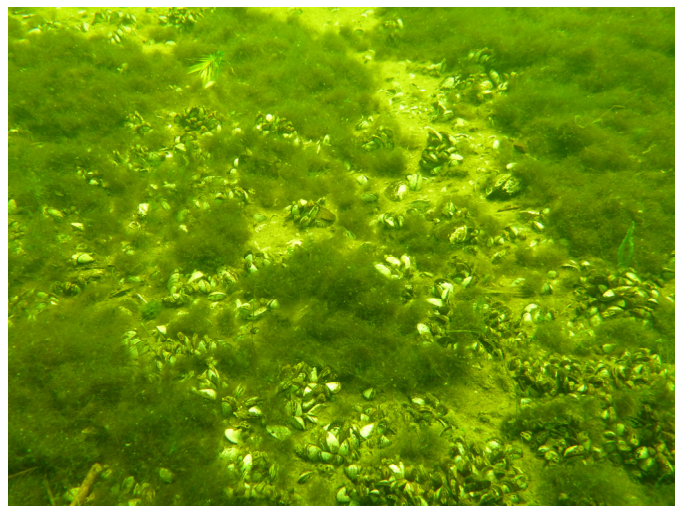


# NEW ENGLAND CLEAN POWER LINK PROJECT

## LAKE CHAMPLAIN FRESHWATER MUSSEL SURVEY REPORT



**Prepared for:**  
**CHAMPLAIN VT, LLC**  
**Charlotte, VT**

**Prepared by:**  
**HDR Engineering, Inc.**  
**Portland, Maine**

**SEPTEMBER 2014**

# 1.0 Introduction and Background

The purpose of the New England Clean Power Link (NECPL) project is to deliver energy generated in Canada to the United States via High Voltage Direct Current (HVDC) cables. The U.S. portion of the proposed project will begin at the U.S./Canadian border, travel within Vermont, and connect to a converter station located in close proximity to the Coolidge Substation. The proposed route for the HVDC cable would enter Lake Champlain near the U.S./Canadian border and at this point it is assumed to make landfall near the vicinity of Benson Landing, Vermont.

Champlain Vermont, LLC d/b/a TDI-New England (the Applicant or TDI-NE) is conducting consultation with the Vermont Fish and Wildlife Department (VFWD) on the potential effects of project construction on rare, threatened and endangered (RTE) species. TDI NECPL submitted an *RTE Necessary Wildlife Habitat and Natural Community Survey Program* to the Vermont Agency of Natural Resources Fish and Wildlife Department (ANR/FWD) on April 24, 2014. The VFWD's Natural Heritage Program provided verbal and email comments on June 16, 2014 noting the potential for five RTE freshwater mussel species to occur in the northern section of Lake Champlain. VFWD noted insufficient field data was available to confirm their presence or absence. Thus, the Applicant was requested to conduct mussel surveys along the cable route in the northeast corner of Lake Champlain when water depths are less than 30 feet to determine if state-protected freshwater mussels occur in the proposed project area. This information will be used to evaluate potential effects of the construction and operation of the proposed cable project on mussel resources.

TDI-NE developed a survey protocol in consultation with VFWD prior to conducting the survey. The approved protocols are included in the Vermont Endangered and Threatened Species Taking Permit issued by VFWG for this survey (Appendix A).

## 1.1 Survey Area

Based on lake bathymetry data and the current route location, the target survey area encompassed the first approximately 12 miles of the route, which is located in the northwest corner of Lake Champlain, specifically from Alburgh, Vermont south to Fisk Point on Isle la Motte. Subsampling was conducted at representative sites approximately every half mile along the proposed cable route where water depths were less than 30 feet. Cable installation at the land to water interface at Alburgh, Vermont, will be conducted using Horizontal Directional Drill (HDD) out to a point beyond the littoral zone. Thus the mussel survey area started near the estimated exit point for the HDD and the starting point for the cable trenching activity.

## 1.2 Study Objectives

The survey objective was to sample representative areas along the proposed project route to determine presence, species identification, and relative abundance of freshwater mussels in the general area (rather than a precise cable location), and to determine the presence of invasive species such as zebra mussels. This level of coverage was considered sufficient to evaluate

potential impact associated with the project construction on state listed species. The target species identified as having the potential to occur in the project area were:

Giant Floater ( <i>Pyganodon grandis</i> )	State Threatened	S2S3 <sup>1</sup>
Pocketbook ( <i>Lampsilis ovata</i> )	State Endangered	S2
Pink Heelsplitter ( <i>Potamilus alatus</i> )	State Endangered	S2
Fragile Papershell ( <i>Leptodea fragilis</i> )	State Endangered	S2
Black Sandshell ( <i>Ligumia recta</i> )	State Endangered	S1

## 2.0 Methods

Mussel surveys were conducted at representative sites along the proposed subsea cable route in Lake Champlain from the entrance point near the town of Alburgh south to Fisk Point off the Isle La Motte. HDR teamed with Biodiversity to conduct the survey and Captain Gilbert Gagner provided boat and captain services. A Vermont scientific collector's and T&E Takings permit (Authorization # ER-2014-03) was obtained prior to conducting the survey. Consistent with the T&E permit conditions issued by the VFWD, the mussel survey methodology consisted of two components, a semi-quantitative timed search survey and a quantitative quadrat survey. Due to depths within the survey area, all surveys were conducted by two SCUBA divers experienced in conducting mussel surveys. A third mussel biologist was available to snorkel shallow water areas, record data and review habitat and collected mussels. Survey locations were spaced approximately every one-half mile along the cable route until water depths increased to greater than 30 feet.

For each survey site, the survey vessel navigated to a preselected sample location using a Garmin Oregon 450t. For the semi-quantitative survey, two divers surveyed the bottom substrate for a minimum of 30 minutes each (total survey time = 1 hour). If no live native freshwater mussels were found, the survey ended. When live native mussels of any species were observed, the survey continued another 15 minutes for each diver for a total survey time of 1.5 hours for each site. The survey methodology also consisted of recording up to 50 individual length measurements and shell condition of each target RTE mussel species at each site. Catch per Unit Effort (CPUE) was calculated based on the number of live native mussels found during the timed effort. Habitat characteristics were recorded for each location. This included water depth, water temperature, water clarity, substrate, aquatic vegetation, and the presence and relative abundance of invasive species such as the zebra mussel (*Dreissena polymorpha*) and Asiatic clam (*Corbicula fluminea*). Surveyors also photo documented habitats and native mussel species collected.

When live native mussels of any species were observed, then ten 1-meter square quadrat samples were collected. Divers recorded all live mussel species found on the surface sediments of each quadrat and then excavated the substrate by hand to determine the number of live mussels buried in the substrate. Data collected from quadrat samples provided mussel densities of both surface and subsurface mussels.

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<sup>1</sup> Natural Heritage Program State Rankings, S1 and S2 are considered rare.

