Winooski One

Low Impact Hydropower Institute Recertification – August 2019

BURLINGTON Electric DEPARTMENT

UTILITY SERVICES, INC.
YOU CAN RELY ON US!

Table of Contents

Section I. Introduction

Winooski One, also known as the Chace Mill Project (FERC Project No. 2756), is a 7.455 megawatt (MW) run-of-river hydroelectric generating station on the Winooski River between the cities of Burlington and Winooski, Vermont.

Constructed from 1990 to 1993, the station consists of a 200-foot-long and 35-foot-high reinforced concrete dam, situated immediately downstream of and abutting an historic timber crib dam built in 1876; a 100-foot-long and 8-foot-high bascule crest gate with a crest elevation of 136 feet NGVD, installed at the top of the dam; a 70-foot-long concrete intake structure, which directs river flow into the station allowing for run-of-river operation; a 36-foot-long bascule gate between the intake structure and the right abutment of the main bascule crest gate; a reinforced concrete powerhouse consisting of three identical double-regulated Kaplan turbines, which yield 7.455 MW of synchronous generation capacity; a reinforced concrete fish trap facility; a 45-foot-wide and 125-foot-long tailrace channel excavated from ledge rock; a buried 400-foot-long 13.8 kilovolt transmission line; and an access road. Winooski One's "Powerhouse Site Plan," an aerial-view engineering schematic, is included in Appendix A.

Located at River Mile 10 from the Lower Winooski River Basin's confluence with Lake Champlain, Winooski One is downstream of the Gorge No. 18 Hydroelectric Project at River Mile 12, the Essex No. 19 Hydroelectric Project at River Mile 18, and the Bolton Falls Hydroelectric Project at River Mile 43. A map of Winooski One's location relative to upstream dams, previously provided to the Low Impact Hydropower Institute (LIHI) in Essex 19 Hydroelectric Project's publicly available LIHI application as exhibit B–1, is included in Appendix A.

Winooski One was first certified by the Low Impact Hydropower Institute in 2004, followed by recertification in 2009 and 2014. Since Winooski One's previous LIHI recertification in 2014, Burlington Electric Department exercised its option to acquire the station from the Winooski One Partnership. The Federal Energy Regulatory Commission found the license's transfer was in the public interest in *Order Approving Transfer of License*, 148 FERC ¶ 62,169 (2014), also included in the Appendix A.

Winooski One has three Zones of Effect (ZOEs): (1) a 5.4-acre impoundment, (2) a bypass reach, and (3) a tailrace and downstream reach. Figures 1, 2, and 3 demarcate Winooski One's three ZOEs. A comprehensive LIHI Certification Criteria and Standards Matrix for all three ZOEs is provided below, and additional facility information is provided in Table 1.

Figure 1: North-facing Distant Aerial Image of Winooski One's Zones of Effect (Google)

Figure 2: North-facing Proximal Aerial Image of Winooski One's Zones of Effect (Google)

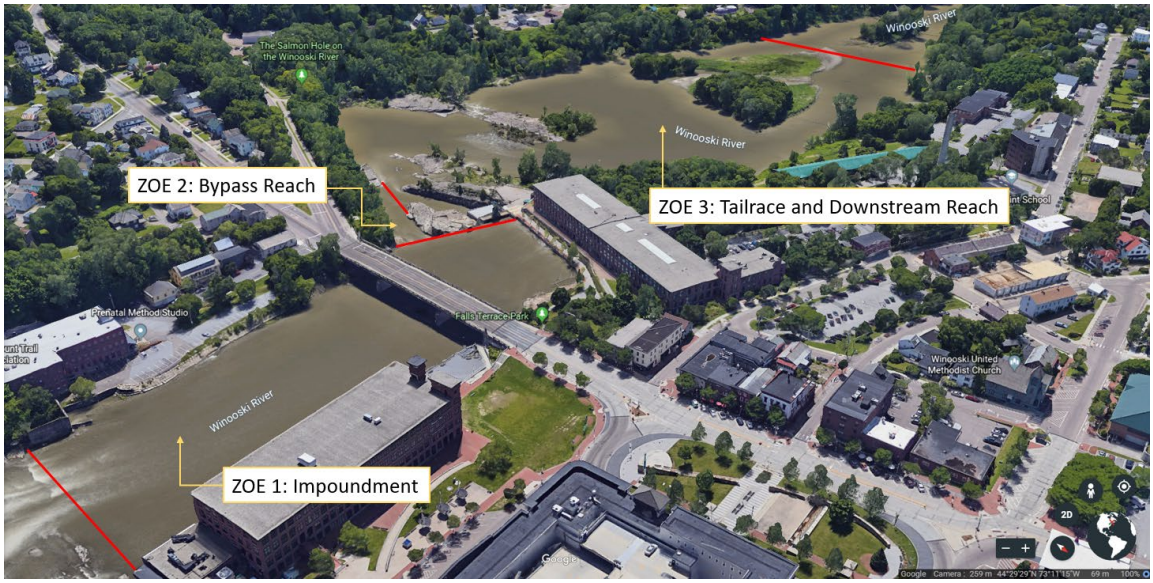


Figure 3: South-facing Distant Aerial Image of Winooski One's Zones of Effect (Google)

Comprehensive LIHI Certification Criteria and Standards Matrix for Winooski One

Criterion		Zone of Effect	Alternative Standards				
			1	2	3	4	Plus
A	Ecological Flow Regimes	1		X			
		2		X			
		3		X			
B	Water Quality	1		X			
		2		X			
		3		X			
C	Upstream Fish Passage	1		X			
		2		X			
		3		X			
D	Downstream Fish Passage	1		X			
		2		X			
		3		X			
E	Watershed and Shoreline Protection	1		X			
		2		X			
		3		X			
F	Threatened and Endangered Species Protection	1		X			
		2		X			
		3		X			
G	Cultural and Historic Resources Protection	1		X			
		2		X			
		3		X			
H	Recreational Resources	1		X			
		2		X			
		3		X			

Table 1. Facility Information

Item	*Information Requested*	*Response (include references to further details)*
Name of the Facility	Facility name	Chace Mill Project No. 2756 (Winooski One)
Location	River name	Winooski River
	Watershed name	Winooski – 02010003
	Nearest town(s), county(ies), and state(s) to dam	Towns: Burlington and Winooski County: Chittenden County State: Vermont
	River mile of dam	10
	Geographic latitude of dam	N 44.488700
	Geographic longitude of dam	W 73.187303
Facility Owner	Application contact names:	Paul Pikna, P.E. Burlington Electric Department Jon Clark, Burlington Electric Deparment
	Facility owner company and authorized owner representative name.	Burlington Electric Department Paul Pikna, P.E.
	FERC licensee company name (if different from owner)	N/A
Regulatory Status	FERC Project Number, issuance and expiration dates, or date of exemption	P-2756 Issuance: 11/3/1988 Expiration: 11/3/2028
	FERC license type	40-year license
	Water Quality Certificate identifier, issuance date, and issuing agency name. Include information on amendments.	Application for Chace Mill Hydroelectric Project (Winooski One Development) (5/5/1987)
	Hyperlinks to key electronic records on FERC e-library website or other publicly accessible data repositories[1]	FERC e-library Accession Numbers: 19881112-0002 (License) 20140829-3031 (Transfer of License) LIHI Website: https://lowimpacthydro.org/assets/files/Winooski%20One/401cert.pdf (401 Water Quality Certificate)
Powerhouse	Date of initial operation (past or future for pre-operational applications)	4/1/1993
	Total installed capacity (MW)	7.455
	Average annual generation (MWh) and period of record used	30,000

[1] For example, the FERC license or exemption, recent FERC Orders, Water Quality Certificates, Endangered Species Act documents, Special Use Permits from the U.S. Forest Service, 3rd-party agreements about water or land management, grants of right-of-way, U.S. Army Corps of Engineers permits, and other regulatory documents. If extensive, the list of hyperlinks can be provided separately in the application.

Item	*Information Requested*	*Response (include references to further details)*
	Mode of operation	Run-of-river
	Number, type, and size of turbines, including maximum and minimum hydraulic capacity of each unit	Number: 3 Type: Bevel Gear Full Kaplan Bulb Turbines Size: 2.485 MW Maximum Flow: 1,000 cfs
	Trashrack clear spacing, for each trashrack	3 Trashracks; 15-foot-wide and 50-foot-deep; Bar Spacing is 2" clear, except that upper 10' have bars 1" on center to minimize entrance of downstream migrating fish
	Dates and types of major equipment upgrades	N/A
	Dates, purpose, and type of any recent operational changes	N/A
	Plans, authorization, and regulatory activities for any facility upgrades or license or exemption amendments	N/A
Dam or Diversion	Date of original construction and description and dates of subsequent dam or diversion structure modifications	Originally constructed from 1990 to 1993.
	Dam or diversion structure height including separately, the height of any flashboards, inflatable dams, etc.	35-foot-high reinforced concrete dam; 8-foot-high bascule crest gate; 8 foot - high inflatable dam
	Spillway elevation and hydraulic capacity	Elevation: 135-foot-high Capacity: 1,000 cfs
	Tailwater elevation	100 – 115 feet
	Length and type of all penstocks and water conveyance structures between the impoundment and powerhouse	70-foot-long intake structure
	Dates and types of major infrastructure changes	N/A
	Designated facility purposes	Power
	Source water	Winooski River
	Receiving water and location of discharge	Winooski River
Conduit	Date of conduit construction and primary purpose of conduit	1993
Impoundment and Watershed	Authorized maximum and minimum water surface elevations	Minimum: 135-foot-high Maximum: 142-foot-high
	Normal operating elevations and normal fluctuation range	Normal operating elevations: 136.5 foot-high ± .2 feet
	Gross storage volume and surface area at full pool	N/A; Run-of-river
	Usable storage volume and surface area	N/A; Run-of-river

