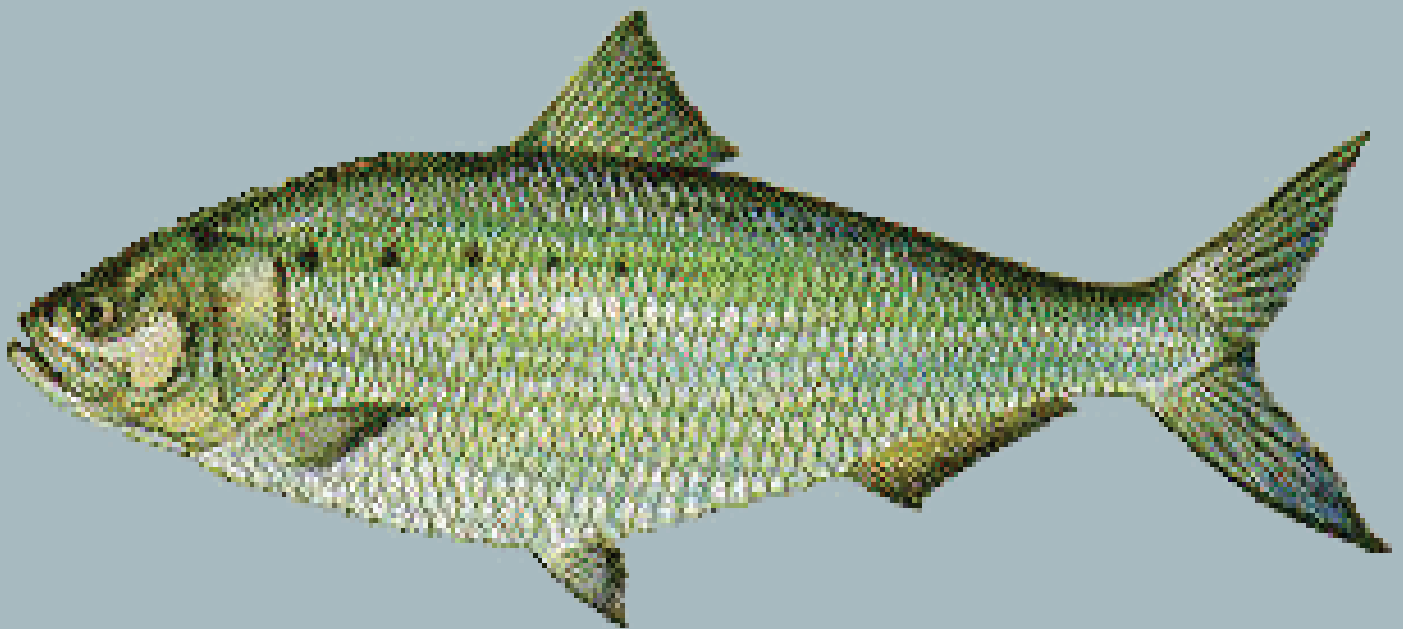


# Charles River Fish FIELD GUIDE



*A Charles River Watershed Association Publication*  
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**Cover photo:**

An American Shad (*Alosa sapidissima*). Once one of the most common fish in the Charles, their populations declined drastically starting in the mid-1800s due to dam construction and degradation of water quality. Today, MA Fish & Game is working on a multi-year restocking effort to reintroduce American Shad to the Charles River.

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## Introduction

The Charles River is 80 miles long and drains an area of 308 square miles. Despite being the most densely populated watershed in Massachusetts, it contains a number of thriving ecosystems, such as the 8000 acres of wetlands that have been preserved in perpetuity as part of the Natural Valley Storage Project undertaken by the U.S. Army Corps of Engineers in 1974. These rich natural areas are responsible for the unique and diverse wildlife that has attracted millions of recreational visitors to the Charles River over the years. Despite this high appeal of the river, a local field guide specifically highlighting the wildlife around the Charles River does not exist.

The Charles River Watershed Association (CRWA) is the leader in Charles River conservancy. It is their mission to protect, preserve, and enhance the Charles River watershed through science, advocacy, and the law. Since its founding in 1965 in response to public concern for the declining health of the river, CRWA has undergone numerous initiatives that have dramatically improved the quality of water in the watershed and helped restore much of its habitat to its natural state. CRWA designed this field guide in order to provide missing information on the wildlife of the river for future tourists, fisherman and wildlife enthusiasts visiting the Charles River. This fish field guide is the second in a series of guides that will document different classes of wildlife (i.e. birds, mammals, etc.) along the Charles.

This fish field guide is intended to be a detailed informational resource on the fish that are most commonly found in the Charles River. It provides an in depth look at each fish species, and includes both diadromous and freshwater species.

The natural habitat of the Charles River has been altered greatly by human disturbance. Besides pollution, the creation of several dams has hindered fish movement up and down the river, as well as slowing its velocity (flow) and altering its temperature and depth. These changes have drastically changed the river's fish populations from its natural state. However, with fish passage improving through partial dam breaches and construction of fish ladders, and improvements in water quality, fish species that have been absent from the Charles for decades are making a return. During the summers of 2002 and 2003, a comprehensive assessment of the current fish communities in the Charles River and its tributaries was coordinated by CRWA in collaboration with Todd Richards of the Massachusetts Division of Fish & Wildlife (DFW). Fish sampling was done in the upper and middle parts of the watershed, 16 mainstream sites and 12 tributaries. The results of this survey revealed 3,320 fish, comprising 25 different fish species.<sup>1</sup> Results from this study can be found in the Appendix on p. 24.

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<sup>1</sup> Assessment of Fish Communities and Habitat in the Charles River Watershed. Charles River Watershed Association. 48 Woerd Avenue Waltham, Massachusetts 02453. December 2003.

## Alewife herring: *Alosa pseudoharengus*



**Appearance:** The Alewife is a herring that is generally around 3-6 inches in freshwater and up to 15 inches long in saltwater, with a grey and silver back and a blue or green tint to the rest of the body. The Alewife is distinguishable from the Blueback by the higher arc of its back near the dorsal fin. The protruding lower jaw is also a unique character trait for separating the Alewife from other herrings.<sup>2</sup>

**Distribution:** They are a key fish species often examined in relation to the health and accessibility of coastal rivers. Alewife range through the whole Northern Atlantic coast, but were not found in the last survey of fish in Charles although they are confirmed to be present.

