Appendix II. Profiles of fish species found in the Lower Warner River Watershed.

**Brown Bullhead**

Brown bullheads were captured at 3 locations within the Lower Warner River watershed and 2 or less locations within each of the Lane River, Upper Warner River and Andrew Brook watersheds. These three locations drain marsh areas and smaller ponds. It is likely that the species is present in several other areas but water depths precluded the use of electrofishing.

The brown bullhead is a member of the catfish family that is native to New Hampshire. It prefers lakes, ponds, and slow moving sections of rivers and streams. The species is widespread throughout New Hampshire and may be found in almost any habitat, including faster flowing streams with rocky substrate. When the species is found in a faster flowing stream, there is an indication that wetlands or a lake or pond is present upstream. Brown bullhead are extremely resilient and can tolerant dissolved oxygen levels of less than 1 part per million. For this reason, they are not a good indicator of water quality. Brown bullhead survive in low oxygen conditions by gulping air into its air bladder and breathing through its skin. It may lie dormant for days in the mud of a dewatered pond or stream.
**Blacknose Dace**

Blacknose dace are found in rocky streams with moderate to swift current. Less streamlined than their relative, the longnose dace, they take advantage of small pools and slower flowing water along the margins of streams with swift current. They feed on a variety of invertebrates and algae. They are more common in small headwater streams than in larger rivers. Often found associated with brook trout, their higher temperature tolerance gives them a wider distribution throughout New Hampshire. They are considered tolerant of pollution and habitat alteration and may be found in both disturbed and undisturbed habitats.

Blacknose dace represented the most abundant species captured within the drainages of the Lower Warner River watershed (556 individuals captured). The species was encountered in 16 different survey locations. Blacknose dace were the second most commonly encountered species (behind brook trout) in the Lane River, Upper Warner River and Andrew Brook watersheds.
The bluegill is a species of sunfish that has been introduced into several water bodies in New Hampshire and is now widespread. Its original range included the St. Lawrence and Mississippi River basins and Atlantic slope drainages as far north as Virginia. Bluegills are bluish green to gray colored sunfish with dark vertical bands. There is a dark spot on the operculum, above the pectoral fin, and also at the rear of the dorsal fin.

Bluegills inhabit ponds, lake shores, or slow flowing rivers with aquatic vegetation. The species thrives among thick aquatic vegetation where they feed on invertebrates and small fish. They are often found with common sunfish and are considered tolerant of pollution and habitat alteration.

The species was caught in a single location within the Upper Warner River Watershed in 2009. It is likely present in many of the lakes and ponds within the Warner River drainage.
Adapted to coldwater streams, brook trout are rarely found in waters that routinely exceed temperatures greater than 72ºF during the summer. Brook trout are powerful swimmers and are often found in steep, cascading mountain streams where no other fish are present. Though some individuals may live their entire lives in one small stream, surveys using radio tags have shown brook can move many miles in search of thermal refuge, spawning habitat, or quality foraging areas. Brook trout are “sit and wait” predators, usually taking up residence in a pool and riffles where they feed on both aquatic and terrestrial invertebrates. Spiders, beetles, and other terrestrial invertebrates that fall into streams are a very important part of brook trout diets, especially in the spring. Brook trout seek out gravel beds with upwelling groundwater, often in small headwater streams, for spawning. Eggs are laid in small excavated nests in gravel, called redds, where they incubate through the winter and hatch in the early spring. Brook trout are more common in northern New Hampshire where cooler summer air temperatures maintain suitable summer water temperatures.

Brook trout are sensitive to habitat disturbance and impairments to water quality. An intact riparian zone provides both shade and prey in the form terrestrial invertebrates. Removal of streamside vegetation may cause a stream to become too warm to support brook trout. Impervious surfaces and undersized culverts increase peak flows and cause erosion and sediment deposition, which may fill pool habitat and bury spawning gravel. Fragmentation is an important limiting factor when it comes to maintaining healthy brook trout populations because impassable stream crossings prevent brook trout from accessing critical habitat, like a cold stream in the summer or spawning habitat in the fall. Promoting groundwater recharge by limiting impervious surfaces and using low impact designed stormwater practices is critical for protecting brook trout populations.

