are not consistent with the Agency's long standing position of managing regulated rivers to mimic the natural flow regime. We recommend that the Agency re-iterate these concerns to the Corps with the goal of moving back towards the original agreement.

If you require more clarification or have any questions regarding these recommendations, please do not hesitate to contact us.

VERMONT

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Young, P.S., J.J. Cech, and L.C. Thompson. 2011. Hydropower-related pulsed-flow impacts on stream fishes: a brief review, conceptual model, knowledge gaps, and research needs. Reviews in Fish Biology and Fisheries. 21:713–731.

Discharge, cubic feet per second
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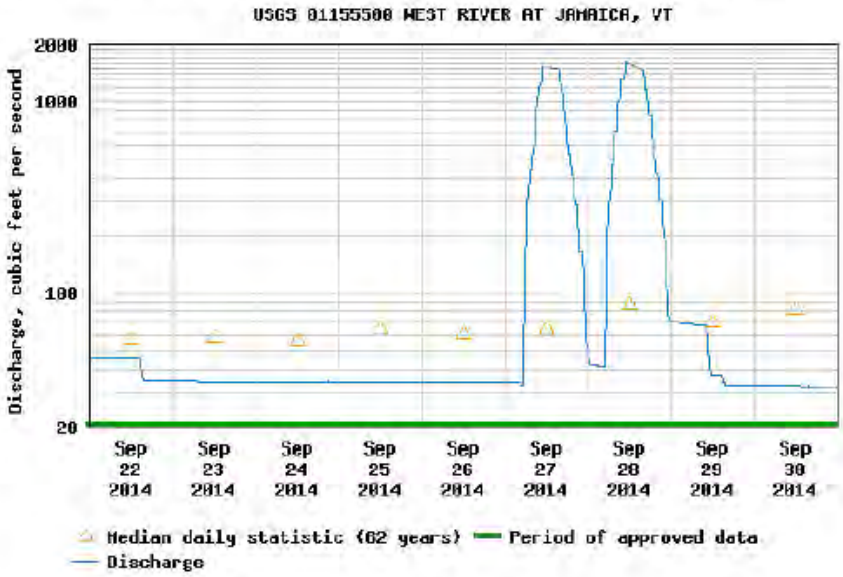
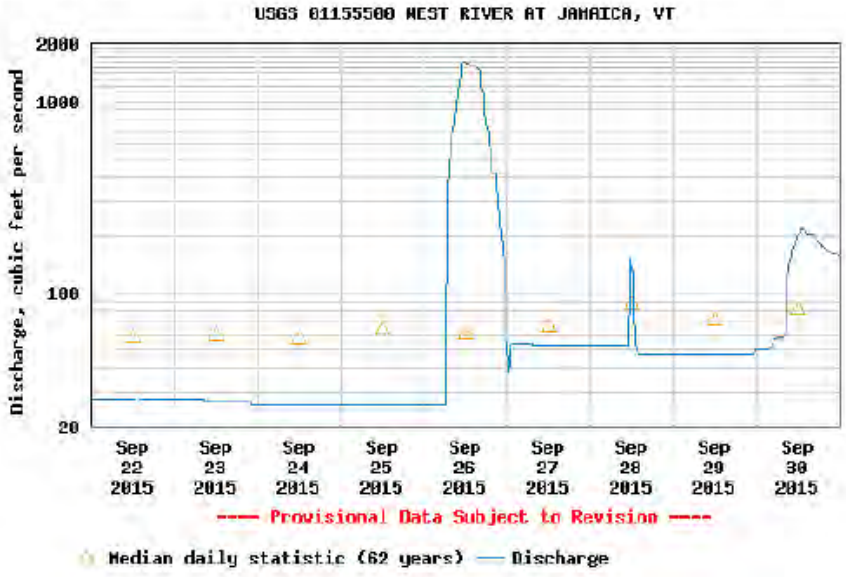


VERMONT

Discharge, cubic feet per second

Most recent instantaneous value: 69 10-06-2015 09:30 EDT



Discharge, cubic feet per second
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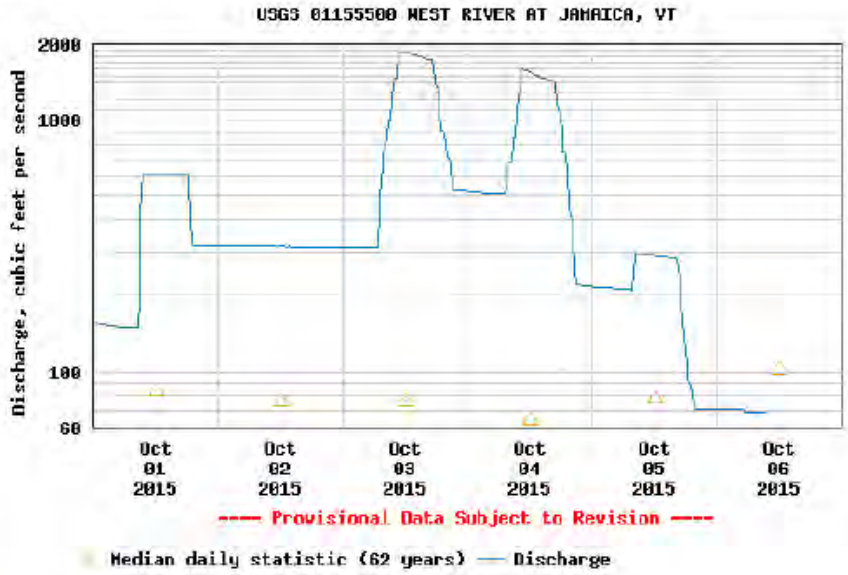

Appendix C – Fisheries Assessment Summary

Rivers and streams supporting fisheries. See Table 7 for fisheries in lakes and ponds. Abbreviations: Brook Trout, BKT; Brown Trout, BNT; Rainbow Trout, RBT.

