

# 2021 Upper Missisquoi and Trout River Wild and Scenic Freshwater Mussel Inventory





# Freshwater Mussels

**Introduction to freshwater mussels**

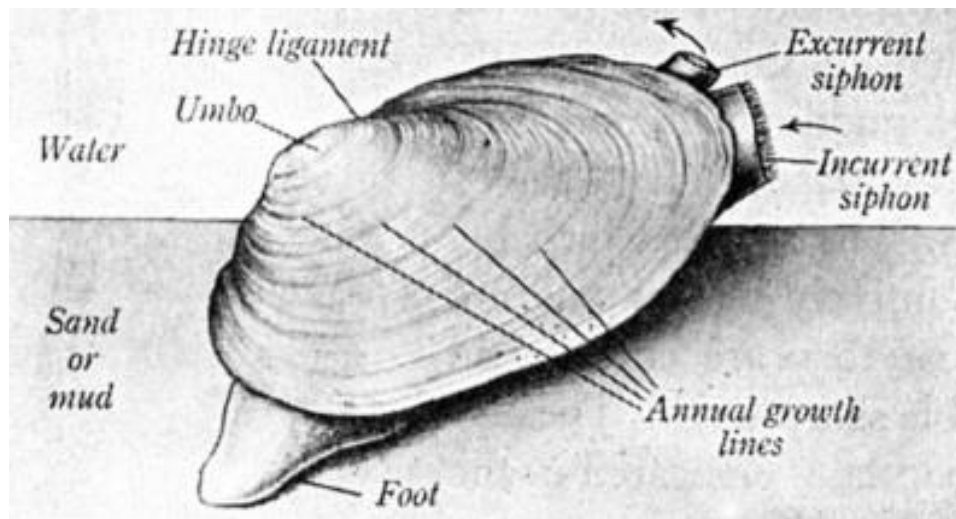
**Study Methods**

**Study Results**





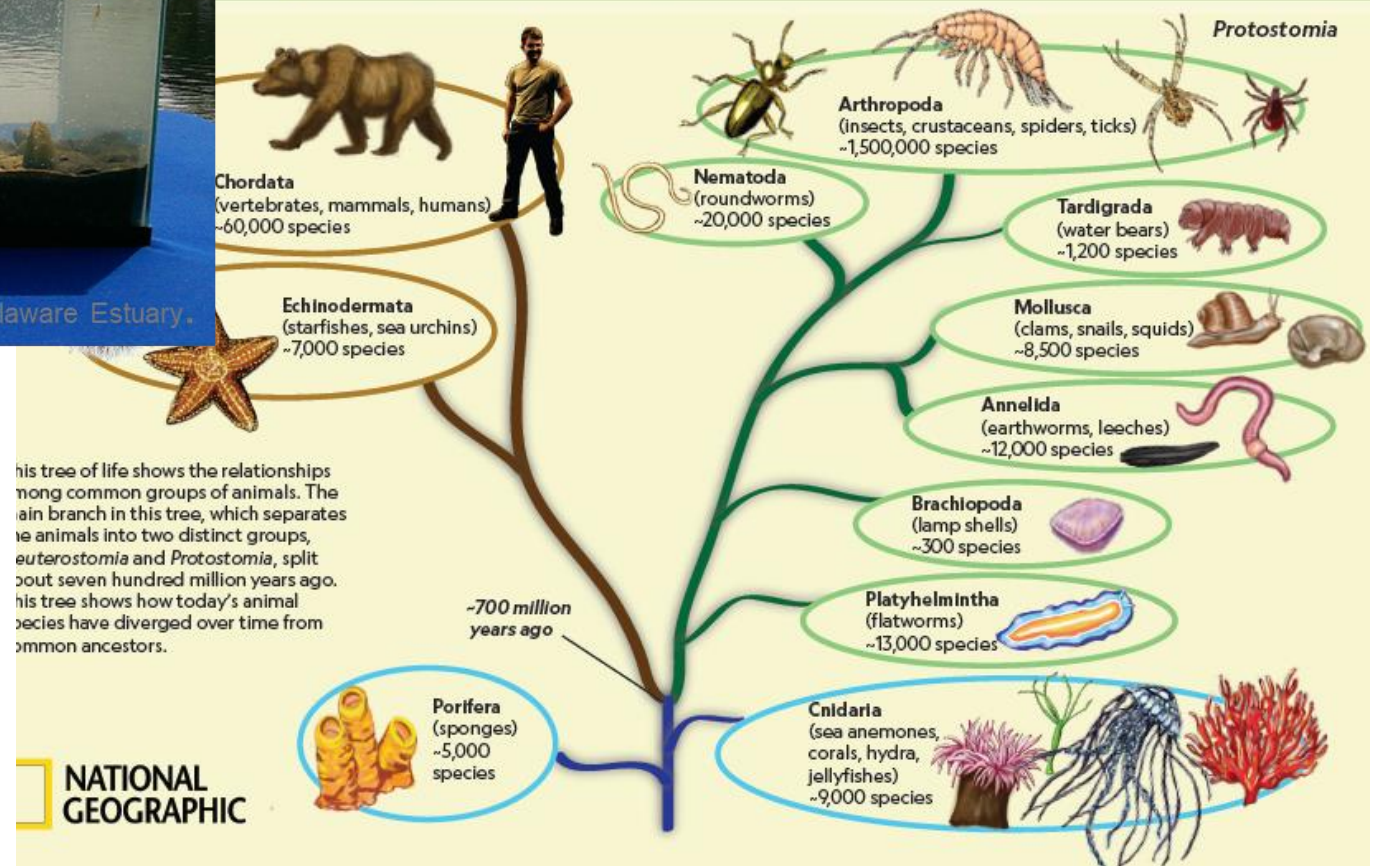
# Freshwater mussels



## THE TREE OF LIFE

A phylogenetic tree shows the evolutionary relationships among different organisms. The branches of the tree show where genetic or physical similarities and differences between organisms begin or end.

