

Surry (USGS 01158000) was approximately 65 and 40 cubic feet per second on the two dates, respectively. Water temperature was in the upper 50s on both days. The survey area included approximately 1.2 miles (1,900 meters) of the Ashuelot River, including the impoundment of the West Street Dam to 100 meters upstream from the Route 9 Bridge, and from the dam downstream to the Cheshire Rail Trail Bridge (Figure 1). Nine sites were surveyed in the impoundment, and the entire 300-meter reach below the dam was surveyed. Most sites were surveyed by SCUBA diving, except for shallower areas that were surveyed by snorkeling.

Biologists recorded presence of all fish species observed while snorkeling and SCUBA diving, or while kayaking throughout the project area. Additional data on potential fish assemblages in areas upstream and downstream from the dam were gathered from existing sources (New Hampshire DES), as summarized in Nedeau (2006). Concurrently, biologists recorded counts, shell length, shell condition (i.e., degree of shell erosion), location (using GPS and field notes), water depth, substrate, distance to shore, and a digital photograph of each dwarf wedgemussel that was found (reported in Biodrawiversity 2013b).

## RESULTS

**Fish:** Biologists noted 11 fish species downstream from the dam; the assemblage was dominated by cool/warm water fish including centrarchids (sunfish and bass) and percids (perch and darters), and catostomids (suckers) (Table 1). One brown trout was observed. Ten fish species were observed in the impoundment, including most of the same species observed downstream from the dam. Dominant fish species in the impoundment included chain pickerel, yellow perch, largemouth bass, sunfish, white sucker, and tessellated darter. Several habitat features in the impoundment favor cool/warmwater fish species that are tolerant of a broad range of habitat conditions. These include a homogeneous substrate characteristic of low-gradient depositional environments (clay, silt, sand, and fine gravel), slow water velocities, deep water, fairly extensive submerged and emergent aquatic vegetation and large woody debris.

**Mussels Downstream from the Dam:** No live or dead dwarf wedgemussels were found downstream from the dam. Three mussel species were found: eastern elliptio (*Elliptio complanata*), eastern lampmussel (*Lampsilis radiata*), and triangle floater (*Alasmidonta undulata*). All three of these species have been found in nearby areas of the Ashuelot River, and none are considered rare in New Hampshire. Eastern elliptio were most abundant, with well over 1,000 individuals observed. Only one live and one shell of the triangle floater were found, and only four live eastern lampmussel were found. Mussels were typically found in sand and gravel substrates in water deeper than 0.5 meters and in slow to moderate flow velocities.

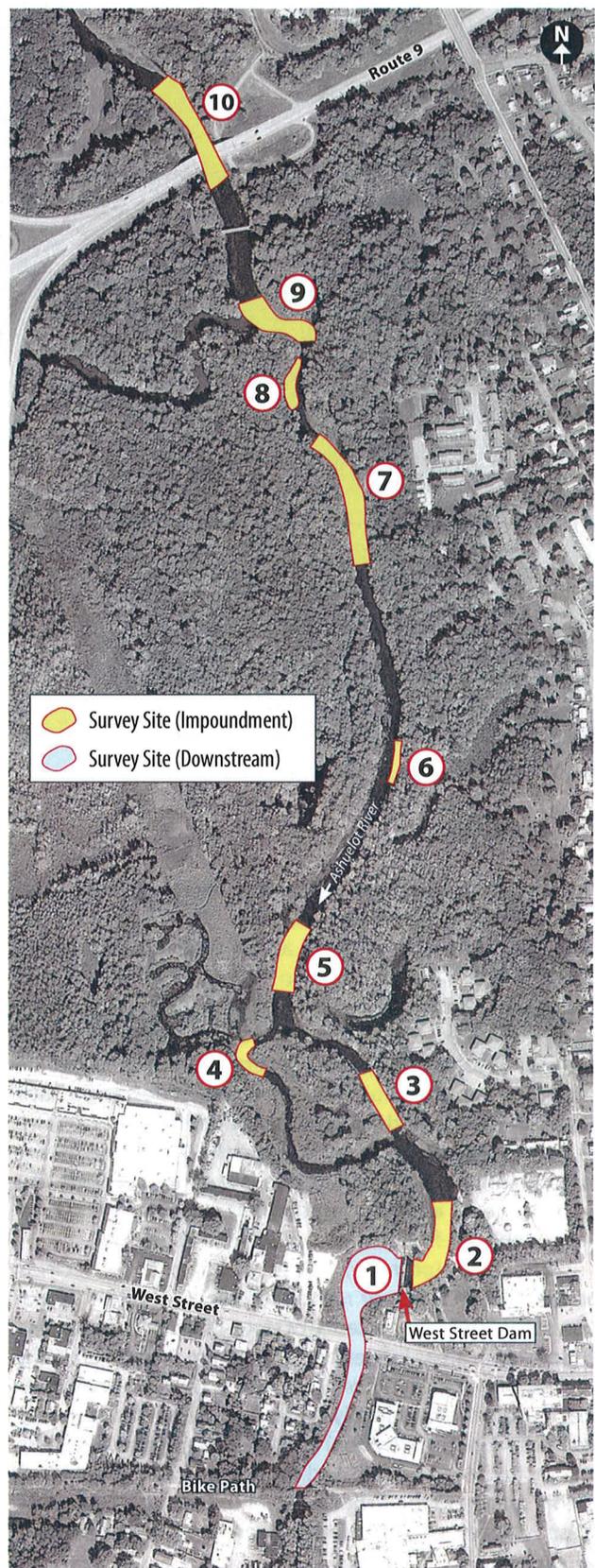


Figure 1. Survey areas in the Ashuelot River upstream and downstream from the West Street Dam (Keene, New Hampshire).

**Table 1.** Fish species known to occur in the Ashuelot River watershed, or that were observed during the 2013 fieldwork. Existing data from New Hampshire Department of Environmental Services and other sources, reviewed in Nedeau (2006).