Waterbody/reach	Location of use	Town(s)	Documentation of use
WEST RIVER			
Mainstem 1	Mouth upstream to U.S. Route 5 bridge	Brattleboro	Fishing pursuant to New Hampshire Connecticut River fishing regulations
Mainstem 2	U.S. Route 5 bridge upstream to Townshend Dam	Brattleboro, Dummerston, Newfane Townshend	General fishing
Mainstem 3	Townshend Lake/Reservoir	Townshend	Panfish & stocked with RBT
Mainstem 4	VT Route 30 bridge upstream to Depot Street Bridge	Townshend, Jamaica	General fishing
Mainstem 5	Depot Street Bridge upstream to Ball Mountain Dam	Jamaica	Stocked with RBT
Mainstem 6	Winhall River confluence upstream to Weston Mill Dam	Jamaica, Londonderry, Weston	General fishing
Mainstem 7	Weston Mill Pond	Weston	Stocked with BKT
Mainstem 8	Miller Farm bridge upstream to headwaters	Weston	Wild BKT
Stickney Brook	Watershed	Dummerston	Wild BKT
Rock River	Watershed	Newfane, Dover	Wild BKT & BNT
Smith Brook	Watershed	Newfane	Wild BKT & BNT
Grassy Brook	Watershed	Brookline	Wild BKT &
Mill Brook	Watershed	Townshend	Wild BKT & BNT
Fair Brook	Watershed	Townshend	Wild BKT
Wardsboro Brook	Watershed	Jamaica, Wardsboro, Stratton	Wild BKT & BNT
Turkey Mountain Brook	Watershed	Jamaica, Windham	Wild BKT & BNT

Waterbody/reach	Location of use	Town(s)	Documentation of use
Ball Mountain Brook	Watershed	Jamaica, Stratton	Wild BKT & BNT
Cobb Brook	Watershed	Jamaica, Windham	Wild BKT
Winhall River	Watershed	Londonderry, Jamaica, Winhall, Statton	Wild BKT & BNT
Flood Brook	Watershed	Londonderry, Peru	Wild BKT & BNT
Utley Brook	Watershed	Londonderry, Landgrove, Peru	Wild BKT
Greendale Brook	Watershed	Weston, Mount Tabor	Wild BKT
SAXTONS RIVER			
Mainstem 1	Mouth upstream to U.S. Route 5 bridge	Westminster	Fishing pursuant to New Hampshire Connecticut River fishing regulations
Mainstem 2	U.S. Route 5 bridge upstream to confluence with South Branch	Westminster, Rockingham, Grafton	General fishing
Mainstem 3	Confluence with South Branch upstream to headwaters	Grafton	Wild BKT
Bull Creek	Watershed	Rockingham, Athens	Wild BKT
South Branch	Watershed		Wild BKT & BNT
WILLIAMS RIVER			
Mainstem 1	Mouth upstream to U.S. Route 5 bridge	Rockingham	Fishing pursuant to New Hampshire Connecticut River fishing regulations
Mainstem 2	U.S. Route 5 bridge upstream to junction of VT Route 103 and Smokeshire Road	Rockingham, Chester	Wild BKT
Middle Branch	Watershed	Chester, Andover	Wild BKT & BNT
South Branch	Watershed	Chester, Windham	Wild BKT & BNT
LESSER CONNECTICUT RIVER TRIBUTARIES			
Salmon Brook	Watershed	Dummerston, Putney	Wild BKT, BNT & RBT
Canoe Brook	Watershed	Dummerston, Putney	Wild BKT, BNT & RBT
Sacketts Brook	Watershed	Putney, Westminster	Wild BNT from mouth upstream to dam; wild BKT in remaining

Waterbody/reach	Location of use	Town(s)	Documentation of use
			watershed
East Putney Brook	Watershed	Putney, Westminster	Wild BKT, BNT & RBT from mouth upstream to falls; wild BKT & BNT in remaining watershed
Fullam Brook	Watershed	Westminster	Wild BKT
Mill Brook	Watershed	West minster	Wild BKT
Cobb Brook	Watershed	Westminster	Wild BKT & RBT from mouth to I-91; wild BKT in remaining watershed

Appendix D – Lakes and Ponds Program Priority Activities in Basin 11 - 13

Lake	Town	LakeWise	AIS Spread Prevention*	Monitoring	Technical Assistance
Athens	Athens	Recruit local demonstration sites	Looking for interested volunteer monitors		Shoreland Best manage-ment training for contractors
Ball Mountain	Jamaica	"	Establish public access greeter program		"
Burbee	Windham	"			"
Cole	Jamaica	"	Establish public access greeter program	LMP volunteer support	"
Forester	Jamaica	"			"
Gale Meadows	Londonderry	"	Establish public access greeter program		"
Kenny	Newfane	"			"
Lily	Londonderry	"			"
Little	Windhall	"			"
Lowell	Londonderry	"			"
Moses	Weston	"			"
Stratton	Stratton	"			"
Sunset	Marlboro	"			"
Telephone	Chester	"			"
Townshend	Townshend	"			"
Wantastiquet	Weston	"			"
Beaver	Weathersfield	"			"
Hidden	Marlboro	"			"
Minards	Rockingham	"			Shoreland Best manage-ment training for contractors

The Vermont Lake Wise Program

The Lake Wise Program is offered through the Vermont Lakes and Ponds Program to provide trainings on lake-friendly shoreland management. Recent data from Vermont and the nation has shown that shoreline development can pose a significant threat to lake water quality. Through Lake Wise, lake property is assessed in four categories of property management– shoreland , recreation area, driveway, and septic /structures. Technical assistance then helps property owners identify locations where the use of best management practices can control run-off and prevent erosion. Properties that meet all Lake Wise criteria receive the Lake Wise award and accompanying sign designating their property as lake-friendly. Lake Associations are also eligible for the "Gold Award" if they assist 15% of their fellow lake residents to participate in Lake Wise.

Beginning in 2016, Lake Wise will be offering training in shoreland best management practices for contractors, landscapers and other shoreland site workers. See the Lake Wise Current events page for more information.