A phylogenetic tree is like a family tree. The root of the tree represents a distant ancestor of the species that appear at the ends of the branches. The branches separate at nodes, or points where ancestral lines split into new lines of evolution.



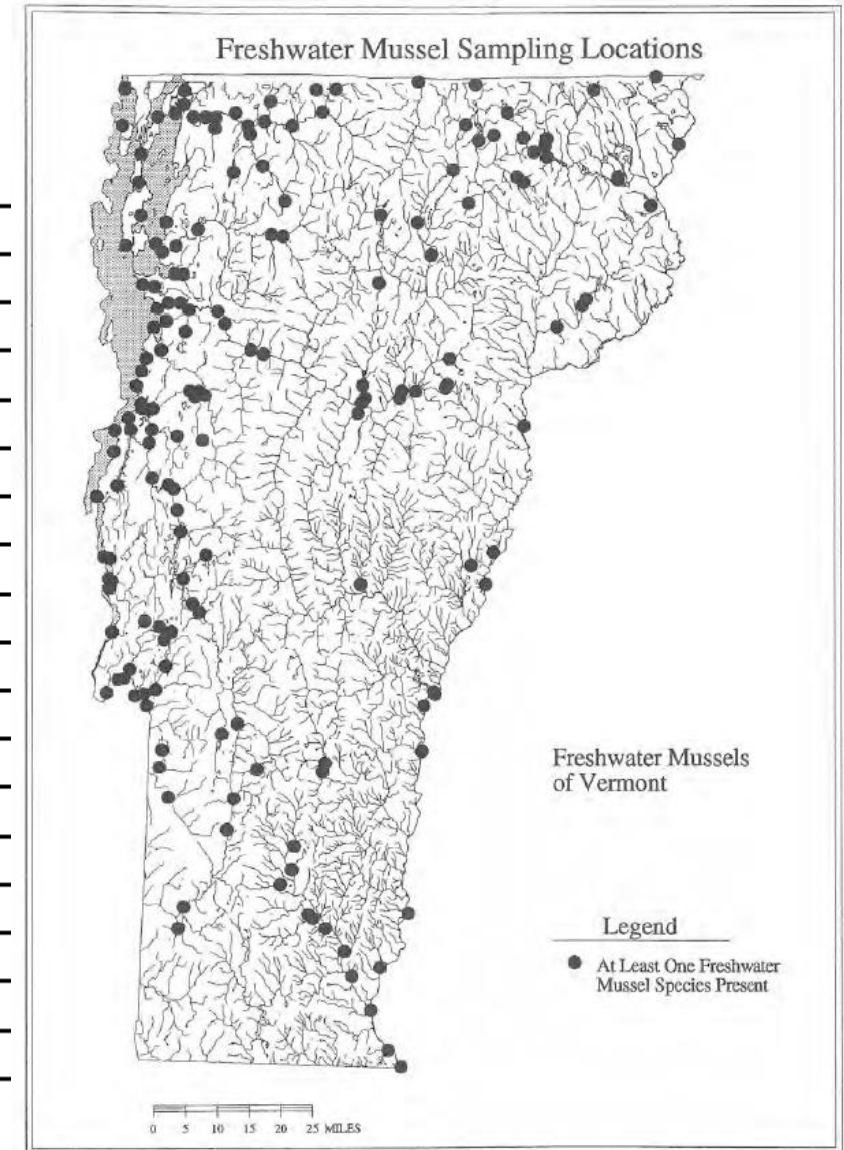




# Freshwater mussels in Vermont

Scientific Name	Common Name	State Rank	Global Rank	State Status
<i>Margaritifera margaritifera</i>	Eastern Pearlshell	S2	G4	T
<i>Alasmidonta heterodon</i>	Dwarf Wedgemussel	S1	G1G2	E
<i>Alasmidonta marginata</i>	Elktoe	S1	G4	SC
<i>Alasmidonta undulata</i>	Triangle Floater	S3	G4	
<i>Alasmidonta varicosa</i>	Brook Floater	S1	G3	T
<i>Anodonta implicata</i>	Alewife Floater	S1	G5	
<i>Anodontoides ferussacianus</i>	Cylindrical Papershell	S1S2	G5	E
<i>Elliptio complanata</i>	Eastern Elliptio	S5	G5	
<i>Lampsilis ovata</i>	Pocketbook	S2	G5	E
<i>Lampsilis radiata</i>	Eastern Lampmussel	S5	G5	
<i>Lasmigona compressa</i>	Creek Heelsplitter	S2	G5	
<i>Lasmigona costata</i>	Fluted-shell	S2	G5	E
<i>Leptodea fragilis</i>	Fragile Papershell	S2	G5	E
<i>Ligumia recta</i>	Black Sandshell	S1	G4G5	E
<i>Potamilus alatus</i>	Pink Heelsplitter	S2	G5	E
<i>Pyganodon cataracta</i>	Eastern Floater	S4	G5	
<i>Pyganodon grandis</i>	Giant Floater	S2S3	G5	T
<i>Strophitus undulatus</i>	Creeper	S3	G5	

