

Fish Diversity in the Mill River Watershed

During 1997-2001, Smith College and UMass researchers used minnow seines and electro-shocking units to assess the diversity of fish throughout the watershed. A total of 26 species were found, ranging from finger-length minnows to foot-long chain pickerel. Approximately half of the species were found only once. Among the most abundant were golden shiners, blacknose dace and brook trout. As expected, the highest number of species was found in the warmer, slower-moving floodplain sites in the Mill River itself and not in the high-gradient, colder, flashier tributaries.

Total Species list: **(bolded species are most common)**

Alosa aestivalis – blueback herring
Ambloplites rupestris – rock bass
Ameiurus melas - black bullhead
Anguilla rostrata – American eel
***Catostomus commersoni* - white sucker**
Erimyzon oblongus – creek chubsucker
***Ethiostoma olmstedii* – tessellated darter**
Esox niger - chain pickerel
Lepomis gibbosus - pumpkinseed
Lepomis auritus – redbreast sunfish
***Lepomis macrochirus* - bluegill**
Luxilus cornutus - common shiner
Micropterus dolomieu - smallmouth bass
Micropterus salmoides - largemouth bass
***Notemigonus crysoleucas* - golden shiner**
Notropis hudsonius - spottail shiner
Oncorhynchus mykiss - rainbow trout
Perca flavescens – yellow perch
Petromyzon marinus – sea lamprey
***Rhinichthys atratulus* - blacknose dace**
Salmo salar - Atlantic salmon
Salmo trutta – brown trout
Salvelinus fontinalis - brook trout
Semotilus atromaculatus - creek chub
***Semotilus corporalis* - fallfish**
Umbra limi - central mudminnow

Fish Species	Mill River	Running Gutter Brook	West Brook	Roaring Brook	Bloody Brook	Great Swamp Brook
<i>Ambloplites rupestris</i> rock bass	X					
<i>Ameiurus melas</i> black bullhead						
<i>Catostomus commersoni</i> white sucker	X	X				X
<i>Erimyzon oblongus</i> creek chubsucker	X	X			X	
<i>Ethiostoma olmstedii</i> tessellated darter	X	X			X	
<i>Esox niger</i> chain pickerel	X				X	X
<i>Lepomis gibbosus</i> pumpkinseed	X				X	X
<i>Lepomis macrochirus</i> bluegill	X	X		X	X	X
<i>Luxilus cornutus</i> Common shiner	X	X			X	X
<i>Micropterus dolomieu</i> smallmouth bass	X					
<i>Micropterus salmoides</i> largemouth bass	X	X				
<i>Notemigonus crysoleucas</i> - golden shiner	X	X		X	X	X
<i>Notropis hudsonius</i> spottail shiner	X					
<i>Oncorhynchus mykiss</i> rainbow trout		X				
<i>Perca flavescens</i> yellow perch	X	X	X			
<i>Rhinichthys atratulus</i> blacknose dace		X	X	X		
<i>Salmo salar</i> Atlantic salmon			X			
<i>Salmo trutta</i> brown trout			X			
<i>Salvelinus fontinalis</i> brook trout	X	X	X	X		
<i>Semotilus atromaculatus</i> creek chub		X				
<i>Semotilus corporalis</i> fallfish	X	X				
<i>Umbra limi</i> central mudminnow		X				

Fish & Freshwater Mussels

Many animals exhibit unusual life histories, but freshwater mussels are among the most bizarre. During their juvenile life stage, all freshwater mussels undergo a brief parasitic period on fish. But not just any kind of fish. Each type of freshwater mussel has a relationship with one or a few species of fish. Some mussels are generalists, with the gravid females spewing tiny mussels into the water column, while others have evolved elaborate fleshy appendages that look like tiny fish, luring in the larger host fish. When the host fish is close enough, the female mussel ejects a cloud of larval mussels, which burrow into the fish's gills or fins like a miniature pac-man. For the next few weeks, the larval mussel draws its nutrients from the host's bloodstream. Once it has matured, the mussel drops off into the sediments and begins its independent life, filtering out particulates from the water column.

One of the 1998-99 research questions asked by Smith and UMass researchers concerned the relationship between Federally Endangered dwarfwedge mussels in the Mill River and its host fish, the tessellated darter (*Etheostoma omstedi*). Since there seems to be sufficient underwater habitat for dwarfwedge mussels, they were curious to know if its ability to reproduce was limited by low numbers of tessellated darters. They also wanted to know how far and when tessellated darters travel, thereby giving some clues as to the potential dispersal and distribution of dwarfwedgemussels.

The answers to these questions, however, are complicated by the darter's small size (only about 2-3") and its habit of hugging the river bottom, the latter making it more difficult to capture darters using traditional seining methods. In order to address these questions, Smith researchers tagged more than 30 darters using a fluorescent dye. A subsequent seining revealed a population estimate of nearly 150 darters in one 30-meter (100') stretch, suggesting that the darter's population size was not limiting the dwarfwedge mussel population.

Genetics Of Tessellated Darters

Understanding the genetic structure of selected fish species in the watershed also contributes to the freshwater mussel recovery efforts. In general, greater genetic variation within a population of host fish indicates more movement between sub-populations, and therefore greater dispersal opportunities for mussels. A 1998 genetic study of tessellated darters by Dr. Bob Merritt of Smith College's Department of Biological Sciences revealed unexpected results—not only were all the darters in the Mill River genetically identical, they were also genetically identical to sub-populations in other portions of the Connecticut River. In this unusual case, genetic markers will not help researchers answer questions about the movements and gene exchange between sub-groups of darters.