**Ecological Role in the Charles:** They are an important prey for larger game fish. They also use the Charles as a spawning ground in April – June, when large schools of saltwater fish run up the river to find slower, shallower portions of the river to spawn. They live the majority of their lives in saltwater and just move to slower parts of the river or to connected lakes and ponds to spawn. However, some Alewife do spawn in the ocean; saltwater spawning produces 6 – 10 times more eggs than freshwater spawning.

**Life History:** Young feed on free-floating plants and organisms, while older alewives feed on plankton, small fish, diatoms, insects, shrimp and their own eggs. Their breeding season ranges from mid-May to mid-June when they can be spotted in large numbers. Once at sea, the Alewife herring can migrate up to 1,200 miles in ocean waters.<sup>3</sup>

**Interesting Fact:** Early colonists kept salted herring for food during the cold winter months.<sup>4</sup>

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<sup>2</sup> Schultz, Ken. *Ken Schultz's field guide to freshwater fish*. John Wiley and Sons, 2004. pp 37.

<sup>3</sup> [http://dnr.maryland.gov/mydnr/CreatureFeature/alewife\\_herring.asp](http://dnr.maryland.gov/mydnr/CreatureFeature/alewife_herring.asp) Accessed 12/9/11

<sup>4</sup> [http://dnr.maryland.gov/mydnr/CreatureFeature/alewife\\_herring.asp](http://dnr.maryland.gov/mydnr/CreatureFeature/alewife_herring.asp) Accessed 12/9/11

## **Blueback Herring: *Alosa aestivalis***



**Appearance:** The Blueback Herring is difficult to separate from Alewives so the two species are often lumped together as “river herring”. However, Bluebacks are gray-green to blue green on top with a silver underside, with metallic scales. They often have dark blue backs, hence the name.<sup>5</sup> They grow to roughly 10-11 inches long and 8-9 ounces. They generally have smaller eyes than Alewives, which helps to distinguish them,<sup>6</sup> and they are often able to utilize habitats that Alewives can't.

**Distribution:** While the Blueback Herring is distributed across the Atlantic coast, it is a species of special concern for NOAA. Although historically abundant in the Charles, recent population counts are significantly lower. A river herring video counting project sampled 40,000 river herring in the Charles in 2008 and 60,000 in 2009.

**Ecological Role in the Charles:** Like many anadromous fish, the Blueback herring is threatened by a rapid decline in connectivity to spawning sites because of the construction of dams. There is currently a moratorium on taking blueback herring in Massachusetts to allow the population to recover. In terms of diet, the Blueback Herring feeds on fish eggs, small fish, plankton, and other small marine animals.<sup>7</sup>

**Life History:** Because females take around 5 years to develop to full maturity, the species is slow to respond to conservation efforts. The Blueback Herring spawns in deep, swift freshwater. They spend most of their life in saltwater and only return to freshwater to spawn. Young move from their freshwater birth place to saltwater when they are about 1 month old.

**Interesting Fact:** Historically, Blueback Herring were an important bait fish for the lobster industry.

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<sup>5</sup><http://www.maine.gov/dmr/recreational/anglerguide/doyouknowyourcatch/documents/bluebackherring.pdf>  
Accessed 12/9/11

<sup>6</sup> <http://pond.dnr.cornell.edu/nyfish/Clupeidae/blueback.html> Accessed 12/9/11

<sup>7</sup> <http://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=488> Accessed 12/9/11



## American Shad: *Alosa sapidissima*



**Appearance:** American Shad have sleek, silver bodies with a row of black spots on their side and will often be found in large schools. They can grow up to 20 – 24 inches long, and weigh 2- 6 pounds.

**Distribution:** The American Shad is the most abundant anadromous fish in Eastern North America.<sup>8</sup>

**Ecological Role in the Charles:** American Shad enter the Charles in the spring and make their way upstream to breed. In an effort to restore the natural habitat of the Charles, the Massachusetts Division of Marine Fisheries, with assistance from CRWA, chose the American Shad as a target fish community for the river. The American Shad were once plentiful in the Charles until the mid-1800s. After 1850, the population began to decline due to construction of dams and the degradation of water quality. With improved water conditions American Shad have been reintroduced into the river system in hopes of revitalizing the population. Between 2006 and 2010, over 10 million shad fry were released into the river. Increased shad monitoring in the summer of 2011 confirmed that individuals stocked in 2006 did in fact return in 2011.

**Life History:** Adult shad will only be found in the Charles during spawning season in the spring, but juveniles may remain in the river for up to a year. The females lay approximately 100,000 – 600,000 eggs, which then float downstream towards salt water.<sup>9</sup> While migrating upriver, the adult shad does not eat, but before it embarks on that journey it eats plankton, small fish and crustaceans.

**Interesting Fact:** Each river generally has its own discrete community of shad based upon their own geographic locale,<sup>10</sup> as shad tend to return to exactly the same river they were born in.

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<sup>8</sup> <http://www.bio.umass.edu/biology/conn.river/shad.html> Accessed 12/9/11

<sup>9</sup> [http://www.chesapeakebay.net/bfg\\_american\\_shad.aspx](http://www.chesapeakebay.net/bfg_american_shad.aspx) Accessed 12/9/11

<sup>10</sup> <http://www.nefsc.noaa.gov/sos/spsyn/af/shad/> Accessed 12/9/11

## **White perch: *Morone Americana***

**Appearance:** As the scientific name suggests, White Perch is not actually true perch but actually a temperate bass that can grow up to a foot and half long. They are easily distinguishable from all other fish except the striped bass because of its two dorsal fins, and an anterior fin with a series of sharp spines. However, the white perch is distinguishable from the striped bass by its lack of prominent lateral stripes. White perch have a variety of colors from silver, green, gray, or black upper bodies. Some large individuals may have a blue luster to around their head. Most individuals grow up to 8 to 10 inches in size and weigh up to 1 pound.<sup>11</sup>

**Distribution:** White perch were abundant in the Charles River study. There is currently very little management of offshore white perch fishing, but commercial fishermen have noted a decrease in their size in recent decades.