# Species: 18

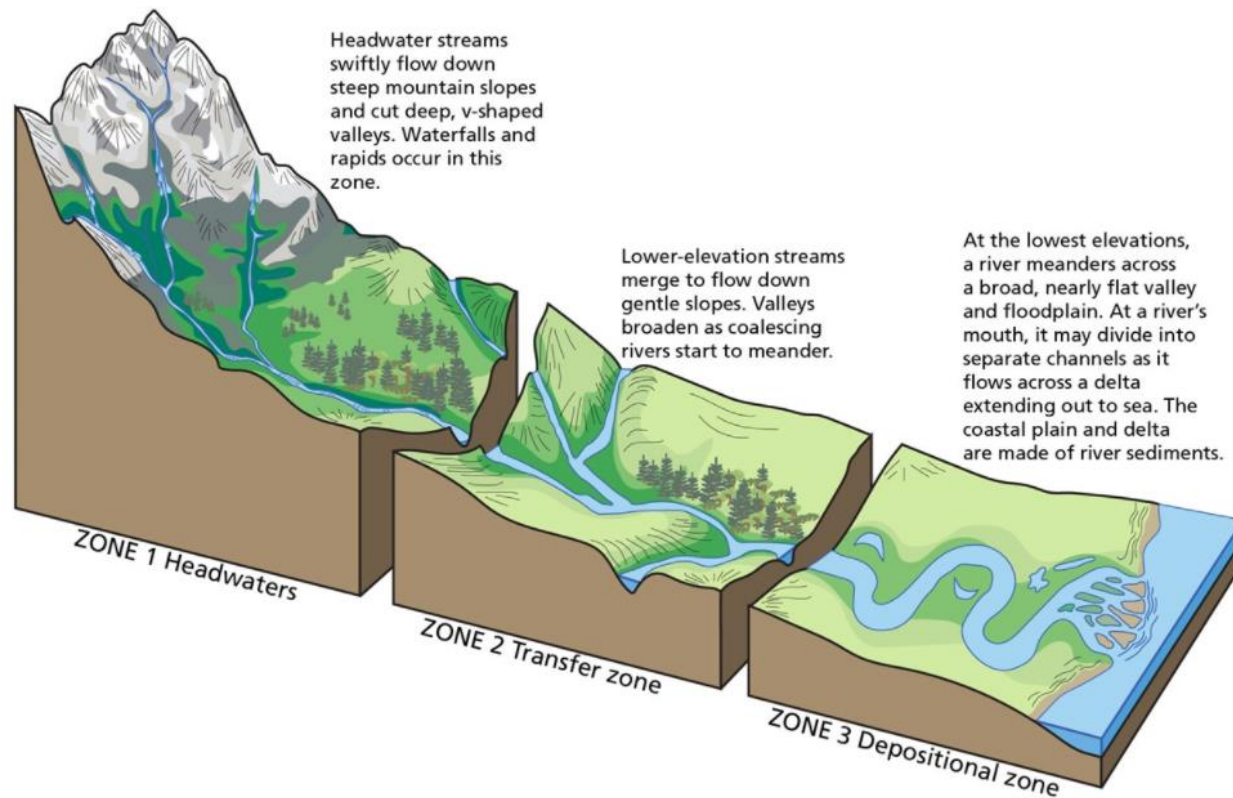


# Mussel Species in Missisquoi

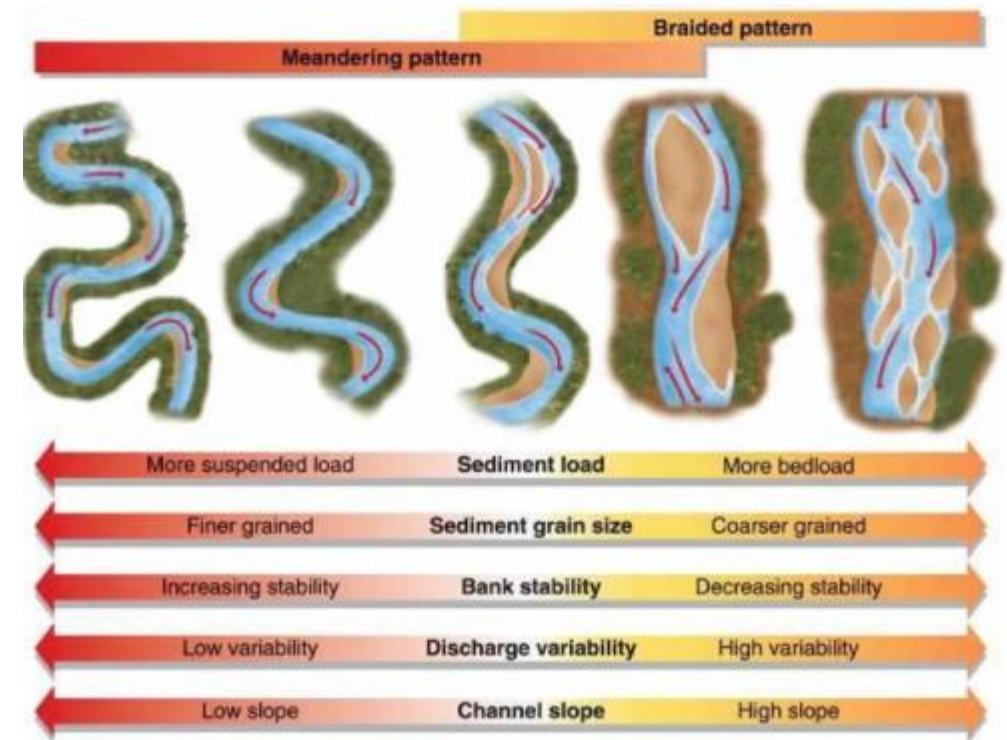
<i>Species</i>	<b>Common Name</b>	<b>S-rank</b>	<b>Distribution in Missisquoi</b>
<i>Alasmidonta undulata</i>	Triangle floater	S3-Uncommon	Throughout Missisquoi
<i>Anodontoides ferrusacianus</i>	Cylindrical papershell	S1S2-Endangered	Below fall-line and upstream to Sheldon
<i>Elliptio complanata</i>	Eastern elliptio	S5- Common	Throughout Missisquoi
<i>Lampsilis ovata</i>	Pocketbook	S2-Endangered	Below fall-line only
<i>Lampsilis radiata</i>	Eastern lampmussel	S5-Common	Below fall-line and upstream to Sheldon
<i>Lasmigona compressa</i>	Creek Heelsplitter	S2-Rare	Above fall-line upstream to Enosburg
<i>Leptodea fragilis</i>	Fragile papershell	S2-Endangered	Below fall-line only
<i>Potamilus alatus</i>	Pink heelsplitter	S2-Endangered	Below fall-line only
<i>Strophitus undulatus</i>	Creeper	S3-Uncommon	Throughout Missisquoi