### 3.0 Results

The survey for freshwater mussels was conducted from July 30 to August 2, 2014 at a total of 24 sites. Lake water clarity was excellent to good at all survey locations and surface water temperatures ranged from 71.2°F to 74.6°F. The survey generally followed the proposed spacing of every half mile along the proposed cable route. Two survey locations were spaced closer together at the interface between the proposed HDD and trenching construction methods. One survey site (# 22) had a depth greater than 30 feet but the survey was conducted slightly closer to the steep shelf nearshore to determine if the habitat for mussels varied closer to shore. Two additional sites were found to have water depths greater than the 30-foot threshold and were not surveyed. These sites were located at the southern end of the survey area where lake depths were generally increasing. Figure 1 presents a map of the survey locations.

Aquatic habitat varied from the northernmost survey sites to the deeper southern sites. The dominant substrate was fine material such as sand, silt, and mud, though some sites contained rocky substrates. Aquatic vegetation was common and generally occurred in up to 15 feet of depth. Starting at Site 10, the lake bottom was covered in a material referred to as gyttja, a lacustrine mud containing abundant organic material.

Table 1 presents a summary of all survey data. A total of 1,468 minutes, or 24.3 hours, of search time was conducted for this survey. No live target RTE species were found at any location during the survey, thus estimated abundance and densities for these species were 0. A single weathered dead shell of the target species Giant Floater (*Pyganodon grandis*) was found at each of three Sites (10, 14 and 15). Three survey sites contained live specimens of two common freshwater mussels. Specifically, sites 15, 17, and 20 contained a few live specimens of the Eastern Elliptio (*Elliptio complanata*) and Eastern Lampmussel (*Lampsilis radiata*), which resulted in the site-specific CPUEs shown in Table 2.

One additional native mussel species was observed based on shell material, the Eastern Floater (*Pyganodon cataracta*). A single shell of this species was found at one site, #6. One additional relict shell is identified as either an Eastern Floater or Cylindrical Papershell (*Anodontoidea ferussacianus*). The shell is being submitted to other experts for confirmation/identification, but in any case was not identified as a target species.

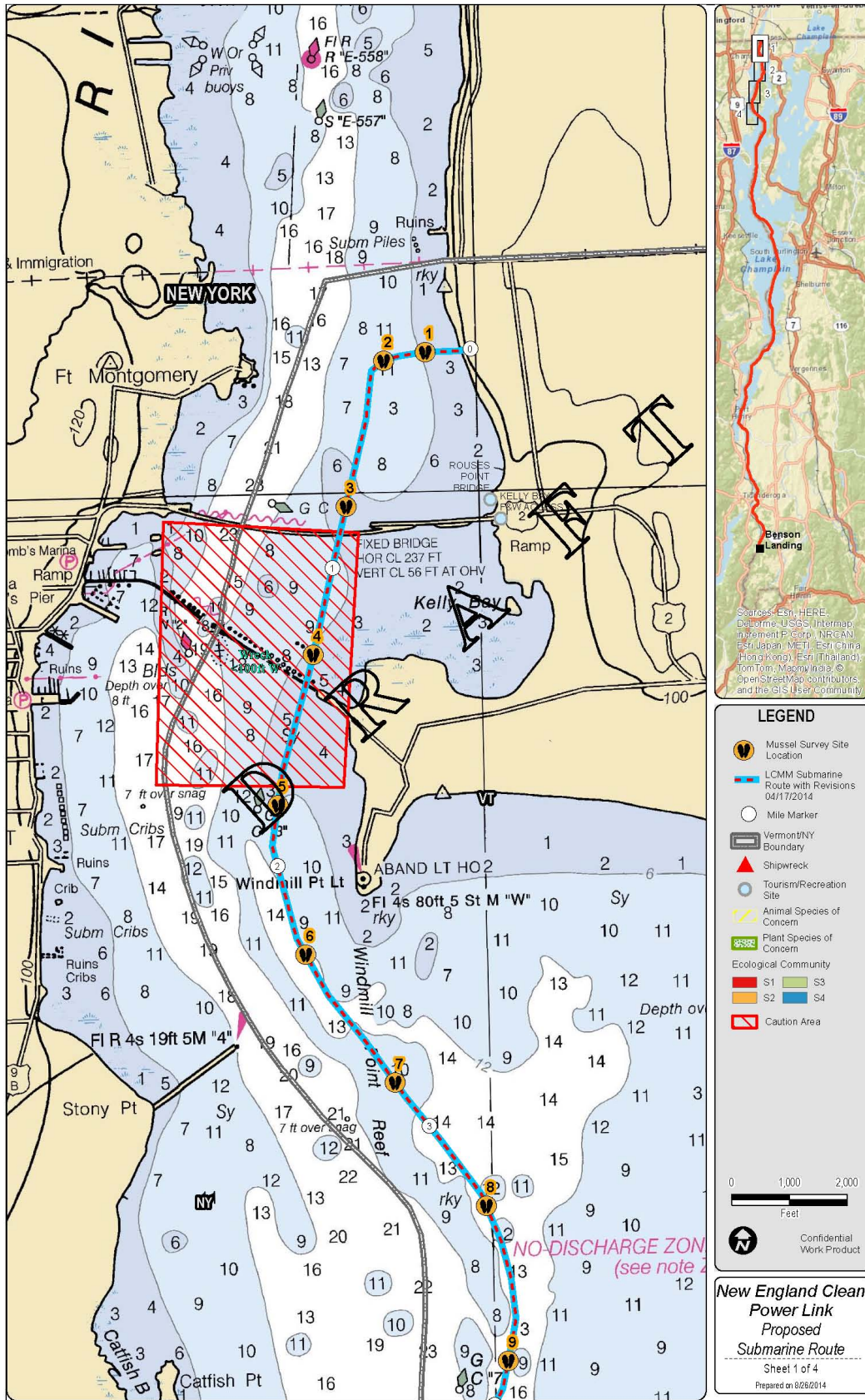
Quadrat samples collected at the three sites where live freshwater mussels were found (Sites 15, 17, and 20) resulted in one additional live Eastern Lampmussel, which was found at Site 20. Thus, the density for this species at Site 20 is estimated at 0.1 mussel per square meter.