**Ecological Role in the Charles:** White Perch can be a rare fish to find in the upper watershed because it prefers brackish waters and is most likely to be found in the Lower Basin of the Charles. They are a prey fish for chain pickerel, bass, and other large fish, as well as terrestrial vertebrates.<sup>12</sup>

**Life History:** Reproduction is stimulated by warmer water temperatures in spring and may last several weeks. Females may release eggs 2 – 3 times per spawning season. Eggs remain unguarded and hatch within 30 – 108 hours depending upon the water temperature. The young larvae then remain in the spawning area for some time, before moving to new locations.

**Interesting Fact:** Juveniles' movements may be dictated by dark and light hours, moving into open water during the day and inshore at night.

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<sup>11</sup> Marine Recreational Fisheries of Massachusetts: White Perch. Pamphlet by the University of Massachusetts Cooperative Extension and the Massachusetts Division of Marine Fisheries.

<sup>12</sup> Schultz, 149 – 150.



## Striped Bass: *Morone saxatilis*



**Appearance:** Silvery overall color that transitions to blue and dark olive along its back, with 7 or 8 dark horizontal stripes. It is distinguishable clearly as a bass by its dorsal fins clear separation into spiky and soft portions.<sup>13</sup> It is capable of growing over six feet long and averages about 35 pounds.

**Distribution:** They were not found in the most recent fish study of the Charles, but there are reports of their populations within the Charles. Although present, they are most often found only a few miles upstream from the mouth of the river.

**Ecological Role in the Charles:** The Striped Bass (aka "striper") preys upon other fish in the Charles, such as Alewives, as well as clams, mussels, and worms. They are one of the most popular sport fish in all of Massachusetts because of their large size. Unlike most anadromous fish, the striped bass travels up the Charles to feed, as well as to spawn historically.

**Life History:** Striped bass in New England are part of a coastal migratory population that overwinter and spawn in the mid-Atlantic (Chesapeake Bay, Delaware Bay and the Hudson River). These coastal migrants journey to New England waters to feed in the spring through fall. Historically striped bass also spawned in New England coastal rivers, however these populations were largely reduced by over-fishing.

**Interesting Fact:** One of the very first public schools in Plymouth Colony was funded by revenue from striped bass fishing.

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<sup>13</sup> <http://www.mass.gov/dfwele/dmf/recreationalfishing/stripedbass.htm> Accessed 12/19/11

## Rainbow Smelt: *Osmerus mordax*



**Appearance:** A Rainbow Smelt is a slender fish that grows to about a foot long with a pointed head and a large mouth, however they most commonly grow to only 6 to 8 inches long. It has a silver body with a pale green back, and its lower jaw extends past its upper. Additionally, they have very large scales that often fall off.<sup>14</sup>

**Distribution:** There used to be millions of rainbow smelt in the Charles River every spring, but their numbers have decreased greatly over time. They used to be caught by the barrelful in the 1800s. Despite declines, their distribution is on the rise due to a coordinated effort between parties in Maine, Massachusetts, and New Hampshire. The rainbow smelt was at one time a completely diadromous fish, but it has recently been introduced into exclusively freshwater habitats.

**Ecological Role in the Charles:** In 1850 an annual harvest of Rainbow Smelt from the Charles River was reported at around 9 million fish. Like other diadromous fish, although once common, their population has greatly decreased from historic standards. Currently, they are a popular prey fish for trout, bluefish, striped bass, and birds. Up to 72% of adult Rainbow Smelt die annually due to predation.

**Life History:** The rainbow smelt is the first diadromous fish to arrive in the Charles River during the early spring in mid-March, when they typically spawn below the Watertown dam. They generally live in harbors and estuaries or just offshore during the summer, fall, and winter, with their movements driven by seasonal changes in water temperature. They have been known to live up to 6 years, but typically only live for 3 or 4 years.<sup>15</sup>

**Interesting Fact:** Rainbow Smelt were so plentiful in New England rivers in the 1800s that farmers spread them on their fields as fertilizer.

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<sup>14</sup> "Rainbow Smelt: An Imperiled Fish in a Changing World."

<sup>15</sup> Schultz, 186 – 187.

## American Eel: *Anguilla rostrata*



**Appearance:** The American Eel is approximately 2-5 ft. long, with a green to yellow-brown color and a lighter belly. The eel has a continuous fin that stretches around the entire body, ending in a rounded tail. Their whole body is covered in a mucous layer, with scales embedded in their skin.<sup>16</sup>

**Distribution:** The American Eel is currently abundant in the Charles.

**Ecological Role in the Charles:** The only eel and catadromous fish (a fish that lives in freshwater and breeds in the ocean) found in the Charles River. The American eel relies on connectivity between the Charles and the Atlantic Ocean in order to complete its life cycle. Disconnections between fresh and salt water threaten the eel's habitat. The eel eats insects, fish, fish eggs, worms, clams, frogs, and dead animal matter. Because the eel eats detritus and decomposing matter, the eel helps keep waterways clean and clear. They can be very secretive and elusive characters for fishermen because they hide in the mud, sand, and gravel during the day, primarily hunting at night.<sup>17</sup>

**Life History:** Their complex life cycle is still not understood, even after hundreds of years of fishing. All American eels hatch out of eggs in the Sargasso sea, in the middle of the North Atlantic, and from there they are carried by the Gulf stream to Atlantic coast of North America where they settle in rivers and where they grow and hunt. It prefers to hunt at night, and during the day it hides in mud, sand or gravel very close to shore, roughly 5 to 6 feet under the surface. After reaching sexual maturity the eel metamorphoses for its long ocean journey back to the Sargasso Sea to mate; their stomach becomes useless and once changed, the eel will not eat for the duration of its journey.<sup>18</sup>

**Interesting Fact:** Most American Eels caught in U.S. are exported to Europe where they are considered a delicacy. American eels can travel short distances over land because they have evolved to absorb oxygen through their gills and their skin.

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<sup>16</sup> Schultz, 115.