Item	*Information Requested*	*Response (include references to further details)*
	Describe requirements related to impoundment inflow, outflow, up/down ramping and refill rate restrictions.	Impoundment outflow: 7Q10 168 cfs
	Upstream dams by name, ownership and river mile. If FERC licensed or exempt, please provide FERC Project number of these dams. Indicate which upstream dams have downstream fish passage.	Gorge No. 18 – GMP – River Mile 12 Essex No. 19 – GMP – River Mile 18 – Project No. 2513 Bolton Falls – GMP – River Mile 43 – Project No. 2879
	Downstream dams by name, ownership, river mile and FERC number if FERC licensed or exempt. Indicate which downstream dams have upstream fish passage	N/A
	Operating agreements with upstream or downstream facilities that affect water availability and facility operation	N/A
	Area of land (acres) and area of water (acres) inside FERC project boundary or under facility control.	50 Acres, land and water combined
Hydrologic Setting	Average annual flow at the dam, and period of record used	661,594 (based on 1928 to 2019 USGS daily means, available here: https://waterdata.usgs.gov/usa/nwis/dvstat/?site_no=04290500&por_04290500_65087=1270480,00060,65087)
	Average monthly flows and period of record used	January (44,390) February (37,560) March (80,280) April (154,340) May (87,580) June (43,650) July (29,299) August (24,438) September (21,306) October (38,681) November (49,870) December (50,200) (USGS)
	Location and name of closest stream gauging stations above and below the facility	USGS 04290500 Essex, Upstream USGS 04294500 Lake Champlain, downstream
	Watershed area at the dam. Identify if this value is prorated and provide the basis for proration.	1060 Square Miles
Designated Zones of Effect	Number of zones of effect	3
	Upstream and downstream locations by river miles	All within River Mile 10
	Type of waterbody (river, impoundment, bypassed reach, etc.)	ZOE 1: Impoundment ZOE 2: Bypass Reach ZOE 3: Tailrace/Downstream Reach
	Delimiting structures or features	See Figures 1, 2, and 3.
	Designated uses by state water quality agency	Power production

Section II. Discussion

This section provides a discussion for how Winooski One meets each Criterion and selected standard across its ZOEs. Letters from relevant agencies are included in the Appendix B.

Ecological Flows

The Vermont Agency of Natural Resources evaluated Winooski One's "consistency and compliance" with requirements related to ecological flows pursuant to its FERC license and 401 Water Quality Certificate. To mitigate impact on fish and wildlife resources, Winooski One is required to operate strictly in instantaneous run-of-river mode. In a letter dated July 3, 2019 to Burlington Electric Department, the Agency of Natural Resources wrote:

> *Per its license, Winooski One is operated as an instantaneous run-of-river mode; thus, project operations negligibly affect downstream flows. As is standard practice with LIHI review, the Agency requested one year of operational data to confirm compliance. Winooski One provided this information to Agency staff and our review confirms compliance with the flow conditions.*

Water Quality

The Agency of Natural Resources evaluated Winooski One's "consistency and compliance" with requirements related to water quality – specifically dissolved oxygen concentrations downstream of the confluence of the tailrace and bypass reach – pursuant to its FERC license and 401 Water Quality Certificate.[2] In a letter dated July 3, 2019 to Burlington Electric Department, the Agency of Natural Resources wrote:

> *Agency staff also reviewed dissolved oxygen records for Winooski one, and confirm Winooski One has been in compliance for this water quality parameter.*

Please note that while the Winooski River, "Mouth to Winooski River Dam (~10.5 Miles)", is listed on the Vermont Department of Environmental Conservation's *303(d)*

[2] Winooski One's *Assurance of Discontinuance* with the Agency of Natural Resources in response to the seal component design failure on January 23, 2018 – which resulted in (1) 10 gallons or less of oil in river and (2) notification to all agencies (as referenced in Winooski One's *LIHI Annual Compliance Statement and Condition Status Report July 2017 – July 2018*) – is available upon request.

List of Impaired Waters for 2018, the stated causes of this listing are combined sewage overflows, not Winooski One's operation.[3]

Upstream Fish Passage & Downstream Fish Passage

The Agency of Natural Resources and United States Fish and Wildlife Service each evaluated Winooski One's adherence to maintaining its fish passage project required under its FERC license. The lift is required to operate from March 15 to May 1, targeting steelhead trout in the spring, as well as from October 1 to November 15, targeting landlocked Atlantic salmon in the fall. In a letter dated July 3, 2019 to Burlington Electric Department, the Agency of Natural Resources wrote:

> *BED staff work collaboratively with staff from the US Fish and Wildlife Service and the Vermont Fish and Wildlife Department to ensure that the project's upstream fish passage facilities (i.e., the Winooski One 'fish lift') are operated in a way that efficiently and effectively supports federal and state fishery objectives for the Winooski River and Champlain system more broadly…*
>
> *The project has downstream bypass facilities that can be accessed via two entry points, as well as a spillway that spills during much of the spring migration period. Recent studies confirm that downstream migrants use these facilities, but also that opportunities may exist for improving passage and survival in the future. The Agency hopes to work collaboratively with BED and other stakeholders to identify opportunities for downstream passage improvements during the project's future relicensing.*

Further, in a letter dated May 28, 2019 to Burlington Electric Department's representative, the Fish and Wildlife Service wrote:

> *The Winooski One fish passage project is a key component of the Lake Champlain Fish and Wildlife Cooperative's salmonid restoration program as it allows salmon access to important spawning and nursery areas previously inaccessible for over a century. Winooski One has operated in compliance with all their fish passage permit conditions…*
>
> *The station operators have been enthusiastic about the program and fully cooperative with the Service in ensuring the lift operates in a manner that allows the system to "fish" most effectively. Winooski One has made several lift modifications requested by the Service and the State to the lift's efficiency. Some lift modifications have also been suggested by the operators as a result of their gained experience in running the facility. Furthermore, Winooski One employees have assisted biologists in processing lifted fish as well as assisting state and federal hatchery personnel with stocking juvenile fish at the facility.*

[3] Vermont Department of Environmental Conservation. (2018). *303(d) List of Impaired Waters*. Available here: https://www.epa.gov/sites/production/files/2019-02/documents/2018-vt-303d-list-report.pdf

Burlington Electric Department looks forward to continued collaboration with state and federal partners to ensure effective operation of the Winooski One fish lift and to identify opportunities for future improvements.

Shoreline and Watershed Protection

The Agency of Natural Resources evaluated Winooski One's adherence to mitigating shoreline and watershed-level impacts. In a letter dated July 3, 2019 to Burlington Electric Department, the Agency of Natural Resources wrote:

> *As Winooski One is a run-of-river facility the Agency has few concerns about project effects on the watershed and shoreline. Winooski One continues to request preapproval when maintenance requires operations to deviate from run-of-river and operates according to Agency recommendations during that time.*

Threatened and Endangered Species

The Agency of Natural Resources evaluated Winooski One's adherence to requirements related to protection of threatened and endanger species as required under its FERC license. One plant species, *Anemone multifidi*, is of particular concern relative to other local terrestrial and aquatic threatened and endangered species (provided in Appendix A). In a letter dated July 3, 2019 to Burlington Electric Department, the Agency of Natural Resources wrote:

> *…The project's run-of-river operating regime means that it does not alter flows relative to what enters the facility's impoundment and forebay. Thus, Winooski One is not suspected of impacting flow-sensitive aquatic species. The project has otherwise complied with specific license conditions concerning rare, threatened, or endangered plants; however, for reasons noted below, endangered plant concerns remain for this project.*
>
> *Despite BED's record of cooperation, the Agency holds concerns about the status/future of the population of state-endangered early thimbleweed (*Anemone multifida*) found at the project site. Per its license, BED continues to support population monitoring and pays an annual fee to Agency for mitigation, and has shown a willingness to support efforts by Agency's botanist and BED's consultant to augment the local* Anemone multifida *population through active planting and site management. The Agency is encouraged by this cooperation and hopes that such a collaborative effort will help reverse the population's decline and ultimately render translocation or the establishment of a new population unnecessary.*

Please note that Burlington Electric Department continues to take seriously the imperative to support efforts by the Agency of Natural Resources to augment the *Anemone multifidi* population near Winooski One. The past four years of *Anemone multifidi* reports by a consulting ecologist and botanist are included in Appendix A. Further, in response to reports by the consulting ecologist, Burlington Electric Department recently supported additional conservation work of seed collection and planting with the objective of establishing *Anemone multifidi* in suitable sites. Details of this conservation work, performed by Burlington Electric Department's consulting ecologist and botanist as well as the Department Botanist for the Vermont Department of Fish & Wildlife, are described in a July 1, 2019 email included in Appendix A. In accordance with its LIHI application, Burlington Electric Department also requested lists of aquatic and terrestrial threatened and endangered species from the Agency of Natural Resources. These lists are included in Appendix A.

Cultural and Historic Resources

Pursuant to its FERC license, Winooski One filed a Cultural Resources Management Plan to ensure that historical characteristics of the Winooski Falls Mill District would not be adversely affected by the hydroelectric station. FERC was satisfied with Winooski One's measures and approved the Plan in 1991, included in Appendix A. Notably, FERC approved the transfer of the license from the Winooski One Partnership to Burlington Electric Department in 2014 absent a condition to enhance cultural and historic resources.

More recently, Winooski One has provided cultural outreach and support to the Heritage Winooski Mill Museum. A letter from the Museum on behalf of Winooski One is included in Appendix A.

Recreational Resources

Pursuant to its FERC license, Winooski One provided $150,000 to the City of Winooski for park improvements during construction from 1990 to 1993. Letters from the City of Winooski Planning Commission, Winooski Valley Park District, and Agency of Natural Resources, each written to communicate satisfaction with the completion of the park in 1993, are included in Appendix B. Notably, FERC approved the transfer of the license from the Winooski One Partnership to Burlington Electric Department in 2014 absent a condition to enhance recreational resources.