# River geomorphology and freshwater mussels



Source: Trista L. Thornberry-Ehrlich, Colorado State University.



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# Methods – Study Area





# Methods – Sampling Types

## Timed Searches

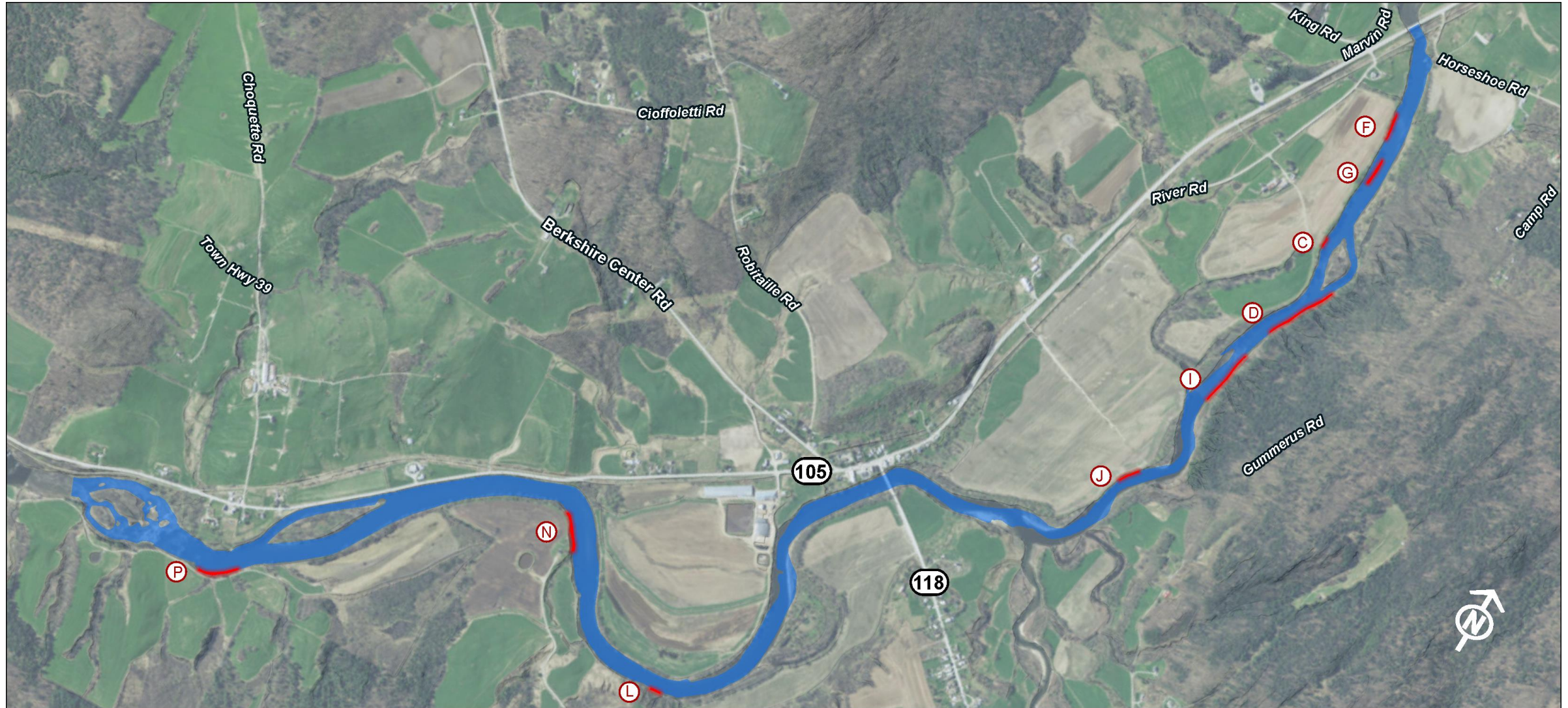


## Quantitative Plots





# Results – Map of Mussel Beds





# Results - Species

<i>Species</i>	<b>Common Name</b>	<b>S-rank</b>	<b>Total # found</b>	<b>Relative abundance</b>
<i>Alasmidonta undulata</i>	Triangle floater	S3	5	0.3%
<i>Elliptio complanata</i>	Elliptio	S5	1373	94.7%
<i>Strophitus undulatus</i>	Creeper	S3	472	5.0%
	Total		1450	100.0%