The invasive zebra mussel was very abundant throughout the survey area. Shells or live zebra mussels covered all available hard structures, including native freshwater mussels, gastropods, rocks, aquatic vegetation, and debris. The few live native mussels found were also covered in zebra mussels, and it was estimated by field staff that these individuals would likely not survive for the duration of the current growing season. Shell material of freshwater mussels was found at all survey locations indicating native mussels once were generally abundant in this area of Lake Champlain. Clumps of zebra mussels attached to native mussel shells were often sunk into the gyttja. Substrates underneath the layer of gyttja was typically mud or clay, but occasionally contained larger cobble and gravel. Detailed habitat characteristics for each site are presented in

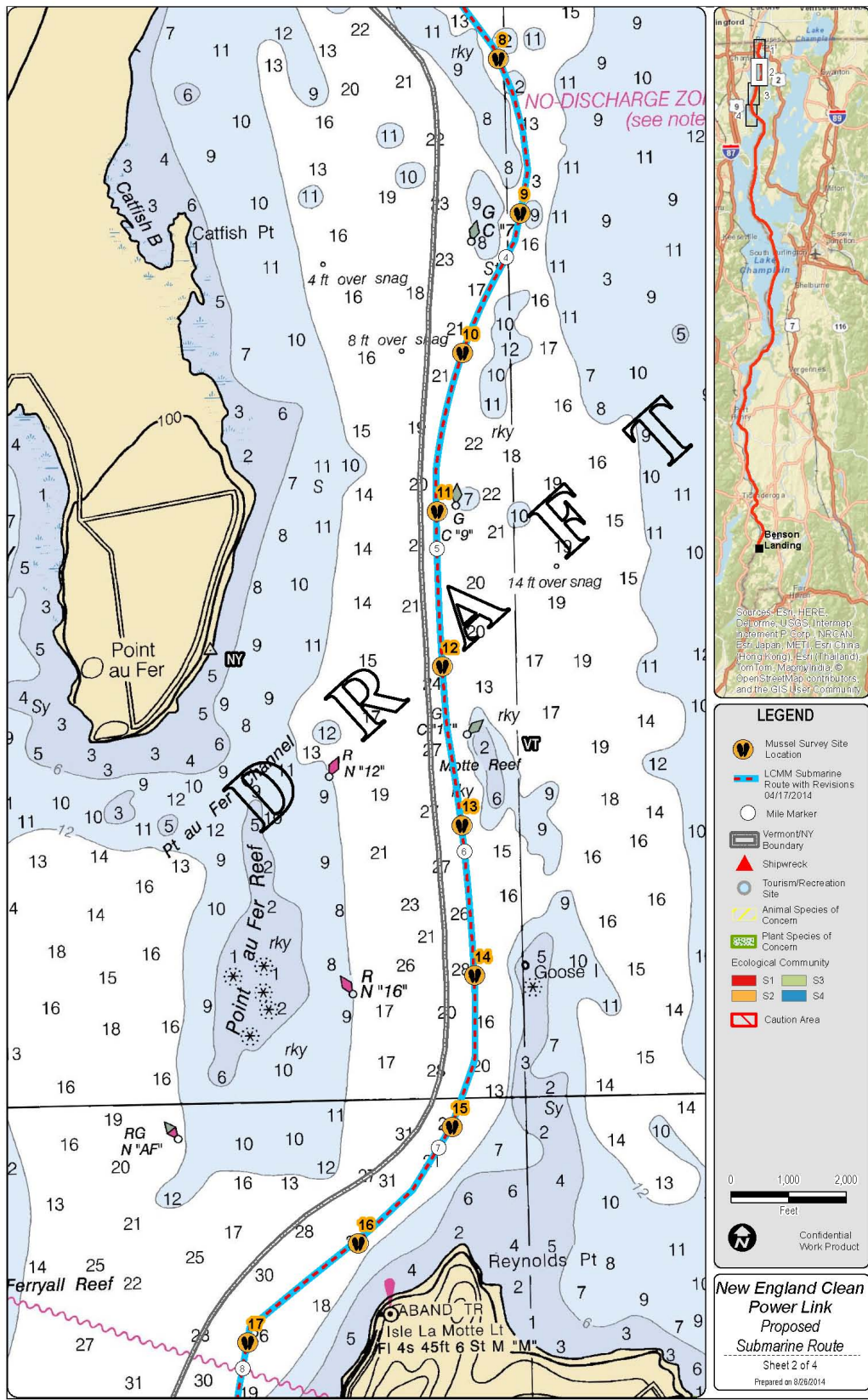
Table 2. Representative photographs of mussel species, abundance of zebra mussels, and habitat are presented in Appendix B.

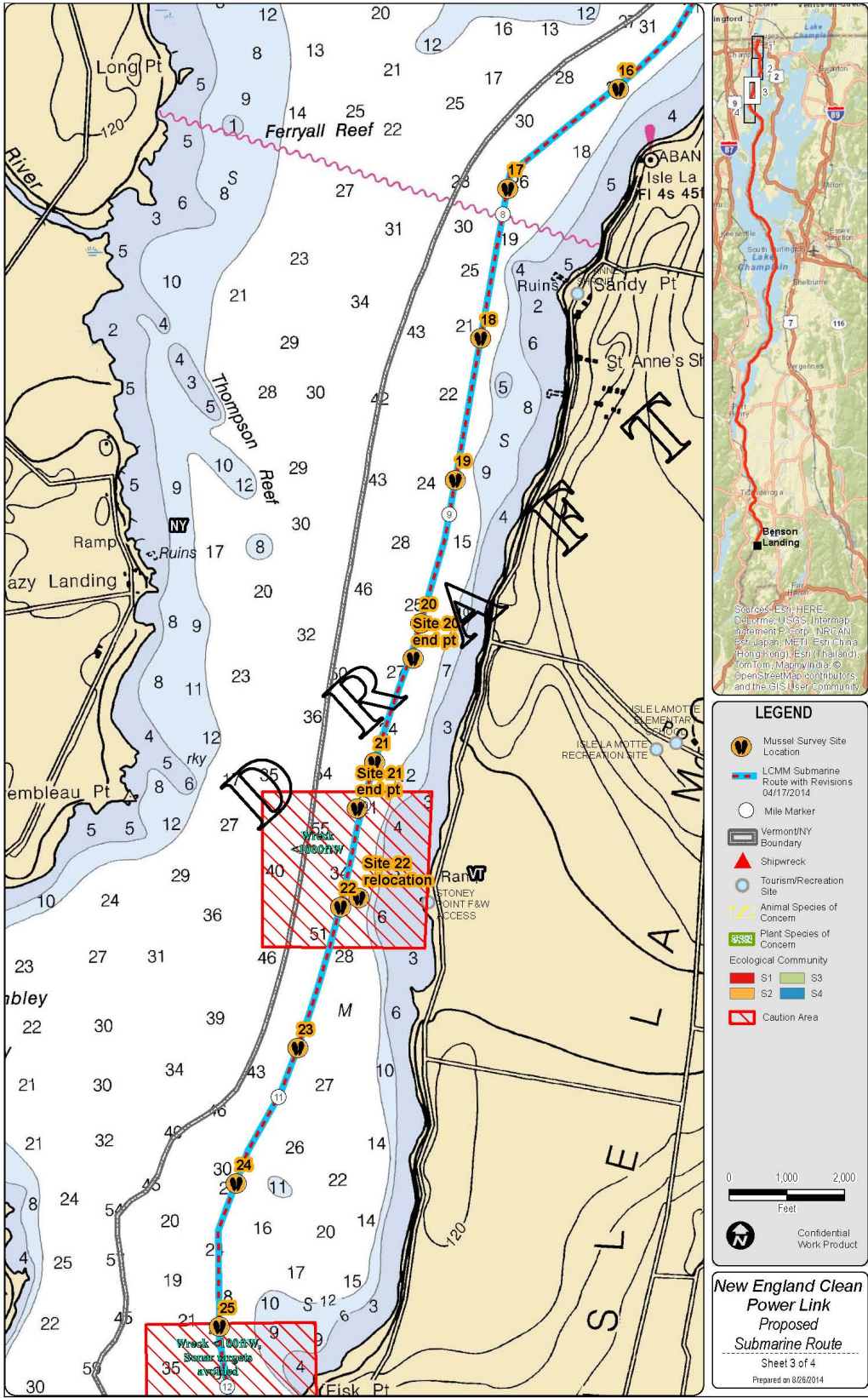
In summary, the freshwater mussel community of the northern section of Lake Champlain, including the area of the proposed cable route, appears to have been decimated by the presence of the invasive zebra mussels. No live Vermont RTE mussel species were observed, and the live common mussels found at only three of the 24 sites surveyed were sufficiently covered in zebra mussels that field staff did not believe that they would survive the year. Based on the results of this survey, the proposed cable installation and operation is unlikely to adversely affect RTE mussel species in Lake Champlain.