Sworn Statement and Waiver Form

SWORN STATEMENT

As an Authorized Representative of Burlington Electric Department, *the Undersigned attests that the material presented in the application is true and complete.*

The Undersigned acknowledges that the primary goal of the Low Impact Hydropower Institute's certification program is public benefit, and that the LIHI Governing Board and its agents are not responsible for financial or other private consequences of its certification decisions.

The Undersigned further acknowledges that if LIHI Certification of the applying facility is granted, the LIHI Certification Mark License Agreement must be executed prior to marketing the electricity product as LIHI Certified®.

The Undersigned further agrees to hold the Low Impact Hydropower Institute, the Governing Board and its agents harmless for any decision rendered on this or other applications, from any consequences of disclosing or publishing any submitted certification application materials to the public, or on any other action pursuant to the Low Impact Hydropower Institute's certification program.

Company Name: Burlington Electric Department

Authorized Representative:

Name: Paul Pikna

Title: Senior Generation Engineer

Authorized Signature: Paul Pikna

Date: 7/31/19

Contacts Forms

A. Applicant-related contacts

Facility Owner: ***Burlington Electric Department***	
Name and Title	***Paul Pikna, P.E. Senior Generation Engineer***
Company	***Burlington Electric Department***
Phone	***802-865-7477***
Email Address	***ppikna@burlingtonelectric.com***
Mailing Address	***111 Intervale Rd. Burlington, Vermont 05401***
Facility Operator (if different from Owner): ***Same as above.***	
Name and Title	
Company	
Phone	
Email Address	
Mailing Address	
Consulting Firm / Agent for LIHI Program (if different from above): ***Utility Services***	
Name and Title	***Dan Kopin, Compliance Associate***
Company	***Utility Services***
Phone	***802-241-1400***
Email Address	***dan.kopin@utilitysvcs.com***
Mailing Address	***1080 Waterbury-Stowe Rd, Suite 2, Waterbury, VT 05676***
Compliance Contact (responsible for LIHI Program requirements): ***Burlington Electric Department***	
Name and Title	***Jon Clark, Power Production Technician***
Company	***Burlington Electric Department***
Phone	***802-865-3423***
Email Address	***jclark@burlingtonelectric.com***
Mailing Address	***16 W Canal St, Winooski, VT 05404***
Party responsible for accounts payable: ***Burlington Electric Department***	
Name and Title	***Paul Pikna, P.E. Senior Generation Engineer***
Company	***Burlington Electric Department***
Phone	***802-865-7477***
Email Address	***ppikna@burlingtonelectric.com***
Mailing Address	***111 Intervale Rd. Burlington, Vermont 05401***

B. Current and relevant state, federal, and tribal resource agency contacts with knowledge of the facility (copy and repeat the following table as needed).

Agency Contact (Check areas of responsibility: Flows_X_, Water Quality _X_, Fish/Wildlife Resources _X_, Watersheds _X_, T/E Spp. _X_, Cultural/Historic Resources __, Recreation __):	
Agency Name	***Agency of Natural Resources***
Name and Title	***Jeff Crocker, Supervising River Ecologist***
Phone	***802-490-6151***
Email address	***Jeff.Crocker@vermont.gov***
Mailing Address	***1 National Life Drive, Main 2, Montpelier, VT 05620-3522***
Agency Contact (Check areas of responsibility: Flows__, Water Quality __, Fish/Wildlife Resources _X_, Watersheds __, T/E Spp. __, Cultural/Historic Resources __, Recreation __):	
Agency Name	***United States Fish and Wildlife Service***
Name and Title	***Nicholas Staats, Fish Biologist***
Phone	***802-879-5679***
Email address	***Nicholas_Staats@fws.gov***
Mailing Address	***111 West Street, Essex Junction VT 05452***
Agency Contact (Check areas of responsibility: Flows__, Water Quality __, Fish/Wildlife Resources __, Watersheds __, T/E Spp. _X_, Cultural/Historic Resources __, Recreation __):	
Agency Name	***Vermont Department of Fish & Wildlife***
Name and Title	***Bob Popp, Department Botanist***
Phone	***(802) 476-0127***
Email address	***bob.popp@vermont.gov***
Mailing Address	***5 Perry St. Suite 40, Barre, VT. 05641***
Agency Contact (Check areas of responsibility: Flows__, Water Quality __, Fish/Wildlife Resources __, Watersheds __, T/E Spp. __, Cultural/Historic Resources _X_, Recreation _X_):	
Agency Name	***City of Winooski Planning & Zoning Department***
Name and Title	***Eric Vorwald, Planning and Zoning Manager***
Phone	***802-655-6410 ex 25***
Email address	***evorwald@winooskivt.gov***
Mailing Address	***Winooski City Hall, 27 West Allen Street, Winooski, VT***

C. Current stakeholder contacts that are actively engaged with the facility (copy and repeat the following table as needed).

Stakeholder Contact (Check areas of interest: Flows__, Water Quality __, Fish/Wildlife Resources __, Watersheds __, T/E Spp. __, Cultural/Historic Resources _X_, Recreation __):	
Stakeholder Organization	***Heritage Winooski Mill Museum***
Name and Title	***Miriam Block, Executive Director***
Phone	***802-355-9937***
Email address	***info@themillmuseum.org***
Mailing Address	***20 Winooski Falls Way suite 302, Winooski, Vermont 05404***
Stakeholder Contact (Check areas of interest: Flows__, Water Quality __, Fish/Wildlife Resources __, Watersheds __, T/E Spp. __, Cultural/Historic Resources __, Recreation __):	
Stakeholder Organization	
Name and Title	
Phone	
Email address	
Mailing Address	

Appendix A

Supporting Documentation

MAIN STREET BRIDGE

RIVERSIDE AVE.

WINOOSKI RIVER

NEW CONCRETE SPILLWAY FOUNDATION

NEW RUBBER GATE

NEW ICE SLUICE / BY-PASS GATE

EXIST. TIMBER CRIB DAM CREST EL. 128.0

TAILWATER DESOLVED OXYGEN SENSOR IN STILLING WELL AT END OF TAILRACE. SENSOR CABLE ON FLOOR OF TAILRACE TO POWERHOUSE.

DOWNSTREAM MIGRANT PIPE

NEW POWERHOUSE

NEW TAILRACE

NEW FOREBAY

HEADWORKS

GAS LINE TO STAIR TOWER FROM CANAL ST.

NEW ACCESS ROAD

EXIST. INTAKE

NEW AIRSHAFT (SEE SHT.S18)

EXIST. RET. WALL

EXIST. GRAVEL FIRE ACCESS

30"ø STIL.PIPE

FISH LIFT PIT

FISH LIFT EQUIP.

TRASH RAKER

ACCESS TUNNEL (BELOW)

FISH LIFT ACCESS DRIVE

DRAIN TO DAYLIGHT EL.137±

LIMIT OF LEDGE EXCAV.

EXIST. 6"ø CLAY PIPE DRAIN INV.EL.136.4±

EXIST. 4"ø PVC

STAIR TOWER

4"ø PVC DRAIN TO DAYLIGHT BEYOND STAIR TOWER

EGRESS PLATFORM

TRANSFORMER

WOOLEN MILL

1H:6V

LEGEND

PLANTS (ANEMONE)

NOTE:

1. REFER TO DWG. C14 FOR SITE UTILITIES.

GRAPHIC SCALE

20 0 10 20 40 80

(IN FEET)
1 inch = 20 ft.

1062\C2

WINOOSKI ONE PARTNERSHIP

WINOOSKI ONE HYDROELECTRIC PROJECT

WINOOSKI & BURLINGTON, VERMONT

THE H.L. TURNER GROUP Inc.
8 LOUDON ROAD, CONCORD NH 03301
ARCHITECTS · CONSTRUCTION MANAGERS
ENGINEERS · ENVIRONMENTAL CONSULTANTS
CONCORD NH HARRISON ME MONTPELIER VT