For more information, contact Amy Picotte at amy.picotte@vermont.gov or (802) 490-6128

Vermont Invasive Patrollers (VIPs)

VIPs are local volunteers who monitor a waterbody for new invasive species. They are trained to distinguish between native and invasive aquatic plants and animals during routine systematic surveys. These individuals provide a vital line of defense in Vermont's efforts to protect lake ecology and recreation. Finding an invasive organism before it becomes well established in a lake or pond increases management options and may make eradication possible.

For more information, contact Bethany Sargent at bethany.sargent@vermont.gov or (802)490-6129

The Vermont Public Access Greeter Program

The Lakes and Pond Program partners with local watershed associations to operate greeter programs at lake access points. Public access greeters educate lake visitors about invasive species, provide courtesy watercraft inspections and STOP introductions while providing needed data on the ways invasive organisms hitch rides on equipment. In 2014, greeters intercepted and removed aquatic invasive species 361 times, more than half of the recorded intercepts for the year.

Training sessions are offered annually. For more information, contact Josh Mulhollem at josh.mulhollem@vermont.gov or (802)490-6121

The Lay Monitoring Program (LMP)

For more than 35 years, the Lakes and Ponds Program has provided technical training and support for local water quality monitors around the state. Following a rigorously documented and quality assured method, these volunteers track changes in chlorophyll, phosphorus and lake transparency. The data support protection and restoration activities around the lake and in the watershed. Currently, there are monitors on approximately 55 inland lakes and 15 locations on Lake Champlain.

For more information, contact Bethany Sargent at Bethany.sargent@vermont.gov or (802)490-6129

Technical Assistance – Aquatic Invasive Species

The Lakes and Pond Program provides local watershed associations and municipalities with technical assistance to implement aquatic invasive species like Eurasian watermilfoil control programs on Vermont waterbodies.

For more information, contact Ann Bove or Josh Mulhollem at ann.bove@vermont.gov or josh.mulhollem@vermont.gov, or (802) 490-6120 (Ann) or (802) 490-6121 (Josh).

Appendix E – Regulatory and Non-regulatory Programs Applicable to Protecting and Restoring Waters

The Vermont Surface Water Management Strategy maintains a continually updated roster of regulatory and non-regulatory technical assistance programs.

Regulatory programs may be accessed at:
http://www.vtwaterquality.org/wqd_mgtplan/swms_appA.htm

Non-regulatory programs may be accessed at:
http://www.vtwaterquality.org/wqd_mgtplan/swms_appD.htm

Appendix F – Responsiveness Summary

Comment: Whitewater releases were eliminated from the Ball Mountain Dam a decade ago in an effort to restore Atlantic Salmon to the watershed, and millions of fry were stocked in the West River and other tributaries. Despite these efforts, Atlantic Salmon have unfortunately failed to return, making the elimination of the spring whitewater releases unwarranted. Given the fact that the USFWS has subsequently abandoned the restoration program, this no longer serves as a basis for eliminating this very well established existing use on the West River.

Response: In 2004 a coordination plan agreement was signed by officials at US Fish and Wildlife Service, US Army Corps of Engineers and VT Department of Environmental Conservation to address operation and maintenance issues at the five Corps owned flood control dams in Vermont. This collaborative agreement was developed to evaluate current operational and maintenance practices and identify ways to maintain and restore the integrity of the downstream and upstream aquatic and terrestrial ecosystems by expanding run-of-river operations that protect the natural flow regime, while maintaining the projects' primary purpose of flood control and recognizing other recreation and natural resource management objectives.

Whitewater boating on the West River is one of the primary recreational activities discussed. Historically the Corps had provided releases to accommodate scheduled recreational boating events at many of its dams. There were two whitewater release events scheduled at Ball Mountain Dam and Townshend Lake, which were timed to coincide with planned seasonal regulations of the conservation pool, and scheduled for the last weekend in April and again in late September. The resource agencies raised concerns about the ecological impacts of these releases based on the VANR's obligation under the VWQS which state in § 1-02 E-1: "The proper management of water resources now and for the future requires careful consideration of the interruption of the natural flow regime and the fluctuation of water levels resulting from the construction of new, and the operation of existing, dams, diversions, and other control structures." In response the Corps adopted minimum conservation flows and ramping rates recommended by the U.S. Fish and Wildlife Service for each project.

Under the agreement whitewater releases are operated following ramping rates of 0.5 csm/hr for flows up to 4.0 csm, and 1.0 csm/hr for flows greater than 4.0 csm. Overnight flows are to remain at 4.0 csm to prevent fish stranding and the dislocation of aquatic insects, mussels and small fish caused by overly rapid increases and decreases in flows. The ramping rates are set to mimic the rates at which flows change naturally before and after a heavy rain to which aquatic organisms are adapted.

The agreement proposed an adaptive management approach with an annual interagency coordination meeting, to be held in January of each year, for the agencies to review the previous years' operations, revise operational and monitoring procedures, and raise new issues. The last meeting took place in the fall of 2012. Unfortunately, since the last meeting the USACE has made unilateral changes to ramping rates and overnight flows. More recent whitewater releases have been conducted in a manner that differs from the protocols identified through the collaborative adaptive management process. It is uncertain if the current protocols properly balance aquatic biota, wildlife, and habitat use with recreation use.

Maintaining fish migration and passage is a primary resource concern for dam operations. Both Ball Mountain and Townshend allow passage for outmigration of salmon smolts and Townshend has

upstream passage for migrating adults. Early agreements also discussed passage, by trucking, upstream of Ball Mountain dam but this was never instituted. While the salmon stocking program has been discontinued, the downstream passage of other species remains possible due to the management of conservation flows and the maintenance of conservation pool elevations based on seasonal fish passage requirements. Upstream passage at Townshend was discontinued by USACE with the salmon program. American eel are known to pass up the Townshend dam when the pool is maintained at a low level. No eels are currently present above Ball Mountain dam but historically, prior to construction of the dams, they ranged up to Weston.