**FIGURE 1: SURVEY LOCATIONS**

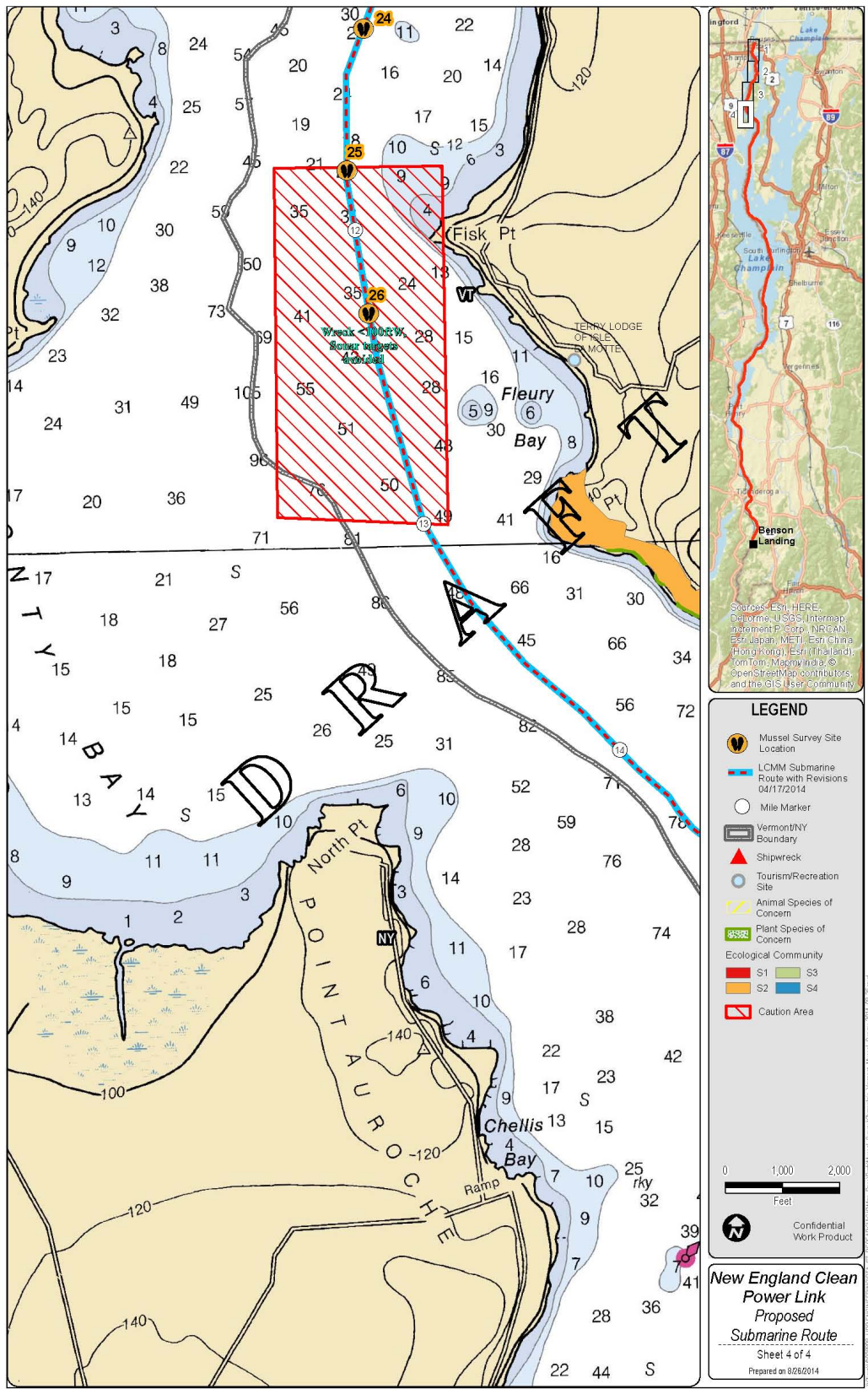


Sheet 2









**TABLE 1: RESULTS OF LAKE CHAMPLAIN MUSSEL SURVEY - JULY 30 TO AUGUST 2, 2014**

Site #	Lat	Long	Date	Survey Conditions	Start Time	End Time	Total Survey Time (minutes)	Species	#Live	#WD	Habitat
1	45.006583	-73.336699	7/30/2014	Sunny & breezy; excellent water clarity, 71.3°F, 6.2 ft depth	9:00 AM	9:30 AM	60	<i>E. complanata</i>		X	Shale rock covered with silt/sand; dense zebra mussels, aquatic vegetation
2	45.006206	-73.339496	7/30/2014	Sunny & breezy; excellent water clarity, 72.5°F, 10.6 ft depth	9:50 AM	10:20 AM	60	<i>E. complanata</i>		X	Deep muck and vegetation; few zebra mussels
3	44.999336	-73.342189	7/30/2014	Sunny & breezy; excellent water clarity, 72.9°F, 5.0 ft depth	10:37 AM	11:07 AM	60	<i>E. complanata</i>		X	Started with rocky substrate changing to sand and mud; dense zebra mussels; aquatic vegetation.
								<i>L. radiata</i>		X	
4	44.992344	-73.344607	7/30/2014	Sunny & breezy; excellent water clarity, 73.6°F, 6.5 ft depth	11:34 AM	12:34 PM	60	<i>E. complanata</i>		X	Sand with some silt; heavy vegetation; moderate numbers of zebra mussels; variety of fish (catfish, bullhead, white sucker)
								<i>L. radiata</i>		X	
5	44.985245	-73.347157	7/30/2014	Sunny & breezy; excellent water clarity, 9.0 ft depth, off point downstream of RR piers	12:34 PM	12:58 PM	48	<i>E. complanata</i>		X	Sandy substrate with heavy vegetation; moderate zebra mussel numbers due to lack of structure.
6	44.978151	-73.345535	7/30/2014	Sunny & breezy; excellent water clarity, 74.3°F, 15 ft depth	1:22 PM	1:52 PM	60	<i>E. complanata</i>		X	Fine algae covering sand, muck, and some cobble; dense zebra mussels
								<i>L. radiata</i>		X	
								<i>P. cataracta</i>		X	
7	44.971995	-73.339700	7/30/2014	Sunny & breezy; excellent water clarity, 74.6°F, 11.1 ft depth	2:21 PM	2:51 PM	60	<i>E. complanata</i>		X	Sand, silt, and dense vegetation; huge numbers of zebra mussel shells; school of SMB
								<i>L. radiata</i>		X	
8	44.966065	-73.333768	7/30/2014	Sunny & breezy; excellent water clarity, 74.5°F, 11.9 ft depth	3:10 PM	3:40 PM	60	<i>E. complanata</i>		X	Sand, silt, gravel with a few larger rocks covered with zebra mussels; no aquatic vegetation but layer of green algae.
								<i>L. radiata</i>		X	
9	44.958696	-73.332499	7/30/2014	Sunny & breezy; excellent water good, 74.3°F, 15.9 ft depth	4:00 PM	4:30 PM	60	<i>E. complanata</i>		X	Sand, silt with green algae and low density of aquatic vegetation; dense zebra mussels
								<i>L. radiata</i>		X	
10	44.952090	-73.336540	7/30/2014	Overcast; water clarity good but light haze layer about 4 - 5ft above bottom, 74.3°F, 15.9 ft depth  Thermocline present at about 15 ft depth	8:47 AM	9:17 AM	60	<i>P. grandis</i>		X	gyttja (gelatinous mass of muck and algae) with sunken clusters of native mussel shells covered with zebra mussels; low density of aquatic vegetation
								<i>E. complanata</i>		X	
								<i>L. radiata</i>		X	
11	44.944595	-73.338486	7/31/2014	Overcast and breezy; water clarity good, 19.6 ft depth and 73.1°F  Thermocline about 2 ft above bottom	9:28 AM	9:58 AM	60	<i>E. complanata</i>		X	gyttja (gelatinous mass of muck and algae) with sunken clusters of native mussel shells covered with zebra mussels; low density of aquatic vegetation
								<i>L. radiata</i>		X	
12	44.937202	-73.338360	7/31/2014	Overcast and breezy; water clarity good, 21.7 ft depth and 73.1°F  Thermocline just above bottom	10:13 AM	10:43 AM	60	<i>E. complanata</i>		X	gyttja (gelatinous mass of muck and algae) with sunken clusters of native mussel shells covered with zebra mussels; low density of aquatic vegetation