TURNER GROUP

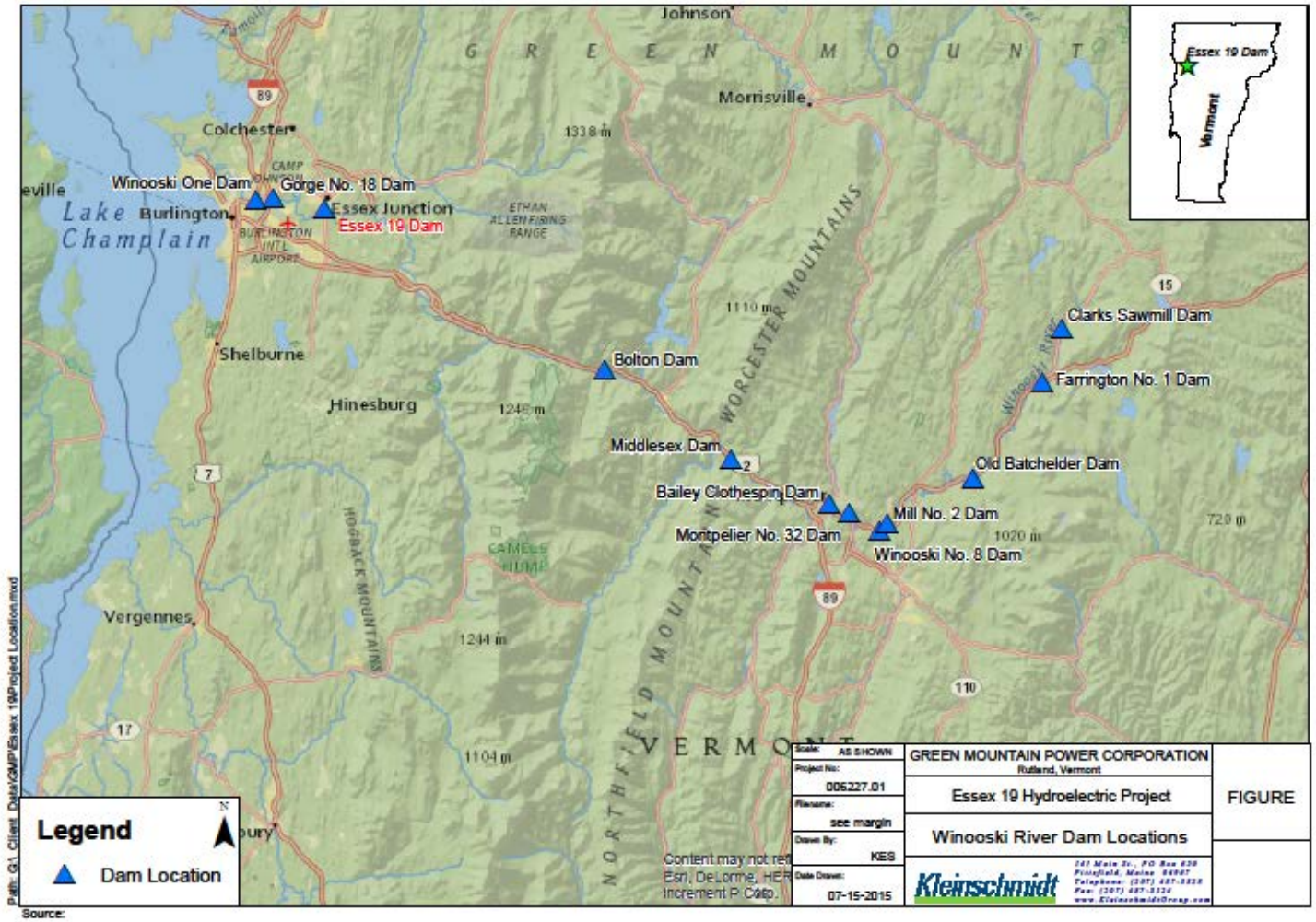
Proj.No. 1062
Scale 1"=20'
Dsgn. By HT
Drn. By AGL
Chkd. By GB
Appd. By HT
Date 10/9/91

Rev.	Date	Description
5.	7/31/92	COORD. REVISIONS
4.	4/3/92	GEN. REVISIONS
3.	2/14/92	ACCESS, STAIR TOWER.
2.	1/10/92	ACCESS DRIVE, STAIR TOWER, TUNNEL
1.	10/9/91	ISSUED FOR TURNKEY CONTRACT

POWERHOUSE SITE PLAN

Drawing No.

C2


Johnson
Morrisville
Colchester
Winooski One Dam
Gorge No. 18 Dam
Essex Junction
Essex 19 Dam
Lake Champlain
Burlington
Shelburne
Hinesburg
Vergennes
Bolton Dam
Middlesex Dam
Bailey Clothespin Dam
Montpelier No. 32 Dam
Mill No. 2 Dam
Winooski No. 8 Dam
Old Batchelder Dam
Farrington No. 1 Dam
Clarks Sawmill Dam
GREEN MOUNTAINS
WORCESTER MOUNTAINS
NORTHFIELD MOUNTAINS
HOGBACK MOUNTAINS
ETHAN ALLEN FIRING RANGE
VERMONT
Essex 19 Dam
Vermont
Legend
Dam Location
Scale: AS SHOWN
Project No: 006227.01
Filename: see margin
Drawn By: KES
Date Drawn: 07-15-2015
GREEN MOUNTAIN POWER CORPORATION
Rutland, Vermont
Essex 19 Hydroelectric Project
Winooski River Dam Locations
FIGURE
Kleinschmidt

148 FERC ¶ 62,169
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Winooski One Partnership
City of Burlington, Vermont and its Burlington Electric Department

Project No. 2756-064

ORDER APPROVING TRANSFER OF LICENSE

(Issued August 29, 2014)

1. By application filed June 19, 2014, Winooski One Partnership (Winooski) and the City of Burlington, Vermont and its Burlington Electric Department (City), seek Commission approval to transfer the license for the Chace Mill Project, FERC No. 2756, from Winooski to the City. The project is located on Winooski River in Chittenden County, Vermont.

2. The Commission issued a 40-year license to Burlington Electric Light Department and Winooski One Partnership (co-licensees) on November 3, 1988.[1] On August 13, 1992,[2] the Commission approved the transfer of license to Winooski One Partnership, solely.

3. The Commission issued a public notice of the current application for transfer on July 8, 2014, that established August 7, 2014, as the deadline for filing comments and motions to intervene. No comments or motions to intervene were filed.

4. The City has agreed to accept all of the terms and conditions of the license and to be bound by the license as if it were the only original licensee.

5. Winooski has generally complied with the terms and conditions of the license and agrees to pay annual charges that have accrued to the date of the transfer. Transfer of the license for this project is consistent with the Commission's regulations and is in the public interest.

[1] 45 FERC ¶ 61,206, Order Issuing License (1988).

[2] 60 FERC ¶ 62,110, Order Approving Transfer of License (1992).

The Director orders:

(A) Transfer of the license for the Chace Mill Project, FERC No. 2756 from Winooski One Partnership to the City of Burlington, Vermont and its Burlington Electric Department, is approved.

(B) Winooski shall pay all annual charges that accrue up to the effective date of the transfer.

(C) Approval of the transfer is contingent upon: (1) transfer of title of the properties under license, transfer of all project files including all dam safety related documents, and delivery of all license instruments to the City of Burlington, Vermont and its Burlington Electric Department which shall be subject to the terms and conditions of the license as though it were the original licensee; and (2) the City of Burlington, Vermont and its Burlington Electric Department acknowledging acceptance of this order and its terms and conditions by signing and returning the attached acceptance sheet. Within 60 days from the date of this order, the transferee shall submit certified copies of all instruments of conveyance and the signed acceptance sheet.

(D) This order constitutes final agency action. Any party may file a request for rehearing of this order within 30 days from the date of its issuance, as provided in § 313(a) of the FPA, 16 U.S.C. § 825*l* (2012), and the Commission's regulations at 18 C.F.R. § 385.713 (2014). The filing of a request for rehearing does not operate as a stay of the effective date of this order, or of any other date specified in this order. The licensee's failure to file a request for rehearing shall constitute acceptance of this order.

Charles K. Cover, P.E.
Chief, Project Review Branch
Division of Hydropower Administration
and Compliance

Matt Peters
Consulting Ecologist & Botanist
Office: 802.456.1051 / Cell: 651.323.8234
1225 Foster Hill Rd – East Calais, VT 05650
peters.matt@yahoo.com

To: Paul Pikna July 29, 2016
Senior Generation Engineer
Burlington Electric Department

CC: Bob Popp
Department Botanist
VT Department of Fish and Wildlife

Re: Annual *Anemone multifida* Monitoring at Winooski One

Paul:

As of June 9 I successfully reinitiated the required annual monitoring for the endangered plant, *Anemone multifida*, at the Winooski One Hydro station. I was accompanied by the previous consultant, Jerry Jenkins, who has studied and extensively monitored the population since 1986, prior to construction of the current hydro station. This in-person "hand-off" of the project proved very helpful in locating and safely accessing the widely scattered plants in the complex site. I also met plant manager Jon Clark, who was most helpful and provided access to the gated area.

We found that the *Anemone* is still extant at the site in all five previously identified subpopulations, but that it has continued its long-term decline. We used four different metrics to assess the status of the population: number of plants, area of plants, number of leaves, and number of flowers and/or fruits. Unfortunately, but not surprisingly, all metrics show a continued decline based on comparisons with graphs in Jenkins' 2010 report. I have not yet received all the prior monitoring data from Mr. Jenkins, but as of the last survey in 2010 the total plant count was 117 plants. The 2016 survey revealed the current population is at 67 plants (23 fruiting), with the other metrics at 1809cm^2 total plant area, 550 leaves, and 49 total fruiting heads. This is a 43% decline in number of plants over the six intervening years.

Over half (40) of the extant plants are in the most heavily trafficked area, dubbed the West Bench, which is easily accessible adjacent to the parking lot and receives by far the heaviest foot traffic of all the subpopulations. Nevertheless, there were no obvious direct impacts from trampling, though this is difficult to assess from a brief visit, and most of the plants are out of the main path of travel. Prior monitoring suggests plants are occasionally lost here due to trampling or even small recreational fires, but that this has not proven to be a major source of loss, or driver of overall declines, over the years. Many of the plants are situated in slightly topographically sheltered areas that are less likely to be stepped upon. However, these crevices are slowly accumulating more shrubs and woody plants, which likely impacts the *Anemone* negatively through shading, competition, and greater leaf litter accumulation, even while it protects the plants from direct trampling and may offer slight protection from moisture stress (via shading). It may be worth considering some minor, experimental brush removal at some point to see if this helps the plants. This is particularly worth considering since some of the shrubs are invasive glossy buckthorn *(Frangula alnus)*. Any such management would need to be coordinated with Bob Popp of the Department of Fish and Wildlife.

The other subpopulations are all quite small, from 3-11 plants each. This is noteworthy given that two of these, the Island and the East Bench, were among the most robust subpopulations in the past, with >300 and nearly 100 plants, respectively, in 1988. Increased shading and growth of woody vegetation is a potential concern at the East Bench as well, which is increasingly overhung by trees and shrubs from the adjacent riverbank. The other subpopulations are subject to substantial regular scouring that prevents woody plant growth. There is currently a very large flood-deposited log spanning the downstream end of the Island, covering a portion of the previously occupied *Anemone* area. I am told that in the past some woody debris was removed from this area to benefit the plants, but at this time the population appears to have contracted so much that such actions appear unlikely to be of much benefit.

Over all, the present patterns in the *Anemone* population appear consistent with previous findings that suggest that climatic factors (hot, dry summers) rather than direct human impacts are likely driving the long-term decline through an excess of mortality over new plant establishment. Some experimental management of woody plants at the site could occur to reduce potential shading stress, but it appears unlikely that this would reverse decline.