Radio telemetry work done for the Connecticut River FERC studies showed that sea lamprey migrate into the West River as far up to Townshend Dam. One was tracked into the West River. Connecticut River lamprey are a Species of Greatest Conservation Need.

A recent development benefitting fish passage is the development of hydropower at the Ball Mountain and Townshend dams (under construction). The developer is required to build fish passage facilities for resident species. The fish passage facilities will be operated from April 1 through June 15 and from September 15 through November 15 each year. The licensee is also required to perform a fish passage effectiveness study.

Rapid increases in flow upon gate opening can disrupt fish spawning behavior and cause the flushing of aquatic insects out of the reach which can result in decreased growth rates of resident fish. Similarly this can displace small, weak swimming fish species and/or fish life stages. The potential for this is greater for spring releases when there are eggs and larvae of early spawners present e.g. trouts and Slimy Sculpin.

Rapid flow fluctuations can also disrupt the reproductive cycle of the Brook Floater mussel, dislodge mussels from the substrate and cause habitat alterations. The West River from Ball Mountain dam to the Connecticut River is the only known location of Brook Floaters in Vermont. It is listed as a state Threatened species and is proposed for listing under the federal Endangered Species Act. Recent surveys have shown this species to be in decline throughout the Northeast region and beyond including the West River. The 2014 study, Brook Floater (*Alasmidonta varicosa*) in the West River in Vermont (Biodrawversity, 2014) identifies possible causes for the decline. In the reach between the dams the threats listed are: bank erosion, channel geomorphology, loss of riparian buffers, hydrologic alteration, and tributary influence. Below Townshend dam they are: thermal alteration, hydrologic alteration, changes in fish assemblage, bank erosion, loss of riparian buffers, channel geomorphology, and tributary influence. All of these may be exacerbated by rapid flow fluctuations.

Rapid drawdown of water levels following the closing of dam gates after a daytime release can result in fish stranding and the dewatering of eggs incubating in the riverbed. It should be noted that stranding of juvenile sized fish was observed in the West River after the two-day whitewater release in 2014[1].

Storage of water and reductions in adequate base flows pose additional impacts to aquatic resources. Storage of water leads to a reduction in stream flows beyond what would be expected to naturally occur. This was evident during the 2014 white water release where flows were well below the 62 year median for weeks prior to the release. These abnormal low flow conditions can pose added stress to fish (e.g. trout), during a time that they are particularly sensitive. Providing adequate base flows which

[1] VDFW Memo to WSMD Streamflow Protection

mimic the natural hydrograph is recommended to insure that aquatic resources are provided with the necessary habitat to meet their biological needs.

While native biota are well adapted to natural high flow events, the duration, frequency, timing and magnitude at which they occur can cause negative impacts (Young et al. 2011). It has been well documented that erratic changes in flows without providing appropriate base flows and ramping rates can have negative consequences to aquatic resources. Ramping of increasing and decreasing flows must be assured. This is important to afford the biota time to seek shelter during increased flows, and time to find water during decreasing flows.

In 2004 ANR conducted a study before and after the fall release approximately 2.8 miles downstream of the Ball Mountain dam. Results show that there were some significant changes in the functional group composition of the community, due to the decrease in the dominate Mayfly *Isonychia sp*.; however the overall community structure and function did not significantly change. As such it was concluded that the fall whitewater releases did not significantly affect the macroinvertebrate community integrity. It should however be noted that the reach assessed was 2.8 miles below the dam and greater scour impacts may occur closer to the dam. A spring release may also cause more disruption due to the life stages of aquatic organisms.

Given the results of studies and other factors noted above, Vermont ANR recommends that the agency coordination meetings be reinstituted to enable future discussion of operational procedures. Also recommended are on-site studies to determine the impacts of dam operations on resident fish passage and the threatened Brook Floater mussel, monitoring of upstream and downstream temperatures and an analysis of aquatic habitat conditions in order to better define the impacts of current operations on the aquatic ecosystem. These studies will inform future discussions of dam operations.

Comment: We request that the spring release date be changed from the last week of April to the first or second week of May.

Response: The timing of the spring release was set based on aquatic organism response to water temperature. At colder temperatures there is less biological activity and less movement of organisms. As temperature rises, which can be fairly rapid in spring, activity increases and this could result in negative impacts to aquatic organism populations.

Comment: With regard to boating on rivers in the Basin 11 and 13 region, the Draft Appendix identifies boating on the West River, Winhall River, Wardsboro Brook, Williams River, Saxtons River, and the Connecticut River as existing uses. The American Whitewater (AW) rivers database and other publications identify additional rivers where boating is an existing use. The Basin Plan should be revised to reflect a more thorough review of existing boating use.

Response: AW data will be incorporated into the Existing Use table in Appendix B. AW data will also be used to evaluate other waters within the Basin for study to gather documentation for potential reclassification of waters to further recognize boating uses, coincident with DEC efforts to refine the classification and use system underlying the Vermont Water Quality standards.

Comment: The 2008 Plan concludes that such releases are harmful, alluding to several old studies related to the effects of hydropeaking. These studies are irrelevant to the supposed impacts from a

handful of whitewater releases on the West River because the Ball Mountain Dam is a flood control rather than a hydropower dam and does not operate in a peaking mode.

Response: Scheduled whitewater releases for whatever purpose when done without ramping mimic hydropower peaking operations. We believe studies related to hydropower flow alterations are pertinent to these releases.

Comment: It does not appear that any effort was made to conduct water quality sampling at whitewater releases and no effort was made to develop and promote a week-long area wide River Festival.

Response: Biomonitoring was done in 2003 before and after the fall whitewater release. A fish survey was conducted in 2014 following the two-day release. The State would be happy to discuss with AW opportunities where augmented water quality sampling would provide important information to support assessment of use support pursuant to the Water Quality Standards.