								<i>L. radiata</i>		X	

Site #	Lat	Long	Date	Survey Conditions	Start Time	End Time	Total Survey Time (minutes)	Species	#Live	#WD	Habitat
13	44.929625	-73.337248	7/31/2014	Overcast and breezy; water clarity good, 21.0 ft depth and 73.1°F; no thermocline  Close to Motte's reef - very popular fishing area	10:57 AM	11:27 AM	60	<i>E. complanata</i>		X	gyttja (gelatinous mass of muck and algae) with sunken clusters of native mussel shells covered with zebra mussels; larger clumps of zebra mussels than previous sites
								<i>L. radiata</i>		X	
14	44.922457	-73.336588	7/31/2014	Very breezy with approaching front; water clarity good, 21.8 ft depth and 72.9°F  Thermocline just above bottom at start of survey but slowly faded as moved south.	11:43 AM	12:13 PM	60	<i>P. grandis</i>		X	gyttja (gelatinous mass of muck and algae) with sunken clusters of native mussel shells covered with zebra mussels
								<i>E. complanata</i>		X	
								<i>L. radiata</i>		X	
15	44.915276	-73.338318	8/1/2014	Partial sun and breezy; water clarity fairly good, slightly less than yesterday; 19.0 ft depth and 71.2°F; no thermocline	8:41 AM	9:11 AM	60	<i>E. complanata</i>	2	X	gyttja (gelatinous mass of muck and algae) with sunken clusters of native mussel shells covered with zebra mussels; small amount of aquatic vegetation (2%); 10 quadrats - 0 mussels.
								<i>L. radiata</i>	2	X	
					9:15 AM	9:30 AM	30	<i>P. grandis</i>		X	Relict shell submitted for identification
								<i>P. cataracta/ A. ferussacianus</i>		X	
16	44.909831	-73.344782	8/1/2014	Breezy with hazy sun; water clarity fairly good; 15.4 ft depth, 72.9°F  On edge of rocky shelf				<i>E. complanata</i>		X	Gyttja with gravel/sand underneath; more aquatic vegetation (40-50%) at start, changing to about 2 ft deeper with no vegetation south. Mussel shells not as densely covered with zebra mussels
								<i>L. radiata</i>		X	
17	44.905214	-73.352304	8/1/2014	Breezy with hazy sun; water clarity fairly good; 24 ft depth, 72.9°F; no thermocline	10:40 AM	11:25 AM	90	<i>E. complanata</i>	2	X	Gyttja with 5-7 inches much loaded with zebra mussels; no vegetation. 10 quadrats - 0 mussels.
								<i>L. radiata</i>	4	X	
18	44.898127	-73.354339	8/1/2014	Weather front moving in, very breezy with heavy clouds; water clarity fairly good; 17.2 ft depth, 73.1°F	11:40 AM	12:10 PM	60	<i>E. complanata</i>		X	Clay under gyttja of 3 to 4 inches depth; not as mucky as previous sites zebra mussels about 40% coverage; cusk eel observed.
								<i>L. radiata</i>		X	
19	44.891418	-73.356233	8/1/2014	Weather front moving in, very breezy with heavy clouds; water clarity fairly good; 13.2 ft depth, 73.3°F  No thermocline	12:26 PM	12:56 PM	60	<i>E. complanata</i>		X	Clay under gyttja of 4 to 6 inches depth; scattered cobble; zebra mussels dense.
								<i>L. radiata</i>		X	
20	44.884640	-73.358732	8/1/2014	Very breezy with partial sun; water clarity fairly good; 22.2 ft depth, 73.4°F	1:05 PM	1:50 PM	90	<i>E. complanata</i>	53	X	Harder clay under 6 to 12 inches of gyttja; scattered cobble; zebra mussels very dense. 10 quadrats yielded 1 <i>L. radiata</i> within gelatinous mass of #9 quadrat.
								<i>L. radiata</i>	25	X	
21	44.878077	-73.362023	8/2/2014	Heavy haze and light breeze; water clarity moderate (6-7 ft); 25.4 ft depth 72.5°F  No thermocline	8:06 AM	8:36 AM	60	<i>E. complanata</i>		X	Deep layer of gyttja (10-12 inches) and no rocks; a few dead shells buried but zebra mussels dens at about 40%; no aquatic vegetation
								<i>L. radiata</i>		X	