Also of note, I observed two additional uncommon but previously undocumented species during my visit. The first, American bittersweet (*Celastrus scandens*), is present near the parking area growing among the shrubs. The second, narrow false oats (*Trisetum spicatum var. spicatum*) was noted on the island growing in the cracks with the *Anemone.*

Finally, if you have any questions on this matter please be in touch, otherwise I will consider this monitoring completed until next year.

Regards,

Matt Peters
Consulting Ecologist/Botanist

Matt Peters
Consulting Ecologist & Botanist
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To: Paul Pikna Sept 7, 2017
Senior Generation Engineer
Burlington Electric Department

CC: Bob Popp
Department Botanist
VT Department of Fish and Wildlife

Re: Annual *Anemone multifida* Monitoring at Winooski One

Paul:

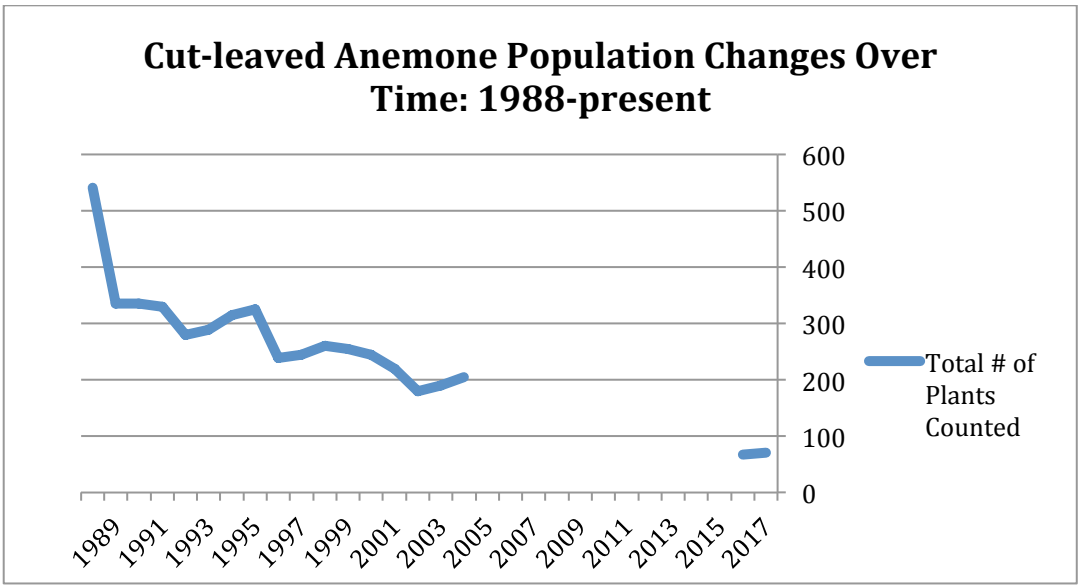
I conducted the required annual monitoring for the endangered plant Cut-leaved Anemone (*Anemone multifida*) at the Winooski One Hydro station on June 14th this year. As I mentioned previously, Bob Popp, Botanist with the VT Department of Fish and Wildlife, accompanied me so we could better assess strategies and needs to control woody vegetation that may be impacting the Anemone.

Despite last year's hot, dry conditions the Anemone population remained stable from last year to this, albeit at a much smaller size than was originally present. We found that the *Anemone* continues to be extant at the site in all subpopulations, including the 5 previously named subpopulations and an additional subpopulation I documented last year for the first time. This apparently new subpopulation is on the vertical west face of the 'West Bench' area and is near the 'West Bench' subpopulation, but does not appear to have been included in it previously.

As usual we used four different metrics to assess the status of the population: number of plants, area of plants, number of leaves, and number of flowers and/or fruits. All of these metrics increased somewhat from 2016, while still representing a substantial decline over longer time frames. The 2017 survey revealed the current population is at about 71 plants with 24 fruiting compared to 67 (23 fruiting) in 2016. The other metrics showed larger improvements, around 20% increase over 2016, with 2412cm^2 total plant area, 664 leaves, and 54 total fruiting heads in 2017 compared to 1809cm^2 total plant area, 550 leaves, and 49 total fruiting heads in 2016. I have not yet received the prior monitoring data in full from Mr. Jenkins, the previous consultant, but have estimated values from his graphics in order to put the present population in context. See the graphic below, noting that I collected only the last two years' data and that gaps represent periods of no monitoring. This indicates the current population is still 40% smaller in number of plants than in 2010, despite the limited gains in the last year.

Over half (37) of the extant plants continue to be in the most heavily trafficked area, the West Bench, which is easily accessible adjacent to the parking lot and receives the heaviest foot traffic of all the subpopulations. Nevertheless, there were no obvious direct impacts from trampling and most of the plants are out of the main path of travel. However, these crevices continue to slowly accumulate more shrubs and woody plants, which likely impacts the *Anemone* negatively through shading, competition, and greater leaf litter accumulation, even while it protects the plants from direct trampling and may offer slight protection from moisture stress (via shading). Increased shading from overhanging shrubs and trees is also potentially impacting the

East Bench subpopulation, on the Burlington side of the river. In discussion with Bob Popp we concluded this smaller subpopulation, with little potential for trampling impacts is the logical place to begin evaluating potential benefits of woody vegetation removal. This is particularly worth considering since some of the shrubs are invasive buckthorns and honeysuckles. Any such management will be coordinated with Bob Popp.



The other subpopulations are all quite small, from 3-11 plants each. This is noteworthy given that two of these, the Island and the East Bench, were among the most robust subpopulations in the past, with >300 and nearly 100 plants, respectively, in 1988. Slight changes in the plant count among the subpopulations, with gain of 1 on the East Bench, loss of 2 in Transect 1, gain of 4 on the West Bench may be real or may be due to slight inconsistencies in counting from year to year given the inherent ambiguity in determining individuals in this clump-forming species.

While no decline from last year's hot, dry conditions occurred, the long-term patterns in the *Anemone* population still appear consistent with previous findings suggesting that climatic factors (hot, dry summers) rather than direct human impacts are likely driving the long-term decline. Some experimental management of woody plants at the site should occur to reduce potential shading stress in hopes of benefitting certain subpopulations.

Also of note, I observed the rare (S1 ranked) species Succulent Hawthorn (*Crataegus succulenta var. succulenta*) during my visit. This had not been previously documented at the site, but a few small trees/shrubs are located at the base of the west face of the West Bench area.

If you have any questions on this matter please be in touch.

Regards,

Matt Peters

Matt Peters
Consulting Ecologist & Botanist
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To: Paul Pikna Nov. 14, 2018
Senior Generation Engineer
Burlington Electric Department

CC: Bob Popp
Department Botanist
VT Department of Fish and Wildlife

Re: Annual *Anemone multifida* Monitoring at Winooski One

Paul:

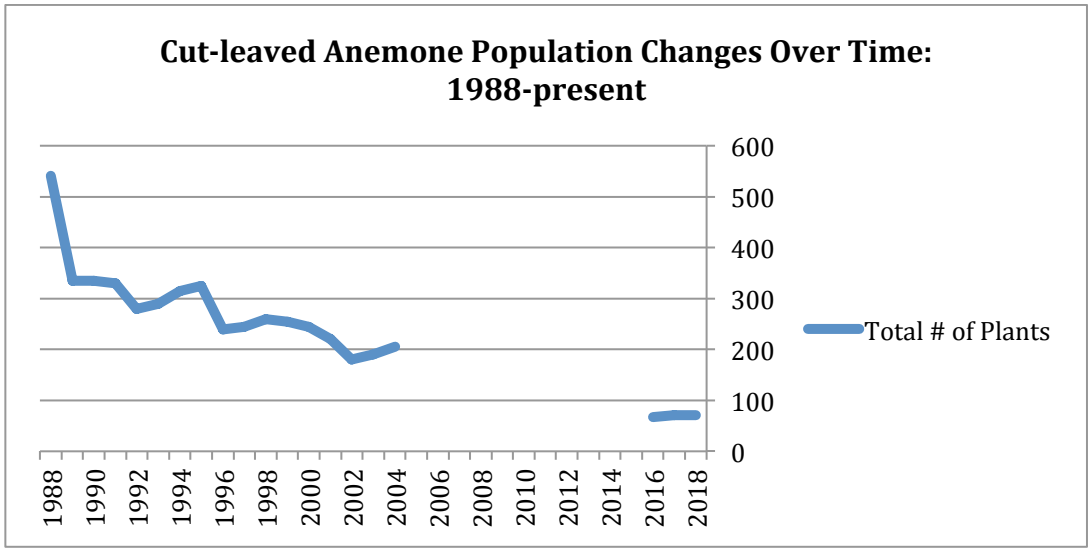
On May 24th of this year I conducted the annual monitoring for the endangered plant Cut-leaved Anemone (*Anemone multifida*) at the Winooski One Hydro station. This was slightly earlier than in prior years, so a number of the plants were still in bloom. The Anemone population remains fairly stable at a much smaller size than was originally present, though there have been some minor dynamics I will discuss below. This is somewhat encouraging given the succession of hot, dry summers (presumably stressful to the plants) we have had lately. The *Anemone* continues to be extant in all subpopulations at the site, including the 5 previously named subpopulations and the additional subpopulation I documented in 2016 for the first time.

As usual I used four different metrics to assess the status of the population: number of plants, area of plants, number of leaves, and number of flowers and/or fruits. Most of these metrics decreased somewhat from 2017, back to levels similar to 2016. This seems to represent stability, while still representing a substantial decline over longer time frames. The 2018 survey revealed the current population held steady at about 71 plants with 23 fruiting compared to 71 plants (24 fruiting) in 2017 and 67 plants (23 fruiting) in 2016. Total plant area, at 1801cm^2, declined by about 35% from 2017 back to 2016 levels. Leaf count declined by about 5% from 2017 to 648 leaves, still well above 2016 levels (550 leaves). Total number of flowering/fruiting heads declined about 20% from 2017 to 43 heads, just under the 2016 level. Minor year-to-year changes in these numbers may be real or may be due to slight inconsistencies in counting from year to year given the inherent ambiguity in determining individuals in this clump-forming species; thus for the present the monitoring data suggest a tenuous stability.