Fish Species	Latin Name	Known from the Ashuelot River	Observed Downstream from the Dam	Observed in the Impoundment
<b>Salmonidae</b>				
Atlantic Salmon	<i>Salmo salar</i>	X		
Brown Trout	<i>Salmo trutta</i>	X	X	
Brook Trout	<i>Salvelinus fontinalis</i>	X		
Rainbow Trout	<i>Oncorhynchus mykiss</i>	X		
<b>Cyprinidae</b>				
Blacknose Dace	<i>Rhinichthys atratulus</i>	X		
Common Shiner	<i>Luxilus cornutus</i>	X	X	X
Creek Chub	<i>Semotilus atromaculatus</i>	X		
Fallfish	<i>Semotilus corporalis</i>	X	X	X
Longnose Dace	<i>Rhinichthys cataractae</i>	X		
<b>Catostomidae</b>				
White Sucker	<i>Catostomus commersoni</i>	X	X	X
<b>Centrarchidae</b>				
Pumpkinseed Sunfish	<i>Lepomis gibbosus</i>	X	X	X
Redbreasted Sunfish	<i>Lepomis auritus</i>	X		
Rock Bass	<i>Ambloplites rupestris</i>	X	X	
Largemouth Bass	<i>Micropterus salmoides</i>		X	X
Smallmouth Bass	<i>Micropterus dolomieu</i>	X	X	X
<b>Percidae</b>				
Tessellated Darter	<i>Etheostoma olmstedii</i>	X	X	X
Yellow Perch	<i>Perca flavescens</i>	X	X	X
<b>Anguillidae</b>				
American Eel	<i>Anguilla rostrata</i>	X		
<b>Ictaluridae</b>				
Brown Bullhead	<i>Ameiurus nebulosus</i>	X	X	X
Yellow Bullhead	<i>Ameiurus natalis</i>	X		
<b>Esocidae</b>				
Chain Pickerel	<i>Esox niger</i>	X		X
<b>Lotidae</b>				
Burbot	<i>Lota lota</i>	X		
	<b>Sum</b>	<b>21</b>	<b>11</b>	<b>10</b>

**Mussels in the Impoundment:** Three mussel species were found in the impoundment of the West Street Dam: dwarf wedgemussel, eastern elliptio, and creeper (*Strophitus undulatus*). Ten live dwarf wedgemussels, and one shell, were found in the impoundment, and the species was detected at six of the nine survey sites. One creeper was found, and the impoundment supports a large population of eastern elliptio. Shell lengths of the live dwarf wedgemussels ranged from 20.0 to 35.0 millimeters (mean = 27.8 mm), which is a small average size compared to other populations in the Ashuelot River, suggesting recruitment of juveniles in the impoundment. Dwarf wedgemussels were typically found in clay, silty-sand, and silty-gravel, in water depths ranging from 0.75 to 3.0 meters (~2-9 feet), in slow water velocities, and were more often found near stream-banks on the outsides of river bends.

**CONCLUSION**

**Fish Assemblage:** Twelve fish species were observed while conducting the mussel survey. Tessellated darters (*Etheos-*

*toma olmstedii*), the primary host fish for dwarf wedgemussels, were found throughout the impoundment and downstream from the dam. Fish assemblages in the impoundment are similar to those in nearby non-impounded areas of the river, and the impoundment contains high-quality



The Ashuelot River downstream from the West Street Bridge.



The Ashuelot River in the lower impoundment of the West Street Dam.

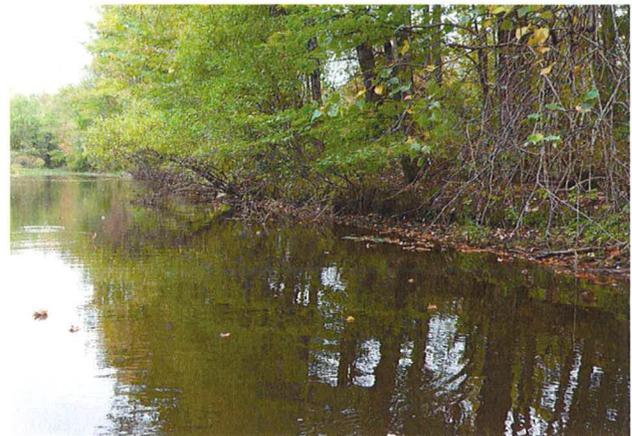
habitat for these fish species.

Approximately 21 fish species are likely to occur in the mainstem Ashuelot River (Table 1) (reviewed in Nedeau (2006)), though the presence and abundance of these varies widely both seasonally and spatially. The lower Ashuelot River supports a warmwater fish community dominated by bass (smallmouth, largemouth, and rock bass), sunfish (pumpkinseed, red-breasted), chain pickerel, yellow perch, tessellated darter, white sucker, fallfish, and common shiner. These species are typically dominant in large, low-gradient rivers in the Connecticut River watershed. Cold-water fish species such as trout, blacknose dace, and slimy sculpin are more prevalent in the upper Ashuelot River watershed (upstream from Surry) and in tributaries, but may occupy the lower mainstem seasonally, or year-round in thermal refugia (i.e., near confluence of small tributaries or in areas of groundwater input). Currently, migration barriers prevent most diadromous fish species from swimming from the Connecticut River to Keene, though American eel can ascend most barriers. New Hampshire Fish and Game transports American shad to areas upstream from impassible barriers to sustain a small sport fishery, but this is not a self-sustaining population.

**Mussels:** Dwarf wedgemussels inhabit the Ashuelot River in the impoundment of the West Street Dam, and high-quality mussel habitat exists throughout the impoundment. Dwarf wedgemussels were not found downstream from the dam. Dwarf wedgemussels and other mussel spe-

cies were found at all water depths in the impoundment (2-9 feet) and most of the highest-density mussel beds were found in deeper areas of the river. Water depth is not a limiting factor for dwarf wedgemussels or their host fish (tessellated darters); both are usually found in areas of a river that are hydraulically and geomorphically stable.

**Impoundment Habitat Assessment:** The approximately 1.1-mile long impoundment provides a variety of riverine and wetland habitats. The river channel ranges in width from 20 to 40 meters, with narrower channels to each side



Mussels were typically more abundant along the deeper side of the meandering river channel, like here in the middle impoundment.