Site #	Lat	Long	Date	Survey Conditions	Start Time	End Time	Total Survey Time (minutes)	Species	#Live	#WD	Habitat
22	44.871222	-73.364501	8/2/2014	Breezy with partial sun/haze; water clarity good (8-10 ft); 34.2 ft depth greater than survey protocol so moved in-shore near steep shelf where depth was 17 ft, and temperature 73.3°F; just offshore of fishing access site Isle la Motte.	8:52 AM	9:22 AM	60	<i>E. complanata</i>		X	Gyttja 2-3 inches over gravel/muck; wall of aquatic vegetation just inshore from survey area at about 15 ft depth
								<i>L. radiata</i>		X	
23	44.864559	-73.367531	8/2/2014	No Survey due to depth of 33 ft. Note Lake level is 96.08 ft compared to a typical range of 95-101 ft							
24	44.858176	-73.371845	8/2/2014	Breeze with light haze; 26.8 ft depth and 73.1°F	9:43 AM	10:13 AM	60	<i>E. complanata</i>		X	Gyttja of 6 to 8 ft depth over clay, scattered boulders, everything covered with dense zebra mussels.
								<i>L. radiata</i>		X	
25	44.851387	-73.373152	8/2/2014	Very breezy; 26.7 ft depth and 73.1°F; density cline at 2-3 ft above bottom affected variable clarity from 2-3 ft to 6-7 ft.  Close to Fiske Pt on Isle la Motte	10:25	10:55	60	<i>E. complanata</i>		X	Gravel and cobble under gyttja, large boulders about 20% substrate; everything covered with dense zebra mussels.
								<i>L. radiata</i>		X	
26	44.844501	-73.371868	8/2/2014	No Survey due to depth of 42.1 ft.							

**TABLE 2: CATCH PER UNIT EFFORT VALUES**

Species	Catch per Hour by Site (Sites where live mussels were found)			Total Catch per Hour (All Sites)
	Site #15	Site #17	Site #20	
<i>Elliptio complanata</i>	1.3	1.3	35.3	2.3
<i>Lampsilis radiata</i>	1.3	2.7	16.7	1.3

## 4.0 References

Vermont Fish and Wildlife. 2012. Endangered and Threatened Animals of Vermont. Vermont Natural Heritage Inventory 15 November 2012. Online URL:  
[http://www.vtfishandwildlife.com/library/Reports\\_and\\_Documents/NonGame\\_and\\_Natural\\_Heritage/Rare\\_Threatened\\_and\\_Endangered\\_Species%20%20---%20lists/Endangered%20and%20Threatened%20Animals%20of%20Vermont.pdf](http://www.vtfishandwildlife.com/library/Reports_and_Documents/NonGame_and_Natural_Heritage/Rare_Threatened_and_Endangered_Species%20%20---%20lists/Endangered%20and%20Threatened%20Animals%20of%20Vermont.pdf)  
Accessed August 7, 2014.

## **APPENDIX A**



## Agency of Natural Resources

1 National Life Dr., Davis 2, Montpelier, VT 05620-3901, 802-828-1294

### Endangered & Threatened Species Takings Permit

Statutory Authority: 10 VSA § 5408

**1. Permittee**

**Donald Jessome**  
**Transmission Developers Inc.**  
600 Broadway, Albany, NY 12207  
518-465-0710, donald.jessome@transmissiondevelopers.com

**2. Permit Period**

**Effective Date:** 7/15/2014  
**Expiration Date:** 9/30/2014  
**Authorization #:** ER-2014-03  
**Amendment #** 0

**3. Principal Officer:** Donald Jessome.

**4. Subpermittee(s):** Ethan Nedeau and employees of Biodrawversity LLC. Mary McCann, HDR Inc.

**5. Authorized Species:** Giant floater (*Pyganodon grandis*), Pink heelsplitter (*Potamilus alatus*), Fragile papershell (*Leptodea fragilis*), Pocketbook (*Lampsilis ovata*), Cylindrical papershell (*Anodontoides ferussacianus*), Black sandshell (*Ligumia rectaa*).

**6. Authorized Activity:** A pre-construction survey along for listed mussels along the proposed 12.5 mile path of an electrical cable line.

**7. Location Where Authorized Activity May Be Conducted:** Lake Champlain, Grand Isle County, VT.

**8. Findings**

- A. The Permittee applied for an Endangered and Threatened Species Takings Permit under 10 V.S.A. § 5408 to authorize a survey for listed mussels in Lake Champlain along the proposed route of a cable line.
- B. Said research has been determined to be non-de minimis in nature and will have the following benefits: improved knowledge of the presence and relative abundance of listed mussels in Lake Champlain.
- C. The Permittee is the Chief Executive Officers of Transmission Developers an energy transmission company.
- D. The Permittee has retained the services of Ethan Nedeau and the staff of Biodrawversity, LLC to conduct the proposed survey.
- E. The Vermont Agency of Natural Resources has reviewed **Mr. Nedeau's** qualifications and has determined that he is qualified to conduct the survey.
- F. The ESC has approved, as a class, pre-construction surveys such as that proposed here, and reviews a summary of such permits annually.

**9. Statutory Determination**

- A. 10 V.S.A. § 5408(a) provides: "[A]fter obtaining the advice of the Endangered Species Committee, the Secretary may permit, under such terms and conditions as the Secretary may prescribe by rule any act otherwise prohibited by this chapter if done for any of the following purposes: scientific purposes; to enhance the propagation or survival of a species; economic hardship; zoological exhibition, educational purposes; or special purposes consistent with the purposes of the federal Endangered Species Act."
- B. The Permittee requests an Endangered & Threatened Species Takings Permit for Scientific purposes.
- C. The state of Vermont recognizes the value which plants, fish and wildlife in their natural environment have for public enjoyment, ecological balance, and scientific study. See 1981, No. 188 (Adj. Sess.), § 1(a).
- D. The state of Vermont recognizes the need for protection and preservation of these plants, fish and wildlife in their natural environment. *Id.*
- E. The General Assembly of Vermont intends that the species of wildlife and wild plants normally occurring within this state which may be found to be threatened or endangered within the state should be accorded protection as necessary to maintain and enhance their numbers. *Id.* at § 1(b).
- F. The General Assembly of Vermont intends that the state should assist in the protection of species of wildlife and wild plants which are determined to be threatened or endangered elsewhere pursuant to the federal

Endangered Species Act. *Id.*

- G. Pursuant to 10 V.S.A. § 5408(a), the ANR Secretary hereby determines, based upon the findings detailed above and after receiving advice from the Endangered Species Committee, that the proposed activity is consistent with the purposes of the 10 V.S.A. ch. 123. An Endangered and Threatened Species Takings Permit is authorized, as conditioned below.