The graph below puts the total present population in context. Note that I collected only the last three years' data and that gaps represent periods of no monitoring. This indicates the current population is hovering at about 40% smaller in number of plants than in 2010.

However, a few clear dynamics are worth noting. I found 5 new individuals in a slightly different locale (under the large cedar) on the West Bench. I have not seen any plants there previously and it is slightly outside the original subpopulation area as explained to me by Mr. Jenkins when I took over the monitoring. Unfortunately, since these plants are definitely new to the count and the total count did not go up, it is clear that an approximately corresponding number of individuals were lost from the population. This type of dynamic is consistent with Jenkins' observations of ongoing recruitment and loss of individuals from the population. It is also noteworthy that this year is the first time, to my knowledge, that one of the subpopulations

('Transect 1') had no reproductive plants. This and the 'NW Bench' subpopulation are most vulnerable to loss, being down to 3 and 2 individuals respectively.



Over half (41) of the extant plants continue to be in the most heavily trafficked area, the West Bench, which is easily accessible adjacent to the parking lot and receives the heaviest foot traffic of all the subpopulations. There continue to be no obvious direct impacts from trampling and most of the plants are out of the main path of travel. These crevices continue to slowly accumulate more shrubs and woody plants, which likely impacts the *Anemone* negatively through shading, competition, and greater leaf litter accumulation, even while it protects the plants from direct trampling and may offer slight protection from moisture stress (via shading).

Increased shading from overhanging shrubs and trees is also potentially impacting the East Bench subpopulation, on the Burlington side of the river. As previously noted this smaller subpopulation, with little potential for trampling impacts could be the logical place to begin evaluating potential benefits of woody vegetation removal. This season's slightly earlier visit also revealed that this subpopulation develops slightly slower, perhaps a week behind the others, likely due to shading and/or different aspect/exposure. The other subpopulations are all quite small, from 2-11 plants each, making them very vulnerable to extirpation.

The *Anemone* population continues to hold on despite a succession of hot, dry summers that previous studies concluded were a driver of declines. It may be that the population has contracted to just those individuals in microsites that provide the most resistance to such stressors. In any case it seems clear that current direct human impacts are not driving the long-term decline. Some experimental management of woody plants at the site should occur to reduce potential shading stress in hopes of benefitting certain subpopulations.

If you have any questions on this matter please be in touch.

Regards,

Matt Peters

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peters.matt@yahoo.com

To: Paul Pikna
Senior Generation Engineer
Burlington Electric Department

June 11, 2019

CC: Bob Popp
Department Botanist
VT Department of Fish and Wildlife

Re: Annual *Anemone multifida* Monitoring at Winooski One

Paul:

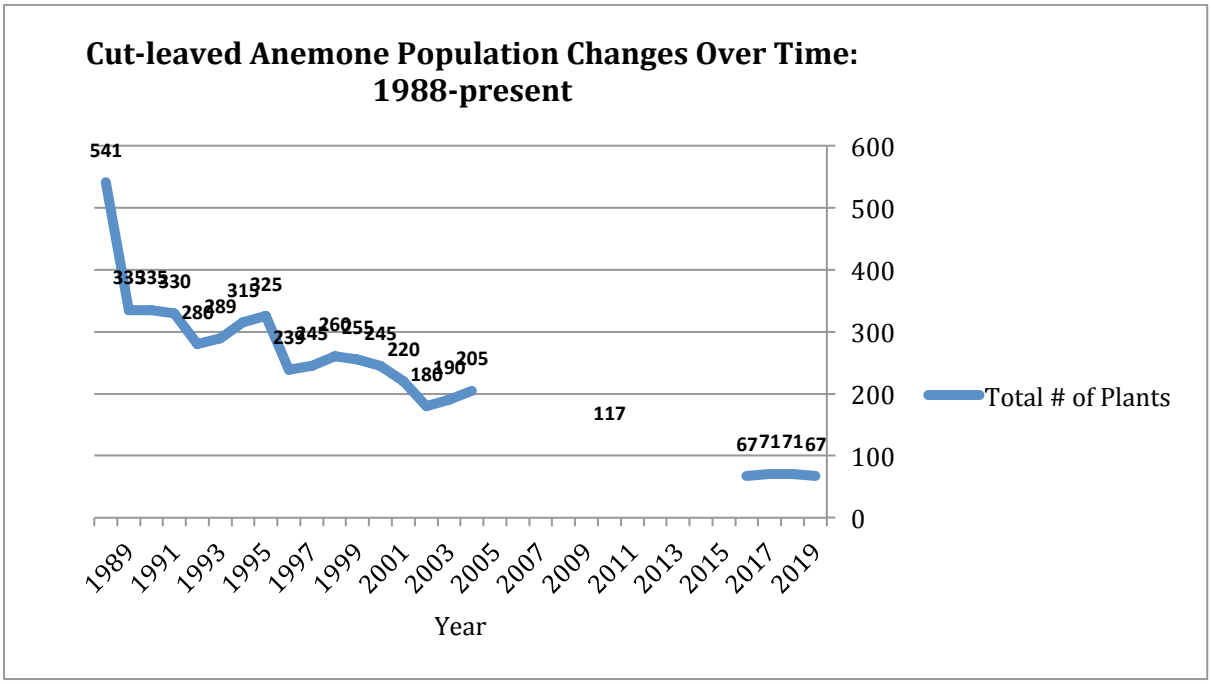
Yesterday, June 10, I conducted the annual monitoring for the State-Endangered plant Cut-leaved Anemone (*Anemone multifida*) at the Winooski One Hydro station. Scheduling was trickier than usual this year due to unusually late high flows and wet weather, but conditions were good and monitoring went smoothly yesterday. Reproductive timing this year appeared to be somewhat delayed due to the cool spring; flowering and fruit development were at a similar stage yesterday as they were during last year's monitoring visit, which occurred about two weeks earlier (May 24th, 2018). Given the hot, dry weather last summer I feared we would see another significant population decline, but I am happy to say the population has maintained itself at similar levels to the last few years and continues to be present at all the subpopulations. There are some fluctuations that present mixed signals as to the population's health and prospects; these are discussed below. As always, I used four different metrics to assess the status of the population: number of plants, area of plants, number of leaves, and number of flowers and/or fruits.

A new phenomenon noted this year is the clear presence of 14 freshly germinated seedlings whose seed leaves (cotyledons) were still visible. These were concentrated in one area of the 'West Bench' subpopulation. I have previously observed very small plants, but never with seed leaves present, which led me to conclude I was previously seeing established plants that were just very small, not fresh germinants. Admittedly there is probably some ambiguity in separating these since seed leaves do not persist very long. I suspect that this year's moist spring may have facilitated germination. I also noted a number of seedlings of the related common species, thimbleweed (*Anemone virginiana*), in some cases occurring right next to seedlings of the cut-leaf anemone. While I am reasonably confident in distinguishing the two, there is some possibility of mistaking one species for the other at the seedling stage. Whether any of these seedlings survive may depend largely on the weather, as they are presumably very vulnerable to desiccating at their current small size. These 14 seedlings are excluded from the total population count discussed below, since their persistence is uncertain, but are left in the dataset for other statistics since their contribution to leaf area and counts is very minimal.

All of the assessed metrics remained fairly stable relative to the previous three years of my monitoring, though of course this still represents a major decline from prior population levels. The total population count was 67 plants (barring the 14 new seedlings discussed above), which is a slight decline from 71 over the last two years, to the same level as 2016. Twenty-two

plants were flowering or fruiting, down slightly from 23 or 24 in the previous three years. Total plant area is up slightly from last year to 2190 cm^2, though it still lags the 2017 level of 2792 cm^2. However, total leaf count is the highest I have yet recorded at 707 leaves, previously 550-682. Reproductive output is up from last year's 43 reproductive heads to 52. Also of interest here is that 2018 had an unusual number (18) of abortive heads in addition to the 43 good heads, perhaps a result of dry conditions that began early. This year there were only 7 abortive heads, similar to the 6 and 4 of 2017 and 2016, respectively. As usual there are slight ambiguities in counting some closely-spaced individuals, so minor fluctuations in some of these statistics can be a sampling artifact.

The graph below puts the total present population in context. Note that I collected only the last four years' data and that gaps represent periods of no monitoring. This indicates the current population is hovering at about 40% smaller in number of plants than in 2010.



Some fluctuations at the subpopulation level are also worth noting. Last year was the first time one of the subpopulations (Transect 1) had no reproductive plants; this continued this year with the nearby NW Bench population also becoming non-reproductive. Each of these subpopulations now have only 2 individuals and are very vulnerable to loss. This year's late high flows may have directly affected these plants, which may have been washed over as recently as the high flows of June 6, though no direct damage was apparent. The lowest plant in the Island subpopulation also appears to have been washed over very recently, though it still had a small flower. The Island and East Bench subpopulations are each down to 6 plants this year, with 2 each reproducing. The recently (2016) discovered 'West Face West Bench' subpopulation appears to have lost 4 plants since 2018; however, one plant is very successful, being the largest and most reproductive I have yet observed with 16 reproductive stems and 120 leaves. This one plant represents almost a third of all the reproductive stems produced in 2019. Finally, with decline or stasis across all of the other subpopulations, the remaining West Bench subpopulation compensated somewhat by increasing from 41 (2018) to 46 plants, plus an additional 14

seedlings. The new area of plants within this subpopulation documented last year, has persisted with some reproduction, offering continued hope that the species will find new suitable microsites within the outcrops.