Wild brook trout were captured at 16 of the 29 survey locations. This species, and blacknose dace, represented the most commonly encountered species at different survey
locations in the Lower Warner River drainage. The total number of individuals captured throughout the watershed (421 individuals) was second only to blacknose dace (556 individuals). Similarly, wild brook trout were the second most common captured species within the Andrew Brook watershed being present in all 8 (139 individuals) survey locations. Wild brook trout were the most abundant species within the Lane River and Upper Warner River watersheds representing 40.6% (189 individuals), and 44.2% (504 individuals), of the total number of fish captured, respectively.
In New Hampshire, Burbot (also known as cusk) inhabit both cooler mid to large size streams and rivers as well as lakes and ponds that offer thermal refuge during the summer months. The lake dwelling individuals can obtain much larger sizes (State Record-Lake Winnipesaukee 34.5 inches and 12.22 pounds) than those found in our rivers and streams. Populations found in flowing systems rarely obtain lengths greater than 12 inches. The species represents the only freshwater member of the cod family. Similarly to brook trout, burbot are less tolerant of warmer water temperatures than other fish species. A unique feature of this species is that spawning occurs during the winter season. Populations living in rivers and streams are known to occur in parts of the Connecticut and Merrimack River watersheds. Beyond this, not much is known specific to burbot populations inhabiting flowing systems in New Hampshire.

Burbot were found at 3 locations within the Lower Warner River watershed. They were captured in Schoodac Brook and Stevens Brook (2 locations). The species was not documented in the other watersheds that comprise the Warner River drainage.
Chain pickerel

Chain pickerel are found throughout New Hampshire, usually associated with aquatic vegetation, which they use as cover for ambushing prey. Chain pickerel spawn in wetlands and marshy backwaters just after ice melt. Early spawning is an adaptation which allows their young to grow large enough to feed on the young of other fish species, which hatch later in the spring. Chain pickerel are a relatively short lived but fast growing species. When the species is found in a faster flowing stream, there is an indication that wetlands or a lake or pond is present upstream. Chain pickerel are considered moderately tolerant of pollution and habitat disturbance. As visual predators, they may be impacted by excessive turbidity or the loss of aquatic vegetation.

Chain pickerel were found at 4 locations within the Lower Warner River Watershed and in a single location within the Upper Warner River Watershed. It is likely the species is found within all lakes and ponds within the Warner River Watershed. These survey locations were influenced by upstream wetlands, marshes, or ponds. The two species were not found to coexist within the survey locations within the Lower Warner River Watershed. The single survey location within the Upper Warner River Watershed did contain both wild brook trout and chain pickerel but the density of wild brook trout was very small (only 3 individuals captured).
Creek Chub

The creek chub is a commonly encountered fish species within the Connecticut River watershed and occasionally found within some portions of the Merrimack River in southern New Hampshire. They seldom reach lengths in excess of five inches and tend to inhabit areas with both moderate and minimal flow. They can be differentiated from the fallfish by their dark sport present at the base of their dorsal fin. Similar to the fallfish, creek chubs deposit their fertilized eggs in constructed gravel nests in the spring. When present, the species usually occurs in high densities. This makes the creek chub an important forage species for larger fish, birds, and piscivorous mammals.

Creek chubs are more tolerable to warmer water temperatures and lower pH and dissolved oxygen values. They have been noted to survive in isolated pools during drought conditions. The species was only documented in Willow Brook (Childs Brook) in Warner during the 2012 surveys. Creek chubs were not documented within the Lane River watershed but noted in 6 locations and 3 locations within the Upper Warner River Watershed and Andrew Brook Watershed, respectively.
Creek Chubsucker

Creek chubsuckers are found in slow flowing rivers and streams with muddy bottom and aquatic vegetation. Like the white sucker, the creek chubsucker spawns over gravel bottom in swift current. Creek chubsuckers feed on a variety of invertebrates found on the bottom and among aquatic plants. Creek chubsuckers are considered moderately pollution tolerant, but intolerant of habitat disturbance. As more visual foragers than common white suckers, they may be more sensitive to turbidity. They are often found associated with other warm water fish species, such as common sunfish (pumpkinseed), juvenile largemouth bass, and golden shiners, which depend on aquatic vegetation for food and shelter. As juveniles, creek chubsuckers have a black lateral band that dissipates as they grow.

Creek chubsuckers were found at 3 different locations within the Lower Warner River watershed in 2012. These locations were associated with marshes, wetlands, and ponds in upstream areas. The population found just below Knight Meadow Marsh represented the dominant fish species in this location. The species was not documented in the Lane River, Upper Warner River, and Andrew Brook watersheds.
Common Shiner

Common shiners are found in small streams to medium sized rivers with gravel to rubble bottoms. They are a short lived species, rarely exceeding 200 mm in length. They tend to concentrate in pool habitat or slow moving shorelines. Common shiners lay adhesive eggs in nests which they excavate in sand or gravel. They have also been known to lay eggs in the nests of other fish species. At first glance, common shiner habitat appears suitable for brook trout, but a higher temperature tolerance and a more omnivorous diet allows common shiners to thrive in warmer streams. During periods of high turbidity, common shiners have been found to shift from feeding on small invertebrates to a diet of plant matter. Its tolerance of warm temperatures and its adaptable foraging strategy make the common shiner relatively tolerant of habitat disturbance.