Accumulation of coarse woody material in the Ashuelot River in the upper impoundment of the West Street Dam.

of the large island located 220 meters upstream from the dam. Water depth is typically in the range from 1.0 to 2.0 meters, with some areas exceeding 3.0 meters (~10 feet) and some shallower water near sandbars and emergent wetlands. Water velocity is typically very slow during normal summertime flows, with slightly faster water in the few places where flow is constricted. Substrate is primarily silt, sand, and gravel, with fairly extensive amounts of underlying, and in some cases exposed, clay. Large woody material (roots, trunks, and limbs of fallen trees) and detritus is retained throughout the impoundment, creating local habitat complexity. Submerged aquatic vegetation is abundant in shallow water where the canopy is open enough to allow enough sunlight to reach the river, but is sparse or absent in deep and shaded areas of the river. The nearshore shallow, gently sloping portions of the river channel have dense emergent vegetation, particularly *Pontedaria* sp. (pickerelweed) and *Sparganium* sp. (bur-reed). There are several small dead-end side channels and former channels (i.e., oxbows) that are either permanently flooded or part of the river's floodplain.

A former road or railroad along the east side of the river, now a recreational trail, has helped to shape aquatic habitats to some extent by restricting the river's access to some of its former floodplain, and providing a long armored bank. The stability provided by this road/railroad bed has undoubtedly benefitted mussels, as mussel den-

sities were always highest, and dwarf wedgemussels were most frequently found, in more stable areas along the east side of the river, especially on the outsides of bends in the river. In these areas, depth was variable, flow velocity was slightly faster than elsewhere in the channel, and substrate usually contained some coarse rock (e.g., cobble and boulder) and woody material embedded in clay, silt, sand, and gravel. Overall, we consider the impoundment of the West Street Dam fair to good for dwarf wedgemussels.

**Conclusion:** It is very likely that the West Street Dam helps to create some of the stable geomorphic and hydraulic



Dwarf wedgemussels observed during the survey.



The Ashuelot River in the central part of the impoundment of the West Street Dam.

conditions that dwarf wedgemussels and other mussel species prefer. If the dam were to be removed, certain types of habitat conditions that are presently in the impoundment would be lost, and eventually replaced with a new combination of habitat characteristics that may or may not also be good for dwarf wedgemussels and their host fish. Alternatively, repairing the dam would maintain the quality and quantity of mussel habitat that currently exists in the impoundment. Adding a 1-foot flashboard would raise impoundment levels by one foot during low or normal flow conditions and have no appreciable effect on water levels during high-flow periods assuming the flashboards have failed as designed. Given the broad range of water depths that dwarf wedgemussels and their host fish occupy, installing a 1-foot flashboard would be unlikely to diminish the quality or quantity of mussel and fish habitat, and could conceivably increase the quantity of mussel and fish habitat by increasing the wetted area of the impoundment. Hydraulic and geomorphic studies might be necessary to more precisely determine the spatial extent and magnitude change in key habitat parameters.

#### Literature Cited

- Biodrawvversity. 2012. Dwarf Wedgemussel Monitoring in the Ashuelot River Following Removal of the Homestead Dam (West Swanzey, NH). Report submitted to Homestead Woolen Mills LLC and the U.S. Fish and Wildlife Service.
- Biodrawvversity. 2013a. Quantitative Survey of Dwarf Wedgemussels in the Ashuelot River Downstream from the Surry Mountain Dam. Report prepared for the U.S. Fish and Wildlife Service and the U.S. Army Corps of Engineers.
- Biodrawvversity. 2013b. Dwarf Wedgemussel (*Alasmidonta heterodon*) Survey in the Ashuelot River Upstream and Downstream from the West Street Dam (Keene, New Hampshire). Report prepared for the City of Keene, NH.
- Nedeau, E.J. 2006. Scientific Basis of Road-Stream Crossing Assessments in the Ashuelot River Watershed. Report submitted to the New Hampshire Chapter of The Nature Conservancy.
- Nedeau, E.J. 2008. *Freshwater Mussels and the Connecticut River Watershed*. Connecticut River Watershed Council, Greenfield, MA.

APPENDIX F. DWARF WEDGEMUSSEL (ALAS MIDONTA HETERODON) SURVEY IN THE ASHUELOT RIVER UPSTREAM AND DOWNSTREAM OF THE WEST STREET DAM (KEENE, NEW HAMPSHIRE)

**REPORT**

Dwarf Wedgemussel (*Alasmidonta heterodon*) Survey in the Ashuelot River  
Upstream and Downstream of the West Street Dam (Keene, New Hampshire)

*prepared for*

**City of Keene Planning Department**  
3 Washington Avenue  
Keene, New Hampshire

*prepared by*



**Biodrawversity LLC**  
433 West Street, Amherst, Massachusetts

December 2013



The West Street Dam on the Ashuelot River in Keene, New Hampshire.

## INTRODUCTION

The City of Keene, New Hampshire, has received a “letter of deficiency” from the New Hampshire Dam Bureau for the West Street Dam (also known as the Faulkner and Colony Dam) on the Ashuelot River in Keene. The City is required to either repair the dam, or remove it, and both options are complex and costly. One factor (of many) that may influence the decision on whether to repair or remove the dam is the presence of state-listed or federally listed species in areas influenced by the dam. In particular, the Ashuelot River is one of only three rivers in New Hampshire that supports the federally endangered dwarf wedgemussel (*Alasmidonta heterodon*) (Nedeau 2008). In recent years, studies

had documented and monitored large populations of this species in the Ashuelot River in southern Keene and West Swanzey, and in northern Keene and Surry (Biodiversity 2012, 2013). However, prior to this survey, the Ashuelot River in the more urban areas of Keene, which includes areas upstream and downstream from the West Street Dam, had not been well surveyed and dwarf wedgemussels had never been documented in this reach.

The objectives of this study were to determine the presence, distribution, relative abundance, demographics, and habitat use of dwarf wedgemussels in the impoundment of the West Street Dam and in a 300-meter reach downstream from the dam. These data will help to determine steps that may be needed in the planning process for repairing or removing the dam, including possibly additional surveys, agency consultation, environmental permitting, and other considerations.

Ethan Nedeau led the planning, fieldwork, and reporting on this project. He has extensive experience surveying for dwarf wedgemussels in the Ashuelot River and elsewhere in the Northeast.