Over half (46) of the extant plants continue to be in the most heavily trafficked area, the West Bench, which is easily accessible adjacent to the parking lot and receives the heaviest foot traffic of all the subpopulations. There continue to be no obvious direct impacts from trampling and most of the plants are out of the main path of travel. These crevices continue to slowly accumulate more shrubs and woody plants, which likely impacts the *Anemone* negatively through shading, competition, and greater leaf litter accumulation, even while it protects the plants from direct trampling and may offer slight protection from moisture stress (via shading).

Again, the *Anemone* population continues to persist with no immediate concerns about direct human impacts, though overall the species' prospects seem tenuous. It will be interesting to try to track the results of new seedlings that were observed. Perhaps some form of direct or indirect population augmentation through planting seeds in the crevices would be of benefit.

As always, if you have any questions on this matter please be in touch.

Regards,

Matt Peters

From: Matthew Peters [mailto:peters.matt@yahoo.com]
Sent: Monday, July 1, 2019 8:12 AM
To: Paul Pikna <ppikna@burlingtonelectric.com>
Cc: Bob Popp <bob.popp@vermont.gov>
Subject: Re: Winooski I Hydro Proposed Work

Hello Paul,

A brief note to let you know how the additional Anemone conservation work went. State Botanist Bob Popp and I got out there last Friday the 27th and timing was good for seed collection and planting, so we proceeded with the objective of boosting establishment of new plants through careful placement of seeds in suitable sites. (Our premise is that given the small population and limited habitat, many of the seeds naturally end up falling and blowing into unsuitable habitat with no chance of survival.) We collected ripe seeds from 12 plants in the West Bench subpopulation and 2 plants in the West Face West Bench subpopulation for a total of what turned out to be about 238 seeds. We then planted these in several areas: 2 spots in the Transect 1 subpopulation (36 seeds), 2 spots in the West Bench subpopulation (153 seeds), and four spots in the West Face West Bench subpopulation (37 seeds). Planting involved finding suitable microsites, essentially crevices with soil deeper than an inch or so, and placing the seeds on or just below the surface with forceps. I photo documented and sketchmapped these locations for followup to determine the results over time. At this point we have elected to try this test augmentation without watering, allowing the seeds to response to natural precipitation conditions, though we may decide in future that some form of irrigation is warranted to help get the plants established. Bob and I will briefly stop by the site, if we are in the area, to check for germination, and I will certainly carefully examine these augmentation areas during next spring's annual monitoring visit.

In addition to the seed augmentation, we removed some of the woody vegetation that is creating competition and shading the Anemone as well as helping to trap leaf litter that may impair seedlings and alter site suitability. We mainly clipped out the invasive shrub glossy buckthorn, which has become common around the site, but also trimmed up lower branches on a few select cedars. I also stripped away some of the accumulated leaf litter from one section to see how that affects the plants.

Hopefully we will see some new plant establishment as a result of this activity, or at least learn more about the plant's needs. We are started with a low investment approach to this process, though, depending on results, more intensive efforts may be required in future.

Let me know if you have any questions and thanks again for supporting the additional conservation work for the cut-leaf anemone.

best,
Matt

Matt Peters
Consulting Ecologist and Botanist
Woodbury, VT
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Vermont Fish & Wildlife Department
Vermont Natural Heritage Inventory

June 11, 2019

		EO ID	State Rank	State Status	Last Observed
LOWER WINOOSKI RIVER					
Vertebrate Animal					
Acipenser fulvescens	Lake Sturgeon	1935	S1	E	2017
Ammocrypta pellucida	Eastern Sand Darter	124	S1	T	2018
Carpiodes cyprinus	Quillback	2924	S1	SC	1985
Hybognathus hankinsoni	Brassy Minnow	9690	S1	SC	2011
Hybognathus regius	Eastern Silvery Minnow	6578	S3S4		2018
Ichthyomyzon unicuspis	Silver Lamprey	6982	S2?	SC	2015
Lethenteron appendix	American Brook Lamprey	6886	S1	T	2015
Moxostoma anisurum	Silver Redhorse	7571	S2	SC	2007
Moxostoma macrolepidotum	Shorthead Redhorse	9884	S2		1997
Necturus maculosus	Mudpuppy	6978	S2	SC	2004
Notropis rubellus	Rosyface Shiner	6579	S3		2018
Percina copelandi	Channel Darter	6385	S1	E	2018
Invertebrate Animal					
Lampsilis ovata	Pocketbook	5269	S2	E	2015
Lasmigona costata	Fluted-shell	5664	S2	E	2005
Leptodea fragilis	Fragile Papershell	4905	S2	E	2012
Margaritifera margaritifera	Eastern Pearlshell	5160	S2	T	1841
Potamilus alatus	Pink Heelsplitter	4674	S2	E	2015
Pyganodon grandis	Giant Floater	1199	S2S3	T	2012
SALMON HOLE					
Vertebrate Animal					
Acipenser fulvescens	Lake Sturgeon	1935	S1	E	2017
Moxostoma macrolepidotum	Shorthead Redhorse	9884	S2		1997
Invertebrate Animal					
Cicindela marginipennis	Cobblestone Tiger Beetle	7569	S1	T	2005
Lampsilis ovata	Pocketbook	5269	S2	E	2015
Lasmigona costata	Fluted-shell	5664	S2	E	2005
Tetragonoderus fasciatus	A Ground Beetle	10344	S2		2013
WINOOSKI BLUFF					
Invertebrate Animal					
Lampsilis ovata	Pocketbook	5269	S2	E	2015
Lasmigona costata	Fluted-shell	5664	S2	E	2005
Leptodea fragilis	Fragile Papershell	4905	S2	E	2012
Potamilus alatus	Pink Heelsplitter	4674	S2	E	2015
Pyganodon grandis	Giant Floater	1199	S2S3	T	2012
WINOOSKI DELTA					
Invertebrate Animal					
Lampsilis ovata	Pocketbook	5269	S2	E	2015
Leptodea fragilis	Fragile Papershell	4905	S2	E	2012
Potamilus alatus	Pink Heelsplitter	4674	S2	E	2015
WINOOSKI DELTA-DELTA PARK					
Invertebrate Animal					
Cicindela hirticollis	Hairy-necked Tiger Beetle	3911	S1	T	2002

		EO ID	State Rank	State Status	Last Observed
WINOOSKI RIVER-DOUGLAS CURVE					
Vertebrate Animal					
Acipenser fulvescens	Lake Sturgeon	1935	S1	E	2017
Invertebrate Animal					
Lampsilis ovata	Pocketbook	5269	S2	E	2015
Lasmigona costata	Fluted-shell	5664	S2	E	2005
Leptodea fragilis	Fragile Papershell	4905	S2	E	2012
Potamilus alatus	Pink Heelsplitter	4674	S2	E	2015
Pyganodon grandis	Giant Floater	1199	S2S3	T	2012

Terrestrial Species and Significant Natural Communities Directly Upstream and Downstream of Winooski One Dam (Zones of Effect 1,2,3)

Common Name	Scientific Name	EO ID	State Rank	State Status
PLANTS				
Carpenter's-square	Scrophularia marilandica	11568	SU	
Red-root Flatsedge	Cyperus erythrorhizos	32200	S2S3	
Tradescant Aster	Symphyotrichum tradescantii	8025	S2	
River-ledge Goldenrod	Solidago racemosa	8147	S1	
Cursed Crowfoot	Ranunculus sceleratus var. sceleratus	1699	S3	
Creeping Love-grass	Eragrostis hypnoides	4399	S2S3	
Graham's Rockcress	Boechera grahamii	8646	S2S3	
Tufted Beggar-ticks	Bidens tripartita ssp. comosa	32553	SU	
Appalachian Arrowhead	Sagittaria australis	32202	S1?	
Virginia Bugleweed	Lycopus virginicus	9895	S2	
Twin-flower Hedge Bindweed	Calystegia silvatica ssp. fraterniflora	32554	S2	
Early Thimbleweed	Anemone multifida var. multifida	4088	S1	E
Ovate Spikerush	Eleocharis ovata	6268	S3	
Fleshy Hawthorn	Crataegus succulenta var. succulenta	33150	S1	
Tuckerman's Panic-grass	Panicum tuckermanii	32201	S3	
Wright's Spikerush	Eleocharis diandra	32159	S2	
Coastal Pit-seeded Goosefoot	Chenopodium berlandieri var. macrocalycium	33095	SU	
Garber's Sedge	Carex garberi	2765	S1	T
NATURAL COMMUNITIES				
Calcareous Riverside Outcrop		397	S3	
Silver Maple-Ostrich Fern Riverine Floodplain Forest		6277	S3	
Calcareous Riverside Seep		1372	S1	

T=threatened; E=endangered

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Burlington Electric Department
and Winooski One Partnership

Project No. 2756-044
Vermont

ORDER APPROVING CULTURAL RESOURCE MANAGEMENT PLAN
(Issued October 29, 1991)

On October 8, 1991, the Burlington Electric Department and the Winooski One Partnership, licensees for the Chace Mill Project, filed a cultural resource management plan (plan) as required by article 412 of the license. The plan provides specific proposals to ensure that the historic characteristics of the Winooski Falls Mill District are not adversely affected by the project.

The plan includes procedures for documentation of the timber crib dam according to Historic American Engineering Records (HAER) standards and protecting the timber crib dam during construction. The plan also includes architectural and landscape drawings which show the project's compatibility with Winooski Falls Mill District historic characteristics.

By letter dated April 22, 1991, the National Park Service stated that the procedure to document the timber crib dam according to HAER standards was acceptable. By letters dated April 10, and August 22, 1991, the Vermont State Historic Preservation Officer stated that the cultural resource management plan and the architectural and landscape drawings were acceptable.

The measures proposed in the plan adequately mitigate the project's effects on the timber crib dam and will maintain the historic characteristics of the Winooski Falls Mill District.

The Director orders:

(A) The cultural resource management plan, filed on October 8, 1991, fulfills the requirements of article 412 and is approved.