Common shiners were captured in 3 locations within the Lower Warner River drainage including the two largest tributaries to the Warner River in this area (Schoodac Brook and Stevens Brook). The species was found to be present with wild brook trout in Willow Brook (Childs Brook). The species was noted in 2 locations with each of the Lane River, Upper Warner River, and Andrew Brook watersheds.
Fallfish

The fallfish is one of New Hampshire’s largest minnow species and one of the most common fish species encountered in the state. The species reaches greater lengths when inhabiting lake or pond systems but rarely reaches lengths greater than 10 inches in smaller rivers and streams. It can be found in nearly any river or stream, but it is most abundant in medium sized rivers with a mix of rocky and gravel substrate. Fallfish males build nest mounds out of pebbles, one stone at a time. Spawning is communal, although usually initiated by the nest builder, with a number of females and surrounding males using a single nest. Larger individuals may move into smaller streams to spawn. The species has a greater tolerance to warmer water temperatures and aquatic habitat impacts when compared to wild brook trout.

Fallfish were captured at 4 locations within the Lower Warner River Watershed, 2 locations within the Lane River Watershed, a single location within the Upper Warner River Watershed, and not documented within the Andrew Brook Watershed. It is likely the species is abundant in more locations including the mainstem of the Warner River but water depths prevented electrofishing surveys in these areas.
Golden Shiner

Golden shiners are a common minnow species found throughout New Hampshire. The species is usually associated with aquatic vegetation in lakes, ponds, or slow moving sections of rivers and streams. Golden shiners lay adhesive eggs that stick to stands of aquatic vegetation. Extremely prolific, the female golden shiner can lay 200,000 eggs multiple times during the growing season. Golden shiners are capable of both filter feeding and catching small invertebrates or fish. Plant material makes up a large portion of their diet. It is widely used as bait by anglers.

Golden shiners were usually encountered in the outlet streams of active or abandoned beaver impoundments, wetlands, or ponds with abundant aquatic vegetation. The species was documented in five different areas within the Lower Warner River Watershed, a single location within the Lane River Watershed, 3 locations within the Upper Warner River Watershed, and not documented within the Andrew Brook Watershed.
Largemouth Bass

Largemouth bass are native to the Mississippi drainage and the coastal watersheds of the southeastern United States. It has been widely introduced into the water bodies of New Hampshire and is now common. Largemouth bass prefer weedy backwaters, ponds, and lake shores with aquatic vegetation and a muddy bottom. They are often associated with golden shiners, brown bullheads, chain pickerel, and bluegill. Like the other members of the sunfish family, largemouth bass males defend a nest in shallow water during the spring. Largemouth bass have a higher tolerance for warm temperatures than smallmouth bass. The record largemouth bass taken by angling in New Hampshire was 10.5 pounds.

The species was only observed in the outlet stream of Tom Pond during the tributary surveys of the Lower Warner River Watershed in 2012 and within a single stream within the Upper Warner River Watershed in 2009. It is likely present in slow flowing sections of the mainstem Warner River as well as other lakes and ponds in the watershed (e.g. Lake Winnipocket). Given two distinctly different habitat preferences, the species if rarely found to coexist with wild brook trout.
**Longnose Dace**

Longnose dace inhabit swift flowing riffle sections of rivers and streams with boulder, cobble, and gravel substrate. Their streamlined shape and small air bladders make them well adapted to living along the bottom in flowing water. They feed on invertebrates in the crevasses between rocks and boulders. The species has one of the greatest distributions of the minnow family in North America. During spawning in late May, early June, males defend territories where females lay adhesive eggs in protected cavities between rocks.

The species was captured at five survey locations within the Lower Warner River drainage in 2012. It was found in Willow Brook (Childs Brook), Schoodac Brook, and all three locations sampled within Stevens Brook. Other populations were noted in an unnamed stream within the Andrew Brook Watershed and two locations within the Lane River as well as a small unnamed stream also within the Lane River Watershed.
Margined Madtom

Margined madtom is a small species of catfish native to rivers and streams on the eastern slope of the Appalachian Mountains from New York south to Georgia. It was likely introduced into New Hampshire due to its past use as a bait fish. Margined madtoms live in rocky sections of medium sized rivers, where they can be locally very abundant. Female madtoms lay clusters of eggs under stones in the quiet sections of riffles, after which the eggs are defended by the males. Madtoms feed on invertebrates living in the spaces between rocks and boulders. They are considered moderately tolerant of pollution.