## METHODS

The survey was conducted on September 27 and October 3, 2013, when river flows were near average and weather was fair. Discharge at the USGS Streamgage in Surry (USGS 01158000) was approximately 65 and 40 cubic feet per second on the two dates, respectively. Water temperature was in the upper 50s on both days.



Two dwarf wedgemussels (*Alasmidonta heterodon*) observed during the survey.

The survey area included approximately 1.2 miles (1,900 meters) of the Ashuelot River, including the impoundment of the West Street Dam to 100 meters upstream from the Route 9 Bridge, and from the dam downstream to the Cheshire Rail Trail Bridge (Figure 1). Nine sites were surveyed in the impoundment, and the entire 300-meter reach below the dam was surveyed. Sites were surveyed for a variable amount of time, which was recorded for each site. Based on dwarf wedgemussel habitat use elsewhere in the Ashuelot River, biologists focused on stream margins in hydraulically stable areas of the river, where substrate was a mix of clay, silt, sand, and gravel. Most sites were surveyed by SCUBA diving, except for shallower areas that were surveyed by snorkeling.

All dwarf wedgemussels and other uncommon species (e.g., triangle floaters, creepers) were counted within each section. Catch-per-unit-effort (CPUE, mussels/hour) was computed for each species within each section. Biologists recorded shell length, shell condition (i.e., degree of shell erosion), location (using GPS and field notes), water depth, substrate, distance to shore, and a digital photograph of each dwarf wedgemussel that was found. Surveyors also recorded the following habitat parameters for each survey section and more generally for intervening reaches: water depth; water velocity; percent of riffle, run or pool habitat; dominant substrate types; presence and abundance of rooted vegetation; presence and abundance of large woody debris; evidence of beaver or muskrat; bank and riparian condition; and obvious signs of channel degradation or instability. These habitat data were used in conjunction with data on where dwarf wedgemussels were actually found, and habitat preference data from elsewhere in the Ashuelot River, to assess the extent of high-quality dwarf wedgemussel habitat in the study area.

## RESULTS

### 1. Mussels Downstream from the Dam

No live or dead dwarf wedgemussels were found downstream from the dam. Three mussel species were found: eastern elliptio (*Elliptio complanata*), eastern lampmussel (*Lampsilis radiata*), and triangle floater (*Alasmidonta undulata*). All three of these species have been found in nearby areas of the Ashuelot River, and none are considered rare in New Hampshire. Eastern elliptio were most abundant, with well over 1,000 individuals observed. Only one live and one shell of the triangle floater were found, and only four live eastern lampmussel were found. Mussels were typically found in sand and gravel substrates in water deeper than 0.5 meters and in slow to moderate flow velocities.

### 2. Mussels in the Impoundment

Three mussel species were found in the impoundment of the West Street Dam: dwarf wedgemussel, eastern elliptio, and creeper (*Strophitus undulatus*). Ten live dwarf wedgemussels, and one shell, were found in the impoundment, and the species was detected at six of the nine survey sites

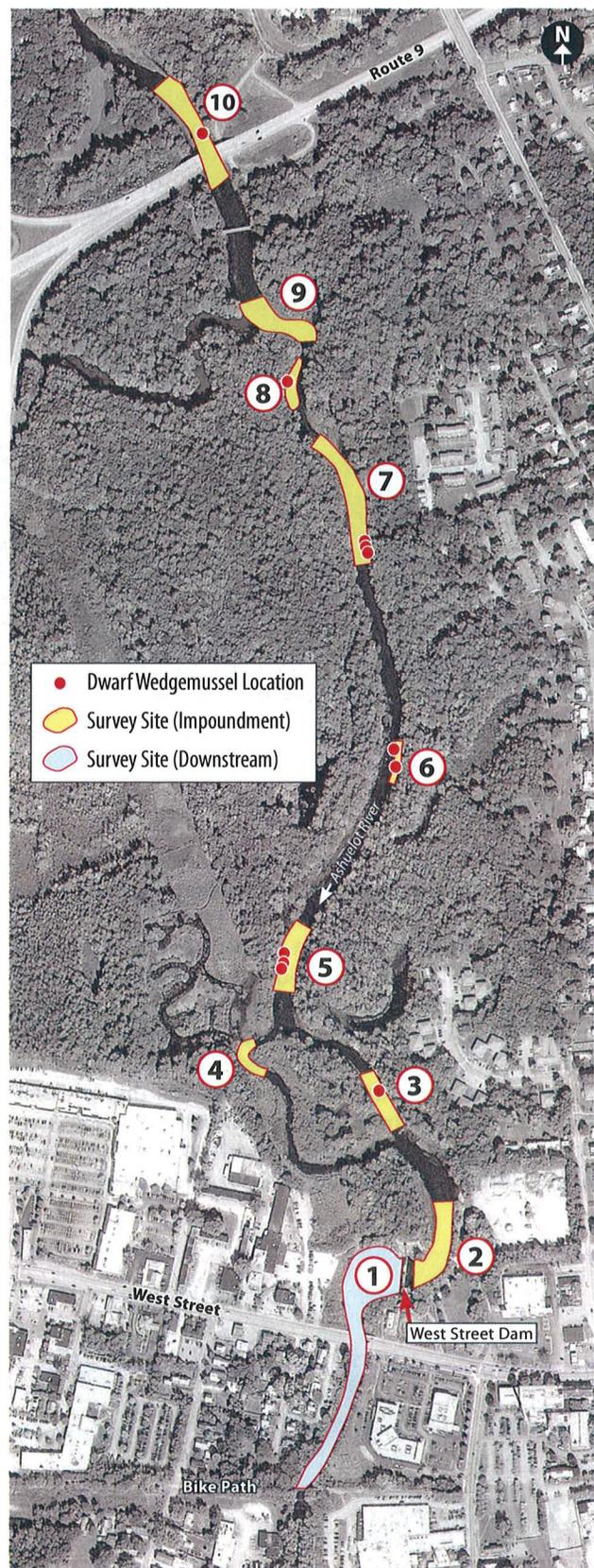


Figure 1. Survey areas in the Ashuelot River upstream and downstream of the West Street Dam (Keene, New Hampshire).