<sup>17</sup> [http://www.chesapeakebay.net/american\\_eel.htm](http://www.chesapeakebay.net/american_eel.htm) Accessed 12/9/11

<sup>18</sup> <http://www.fws.gov/northeast/newsroom/eels.html> Accessed 12/9/11

## Largemouth Bass: *Micropterus salmoides*



**Appearance:** A famous freshwater sport fish, Largemouth Bass are the largest fish in the Centrarchidae sunfish family. It is a popular fish for anglers along the Charles and usually averages 1 to 1 ½ pounds in weight. Sizes up to 5 pounds or more are not uncommon, with a world record catch of 22 pounds.<sup>19</sup>

**Distribution:** The largemouth bass, like the Bluegill (p.12), was native to most of the eastern half of the United States but has been introduced to most parts of North America as well as other countries around the world. The largemouth bass is abundant in the Charles and its tributaries.

**Ecological Role in the Charles:** While it's an adaptable fish, it prefers calm and slow moving water like the Charles where it can survive over its competitors with its omnivorous feeding capability.

Largemouth bass primarily feed on other smaller fish, which in the Charles would include bluegills, other sunfish, catfish, and golden shiner. The largemouth bass is able to hunt in extremely turbid and polluted water, although it also excels in clear and clean water. They prefer to hunt through ambush by lurking under cover, but the largemouth bass is an opportunistic predator and will also pursue fish in open water.

**Life History:** They spawn between late winter and late spring depending on latitude and temperature. The male builds a nest on a rocky portion of the river bottom and eggs are then deposited on roots or sticks in the nest. The male stands guard over his nest even after the larvae emerge.<sup>20</sup> Largemouth bass can live up to 16 years.<sup>21</sup>

**Interesting Fact:** They are a prized angling fish due to their extremely quick and strong movements.<sup>22</sup>

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<sup>19</sup> Schultz 40-41.

<sup>20</sup> [http://www.mi.gov/dnr/0,4570,7-153-10364\\_18958-45681--,00.html](http://www.mi.gov/dnr/0,4570,7-153-10364_18958-45681--,00.html) Accessed 12/9/11

<sup>21</sup> <http://www.tpwd.state.tx.us/huntwild/wild/species/lmb/> Accessed 12/9/11

<sup>22</sup> <http://www.dnr.state.mn.us/fish/bass/largemouth/index.html>



## **Bluegill: *Lepomis macrochirus***



**Appearance:** A common member of the sunfish family Centrarchidae, it ranges from 4 to 12 inches long and is distinguished by a dark spot on the posterior part of its dorsal fin, as well as a faint shine of blue on the sides of its head and chin.<sup>23</sup> It has a very small mouth and head and a rounded, oval body.

**Distribution:** Bluegill was the most abundant fish sampled in the Charles, despite the fact that it's not native to the Charles. It originally ranged from the Rockies as far east as western New York, but has now been transported across all of North America, including the Charles, and densely populates areas in which it resides through its high reproductive capabilities.<sup>24</sup>

**Ecological Role in Charles:** It prefers slow moving or still water lakes, but can survive in most freshwater habitats, including rivers and lakes.

**Life History:** Their spawning period occurs between April and September when the water is the warmest. Males make nests along the shoreline in colonies up to 500 where they defend the females 2,000 and 63,000 eggs that hatch 30 to 35 hours after fertilization.<sup>25</sup>

**Interesting Fact:** They are one of the most commonly caught sportfish in the country because of their extremely high abundance. They also are strong fighters and can be fun for young anglers. Their populations can easily grow past carrying capacity, which causes stunting in the smaller bluegills as they all compete for space and resources.

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<sup>23</sup> Schultz, 62-63.

<sup>24</sup> Pam Fuller and Matt Cannister. 2011. *Lepomis macrochirus*. USGS Nonindigenous Aquatic Species Database, Gainesville, FL. <http://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=385> RevisionDate: 12/15/2010. Retrieved 6/7/11

<sup>25</sup> Schultz, 62-63.

## Common Carp: *Cyprinus carpio*



**Appearance:** The Common Carp is easily distinguished from similar species by its characteristic two barbels on either side of its jaw and by the serrated edge of its dorsal and anal fins. They have a heavy body that can be gray green, yellow, brown, or occasionally silver.<sup>26</sup> Brightly colored carp are called *koi*.<sup>27</sup> Adults generally range from 12 – 25 inches long and weigh between 5-10 pounds.

**Distribution:** They are common in the mainstream of the Charles, but were not found in any of the tributaries. Originally from Europe, the carp was introduced to the USA as a sportfish. They are considered a particularly nasty pest because they tend to destroy vegetation in rivers and lakes.<sup>28</sup>

**Ecological Role in Charles:** The Common Carp feeds on mollusks, insect larvae, crustaceans, and fish eggs. The carp can thrive in very low quality water and sometimes will be one of the only fish species living in an area. In fact, they prefer muddy waters with lots of organic matter over clear cold water.

**Life History:** Spawning occurs in late spring to early summer. Females can produce between 100,000 – 500,000 eggs. Once the young hatch they tend to stay in highly vegetated areas until they are 3 – 4 inches long.

**Interesting Fact:** They are generally considered an invasive nuisance here, but are prized in Europe for their “fight.”

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<sup>26</sup> <http://www.tpwd.state.tx.us/huntwild/wild/species/crp/>

<sup>27</sup> [http://www.dnr.state.oh.us/Home/species\\_a\\_to\\_z/SpeciesGuideIndex/commoncarp/tabid/6589/Default.aspx](http://www.dnr.state.oh.us/Home/species_a_to_z/SpeciesGuideIndex/commoncarp/tabid/6589/Default.aspx)

<sup>28</sup> Schultz, 73 – 74.

## Pumpkinseed: *Cyprinus carpio*



**Appearance:** The Pumpkinseed is a sunfish with a very deep body and orange, yellow, and blue spots on its sides. The pumpkinseed is an extremely fun fish for anyone, but especially young anglers to catch because it's easy and colorful. They look very similar to the common bluegill sunfish, but are generally more colorful and have a crimson spot on its black opercle flap. Pumpkinseeds have similar dark vertical bands on their sides, but they are much fainter than on the bluegill. They are around 6- 8 inches long and weigh less than 1 pound.<sup>29</sup>

**Distribution:** Pumpkinseeds are abundant in the Charles. They are a common sportfish, but are rarely consumed because of their small size.<sup>30</sup>

**Ecological Role in Charles:** They prefer shallow, moderately warm water with low vegetated cover, and generally prey on insects, insect larvae, mollusks, snails, and smaller fish.