(B) This order constitutes final agency action. Requests for rehearing by the Commission may be filed within 30 days of the date of issuance of this order, pursuant to 18 C.F.R. § 385.713.

Joseph D. Morgan

J. Mark Robinson
Director, Division of Project
Compliance and Administration

Héritage Winooski
MILL MUSEUM

Champlain Mill
20 Winooski Falls Way
Suite 302
Winooski VT 05404
info@themillmuseum.org

Attn: Dan Kopin
Utility Services, Inc.
Compliance Associate
dan.kopin@utilitysvcs.com

May 24, 2019

Dear Dan,

Per your request, I am writing to confirm the cultural outreach and support provided to the Heritage Winooski Mill Museum by Winooski One Hydroelectric Station.

W1H has been a helpful resource. A waterpower exhibit in our gallery contains information and labelled illustrations of the hydro-power plant and the fish elevator provided to us by W1H. The exhibit also includes a real time power production display meter which W1H maintains.

Last year, W1H gave a complimentary tour of the fish elevator and facilities to a group of home school students as an extension of a waterpower workshop given at the Mill Museum.

We are grateful for W1H's willingness to share their expertise about waterpower.

Sincerely,

Miriam Block
Executive Director
Heritage Winooski Mill Museum

Appendix B

Agency Letters

VERMONT

Vermont Department of Environmental Conservation *Agency of Natural Resources*
Watershed Management Division
1 National Life Drive [phone] 802-490-6151
Montpelier, Vermont 05620-3522
http://www.watershedmanagement.vt.gov

July 3, 2019

Paul Pikna
Burlington Electric Department
585 Pine Street
Burlington, Vermont 05401

Re: Renewal of Low Impact Hydropower Institute Certification of Burlington Electric Department's Winooski One Hydroelectric Facility

Dear Mr. Pikna,

This letter responds to recent inquiries made in relation to Burlington Electric Department's (BED) effort to renew the Low Impact Hydropower Institute (LIHI) certification for its Winooski One Hydroelectric Facility. Agency of Natural Resources (ANR or 'Agency', hereafter) staff have reviewed the project for its consistency and compliance with its FERC license (No. P-2756) and 401 Water Quality Certificate (WQC), as well as more generally for its potential impacts in other areas of resource concern. Based on this review, the Agency finds that BED has operated the facility in a manner consistent with its license and 401, both of which include conditions to ensure the project minimally impacts the habitat and biota of the Winooski River within the project's vicinity. Regarding specific LIHI criteria within the Agency's purview, the following is noted:

- *Ecological Flow Regimes*: Per its license, Winooski One is operated as an instantaneous run-of-river mode; thus, project operations negligibly affect downstream flows. As is standard practice with LIHI review, the Agency requested one year of operational data to confirm compliance. Winooski One provided this information to Agency staff and our review confirms compliance with the flow conditions.
- *Water Quality Protection*: Agency staff also reviewed dissolved oxygen records for Winooski one, and confirm Winooski One has been in compliance for this water quality parameter.
- *Upstream Fish Passage*: BED staff work collaboratively with staff from the US Fish and Wildlife Service and the Vermont Fish and Wildlife Department to ensure that the project's upstream fish passage facilities (i.e., the Winooski One 'fish lift') are operated in a way that efficiently and effectively supports federal and state fishery objectives for the Winooski River and Champlain system more broadly.
- *Downstream Fish Passage*: The project has downstream bypass facilities that can be accessed via two entry points, as well as a spillway that spills during much of the spring migration period. Recent studies confirm that downstream migrants use these facilities, but also that opportunities may exist for improving passage and survival in the future. The Agency hopes to work collaboratively with BED and other stakeholders to identify opportunities for downstream passage improvements during the project's future relicensing.

- *Watershed and Shoreline Protection*: As Winooski One is a run-of-river facility the Agency has few concerns about project effects on the watershed and shoreline. Winooski One continues to request preapproval when maintenance requires operations to deviate from run-of-river and operates according to Agency recommendations during that time.
- *Threatened and Endangered Species Protection*: As noted above, the project's run-of-river operating regime means that it does not alter flows relative to what enters the facility's impoundment and forebay. Thus, Winooski One is not suspected of impacting flow-sensitive aquatic species. The project has otherwise complied with specific license conditions concerning rare, threatened, or endangered plants; however, for reasons noted below, endangered plant concerns remain for this project.

Despite BED's record of cooperation, the Agency holds concerns about the status/future of the population of state-endangered early thimbleweed (*Anemone multifida*) found at the project site. Per its license, BED continues to support population monitoring and pays an annual fee to Agency for mitigation, and has shown a willingness to support efforts by Agency's botanist and BED's consultant to augment the local *Anemone multifida* population through active planting and site management. The Agency is encouraged by this cooperation and hopes that such a collaborative effort will help reverse the population's decline and ultimately render translocation or the establishment of a new population unnecessary.

In sum, the Agency believes that BED has operated, and will continue to operate, Winooski One in a manner that is consistent with its existing FERC license and 401. Further, BED shows a continued commitment to working collaboratively with Agency staff to implement operational changes to better support passage, as well as to ensure the site's unique botanical legacy is protected and preserved.

Thank you for contacting Agency staff about this matter,

Sincerely,

Jeff Crocker
Supervising River Ecologist

Cc: Jon Clark, Burlington Electric Department
Dan Kopin, Utility Services, Inc.
Nick Staats, USFWS
Bob Popp, VT FWD
Pete McHugh, VTFWD
Bernie Pientka, VTFWD
Betsy Simard, VTDEC
Eric Davis, VTDEC

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Lake Champlain Fish and Wildlife Resources Office
11 Lincoln Street
Essex Junction, Vermont 05452

In Reply Refer To:
FWS/Region 5/LCFWRO

May 28, 2019

Mr. Dan Kopin
Utility Services
Compliance Associate

Re: Winooski One Fish Passage Project – LIHI ReCertification

Dear Mr. Kopin,

The Fish and Wildlife Service's Lake Champlain Fish and Wildlife Resources Office, in cooperation with the Vermont Department of Fish and Wildlife, monitor and evaluate the fish passage project at the Winooski One hydroelectric facility. The lift is required to operate from March 15 to May 15 and from October 1 to November 15 targeting steelhead trout in the spring and landlocked Atlantic salmon in the fall. Winooski One also operates a downstream passage facility which operates in the spring (April 1 – June 15) and fall (September 15 – December 15). The Winooski One fish passage project is a key component of the Lake Champlain Fish and Wildlife Cooperative's salmonid restoration program as it allows salmon access to important spawning and nursery areas previously inaccessible for over a century. Winooski One has operated in compliance with all their fish passage permit conditions. This letter does not address Winooski Ones performance as it relates to any of the other permit conditions.

The station operators have been enthusiastic about the program and fully cooperative with the Service in ensuring the lift operates in a manner that allows the system to "fish" most effectively. Winooski One has made several lift modifications requested by the Service and the State to improve the lifts efficiency. Some lift modifications have also been suggested by the operators as a result of their gained experience in running the facility. Furthermore, Winooski One employees have assisted biologists in processing lifted fish as well as assisting state and federal hatchery personnel with stocking juvenile fish at the facility.

I look forward to continuing our partnership in the future. If you have any questions, please contact me.

Sincerely,

Nicholas Staats
Fisheries Biologist
U.S. Fish and Wildlife Service

Cc: Andrew Milliken, USFWS
William Ardren, USFWS
Melissa Grader, USFWS

CITY OF WINOOSKI
PLANNING COMMISSION
27 WEST ALLEN STREET
WINOOSKI, VERMONT 05404

December 27, 1993

Mr. John Warshow
Winooski One Partnership
26 State Street
Montpelier, Vermont 05602

RE: FERC No. 2756

Dear John:

This communication shall serve as confirmation that park and public access improvements required through Article 410 of FERC Licence No. 2756 have been completed to the satisfaction of the City of Winooski, Vermont.

Contact me should you require any additional detail.

Regards,

James C. Trzepacz
City Planner

cc: Michael D. Letcher, City Manager

Winooski Valley Park District
ETHAN ALLEN HOMESTEAD
Burlington, Vermont 05401
Tel: (802) 863-5744

John L. Warshow
Winooski One Partnership
26 State Street
Montpelier, VT 05602

December 20, 1993

Dear John,

Regarding the Winooski One Partnership project, I understand that the Federal Energy Regulatory Commission license requires that I acknowledge to you that your company has completed park improvements at this project. Please be advised that the promised work meets with our full satisfaction.

Wishing you the best for the holidays and the new year.

Sincerely,

Jennifer Ely
Director

elycorr93:warshow.ltr

State of Vermont

Department of Fish and Wildlife
Department of Forests, Parks and Recreation
Department of Environmental Conservation
State Geologist
Natural Resources Conservation Council
RELAY SERVICE FOR THE HEARING IMPAIRED
1-800-253-0191 TDD>Voice
1-800-253-0195 Voice>TDD

AGENCY OF NATURAL RESOURCES
Department of Environmental Conservation
WATER QUALITY DIVISION
103 South Main Street
Building 10 North
Waterbury, VT 05671-0408

802-241-3770

January 6, 1994

John L. Warshow, Partner
Winooski One Partnership
26 State Street
Montpelier, VT 05602

RE: Chace Mill Project - FERC No. 2756

Dear Mr. Warshow:

Per your letter of December 17, 1993 concerning Article 410 of the FERC license, the Agency confirms that the required park improvements have been completed to the Agency's satisfaction. The Agency looks forward to continued cooperation with the Winooski One Partnership with respect to public access and use of the project area.

Sincerely,

Jeffrey R. Cueto

Jeffrey R. Cueto, P.E.
Principal Hydrologist

cc: Stephen Sease, Planning
Susan Bulmer, Forests, Parks and Recreation
City Planner, City of Winooski
Jennifer Ely, Winooski Valley Park District