The species was documented in Schoodac, Stevens and Willow (Childs) brook in the Lower Warner River drainage in 2012. The species was also documented in 2 locations within the Lane River mainstem but not observed in the Upper Warner River or Andrew Brook watersheds.
Pumpkinseed (Common Sunfish)

Pumpkinseed sunfish, also known as common sunfish, are an adaptable species capable of living in both flowing and standing water habitats. They are usually found associated with aquatic vegetation, although in rivers they may be found in the pools of faster moving sections of river if there are slower flowing reaches near by. Pumpkinseed males excavate a circular nest in shallow water, often in groups or colonies. Females spawn with males in multiple nests where the eggs are aggressively defended by the males until they hatch.

After wild brook trout and blacknose dace, the pumpkinseed was captured in the most locations throughout the Lower Warner River drainage in 2012. All of these seven locations were associated with wetlands, marshes, lakes, or ponds upstream from the survey locations. These upstream waterbodies are likely contributing sources of the species in downstream areas. The species was not documented in the other watersheds that comprise the Warner River drainage but likely occupy many of the lakes and ponds within the area.
**Tessellated Darter**

The tessellated darter has a preference for areas with slow or marginal flow with sand or mud bottoms. Spawning typically takes place in May when the male chooses a location and guards it throughout the hatching of the eggs. Primary food sources include benthic invertebrates, primarily midge larvae but other organisms, such as amphipods and copepods are taken in smaller amounts. The species is rarely found in great abundance. In New Hampshire, the species has been documented in the Connecticut and Merrimack River watersheds. Tessellated darters are an important host species for the Federally Endangered dwarf wedge mussel. Mussel larvae, called glochidia, can only be distributed by attaching to the gills of a host fish species. Maintaining healthy populations of tessellated darters is a critical component of efforts to protect and restore dwarf wedge mussel populations.

The species was only documented in the outlet stream of Tom Pond in Lower Warner River during the 2012 surveys. The species is also likely in the mainstem of the Warner River and lower reaches of larger tributary streams within the Warner River drainage.
White Sucker

With the exception of high gradient mountain streams, the species adaptability and moderate tolerance to water quality impairments, allows it to be found throughout most of New Hampshire’s aquatic habitats. Adults tend to have an affinity towards deeper stream and river reaches with slow flow. Juvenile white suckers can often be found in more shallow areas with moderate flows. The species spawns in the spring (late April/May) in substrates consisting of sand and gravel. Habitat fragmentation (dams, perched road crossings) may preclude the species from accessing these locations.

We found the species in one unnamed stream within the Andrew Brook Watershed in 2008. White suckers were noted in four locations within the Upper Warner River in 2009 (Hoyt Brook, West Branch Brook, and 2 unnamed streams). The species was documented in six locations throughout the Lower Warner River watershed in 2012. The species was noted in 3 locations within the Lane River mainstem as well as an unnamed stream in the Lane River Watershed in 2013. It is likely present in many more locations throughout the Warner River drainage in deeper water habitats but water depth precluded electrofishing surveys.
The yellow bullhead is native to parts of the midwestern and southeastern U.S. They were first introduced into the Connecticut and Merrimack rivers and have now been spread to many coastal rivers. Yellow bullheads prefer faster flowing, more riverine habitats than brown bullhead, but there is much habitat overlap between the two species. Eggs and fry are guarded by both parents in shallow nursery areas with adequate cover. They are similar to brown bullheads in size, reaching lengths of up to 18 inches (457 mm) and weights of 3 pounds (1.4 kg).

This species was found at a single location within the Lower Warner River drainage (the outlet stream that drains Knight Meadow Marsh). No other records of the species presence were noted throughout the Warner River drainage. It is likely present in many more locations in the area in deeper water habitats but water depth precluded electrofishing surveys.
The yellow perch is native to ponds, lakes, and slow flowing rivers throughout New Hampshire. It is usually abundant in stands of aquatic vegetation along shorelines in the summer. Yellow perch consume a wide variety of invertebrates and small fish species. Spawning takes place in the spring as water temperatures warm along the shorelines. Eggs are strewn in long ribbons over vegetation and submerged tree limbs, stumps, etc. Each female is followed by a group of males, attempting to fertilize the eggs as they are extruded. The abundance of yellow perch in most waters makes them an important forage species for many predators, including loons, otters, and largemouth bass.

Yellow perch are often encountered in uncharacteristic habitat such as shallow streams. These streams are usually downstream from lakes and ponds with abundant perch populations. Yellow Perch were documented in an unnamed stream in the Upper Warner River Watershed in 2009. The species was found in a single location during the 2012 surveys (the outlet stream of Tom Pond) in the Lower Warner River Watershed as well as the mainstem Lane River in 2013. It is likely present in many more locations in the area but water depth precluded electrofishing surveys.