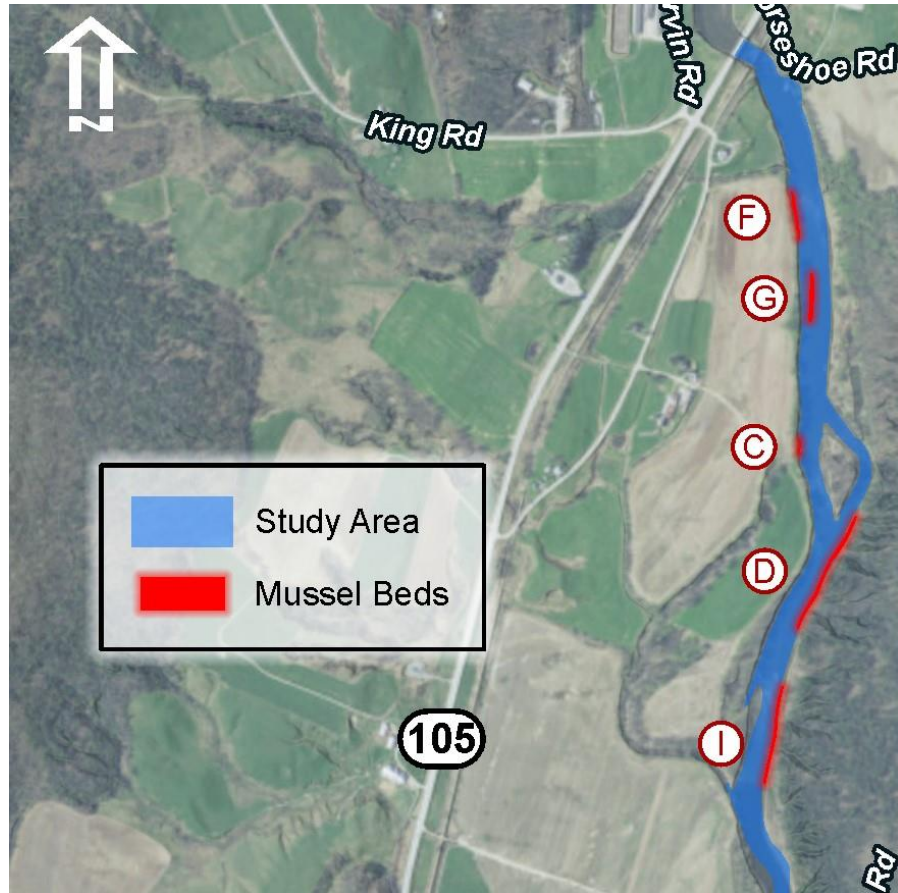


# Results – Timed Searches

CPUE (# of mussels encountered per person hour of search effort)				
Site*	Triangle floater	Elliptio	Creeper	Total
Mussel Bed-C	5	10.0	0.0	15.0
Mussel Bed-D	0	438.0	21.0	459.0
Mussel Bed-F	1.5	429.0	1.5	432.0
Mussel Bed-G	0	66.7	60.0	126.7
Mussel Bed-I #1	3	189.0	24.0	216.0
Mussel Bed-I #3	0	252.9	2.1	255.0
Mussel Bed-I #4	0	307.2	0.0	307.2
Mussel Bed-L #1	0	206.1	2.6	208.7
Mussel Bed-L #2	0	18.0	0.0	18.0
Mussel Bed-N	1	339.0	30.0	370.0
Mussel Bed-P	6	498.0	36.0	540.0



# Results





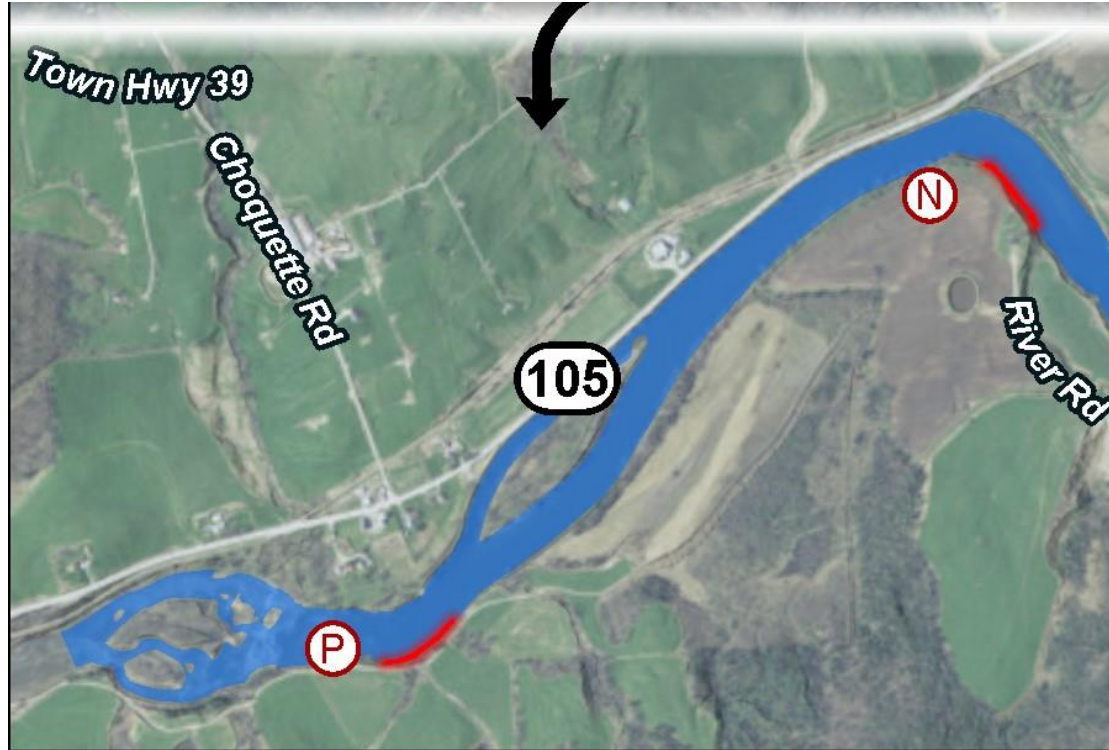
# Results – Quantitative Plots

Site	Average # mussels / m2
Mussel Bed-C	2.0
Mussel Bed-D	3.0
Mussel Bed-N	4.3
Mussel Bed-P	26.0