**Table 1.** Presence and counts/estimates of mussel species at each survey site, and shell and habitat data for each live dwarf wedgemussel that was found.

Site	Survey Duration	Species Counts or Estimates*						Dwarf Wedgemussel Data				
		AIHe	EICo	AIUn	StUn	LaRa	CPUE: AIHe	Shell Length	Shell Condition	Water Depth (m)	Substrate**	Flow Velocity
1	8.00	0	100s	1	0	4	0.00					
2	2.00	0	100s	0	0	0	0.00					
3	0.75	1	100s	0	0	0	1.33	33.0	0.50	1.00	S	Slow
4	0.50	0	100s	0	0	0	0.00					
5	0.75	3	100s	0	1	0	4.00	23.0	0.00	2.25	Si-S-G	Slow
								20.0	0.00	3.00	Si-S-G	Slow
								29.5	0.00	2.50	Si-S-G	Slow
6	0.50	2	100s	0	0	0	4.00	27.0	0.00	1.25	C	Slow
								33.0	0.25	2.50	Si-C	Slow
7	1.25	2	100s	0	0	0	1.60	35.0	0.00	0.75	C-Si-S-G	Slow
								32.0	0.00	0.75	C-Si-S-G	Slow
8	0.50	1	100s	0	0	0	2.00	23.0	0.00	1.25	C-Si-S	Slow
9	0.75	0	100s	0	0	0	0.00					
10	0.75	1	100s	0	0	0	1.33	22.0	0.00	1.25	S-G	Slow

\*Species Abbreviations: AIHe = *Alasmidonta heterodon*, EICo = *Elliptio complanata*, AIUn = *Alasmidonta undulata*, StUn = *Strophitus undulatus*, LaRa = *Lampsilis radiata*

\*\*Substrate Abbreviations: C = Clay, Si = Silt, S = Sand, G = Gravel



Small (23.0 mm) dwarf wedgemussel observed during the survey.

(Figure 1, Table 1). One creeper was found, and the impoundment supports a large population of eastern elliptio.

For dwarf wedgemussels, CPUE ranged from 0.0 to 4.0 mussels/hour among the survey sites, and the overall mean CPUE was 0.63 mussels/hour. Shell lengths of the live dwarf wedgemussels ranged from 20.0 to 35.0 millimeters (mean = 27.8 mm), which is a small average size compared to other populations in the Ashuelot River, suggesting recruitment of juveniles in the impoundment. Dwarf wedgemussels were typically found in clay, silty-sand, and silty-gravel, in water depths ranging from 0.75 to 3.0 meters (~2-9 feet), in slow water velocities, and were more often found near streambanks on the outsides of river bends.

### 3. Dwarf Wedgemussel Habitat Assessment

**Downstream:** Downstream from the dam, there appears to be suitable habitat for dwarf wedgemussels based on water depth, flow velocity, and substrate. There are two distinct habitat areas downstream from the dam: the large, over-widened scour pool between the dam and West

Street, and the narrower and shallower channel between West Street and the bike path bridge. Aside from the anomalously deep water in the scour pool below the dam, this entire reach is shallower, has faster flow velocities, and has a higher proportion of gravel and cobble substrates than the impoundment.

The stream also contains quite a lot of manmade materials such as brick and concrete, metal, broken glass, and other debris. Streambanks downstream from the dam are typically armored (i.e., with riprap and other structures), and the stream channel is deeply incised. The stabilized banks, deeply incised channel, lack of adjacent floodplain, and faster water velocities suggest that much of the river's energy is directed downward rather than laterally, subjecting benthic habitats and mussels to very significant shear forces and scouring during floods. The relatively simple, homogeneous stream channel may also be vulnerable to dewatering during drought periods, especially the stream margins that have been shown to be critical for dwarf wedgemussels.



The Ashuelot River downstream from the West Street Bridge.



The Ashuelot River in the impoundment of the West Street Dam, near Site 5 where three dwarf wedgemussels were found.

Water quality may also be impaired in this reach; stormwater runoff from the extensive impervious surfaces nearby may convey numerous contaminants to the stream (salt, oil, grease, excess nutrients), as well as very warm water during summer rainstorms. Dwarf wedgemussels may be sensitive to some of the altered geomorphic and hydraulic conditions downstream from the dam, as well as to water quality during critical times of the year. In a 2001 study, dwarf wedgemussels were not found near or downstream from the Route 101 Bridge in Keene, in a reach that seems similarly impaired both in terms of habitat quality and water quality (Biodiversity 2001). Overall, we consider the area downstream from the West Street Dam only marginal to fair for dwarf wedgemussels.

**Impoundment:** The approximately 1.1-mile long impoundment provides a variety of riverine and wetland habitats. The river channel ranges in width from 20 to 40 meters, with narrower channels to each side of the large island located 220 meters upstream from the dam. Water depth is typically in the range from 1.0 to 2.0 meters, with some areas exceeding 3.0 meters (~10 feet) and some shallower water near sandbars and emergent wetlands. Water velocity is typically very slow during normal summertime flows, with slightly faster water in the few places where flow is constricted. Substrate is primarily silt, sand, and gravel, with fairly extensive amounts of underlying, and in some cases exposed, clay. Large woody material (roots, trunks, and limbs of fallen trees) and detritus is retained through-

out the impoundment, creating local habitat complexity. Submerged aquatic vegetation is abundant in shallow water where the canopy is open enough to allow enough sunlight to reach the river, but is sparse or absent in deep and shaded areas of the river. The nearshore shallow, gently sloping portions of the river channel have dense emergent vegetation, particularly *Pontedaria* sp. (pickerelweed) and *Sparganium* sp. (bur-reed). There are several small dead-end side channels and former channels (i.e., oxbows) that are either permanently flooded or part of the river's floodplain.

A former road or railroad along the east side of the river, now a recreational trail, has helped to shape aquatic habitats to some extent by restricting the river's access to some of its former floodplain, and providing a long armored bank. The stability provided by this road/railroad bed has undoubtedly benefitted mussels, as mussel densities were always highest, and dwarf wedgemussels were most frequently found, in more stable areas along the east side of the river, especially on the outsides of bends in the river. In these areas, depth was variable, flow velocity was slightly faster than elsewhere in the channel, and substrate usually contained some coarse rock (e.g., cobble and boulder) and woody material embedded in clay, silt, sand, and gravel. Mussels were uncommon near and among the dense emergent vegetation, and densities were variable in the sandy substrates toward the center of the river channel. Overall, conditions in the impoundment of the West Street Dam are similar to conditions documented within



The Ashuelot River at the lower end of the West Street Dam impoundment, just upstream from a canoe/kayak access point.