Comment: A 2005 study of the economic impact of whitewater releases conducted by Crane & Associates concluded that each release weekend resulted in an economic impact of $440,065 for each 2-day release cancelled, or a loss of $147,973 for the elimination of the second day release on a release weekend. The cumulative impact of the 2008 Plan was that thousands of people were deprived of recreational opportunities on the West River, and the towns in the area of Jamaica were deprived of millions of dollars in economic benefit in the ensuing decade. There is no data to support the view that these losses resulted in any benefit to the Atlantic Salmon restoration program or that there was any benefit to the aquatic habitat as promised by the 2008 Plan. The Agency should revise the 2015 Draft Basin Plan to appropriately recognize this use and the positive economic impact that it brings to Vermont.

Response: Atlantic salmon restoration is not the only reason to work toward habitat restoration on the West River. The viability of other anadromous and catadromous fish populations and the movement of resident fish and other aquatic organisms throughout the river system continue to be important goals, the support of which is required by 10 VSA 1252 and the Vermont Water Quality Standards. The natural resource concerns expressed by VANR and USFWS remain for these species. It is the responsibility of VANR to protect and improve the health of Vermont's ecosystems.

Comment: Nowhere in the 2014 Water Quality Assessment Report is there any mention of whitewater releases as contributing to the temperature impairment on the river. Short of removing the Ball Mountain and Townshend dams, temperature impairments will continue due to heating caused by the presence of the reservoirs.

Response: Agreed

Comment: The unsigned and undated ANR/USACE agreement document was drafted without the input of stakeholder groups that would be directly impacted. The document is no longer accurate in that the spring whitewater releases were cancelled entirely when the Atlantic salmon smolt migration period was extended to April 1 – June 15.

Response: The agreement was written to support an adaptive management approach to dam operations which involves on-going monitoring and evaluation leading to revised strategies that will achieve the desired results. Meetings have taken place up to 2012, and appropriate changes made to

the operating procedures altering the original document's language. The Department supports reinstitution of the standing coordination meetings.

The signed original agreement is now included in Appendix B.

Comment: Based on our review of the flow data upstream of the Ball Mountain Dam at Londonderry over the past three years, it is clear that there are numerous unscheduled times during the year when there are boatable flows on the West River. While there has been no whitewater boating study on the West River to determine minimum boatable and optimal flows, flows in the range of 1300-1700 cfs are often boated during the fall scheduled release, with a target of 1500 cfs for scheduled releases.

Over the past three water years, there were approximately 10-15 natural high-flow occurrences on the West River that produced boatable flows, half of which were multi-day events.

Response: These natural flow events provide opportunity for recreational boating at flows enjoyed by whitewater paddlers, which supports ongoing use of waters for boating across a range of flows.

Comment: Any actions that restrict or eliminate existing uses should only occur after careful study and through an open and transparent process involving all community stakeholders impacted by the proposed action. Plainly that did not occur on the West River prior to the elimination of scheduled whitewater releases.

Response: Site specific studies have been conducted to evaluate the impacts of whitewater releases to the river ecosystem. These include:

- West River release macroinvertebrate assessment, 2004 – macroinvertebrate study before and after fall release
- Fish survey 2014 – documented fish stranding on the West River at end of release
- Brook Floater (*Alasmidonta varicosa*) in the West River in Vermont, 2014

The conclusions of these studies are stated under other responses.

Further, it is the position of the Department that existing uses of boating are supported in the West River notwithstanding the changes to the scheduled drawdown. The contention that rescheduling or curtailment of a scheduled release eliminates an Existing Use as defined by the Vermont Water Quality Standards is an inaccurate application of the antidegradation policy in the Water Quality Standards. The existence of scheduled releases creates a situation where the opportunity exists for boating in high-flow situations. However, this does not mean that the releases create water quality conditions necessary for the attainment of uses as defined by 10VSA §1252(a), which states that Class B waters are *"suitable for bathing **and recreation**, irrigation and agricultural uses; good fish habitat; good aesthetic value; acceptable for public water supply with filtration and disinfection"* (emphasis added). Further, the protection of the use of boating at scheduled high-flow conditions cannot conflict with the maintenance of other designated uses. Documented strandings of fish resulting from improperly managed flow ramping would be an expression of the non-attainment of the fish habitat uses as defined in 10VSA§1252(a).

Comment: Given the lack of site-specific studies, conflicting information on the impact of pulse flows, and the lack of any nexus between the temperature impairment on the West and whitewater releases, the 2015 Plan should be modified to support the restoration of whitewater releases on the West River

until such time as there is real data supporting the conclusion that whitewater releases should be curtailed.

Response: The river reach between the Ball Mountain and Townshend dams is listed as impaired for temperature due to the impounding of water above both dams. The West River from the Ball Mountain dam to the Connecticut River is listed in Part F. Surface Waters Altered By Flow Regulation, of the 2014 Vermont Priority Waters List. Waters appearing in Part F are assessed as "altered." They represent priority management situations where aquatic habitat and/or other designated uses have been altered by flow regulation. From the Townshend dam to the Connecticut River the river is also listed as Stressed for both temperature and flow modifications due to dam operations and other impacts.

More studies are recommended in the Plan to try to document the causes of these impacts. Until a full analysis can be conducted ANR will proceed with caution in order to protect the aquatic ecosystem.

Comment: West River whitewater releases should be re-established for their recreational and economic benefits.

Response: ANR does not support re-establishing whitewater releases on the West River without multi-Agency meetings as recommended in conjunction with the 2004 coordination plan.

Comment: The description of the West River in Chapter 2 uses rather mild language to describe impacts (temperature and flow regulation) caused by the two Corps of Engineers flood control dams. The plan should go into more detail about disruption of sediment transport, other impacts resulting from Corps operations (e.g., desilting at Townshend), the ineffective fish trap at Townshend, water level regulation in Ball Mountain Reservoir, loss of riverine habitat in the impoundments and degraded littoral habitat. There are likely other impacts. In other words, these dams are killing the West River and the plan should point that out. Further, addressing these problems should be included as a priority action using **all** of the tools at the Agency's disposal, including legal action if necessary, since past efforts to resolve problems at the Corps dams in a collaborative fashion have failed.