# Results



# Mussel Population Demographics

Figure 3 Length-Frequency Histogram for *Elliptio complanta* (n=264)

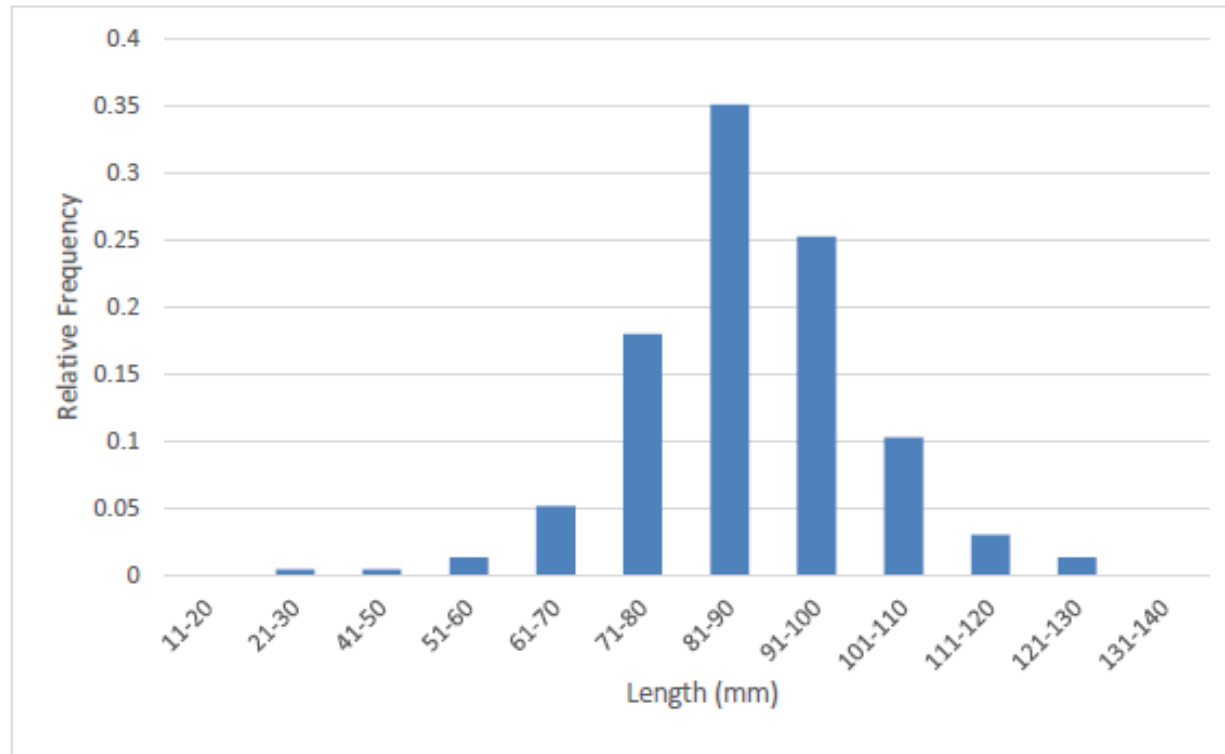
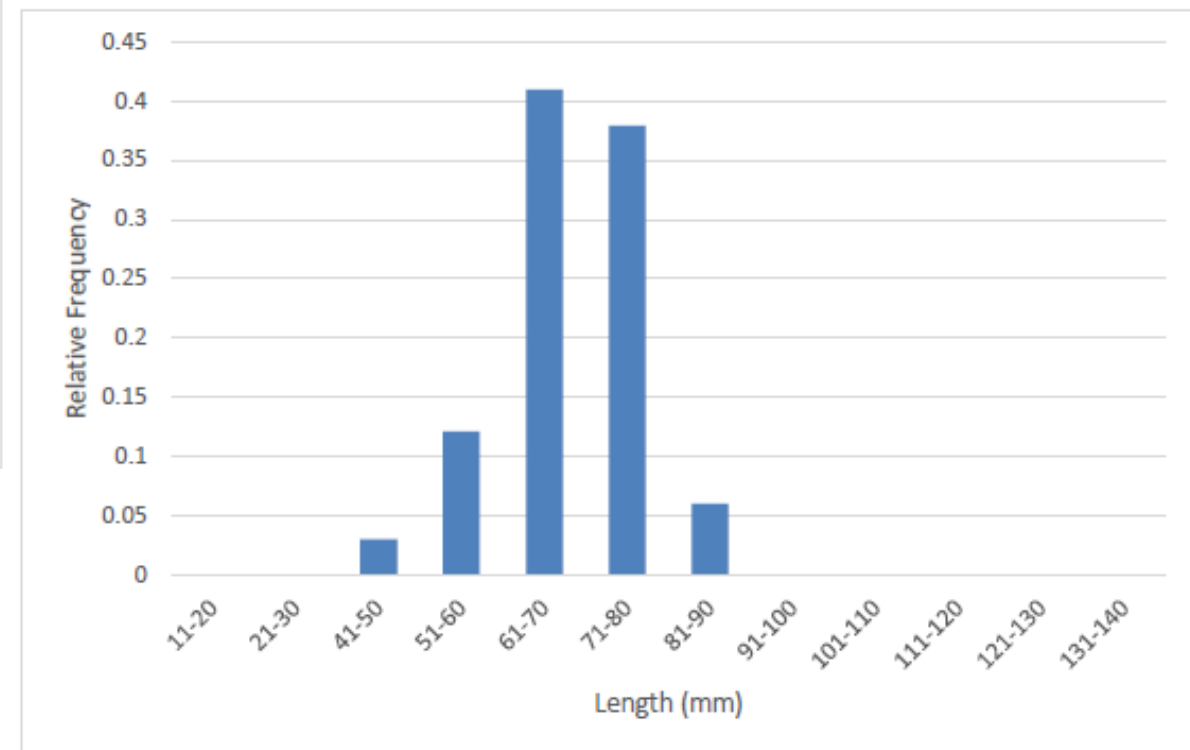