The Ashuelot River at the upstream end of the impoundment, looking downstream toward Route 9 Bridge and the recreational trail footbridge.

the impoundment of the former Homestead Woolen Dam in West Swanzey, and dwarf wedgemussels appear to occupy the same types of habitats, and to be similarly abundant. Overall, we consider the impoundment of the West Street Dam fair to good for dwarf wedgemussels. Tessellated darters (*Etheostoma olmstedi*), the primary host fish for dwarf wedgemussels, were also found throughout the impoundment.

## CONCLUSION

Dwarf wedgemussels inhabit the Ashuelot River in the impoundment of the West Street Dam, and high-quality mussel habitat exists throughout the impoundment. Dwarf wedgemussels were not found downstream from the dam, where habitat quality is only marginal to fair, and where water quality may be poor at certain times of the year. It is very likely that the West Street Dam helps to create some of the stable geomorphic and hydraulic conditions that dwarf wedgemussels and other mussel species prefer. If the dam were to be removed, certain types of habitat conditions that are presently in the impoundment would be lost, and eventually replaced with a new combination of habitat characteristics that may or may not also be good for dwarf wedgemussels and their host fish. It may be prudent to conduct a similar mussel inventory in an adjacent reference reach upstream (minimum of one mile in length) from the West Street Dam impoundment to determine the presence and habitat use of dwarf wedgemussels. This may provide a better understanding of potential mussel habitat in the impoundment if the dam were to be removed, and also provide insight on the “uniqueness” of the impoundment for dwarf wedgemussels in a larger reach of the Ashuelot River. Moving forward, this report provides information that should be helpful in the planning process for repairing or removing the dam, agency consultation, environmental permitting, and other considerations.

## Literature Cited

- Biodrawversity. 2012. Dwarf Wedgemussel Monitoring in the Ashuelot River Following Removal of the Homestead Dam (West Swanzey, NH). Report submitted to Homestead Woolen Mills LLC and the U.S. Fish and Wildlife Service.
- Biodrawversity. 2013. Quantitative Survey of Dwarf Wedgemussels in the Ashuelot River Downstream from the Surry Mountain Dam. Report prepared for the U.S. Fish and Wildlife Service and the U.S. Army Corps of Engineers.
- Nedeau, E.J. 2008. Freshwater Mussels and the Connecticut River Watershed. Connecticut River Watershed Council, Greenfield, MA.

UNITED STATES OF AMERICA  
FEDERAL ENERGY REGULATORY COMMISSION

To: Ms. Kimberly Bose, Secretary  
Federal Energy Regulatory Commission  
888 First Street, N.E.  
Washington, D.C. 20426

From: West Street Hydro, Inc.  
PO Box 323  
20 Central Square, Suite 2  
Keene, NH 03431

Project No. P-14471

NOTICE OF INTENT TO FILE APPLICATION FOR  
NEW LICENSE

Pursuant to 18 C.F.R. § 5.5, West Street Hydro notifies the Federal Energy Regulatory Commission of its intention to file an Application for a(n) New License for the Ashuelot River Dam Restoration, Project No. P-14471.

The following information is provided consistent with the requirements of 18 C.F.R. § 5.5.

**The exact name and business address of the applicant(s) is:**

Applicant's Name: West Street Hydro, Inc.  
Address: PO Box 323  
20 Central Square, Suite 2  
Keene, NH 03431

**Project Number:**

The FERC Project No. is P-14471

**Unequivocal Statement of Intent:**

West Street Hydro intends to file an application for a (n) new license for the Project utilizing the Commission's *Traditional Licensing Process (TLP)*.

**Type of Principal Project Works to be licensed:**

The Ashuelot River Dam Hydroelectric Project is potentially a 96 kilowatt project that could generate 360,000 kilowatt hours (KWH) annually. It is being proposed for study, and possibly development by West Street Hydro, Inc. (WSH) at a dam owned by the City of Keene in Keene, New Hampshire. A gross head of 8.5 feet with a tail

water effect of 4 feet was used in the applicant's estimation. The project would be located at the Ashuelot River Dam, also known as the Ashuelot Park Dam. The proposed powerhouse would be approximately 22 feet square. The reinforced concrete foundation and flume would be below grade. The brick superstructure would stand about 18 feet above grade at the peak of the roof. The generating equipment would consist of two vertical shaft Francis turbines with approximate capacity of 43 kilowatts each. These turbines would be set in an open flume with vertical shafts extending to belt drives or gearboxes on the upper floor of the powerhouse (at grade level). Here would be generators, switchgear and controls.

The present primary use for this dam is to maintain the level of the Ashuelot River behind the impoundment which is estimated at approximately 34 square surface acres and 120 acre feet of storage at the spillway crest elevation of 468 feet MSL. The Ashuelot River runs through Ashuelot Park, a public park that is the site of many community events and public use. Jogging trails and exercise routes run the length of the trail. The Ashuelot River is canoed above the dam and further below the dam.

The dam is approximately 160 feet in total length and 16 feet in total height. The dam features a 134 foot sharp crested weir type overflow spillway along with a gate structure at the southerly abutment which is also made out of stone masonry. This outlet structure consists of a fore bay which feeds three sluiceways, each of which was once controlled by a vertical stem slide gate approximately 6.5 ft. H x 5 ft. W. The middle gate has been blocked with a steel plate and the remaining two gates also appear to be inoperable. The impoundment is maintained by a dike structure, which extends approximately 1,750 feet upstream of the northerly abutment on the west side of the channel. The dam originally had flashboards which raised the head of the pond approximately 2 feet.

**Expected Modification:**

Approximately 50 feet of tailrace below the powerhouse would need to be excavated and 1 foot of flashboards would be reinstalled on the spillway crest to return the impoundment closer to its historical operating level to develop the maximal hydraulic capacity of the site. This flashboard addition would also facilitate the installation of passage for the American eel.