Response: Added:

- Appendix B.3. How a Dam Affects a River
- Appendix B.4. VDFW Memo - Ball Mountain White Water Release
- Appendix B.5. VDFW Whitewater Release Memo

Comment: The by-pass reach of the Connecticut River in Bellows Falls below the hydroelectric dam should be developed as a whitewater recreation area. The 2015 Basin 13 Plan should be revised to reflect the public interest in whitewater boating at Bellows Falls. The Plan should also support the study of the feasibility of removing the low-head dam upstream from the Vilas Bridge.

Response: The Bellows Falls by-pass reach is under consideration for recreational development as part of the Federal Energy Regulatory Commission's (FERC) re-licensing process for the hydroelectric dam. TransCanada Corp conducted a whitewater boating assessment looking at the potential for boating and the safety of paddling the reach. The results are pending and the re-licensing process will not be completed for several years.

Vermont does not have sole jurisdictional control of the Connecticut River and any development would require agreement between Vermont, New Hampshire, USACE, FERC and TransCanada Corp.

The State recognizes the prospective removal of the low head dam, and is awaiting results of ongoing studies before making a final determination as to the advisability of the removal.

References:

Biodrawversity LLC. 2014. Brook Floater (*Alasmidonta varicosa*) in the West River in Vermont. Prepared for Vermont Fish and Wildlife, Wildlife Diversity Program, Montpelier, Vermont.

Bunn, S.E. and A.A. Arthington. 2002. Basic Principles and Ecological Consequences of Altered Flow Regimes for Aquatic Biodiversity. Environmental Management 30 (4) pages 492–507.

Young, P.S., J.J. Cech, and L.C. Thompson. 2011. Hydropower-related pulsed-flow impacts on stream fishes: a brief review, conceptual model, knowledge gaps, and research needs. Reviews in Fish Biology and Fisheries. 21:713–731.

General Comments

Comment: In Chapter 2, there is a description of lakes and ponds in the watershed. Ball Mountain Reservoir and Townshend Reservoir are included in that section, likely because they are included in the DEC lakes inventory. An online check revealed that the inventory lists them both as lakes with "artificial" outlets.

It's really not accurate to consider either of these artificial impoundments to be lakes. A quick look at an air photo will show that they are both really impounded reaches of the West River. That is, at normal water levels (i.e., when not storing water for flood mitigation) they are fairly long and narrow, being basically confined to the river channel and immediately adjacent floodplain. Townshend in particular impounds a large volume of sediment, similar to many riverine impoundments. Both have much more in common with the Connecticut River impoundments behind the dams at Vernon and Bellows Falls (which are not in the lakes inventory) than they do with other reservoirs in the state like Somerset, Harriman, Green River and Waterbury. I suggest that they be reclassified and be inventoried and assessed as impounded reaches of the West River rather than lakes.

Response: Added wording indicating that all four of the largest lakes in B11 are impounded by dams. Removal of these waterbodies from the Lakes Inventory would have other management implications, and therefore this action is not supported by VANR.

Comment: A section on dams and dam removal begins in Chapter 2. This section does a nice job of describing the impacts of dams and the driving forces behind dam removals. The plan goes on to explain that The Nature Conservancy evaluated dams in the Connecticut River drainage. While the description is correct, it would be worth noting that the analysis will likely be redone at a finer scale to pick up smaller structures. (The original analysis was performed using 1:100,000 scale hydrography.) Once that work is completed, most likely in 2016, additional dams that may be good removal candidates may be identified. (I also noted that the link in footnote 9 is broken.)

Response: Language added, link fixed.

Comment: The Connecticut River Watershed Council should be included as a partner under hydro dam licensing in the table on p.65.

Response: Added

Comments on Implementation Table

Comment: It would be worth adding a new objective under assessment and monitoring: "Assess all dams listed in the Vermont Dam Inventory and identify dams to be added to the inventory". The point would be to ensure that AOP and other important factors are accurately portrayed in the inventory and that all dams are listed.

Response: Objectives added

Comment: *Objective 15:* The plan notes that the Sacketts Brook Dam was highly ranked in the TNC dam analysis. However, it is not identified in this objective. Conversely, the Coop Dam on Whetstone Brook is listed. Isn't that structure outside of the scope of this plan?

Response: Addition and correction made

Comment: Also under this objective, I suggest changing Action C to read "Prioritize dams using the revised TNC analysis and an assessment of removal potential and initiate additional removal projects."

Response: Change made

Comment: For Action D, I'm not really sure what this action means. I assume it proposes to restore wetland functions following a dam removal project. I think this action is unnecessary, as this issue would be addressed specifically in the plan for each removal project.
Response: No change made, the objective's goal is to stress the need for thorough evaluation of wetland impacts prior to dam removal.

Comment: *Objective 33:* the actions seem to have migrated from the Basin 12 plan and have to be tweaked.

Response: Correction made

Comment: *Objective 36:* While it's excellent that this objective is included, I suggest changing it to read "Correct water quality impairments due to flow alterations to Mill Brook and tributary."
Response: Change made

Comment: Also, it should be identified as a priority action.
Response: The priority of this action will be assessed in relation to the importance of addressing flows in the larger reaches of the West River.

Comment: I didn't find an objective related to the drawdown of Hapgood Pond, although the impacts of that drawdown are noted earlier in the plan. There should be an objective that addresses this problem.
Response: Objective added

Comment: No explanation in given of how actions listed in the implementation table became priority actions in the executive summary. Also, there didn't seem to be any explanation of the implications of

an action being considered priority. For example, will only priority actions be eligible for ANR support, such as funding and staff time?
Comment: There is a long list of actions to be undertaken in this Plan. Given the limitations of state, municipal, and grant funding, this implementation section would be enhanced by creating a list of prioritized projects that take into account factors such as cost, severity of condition, and project benefit.