Figure 4 Length-Frequency Histogram of *Strophitus undulatus* (n=66)

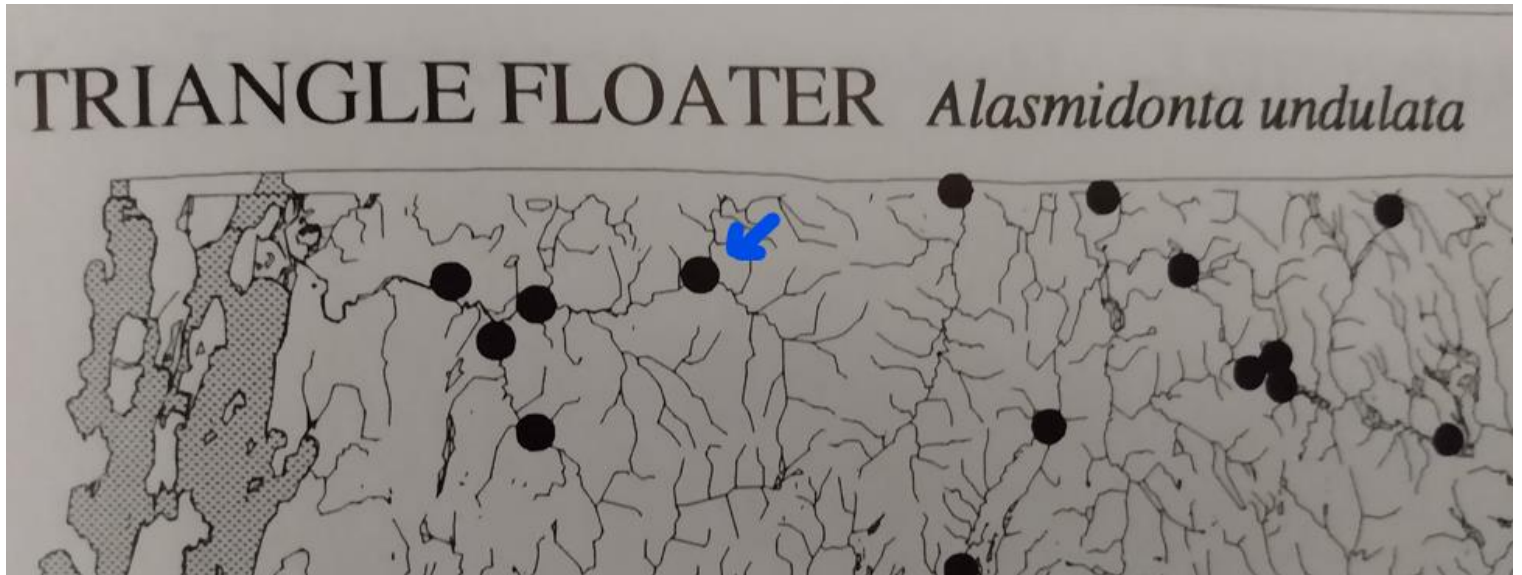




# Mussel data from 1995

Three mussel species  
documented in 1995

Elliptio  
Creeper  
Triangle Floater



Christopher Fichtel  
Vermont Field Office  
The Nature Conservancy  
Montpelier, VT

and

Douglas G. Smith  
Department of Biology  
University of Massachusetts  
Amherst, MA