**Transmission Line:**

The project would interconnect to a PSNH 34.5 KV distribution line which runs along West Street adjacent to the site. The new transmission line would be approximately 330 feet long.

**Location of the Project:**

State or Territory: Keene, New Hampshire  
County: Cheshire  
Township or nearby town: Keene

**The installed capacity of the project is:** 96 KWH

**Names and Mailing Addresses of Entities Listed in 18 C.F.R. § 5.5(b) (8):**

- (a) The County in which the Project is located, and in which any Federal Facility that is used or to be used by the Project is located:

Cheshire County Commissioners  
33 West St.  
Keene, NH 03431

- (b) Each city or town in which any part of the Project is located, and in which any Federal facility that is used or to be used by the Project is located.

City of Keene  
3 Washington St.  
Keene, NH 03431

- (c) Each city or town that has a population of 5,000 or more people and is located within 15 miles of the existing Project dams:

City of Keene  
3 Washington St.  
Keene, NH 03431

Town of Swanzey  
P.O. Box 10009  
620 Old Homestead Highway  
Swanzey, NH 03446

Town of Brattleboro  
230 Main Street  
Brattleboro, VT  
05301

- (d) Each irrigation district, drainage district, or similar special purpose political subdivision in which any part of the Project is located, and in which any Federal facility that is used or to be used by the Project is located.

No such entities are known to exist and be affected by the project.

- (e) Each irrigation district, drainage district, or similar special purpose political subdivision that owns, operates, maintains, or uses any Project facility or any Federal facility that is or is proposed to be used by the Project.

No such entities are known to exist and be affected by the project.

- (f) Every other political subdivision in the general area of the Project that there is reason to believe would likely be interested in, or affected by, this notification.

NH Office of Energy and Planning

Governor Hugh J. Gallen State Office Park  
 Johnson Hall, 3rd Floor  
 107 Pleasant Street  
 Concord, NH 03301

(g) Affected Indian Tribes.

No known Indian tribes will be affected by the project.

(h) Other interested agencies or stakeholders.

Below is a list of stakeholders who abut the river and may be affected by the alternation in flow. A list of agencies is provided on page 7.

<b>List of Abutters One Mile Above and Below Dam</b>						
<b>Last Name</b>	<b>First Name</b>	<b>Company</b>	<b>Street</b>	<b>Town</b>	<b>State</b>	<b>Zip</b>
158 Island Street Investments			656 West Street	Keene	NH	03431
Carbone Michael P. Revocable Trust			193 Island Street	Keene	NH	03431
Estate of Henry Furlone			41 Winchester Court	Keene	NH	03431
Island Mill Realty Group			PO Box 1060	Keene	NH	03431
Kingbury Edward A Jr. Trust			72 Ridgewood Avenue	Keene	NH	03431
North American Riverview Holdings			PO Box 389	Keene	NH	03431
Public Service of New Hampshire			19 Production Avenue	Keene	NH	03431
Public Service of New Hampshire			780 N Commercial St	Manchester	NH	03101
RDH Property Management			PO Box 1090	Keene	NH	03431
Ridgewood Leasing Inc			472 Winchester Street	Keene	NH	03431
Societa Italiana di Mutuo			97 Wood Street	Keene	NH	03431
Abare	Bruce		79 Wood Street	Keene	NH	03431
Abbott	Steven		11 Cobb Street	Keene	NH	03431
Abbott	Todd		253 Chesham Rd.	Harrisville	NH	03450
Arwe	Dorothy	Realites Inc./Ellis Robertson Corp.	300 Woodhaven Drive, Unit 1503	Hilton Head	SC	29928
Bass	Robert		PO Box 964	Georgetown	CT	06829
Boes	Gary		652 Old Homestead Highway	East Swanzey	NH	03431
Boyle	Kevin		27 Ashuelot Court	Keene	NH	03431
Bzdak	James		25 Bridge Court	Keene	NH	03431
Descoteaux, SR.	Joseph	Family Revocabile	24 Speaker Street	Keene	NH	03431

		Trust				
Dibernardo	John		15 Cobb Street	Keene	NH	03431
Elliot	Suzanne		15 Wagner Street	Keene	NH	03431
Grauer	Albert		283 Rowland Road	Fairfield	CT	06824
Gray	David		9 Ridgewood Avenue	Keene	NH	03431
Greene	Catherine		60 Hooper Street	Keene	NH	03431
Haase	Stephanie		83 Wood Street	Keene	NH	03431
Hamelin	Dennis		52 Hooper Street	Keene	NH	03431
Hanna	Thomas	Colony Mill	41 School Street, Suite 204	Keene	NH	03431
Hodgdon	Charles		7 Cobb Street	Keene	NH	03431
Kahn	Jay	Keene State College	229 Main Street	Keene	NH	03431
Kellner	Bernwart		11 Bridge Court	Keene	NH	03431
Kiritsy	Stephen	Kiritsy LLC	PO Box 24041	Hilton Head Island	SC	29925
Lambert	Scott		333 Monadnock Highway	Keene	NH	03431
Maclean	John	City of Keene	3 Washington Street	Keene	NH	03431
Nicholas	Mary		253 Chesham Road	Harrisville	NH	03450
Novak	Kerry	One Hundred Eleven Realty Association	PO Box 6224	Cape Elizabeth	ME	04107
Perry	Michael		59 Bow Center Road	Bow	NH	03304
Phippard	Linda	Monadnock Affordable Housing Corp	831 Court Street	Keene	NH	03431
Porter	Loretta		85 Wood Street	Keene	NH	03431
Simpson	Paul		264-266 Roxbury Street	Keene	NH	03431
Sosnowski	John		8 Lux Avenue	East Hampton	MA	01027
Surpry	James		352 Pearl Street	Keene	NH	03431
Thevenin	Michelle		59 Hooper Street	Keene	NH	03431



Ashuelot River Dam Restoration Project, P-14471  
INTERESTED PARTIES MAILING LIST