#### 10. General Conditions & Authorizations

- A. This permit is issued in accordance with 10 V.S.A. ch. 123. All activities authorized herein must be carried out in accord with and for the purposes described in the application submitted. Continued validity or renewal of this permit is subject to complete and timely compliance with all applicable conditions, including the filing of all required information and reports.
- B. This permit is expressly conditioned upon compliance with all applicable federal and state laws, regulations and permits.
- C. This permit does not confer upon the Permittee the authority to conduct research without the acquiring necessary landowner permission including, but not limited to, state lands.
- D. By acceptance of this permit, the Permittee and its heirs, successors and assigns agree to provide the Agency of Natural Resources with unrestricted access, at reasonable times to the animal or plant specimens and/or animal or plant parts collected and possessed under this permit, collection and monitoring records, and access to the premises as necessary to ensure compliance with this permit.
- E. The Agency maintains continuing jurisdiction over this activity, and may, at any time, order the Permittee to undertake remedial measures if necessary to ensure the protection and conservation of listed species.
- F. This permit is not valid for endangered and threatened species that are not listed in section 5.
- G. The permit is valid for use by the named Permittee and subpermittees(s) only and may be revoked by the Secretary at any time for cause, or violations of any terms or conditions of this permit or state law.
- H. The Permittee and subpermittee(s) shall carry copies of this permit whenever performing authorized activities and shall make the permit available upon request.

#### 11. Specific Conditions & Authorizations

##### Standard Requirements

- A. **Qualified personnel:** A qualified and experienced mussel biologist shall conduct all surveys, translocations, and follow-up monitoring. Authorization is conditioned upon the mussel biologist demonstrating to the Vermont Agency of Natural Resources (VANR) that he/she is fully capable of locating and identifying state-listed and federally-listed mussel species and their habitats. The VANR reserves the right to reject surveys, translocations and monitoring data that are not conducted by qualified individuals.
- B. **Consultation:** The Permittee and mussel biologist shall consult with the VFWD mussel specialist throughout the project as needed, on survey conditions, protocols, any proposed changes to the protocols proposed in the application.
- C. **Field Conditions:** Surveys shall occur under favorable conditions (e.g. high water clarity, suitable water temperatures), generally between May 20<sup>th</sup> and September 30<sup>th</sup> of the permit period and no more than one-year prior to the commencement of construction activities. The VFWD mussel specialist may authorize the permitted activity on site if one or more of these conditions is deemed borderline unfavorable.
- D. **Mussel Handling:** Care shall be taken to prevent damage to mussels during handling and during removal from and return to the substrate. Mussels shall be removed slowly from consolidated fine substrate, such as clay or sand, to prevent damage to the foot, which can be extended deep into the substrate. Each mussel shall be oriented in an upright position (foot/anterior end down) when being returned to the substrate as placing a mussel upside down would likely result in its death. If the substrate is firm or rocky, it may be necessary to



create an opening to place the mussel in using a hand trowel or other implement to prevent damage to the shell that can occur from attempting to push a mussel directly into hard substrate.

- E. Site Inspections and remedial requirements:** VANR reserves the right to conduct field inspections prior to, during, or after permitted activities as a means of verifying compliance with permit conditions and to ensure that impacts to protection are minimized. VANR also maintains continuing jurisdiction over this activity and the listed species and may at any time order the Permittee to undertake remedial measures, if necessary, to ensure the protection and conservation of listed species.

#### **Survey**

- F. Survey area:** The survey area shall be those areas within 30 feet of the centerline of the path proposed for an electrical cable line between Alburgh and Fisk Point in Grand Isle County, VT (approximately 12.5 miles in length) where the water depth is 30 feet or less and includes the area where horizontal directional drilling exits the sub-surface into the lake.
- G. A semi-quantitative survey** shall be employed to evaluate mussel species presence and relative density at a minimum of 25 surveys sites distributed across the survey area. Each survey site shall be searched for a minimum of 1.5 person-hours. If no mussel specimens of any species are found at a site after 1.0 person-hours of search, surveyors may stop searching at the site and spend the remaining time searching another site. Detection methods shall include visual and tactile searches.
- H.** A qualitative estimate of abundance for the mussel species listed in Section 5 shall be calculated using a timed search and the Catch per Unit Effort (CPUE) method. Density estimates may be used to quantify common species.
- I. A quantitative survey** shall be employed to evaluate mussel densities with a minimum of 10 one-meter square quadrats placed randomly within each of the 25 survey sites. Detection methods shall include visual searches at the substrate surface and excavation to find mussels located in the substrate. Substrate sediments shall be excavated in quadrats to a minimum depth of 10 cm and sieved through a mesh screen with openings of 4-6 mm to detect juvenile mussels.
- J.** Surveyors shall record separately, those specimens found at the surface and those found through excavation. Surveyors shall record the shell length, shell condition, microhabitat (depth, substrate) of up to 50 individuals of each target species at each site. Surveyors shall also take digital voucher photographs of mussels and their habitat, and record locations (using GPS) of each survey site.
- K.** A quantitative estimate of mussel density shall be calculated at each site using the number of mussels found per species per square meter of survey area.

#### **12. Reporting Requirements**

- A.** Any mortality/morbidity related to the activities authorized under this permit that was/were not specifically requested, anticipated and/or authorized shall be reported in writing to the VFWD mussel specialist within 72 hours of each occurrence. Reports shall include the preserved specimens and a plan for reducing the likelihood of future occurrences.
- B. Survey Report:** A report shall be submitted within 45-days of the completion of the survey unless an extension is specifically requested and granted, and at a minimum shall include:
- i. Survey methods (including those used for substrate excavation/subsurface search) and a rationale for any additional efforts and modifications to proposed methods.
  - ii. Survey time, date, and level of effort (number of surveyors, time spent surveying at surface and subsurface).
  - iii. Environmental conditions including weather, water clarity, water temperature, and depth.
  - iv. Separate counts of each listed species found at surface and at subsurface; a qualitative estimate of abundance for each mussel species observed; a quantitative estimate of abundance for each listed mussel species observed; shell length, shell condition and lateral photographs of representative specimens from each survey site.

- v. Habitat and micro-habitat descriptions (e.g., substrate types, depth and flow velocities), subsurface excavation areas; photograph(s); and a map that shows the location and spatial extent (size, area) of habitats, excavation areas and locations where mussels were found.
- C. The Permittee shall accommodate requests by VANR staff for additional information from collection activities (e.g., copies of original field sheets, computerized data in usable format). Reports of results of any subsequent analyses and copies of subsequent publications resulting from the collections made under this permit shall be forwarded to the VFWD Permits Specialist within 30-days.