**Life History:** Spawning occurs from May to July and starts with males building a small hole in a sandy or gravelly area for a nest. The female then lays her eggs in the nest and the male fertilizes them. The eggs hatch within 5 days and the young fish then swim to nearby grassy areas to hide and grow.<sup>31</sup>

**Interesting Fact:** They eat a huge quantity of mosquito larvae.

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<sup>29</sup> <http://seagrant.wisc.edu/greatlakesfish/fpumpkinseed.html> Accessed 12/9/11

<sup>30</sup> <http://fish.dnr.cornell.edu/nyfish/Centrarchidae/pumpkinseed.html> Accessed 12/9/11

<sup>31</sup> [http://www.chesapeakebay.net/bfg\\_pumpkinseed.aspx?menuitem=14406](http://www.chesapeakebay.net/bfg_pumpkinseed.aspx?menuitem=14406) Accessed 12/9/11



## Redbreast Sunfish: *Lepomis auritus*



**Appearance:** The Redbreast Sunfish is a sunfish with a very deep and compressed body. Males have a distinctively bright red-orange belly, as its name implies. It has a unique, long, dark earflap and a large eye. Its pectoral fin is highly rounded. Redbreast Sunfish can grow to 3-6 inches, and weigh 1 pound.

**Distribution:** The Redbreast Sunfish is native to streams of Eastern North America, but has spread across the continent.<sup>32</sup> They are highly abundant in the Charles River and its tributaries.

**Ecological Role in Charles:** They are found primarily in low flow portions of the river and feed on insects, crayfish, mollusks, and rarely other fish. They are often the prey of larger fish including the largemouth bass.

**Life History:** Males build their nests in areas with strong protection, such as near logs, stumps or large boulders. The nests are large, roughly 3 feet in diameter and half a foot deep. These nests are positioned in well-covered areas with low quantities of silt and shallow water depth. Redbreast Sunfish have a strong reproductive capability and are therefore often extremely abundant where it resides.<sup>33</sup> Redbreast sunfish generally live five to six years.<sup>34</sup>

**Interesting Fact:** The Redbreast Sunfish is a popular sport fish because of its high abundance.

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<sup>32</sup> <http://www.tpwd.state.tx.us/huntwild/wild/species/redbreastsunfish/> Accessed 12/9/11.

<sup>33</sup> Schultz, 219.

<sup>34</sup> <http://www.dcnr.state.al.us/fishing/freshwater/fish/bream/redbreast/>

## Yellow Perch: *Perca flavescens*



**Appearance:** All members of the perch family are distinguished by having two separate dorsal fins, one spiny and one soft. The yellow perch has a distinct lack of canine teeth. The yellow perch can be differentiated from other perch by its bright yellow sides and 7 black bars.<sup>35</sup> They can grow roughly 4 – 10 inches long and weigh 4 – 10 ounces.

**Distribution:** They are very common in both the main channel of the Charles and in its tributaries.

**Ecological Role in Charles:** Perch travel in schools and prefer shallower waters, nearer to shore, perhaps leading to their high capture rate. They feed primarily on insect larvae, large invertebrates like crayfish, and the eggs of other fish. In turn, they are preyed upon by bass, pickerel (pike), other larger fish, and turtles.<sup>36</sup>

**Life History:** They reach sexual maturity at the age of 3-4 years and spawn in the spring, laying eggs in a gelatinous string on vegetation, roots, and logs. Their size can be stunted by high population density so it may be beneficial to have managed fishing of yellow perch to maintain a healthy population.

**Interesting Fact:** Perch remain very active through even the coldest winter months so they are also a popular ice fishing target.

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<sup>35</sup> [http://www.michigan.gov/dnr/0,4570,7-153-10364\\_18958-45696--,00.html](http://www.michigan.gov/dnr/0,4570,7-153-10364_18958-45696--,00.html) Accessed 12/9/11.

<sup>36</sup> [http://www.fcps.edu/islandcreekes/ecology/yellow\\_perch.htm](http://www.fcps.edu/islandcreekes/ecology/yellow_perch.htm) Accessed 12/9/11.

## **Black Crappie: *Pomoxis nigromaculatus***



**Appearance:** The Black Crappie is a small, flat bodied fish and a member of the sunfish family. They have black and white to gray bodies that are generally 6 – 8 inches long and weigh less than 1 pound.<sup>37</sup>

**Distribution:** They are very common in the main stem of the Charles, but have low abundance in the tributaries.

**Ecological Role in Charles:** Crappies can take over small ponds and lakes, limiting the size of other fish species by eating a majority of small fish in the pools. They prefer deep, cool, and clear water and eat small fish and aquatic insects.

**Life History:** All sunfish are nest building species and the black crappie is no exception. The males remain with the nest to guard the eggs, as the females leave shortly after laying the eggs.

**Interesting Fact:** Black Crappies often feed upon the young of the fish that predate them.

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<sup>37</sup> <http://www.tpwd.state.tx.us/huntwild/wild/species/crappie/> Accessed 12/9/11.



## Golden Shiner: *Notemigonus crysoleucas*



**Appearance:** The Golden Shiner is a minnow characterized by its deep-body, yellow-green eyes and a golden-white body. There is a strong downward curve to their lateral line.<sup>38</sup> They can grow up to 8 inches and weigh up to 4 ounces, but are generally much smaller.

**Distribution:** Golden Shiners are very abundant in both the main stem of the Charles and its tributaries.

**Ecological Role in Charles:** Young Golden Shiners feed mostly on plant material, while older individuals feed on zooplankton, water fleas, insects, insect pupae, and algae. They are an important prey fish for larger predators including other fish, turtles, and birds.<sup>39</sup>

**Life History:** The Golden Shiner does not build nests for spawning. Eggs are sticky and can be attached to algae or vegetation. Spawning generally takes place in early spring, but may be repeated in late summer when the water temperatures drop again. Golden Shiners prefer slower moving water, where they are generally most abundant. They travel in large schools and reproduce in smaller groups.<sup>40</sup>

**Interesting Fact:** Each female can produce up to 200,000 eggs in her lifetime.

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<sup>38</sup> <http://www.tpwd.state.tx.us/huntwild/wild/species/goldenshiner/> Accessed 12/9/11.