Response: Priority projects are selected by the team of steering committee members including the RPC and NRCD based on the level of impairment being addressed and the level of benefit that would be achieved. Priority projects are ranked higher for grant funding in any grant round but non-priority projects can also receive funding based on the projects benefits. In addition, the Department engaged in a business process analysis during 2015 to develop a criteria based prioritization system, known as Stage-Gate, by which the implementation tables of tactical basin plans will be prioritized. This Basin 11 implementation table will benefit from additional prioritization using the Stage-Gate criteria in the coming year.

Comment: The large scale maps are difficult to interpret. The base layer for the Major Watershed map is blurry. The labeling on all maps is out of scale with the water body it relates to. The document would be enhanced with a consistent cartographic approach.

Comment: I would like to have a better understanding of where the rivers and streams run in these basins. Is there an interactive map that would show and label these waterways along with the streets?

Response: Printed maps are difficult at the watershed scale. VANR's Natural Resources Atlas is an on-line interactive map program that can be zoomed in to show highly detailed watershed information. It can be accessed at: http://anrmaps.vermont.gov/websites/anra5/

Comment: It would be helpful to provide more context as to the extent of the Connecticut River that is covered by this Basin Plan in Brattleboro. It appears that it is covered to the confluence with the West River based on the Major Watershed Map and on the actions in Chapter 4. However, in the discussion of water quality assessment, it notes that the Connecticut River main stem extends to the Dummerston/Brattleboro town line. It may very well be a different boundary but if so, it would be helpful to have a footnote explaining that the actual Basin Plan extends further south.
Response: Language added: … the adjacent Connecticut River valley tributaries from the mouth of the Williams River at Herricks Cover to the mouth of the West River at Retreat Meadows.

Comment: Table 4 includes Brattleboro's Halladay Brook. This Brook drains into the Whetstone Brook, which is part of Basin 12/13. This should be removed from the table.
Response: Correction made

Comment: Removal of the Coop Dam on the Whetstone Brook is listed as an Action Item. This is not located in Basin 11/13 and should be removed. In addition, Appendix B lists 3 dams on the Whetstone Brook as being in the Basin. These dams are included in Appendix B of the Basin 12 Plan.
Response: Corrections made

Comment: While the majority of this Basin 11/13 falls within the Windham Regional Commission's jurisdiction, there are northern parts of the basin that are covered by Southern Windsor Regional Planning Commission. I suggest that SWRPC be added to the abbreviation list and that the actions be

edited to ensure that when the action applies throughout the basin that RPC be listed as the partner, rather than just WRC.
Response: Corrections made

Comment: Objective 19, Action A only lists the Implementation Location in coordinates. It would be helpful to the reader to provide some additional location information. At a minimum, the Town should be listed.
Response: Additions made

Comment: Objective 50, Action A refers to the reader to Section 3.7 for the Implementation location. There is no 3.7 in this document.
Response: Correction made

Comment: Objective 55, Action B refers to this location as Fairfield Plaza. This is now referred to as Royal Plaza.
Response: Correction made

Saxtons River:
Comment: Saxtons River description --"Bull Creek running south from Cambridgesport. . ." should read: "Bull Creek flowing north to Cambridgeport.

Response: Corrections made

Comment: The Saxtons River WWTF was scheduled for replacement. Is a pump station still an option? As stated elsewhere is the text. Either way, is phosphorus discharge will go down.
Response: The Plan (p.52) now reads: "The Saxtons River WWTF has been in operation since 1972 and is in need of a major refurbishment. The trustees have contracted with an engineering firm to evaluate the options available. Currently, an entirely new WWTF is being designed replacing the oxidation ditch/clarifier with a Sequencing Batch Reactor (SBR). The cost of this new SBR facility is being compared to eliminating the WWTF and replacing it with a pump station, pumping the wastewater to the Bellows Falls WWTF. A decision on replacing the WWTF with an SBR facility versus replacing the facility with a pump station should be made sometime in 2016."

Comment: Table 9: What does this mean? "Saxtons River, from upstream to South Branch--upstream of what? In the map on p. 46, Fig. 6, the whole river is stressed from South Branch to mouth.
Response: Language amended to - Saxtons River, from Grafton village to mouth

Sacketts Brook:
Comment: I strongly support your recommendations on the management of the Sand Hill Road wetlands

Comment: I am delighted with the recommendation that the upper reaches of Sacketts Brook be reclassified to Class A(1) waters. Landmark College teachers are involved in water testing and may have supporting data. Putney Mountain Association because their protection of the ridgeline's forests, where Sacketts Brook and Salmon Brook originate, has preserved the health of these streams.

Comment: What is the status of on-the-ground geomorphic assessment and corridor planning for Sacketts Brook? In one chart it is indicated as completed, but elsewhere "Complete geomorphic assessment and corridor planning for Sacketts Brook" is listed as an Objective.

Response: Sacketts Brook has not yet been assessed, and is being recommended for an SGA.

Comment: Removing the dam in Putney village is an interesting idea; I assume the mussel study will be done first?

Response: Prior to any activity regarding the proposed removal of the Sacketts Brook dam, or any dam, a public involvement effort would be undertaken and feasibility studies would be conducted to assess any specific resource concerns including a mussel survey.

Comment: In regard to Putney's sewer facility: Landmark College has made the decision to become a 4-year college, complete with more dorms. Occasionally, when the 2-year school is in session, the WWMF has had to cope with a day or two of max capacity. I believe the possibility of more sewage in the future is on the town's agenda, but help with research and planning help might help.

Response: All direct discharge permits are subject to monitoring and operational requirements, and are also required to be re-evaluated every five years. If there are increases to the flows coming to the subject facility due to new construction, the municipality of Putney will be required to document and address increased flows. This comment is appreciated, and the information has been relayed to the relevant permitting program at the Department. The Putney wastewater treatment facility will be re-evaluated with a projected permit reissuance year of 2018, as noted in page 51 and 52 of the Plan.