Agency	Agency Con't	Title	Region	Address
Advisory Council on Historic Preservation	Old Post Office Building	Executive Director	Headquarters	1100 Pennsylvania Ave NW Suite 803 Washington DC 20004
Bureau of Indian Affairs	U.S. Department of the Interior	Director	Headquarters	1849 C Street NW MS 2624 MIB Washington DC 20240
Federal Emergency Management Agency		Regional Administrator	Region 1	99 High Street 6th Floor Boston MA 2110
Federal Emergency Management Agency		Director	Headquarters	500 C Street SW Washington DC 20472
Federal Energy Regulatory Commission	Division of Dam Safety and Inspections	Regional Engineer	New York Regional Office	19 West 34th Street Suite 400 New York NY 10001-3006
National Oceanic and Atmospheric Administration		Administrator	Headquarters	1401 Constitution Ave NW Room 6217 Washington DC 20230
National Oceanic and Atmospheric Administration	Fisheries Regional Office	Regional Administrator	Northeast Region	55 Great Republic Drive Gloucester MA 01930-2298
National Oceanic and Atmospheric Administration	Marine Chart Division - Nautical Data Branch	Chief	Headquarters	N/CS26 Station 7331 1315 East-West Highway Silver Spring MD 20910-
National Oceanic and Atmospheric Administration	Northeast Fisheries Science Center	Director	Northeast Region	166 Water Street Woods Hole MA 02543-1026
National Park Service	U.S. Custom House	Regional Director	Northeast Region	200 Chestnut Street 5th Floor Philadelphia PA 19106
National Park Service	U.S. Department of the Interior	Director	Headquarters	1849 C Street NW Washington DC 20240
Naval Seafloor Cable Protection Office	Naval Facilities Engineering Command, NAVFAC-		Ocean/Tidal Hydrokinetics	1322 Patterson Ave SE Suite 1000 Washington DC 20374-5065

	OFF/C			
Office of Senator Ayotte		U.S. Senator		144 Russell Senate Office Building, Washington, DC 20002
Office of Senator Shaheen		U.S. Senator		520 Hart Senate Office Building Washington DC 20510
U.S. Army Corps of Engineers		Commander	Headquarters	441 G Street NW Washington DC 20314
U.S. Army Corps of Engineers		District Engineer	New England District	696 Virginia Road Concord NH 01742-2751
U.S. Army Corps of Engineers	Fort Hamilton Military Community	Division Commander	North Atlantic Division	302 General Lee Avenue Fort Hamilton NY 11252-6700.
U.S. Bureau of Land Management	U.S. Department of the Interior	State Director	Eastern States Office	7450 Boston Boulevard Springfield VA 22153
U.S. Bureau of Land Management	U.S. Department of the Interior	Director	Headquarters	1849 C Street NW MIB 5655 Washington DC 20240
U.S. Bureau of Reclamation	U.S. Department of the Interior	Commissioner	Headquarters	1849 C Street NW Washington DC 20240
U.S. Coast Guard	Navigation Standards Division	Commandant (CG-5533)		2100 2nd St. SW Stop 7580 Washington DC 20593-7580
U.S. Coast Guard	Waterways Management Branch		District One	408 Atlantic Avenue Boston MA 02110-
U.S. Department of Agriculture - Forest Service		Chief	Headquarters	1400 Independence Ave SW Washington DC 20250-0003
U.S. Department of Agriculture - Forest Service		Regional Forester	Eastern Region - 9	626 East Wisconsin Avenue Milwaukee WI 53202
U.S. Department of Commerce	Office of the Secretary	Secretary		1401 Constitution Avenue NW Washington DC 20230
U.S. Environmental Protection Agency		Regional Administrator	Region 1: New England	5 Post Office Square Suite 100 Boston MA 02109-3912
U.S. Environmental Protection Agency	Ariel Rios Building	Administrator	Headquarters	1200 Pennsylvania Ave NW Washington DC 20460

U.S. Fish and Wildlife Service		Regional Director	Region 5 - Northeast	300 Westgate Center Drive Hadley MA 01305-9589
U.S. Fish and Wildlife Service	New England Field Office	Field Supervisor	Northeast Region	70 Commercial Street Suite 300 Concord nh 03301-5087
U.S. Fish and Wildlife Service	U.S. Department of the Interior	Director	Headquarters	1849 C Street NW Room 3238 Washington DC 20240-0001
U.S. Forest Service			Headquarters	1400 Independence Avenue SW Washington DC 20250-0003
United States Geological Survey	National Center	Regional Director	Eastern Region	12201 Sunrise Valley Drive Reston VA 20192
United States Geological Survey	U.S. Department of the Interior	Director	Headquarters	12201 Sunrise Valley Dr Reston VA 20192
American Canoe Association		Executive Director		1340 Central Blvd. Suite 210 Fredericksburg VA 22401
American Rivers				1101 14th St. NW Suite 1400 Washington DC 20005-
American Whitewater		Executive Director		P.O. Box 1540 Cullowhee NC 28723
Appalachian Mountain Club		Director of Research		P.O. Box 298 Gorham NH 03581
Appalachian Trail Conservancy		Director of Conservation		P.O. Box 174 110 South Park Dr Blacksburg VA 24063
Appalachian Trail Conservancy		Executive Director		P.O. Box 807 799 Washington St Harpers Ferry WV 25425
Hydropower Reform Coalition		National Coordinator		1101 14th St. NW Suite 1400 Washington DC 20005-
Hydropower Reform Coalition		National Coordinator		830 Reville St. Bellingham WA 98229-
Trout Unlimited				227 SW Pine Street Suite 200 Portland OR 97204-
New Hampshire Department of Environmental Services	Office of the Commissioner	Commissioner		6 Hazen Drive P.O. Box 95 Concord NH 03302-0095
New Hampshire Department of Environmental	Dam Bureau	Director		6 Hazen Drive P.O. Box 95 Concord NH 03302-0095

Services				
New Hampshire Department of Environmental Services	Water Division	Director		6 Hazen Drive P.O. Box 95 Concord NH 03302-0095
New Hampshire Division of Historical Resources		SHPO & Director		19 Pillsbury St 2nd Floor Concord NH 03301-3570
New Hampshire Fish and Game Department	Executive Director's Office	Executive Director		11 Hazen Drive Concord NH 03301
Office of the Attorney General	State House Annex	Attorney General		33 Capitol Street Concord NH 03301-6397