<sup>39</sup> [http://www.fcps.edu/islandcreekes/ecology/golden\\_shiner.htm](http://www.fcps.edu/islandcreekes/ecology/golden_shiner.htm) Accessed 12/9/11.

<sup>40</sup> Schultz, 136 – 137.

## Yellow Bullhead: *Ameiurus natalis*



**Appearance:** The Yellow Bullhead is yellow to light green and brown and frequently has mottled coloration, with a white to yellow underside. They have a rounded tailfin and chin barbels that are generally light colored to white.<sup>41</sup> They Yellow Bullhead can grow up to 6-14 inches long and adults can weigh anywhere from 4 ounces to 4 pounds.

**Distribution:** Yellow Bullhead is widespread throughout the main stem of the Charles and its tributaries.

**Ecological Role in Charles:** The Yellow Bullhead is a nocturnal omnivore, and feeds mostly on alive and dead insects, snails, plants, and crustaceans, but will eat anything. They can often be found in areas where other fish cannot survive because they can tolerate waters with low dissolved oxygen levels.

**Life History:** They dig out nests in muddy areas and when it comes time for spawning, both the males and females help to guard the nests and then the larval fish, but it's the males that guard the nest before hatching occurs.<sup>42</sup> The females can lay anywhere from 300 – 12,000 eggs.<sup>43</sup>

**Interesting Fact:** Although Yellow Bullheads are not a very popular sport fish, they can be easily caught by fishing on the bottom at night.

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<sup>41</sup> <http://www.tpwd.state.tx.us/huntwild/wild/species/ybh/> Accessed 12/9/11.

<sup>42</sup> <http://www.dnr.state.mn.us/fish/yellowbullhead.html> Accessed 12/9/11.

<sup>43</sup> <http://www.tpwd.state.tx.us/huntwild/wild/species/ybh/> Accessed 12/9/11.

## **Redfin Pickerel: *Esox americanus americanus***

**Appearance:** The Redfin Pickerel is a small fish, usually less than 10 inches long, that gets its name from its orange to red fin coloration.

**Distribution:** Redfin Pickerel are found throughout the eastern half of North America usually in sluggish, vegetated waters of pools, lakes, and swamps, which may explain the high population reported in the Charles River with its slow, almost lake-like waters in some areas, where they are the second most abundant fish.

**Ecological Role in Charles:** Redfin Pickerel primarily feed on other small fish such as minnows, which they hunt by remaining still in vegetation for hours at a time before darting out at potential prey.<sup>44</sup> The Redfin Pickerel prefers sluggish waters such as pools and swamps.

**Life History:** They reach sexual maturity at about 2 years of age and spawn in the spring or early winter. The females scatter their eggs in areas of shallow water with dense vegetation. Eggs are left unprotected, where they will hatch after 12 to 14 days.<sup>45</sup>

**Interesting Fact:** Because the Redfin Pickerel prefers slow moving and vegetated portions of the river, their populations are at risk erosion problems and bank failure.

## **White Sucker: *Catostomus commersonii***

**Appearance:** The White Sucker can be easily identified by its big lips, which it uses for sucking up small organic matter from the river bottom, its lack of teeth, and its soft fins. They generally grow to about 14-18 inches long and weigh 2-3 pounds.<sup>46</sup>

**Distribution:** White Suckers are fairly common in both the main stem of the Charles and its tributaries. Also, the White Sucker is one of the most common fish in North America.<sup>47</sup>

**Ecological Role in Charles:** Young White Suckers feed on plankton near the surface, while adults primarily vacuum up plants, small crustaceans, and organic matter off the bottom of the river. They are preyed upon by pike and other larger fish.

**Life History:** The White Sucker spawns in April and May in a gravelly area. During spawning, there are generally two males to every female. Females can release upwards of 100,000 eggs.

**Interesting Fact:** The White Sucker can live in polluted waters. Males grow *pearl organs* during mating season to cling on to females

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<sup>44</sup> Schultz, 155 – 156.

<sup>45</sup> Schultz, 155 – 156.

<sup>46</sup> <http://www.dnr.state.mn.us/fish/whitesucker.html> Accessed 12/9/11.

<sup>47</sup> Schultz, 209 – 210.

## **Chain Pickerel: *Esox niger***

**Appearance:** Chain Pickerel have a very particular, long snout and very slender body. They have an interlocking dark chain-like pattern on their sides, with an overall olive-green color on their backs, fading to a yellow on the belly.<sup>48</sup> They can grow to 12-24 inches long and weigh up to 2-3 pounds.<sup>49</sup>

**Distribution:** They are native to this region and are common in both the main stem of the Charles and its tributaries.

**Ecological Role in Charles:** Chain Pickerel are large predators that prefer to inhabit weedy areas. They are a sight-oriented predator and hunt primarily during sunlight hours, feeding on smaller fish, amphibians, and insects. They are a solitary fish and can be caught in all seasons throughout the year. The Chain Pickerel is a popular sport fish and food fish in many areas, although it has many small bones that can make cleaning and eating the fish difficult.

**Life History:** Chain Pickerel are some of the Charles' earliest spawners, spawning in early spring when water temperatures are around 50°F. Their eggs are extremely adhesive and form ribbon-like masses that they attach to vegetation. There is no nest guarding behavior in Chain Pickerel.<sup>50</sup>

**Interesting Fact:** Chain Pickerel are active throughout the winter time.<sup>51</sup>

## **Brown Bullhead: *Ameiurus nebulosus***

**Appearance:** The Brown Bullhead is a small cousin of the catfish. They are scaleless and have 4 pairs of feelers called barbells on their head. They can grow to about 8 – 14 inches long and weigh 1-2 pounds.

**Distribution:** Brown Bullheads are common in tributaries of the Charles, but rare in the main stem of the river, probably because the water in the main stem of Charles is less turbid than some of the smaller tributaries, which it prefers.