<u>East Putney Brook:</u>
Comment: I support the replacement of the perched culvert at the River Road crossing to allow Rainbow Trout to spawn further up river. The E. Putney Brook stretch from the Great Falls, located just about a mile up-stream, to its mouth, is an incredible, natural section. You have noted that the culvert's perched situation has created a deep swimming hole. This pool also is used by the fire department to refill tanks.
Comment: In regard to E. Putney Brook swimming holes: You left out two major ones: at the E. Putney "Great Falls" Trail just off E. Putney Falls Rd. at 42.99327, -72.48368 and at the small falls off E. Putney Falls Rd. close to Rt. 5 at 42.99657, -72.48722. I am sure both of these have been in use since Nov. 28, 1975, if not before.

Response: These locations will be examined to determine if they meet ANR criteria, if so they will be added to the Existing Use list.

Comment: I am most interested in protecting upland forests on Bare Hill's west side. From a town point of view, some of this land is part of the town well's Source Protection Area. From a conservation point of view, the west side of Bare Hill is deer wintering; it used to have beaver ponds; and it has the most productive vernal pool I have seen in Putney.

Response: Information provided to Wetlands Section for further review.

Comment: Change Darby Hill Brook to Webb Brook.

Response: Correction made

Comment: Table 2 --"Ellis Brook (Minards Pond outlet)" in table. As I understand it, Ellis Brook is a backup water supply to Minards Pond, not an outlet from it. It is also a trib of Webb Brook, not the CT River.

Response: Ellis Brook continues below Minards Pond to Albees Cove and the Connecticut River. It is this reach that is altered for flow.

Comment: Table 11: I read in a history of Minards Pond that "Ellis (and Farr) Brook to Minards Pond" is a pipe to bring water from the brook to the pond, not a stream segment. Is that incorrect?

Response: Flow from both brooks is piped to Minards Pond causing altered flows in the brooks below the withdrawal site.

Comment: Table 12. Water withdrawals from Ellis & Farr books not included--were they done too early to be permitted?

Response: Corrections made

Comment: Table 18--Brockways Mills Gorge--for this and Twin Falls, it should list which river it's on. You may also want to mention Sokoki Falls as the proposed name of the falls in the gorge.

Response: Language added. Sokoki Falls will be added once it has an official name.

Comment: Table 19--"Upper Meadows" should be "Upper Meadow." See http://geonames.usgs.gov/apex/f?p=136:2:0::NO:RP:

Response: Corrections made

Comment: I suggest changing the heading from "Tributary Brooks" (which is ambiguous) to "Major Connecticut River Tributary Brooks," since these are only the larger ones. Webb Brook may have the smallest watershed of the group with about 1,500 acres.

Response: Language amended

Comment: Add for reclassification as Class A(1):

1. South Branch of the Saxtons River
2. Ledge Road Brook in Grafton
3. Simpson Brook in Townshend
4. Grassy Brook in Athens and Brookline headwaters to Greer Road (Brookline) to A(1).

Response: 1. – 3. Are now included in or added to Obj. 1 for monitoring to gather the necessary data to verify if it meets Class A requirements
Response: 4. Grassy Brook currently meets A(1) requirements, added to A(1) list

Comment: Add Lily Pond in Athens for designation as an Outstanding Resource Waters using criteria 5, 6, 8 and 9. 100% undeveloped shoreline, remote pond.

Response: Added to Obj. 1 for monitoring to gather data to support designation

Comment: Add the Athens Dome Wetland Complex to Class 1 wetlands as per map attached. Possible to add the large wetland at the end of Turner Hill Road also but this site is compromised by the proposed use as a historic landmark, by the road, and by the man made alterations to the landscape.

Response: Added to proposed Class 1 list

Comment: Add to Existing Use list swimming spots that have gotten consistent recreational use for an extended period.

- East Putney Brook Falls. Longtime swimming spot downstream from Rt. 5, across from Pierce's Hall.
- "The Culvert" on west branch of Sacketts Brook at culvert under Hickory Ridge Road South in Putney. Hugely popular for decades.
- Swimming hole on the West River adjacent to a power substation (site of former power dam?) just north of Maple Valley ski area and downstream of Rock River. Popular.

Response: These locations will be examined to determine if they meet ANR criteria, if so they will be added to the Existing Use list.

Comment: The west branches of Sacketts Brook would seem like candidates for A-1 status.

Response: Included in or added to Obj. 1 for monitoring to gather the necessary data to verify if it meets Class A requirements

Comment: A branch of Sacketts Brook flows in a long, narrow cut adjacent to Brook Road and there are frequent erosion problems with sediment from the road getting into the brook.

Response: Watershed coordinator will conduct site visit to evaluate problem

Comment: Can something be done in the plan to address Japanese knotweed control? It is especially egregious along the Saxtons River between Cambridgeport and Grafton.

Response: Obj. 23 addresses knotweed control efforts

Comment: Please add these lakes to your table as proposed A1's. Lily (Londonderry) and Forester Pond (Jamaica) because of the Long-Term Monitoring of Acid Lakes Program and their scenic, and generally natural or recreational values.
Response: Lily and Forester Ponds for the stated features ae more appropriate for designation as Outstanding Resource Waters and so have been added to that list.

Comment: Include Pikes Falls (and 4,000' of the North Branch of Ball Mt) that was approved for ORW in July, 1991. The reach extends from Kidder Brook east.

Response: Correction made

Comment: Kidder Brook should be considered for inclusion in the Very High Quality Waters list.

Response: Kidder Brook is classified as a Class A waterbody which exceeds VHQW standards.

Comment: If the statement, "The West River mainstem is not monitored above Ball Mountain Reservoir" in the section *Upper West River – Winhall River to headwaters* - includes monitoring by SeVWA then the three Londonderry sites are on the main stem of the West above the Ball Mountain dam.

Response: Language added to reference SeVWA sites

Comment: Please include as Objectives these two post-Irene berms that need to be removed:

- Willie Brook at 43.13099, -72.63734 and
- Stiles Brook at 43.12693, -72.63921.

Response: Projects added to implementation table