Status of Creek Heelsplitter (*Lasmigona compressa*) unknown in this reach

1995

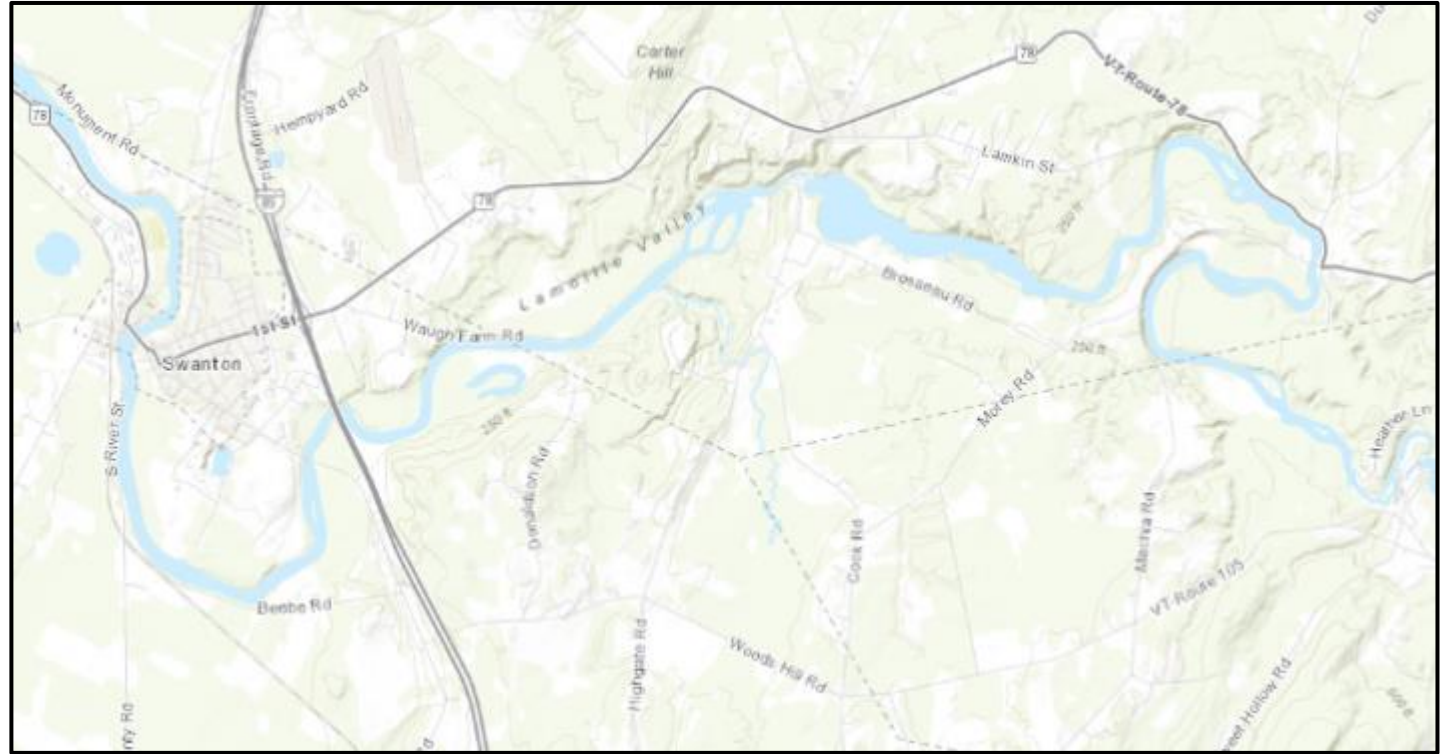
# Data from 1999 in Lower Missisquoi

**Elliptio common throughout  
1999 study**

**Mussel beds with median of  
2.76 elliptio / m<sup>2</sup>**

**Some mussel beds very  
dense**

**More mussel diversity**



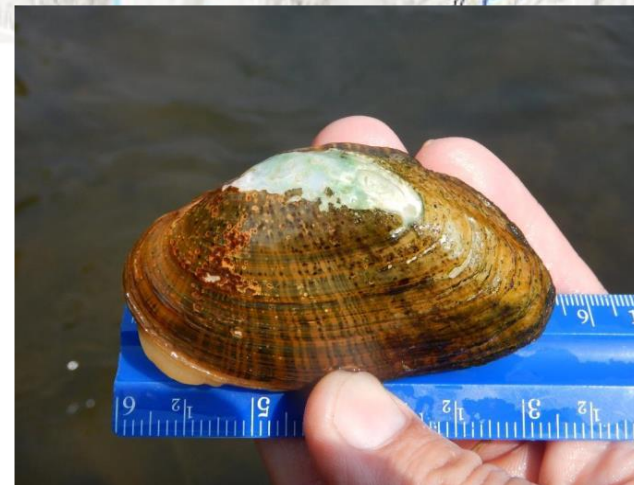
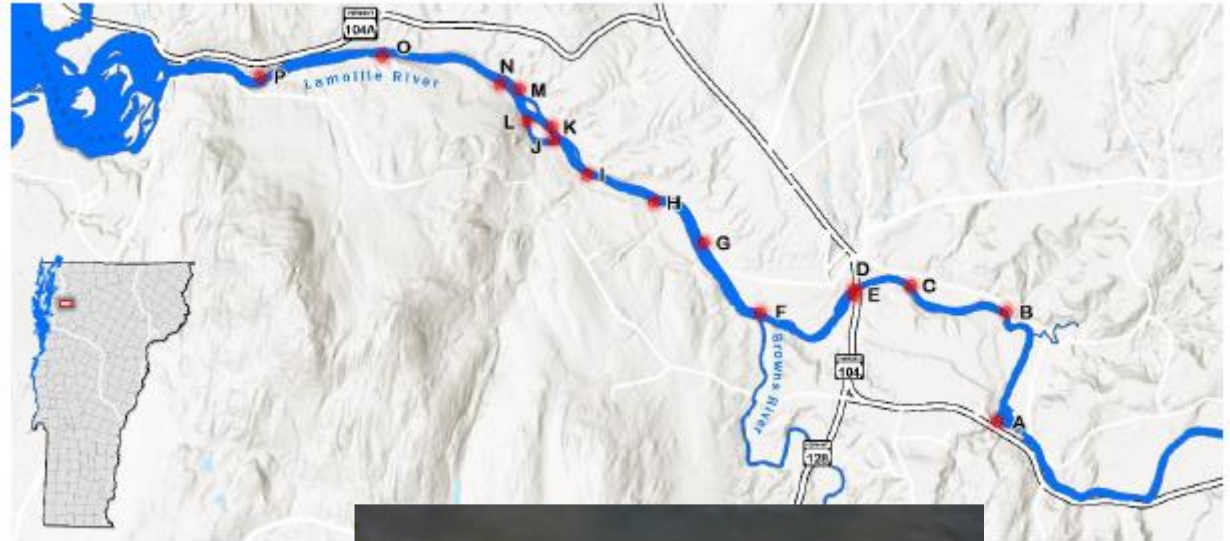


# Comparison with Lamoille

**Similar geomorphology**

**2020 Study 6.23 mussels / m<sup>2</sup>**

*Figure 1 Study Area and Survey Sites on the Lamoille River*



# Conclusions

- **Nine mussel beds mapped and assessed**
- **Three species documented**
  - Elliptio – common and widespread**
  - Creeper – uncommon**
  - Triangle floater - rare**
- **Inventory indicates healthy range of age classes for elliptio and creeper**
- **Diversity of mussels in this reach unchanged from 1995**
- **Abundance of mussels appear to be consistent with other data collected historically on the Missisquoi and more recently on the Lamoille**