**Ecological Role in Charles:** The Brown Bullhead is an extreme macrohabitat generalist. Although, they are a prey fish when they are juveniles (under 4 inches), as adults they are a nocturnal bottom feeder, eating insects, leaches, snails, fish, clams, and plants.

**Life History:** The Brown Bullhead prefers backwater areas with high turbidity and low oxygen. They spawn in nests dug into the mud in late spring or early summer. They can live to be 6 to 8 years old.<sup>52</sup>

**Interesting Fact:** These are not always the most popular fish in the eyes of the public.

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<sup>48</sup> Schultz, 153 – 154.

<sup>49</sup> <http://www.tpwd.state.tx.us/huntwild/wild/species/cpk/> Accessed 12/9/11.

<sup>50</sup> <http://www.dnr.state.md.us/fisheries/fishfacts/chainpickerel.asp> Accessed 12/9/11.

<sup>51</sup> <http://www.dnr.state.md.us/fisheries/fishfacts/chainpickerel.asp> Accessed 12/9/11.

<sup>52</sup> [http://www.michigan.gov/dnr/0,4570,7-153-10364\\_18958-45648--,00.html](http://www.michigan.gov/dnr/0,4570,7-153-10364_18958-45648--,00.html) Accessed 12/9/11.



## **Smallmouth Bass: *Micropterus dolomieu***

**Appearance:** The Smallmouth Bass has a compressed and elongated, olive green body with red eyes and dark brown vertical bands on its body.<sup>53</sup> Males are typically smaller than females. Adults of both sexes can grow to be 12-20 inches long and weigh up to 6 pounds.

**Distribution:** Smallmouth Bass are native to the region, but had low counts in the Charles River.

**Ecological Role in Charles:** They are primarily a visual predator that prefers clear waters and low turbidity so their success depends on the clarity of the Charles. They generally stay near structural items like fallen logs and rocks to hide. They are a top level predator that can feed on anything from zooplankton, insect larvae, crayfish, amphibians, insects, and fish. They are generally found in areas with swift currents and rocky or sandy bottoms.

**Life History:** In spawning season (late spring), males build and guard nests in shallow water. These nests are then visited by one or more females. Parental care is carried out by the males. As water temperatures increase in late spring and summer, the smallmouth bass often retreats to deeper, cooler parts of the river.<sup>54</sup>

**Interesting Fact:** "Micropterus", from the Smallmouth Bass's scientific name, means "small fin".

## **White Catfish: *Ictalurus catus***

**Appearance:** The White Catfish has a stout bluish gray body, with a white belly. It can be distinguished by its long white barbells on either side of its mouth. The White Catfish can grow up to 24 inches long and weigh up to 6 pounds, but is generally much smaller, around 13 inches long.<sup>55</sup> They are the smallest catfish in the large North American catfish species. Like all catfish, the White Catfish lacks scales.

**Distribution:** Although, the White Catfish is native to the East Coast, it had low abundance in the Charles River.

**Ecological Role in Charles:** The White Catfish is an omnivore that feeds primarily on a variety of bottom dwellers, from fish to crustaceans to insects.<sup>56</sup>

**Life History:** They spawn in the summertime when waters are very warm (68-72°F). Although they are found both in tidal waters and in a variety of freshwater locations, they prefer slower backwaters of rivers with muddy bottoms.

**Interesting Fact:** Barbells sometimes can aid in a fish's tasting sense. The white catfish only has to touch food with its four barbells to taste its meal.

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<sup>53</sup> [http://animaldiversity.ummz.umich.edu/site/accounts/information/Micropterus\\_dolomieu.html](http://animaldiversity.ummz.umich.edu/site/accounts/information/Micropterus_dolomieu.html) Accessed 12/9/11.

<sup>54</sup> Schultz, 49 – 50.

<sup>55</sup> <http://cnre.vt.edu/efish/families/white.html> Accessed 12/9/11.

<sup>56</sup> <http://myfwc.com/wildlifehabitats/profiles/fish/freshwater-fish/white-catfish/> Accessed 12/9/11.

## **Brook Trout: *Salvelinus fontinalis***

**Appearance:** The Brook Trout is a member of the salmon family and although it's called a trout, it's actually a charr. It has a blue-gray to black streamlined body with a silvery white underbody and wormlike markings on its back.<sup>57</sup> Brook Trout can grow up to 7-9 inches long.

**Distribution:** Brook Trout are not found in the main stem of the Charles, but are found in low counts in its tributaries

**Ecological Role in Charles:** The Brook Trout are voracious eaters and will eat just about everything that is available, including zooplankton, worms, crustaceans, insects, and other fish. They live only in cold and clear waters and are often found hiding around large rocks and downed logs, making them fluvial specialists (see the Appendix for further discussion about this).

**Life History:** Spawning occurs in late fall and starts with the brook trout swimming to areas with a large quantity of water movement. The females create a spawning bed with their tail in a gravelly portion of the river bed. These spawning beds can be up to 1 – 2 feet wide. The eggs must then be continually oxygenated in order for them to mature. After 2 – 3 months they become fry and absorb their yolk sac. They then take 2 – 3 years to mature completely, but only live for 5 – 6 years.<sup>58</sup>

**Interesting Fact:** Air pollution has also caused a decline in brook trout population because of the impacts of acid rain.

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<sup>57</sup> [http://www.michigan.gov/dnr/0,4570,7-153-10364\\_18958-96400--,00.html](http://www.michigan.gov/dnr/0,4570,7-153-10364_18958-96400--,00.html) Accessed 12/9/11.

<sup>58</sup> Schultz, 87 – 88.