Issued by: Deb Markowitz Date: 7-18-14  
Deb Markowitz, Secretary  
Agency of Natural Resources

**Right to Appeal to Public Service Board**

If this decision relates to a renewable energy plant for which a certificate of public good is required under 30 V.S.A. §248, any appeal of this decision must be filed with the Vermont Public Service Board pursuant to 10 V.S.A. §8506. This section does not apply to a facility that is subject to 10 V.S.A. §1004 (dams before the Federal Energy Regulatory Commission), 10 V.S.A. §1006 (certification of hydroelectric projects) or 10 V.S.A. Chapter 43 (dams). Any appeal under this section must be filed with the Clerk of the Public Service Board within 30 days of the date of this decision; the appellant must file with the Clerk an original and six copies of its appeal. The appellant shall provide notice of the filing of an appeal in accordance with 10 V.S.A. 8504(c)(2), and shall also serve a copy of the Notice of Appeal on the Vermont Department of Public Service. For further information, see the Rules and General Orders of the Public Service Board, available on line at [www.psb.vermont.gov](http://www.psb.vermont.gov). The address for the Public Service Board is 112 State Street, Montpelier, Vermont, 05620-2701 (Tel. # 802-828-2358).

## **APPENDIX B**



Photo 1: Native freshwater mussel shells covered in zebra mussels.



Photo 2: Underwater photo of native freshwater mussel shell covered in zebra mussels.



Photo 3: Submerged aquatic vegetation at some mussel survey sites.

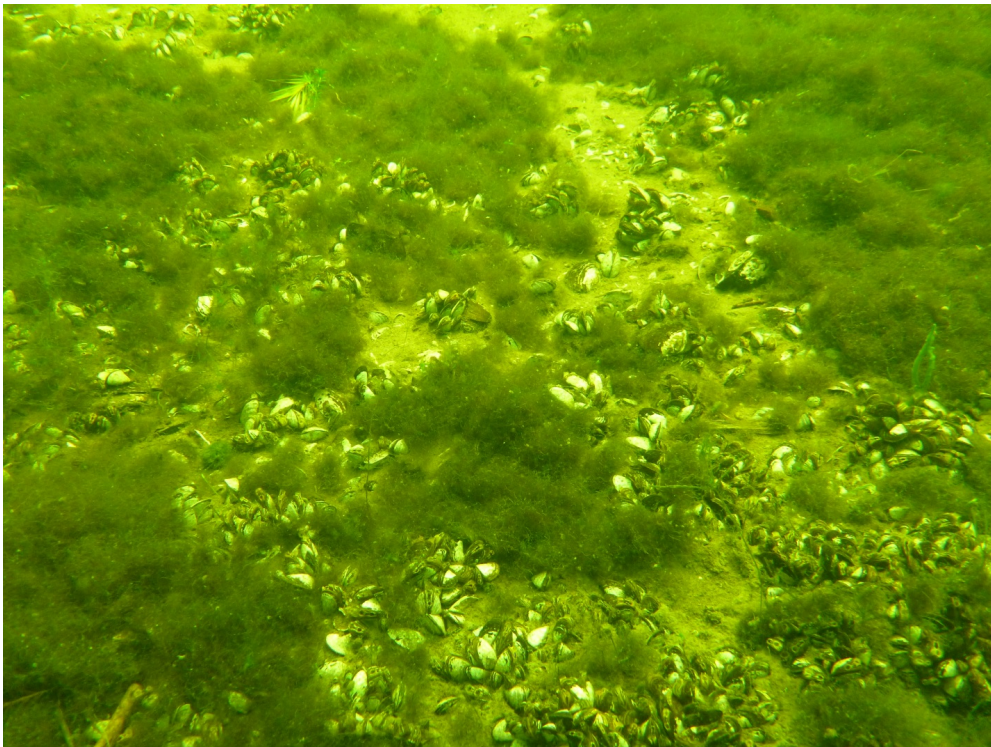


Photo 4: Representative photo of bottom substrate with native mussel shells and zebra mussels.

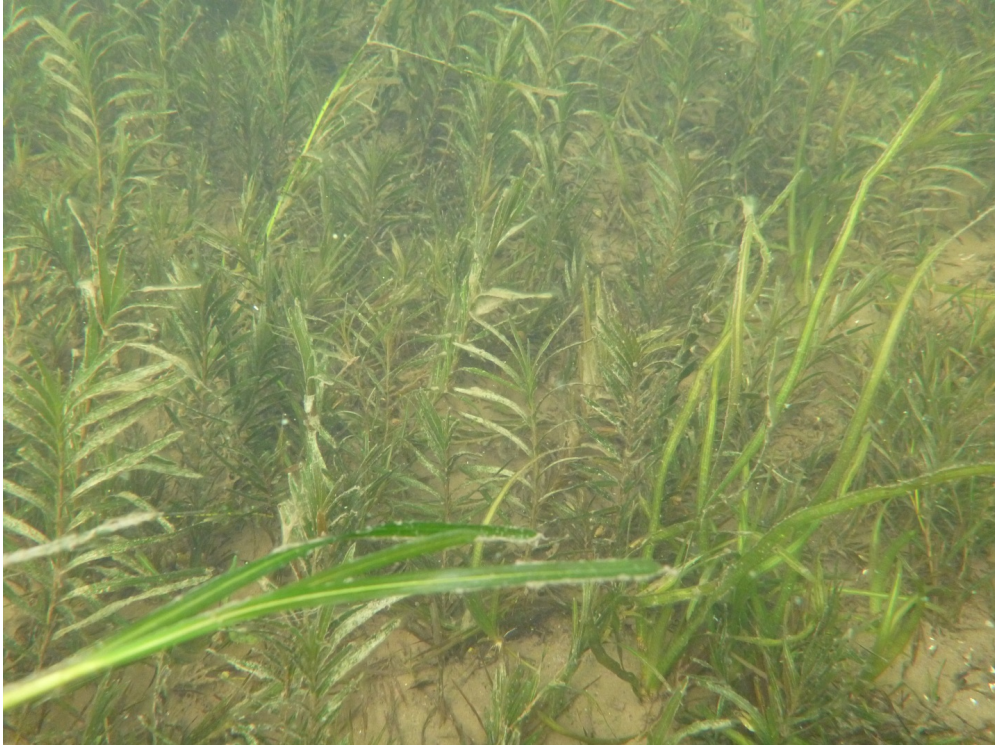


Photo 5: Submerged aquatic vegetation at some mussel survey sites.



Photo 6: Live *Elliptio complanata* and *Lampsilis radiata* mussels in northern Lake Champlain.