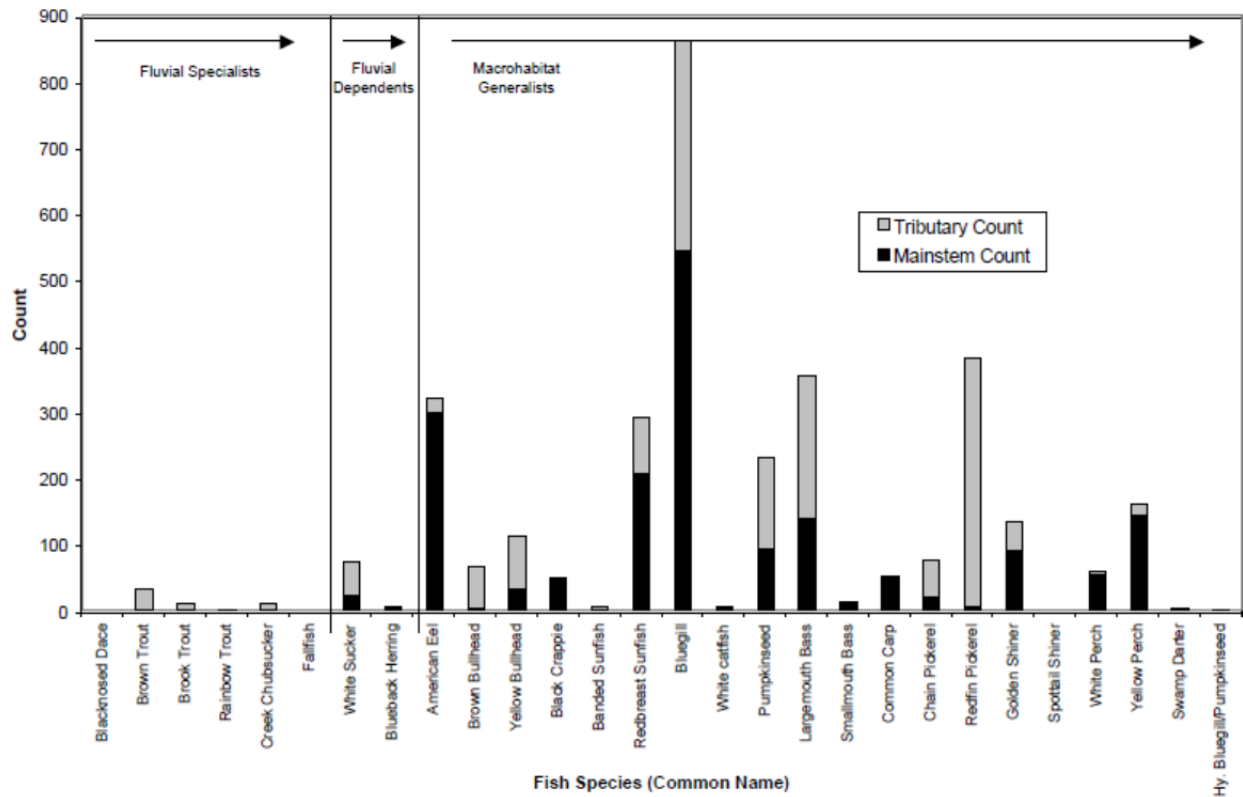
## Appendix: Charles River Watershed Fish Sampling Results

**Table 4-3. Charles River Watershed Fish Sampling Results  
2000-2003**

Fish Species	Macrohabitat Classification <sup>(1)</sup>	Mainstem Count	Tributary Count	Total Count	Relative Abundance	Pollution Tolerance <sup>(2)</sup>
Bluegill	MHG	545	316	861	25.9%	T
Redfin Pickerel	MHG	6	376	382	11.5%	
Largemouth Bass	MHG	140	216	356	10.7%	M
American Eel	MHG	298	24	322	9.7%	T
Redbreast Sunfish	MHG	207	85	292	8.8%	M
Pumpkinseed	MHG	92	139	231	7.0%	M
Yellow Perch	MHG	145	16	161	4.8%	M
Golden Shiner	MHG	90	44	134	4.0%	T
Yellow Bullhead	MHG	33	80	113	3.4%	T
Chain Pickerel	MHG	19	57	76	2.3%	M
White Sucker	FD	22	52	74	2.2%	T
Brown Bullhead	MHG	4	63	67	2.0%	T
White Perch	MHG	55	3	58	1.7%	
Common Carp	MHG	51	0	51	1.5%	T
Black Crappie	MHG	48	1	49	1.5%	M
Brown Trout	FS	1	32	33	1.0%	I
Smallmouth Bass	MHG	14	0	14	0.4%	
Creek Chubsucker	FS	0	12	12	0.4%	I
Brook Trout	FS	0	10	10	0.3%	I
Banded Sunfish	MHG	0	7	7	0.2%	
White catfish	MHG	6	0	6	0.2%	
Blueback Herring	FD	5	0	5	0.2%	
Swamp Darter	MHG	0	3	3	0.1%	I
Rainbow Trout	FS	2	0	2	0.1%	
Hy. Bluegill/Pumpkinseed	MHG	0	1	1	0.0%	
Blacknosed Dace	FS	0	0	0	0.0%	T
Fallfish	FS	0	0	0	0.0%	M
Spottail Shiner	MHG	0	0	0	0.0%	

(1) FS - Fluvial Specialist  
 FD - Fluvial dependent  
 MHG - Macrohabitat Generalist

(2) I - Intolerant  
 M - Moderate  
 T - Tolerant



**Figure 4-3. Charles River Watershed Fish Sampling Results**

These results indicate that the Charles River and its tributaries are better suited for *Macrohabitat generalists* (95% of all fish collected) that do not require free-flowing water for any part of their life and can flourish in streams, ponds and reservoirs. Fluvial specialists who need free-flowing waters throughout their entire life cycle only made up 2% of all fish collected, while fluvial dependent fish that need free-flowing waters for only part of their life cycle made up 3%<sup>59</sup>.

After this data was assessed CRWA developed a target fish community for the Charles River, specifying fish species that would be expected to exist in a healthy Charles River ecosystem, in terms of water quality, flow and habitat, as well as historical records of the fish in river. They picked an anadromous fish, the American Shad, as a model example of a fish that could only survive in a health Charles.

Anadromous fish spend the majority of their life in saltwater before migrating to freshwater streams to breed. Anadromous fish make their way past the Charles River dam before they reach the Watertown dam where they struggle to pass up the fish ladder with a reported mortality rate of 85%<sup>60</sup>. Spawning will only occur for those fish lucky enough to get past it or those who choose not to push forward.

<sup>59</sup> Assessment of Fish Communities and Habitat in the Charles River Watershed. Charles River Watershed Association. 48 Woerd Avenue Waltham, Massachusetts 02453. December 2003

<sup>60</sup> " "