

## **APPENDIX A**

### **Fish and Invertebrate Species, Characteristics, and Habitat**

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## **Biological Summary of Order (Odonata)**

### **A. Life History**

1. Eggs - usually several hundred to several thousand; either in water or in plants; usually hatch in several days to 1 month
2. Nymphal Stage (immature stage) - nymphs; usually approximately 1 year (ranges from 3 weeks to 5 years)
3. Adults
  - A. Most species live 40 to 50 days
  - B. Crawl out of water to molt
4. Number of generations per year - most univoltine (some semivoltine or merovoltine)
5. Time of emergence - most spring and summer (some early fall)
6. Delays in development – during periods of adverse abiotic conditions diapause in the egg stage may commence for periods up to 7 months.

### **B. Habitat and Habits**

1. Adults – many disperse widely but return to spend most of adult life near preferred aquatic habitat (not necessarily their natal habitat); some fly almost all of the time, others perch for short periods between flights
2. Nymphs – dragonflies common in slow-moving flowing waters and standing waters; not many damselflies found in flowing waters; nymphs move rather slowly, if at all; lie in soft sediment or climb about in vegetation or plant debris

### **C. Food**

1. Adults
  - A. Capture insects with spines on front legs
  - B. Large eyes, 360 degrees to capture prey
2. Nymphs - capture invertebrates (anything they can subdue) with hinged labium

### **D. Respiration of Immature Stages**

Closed tracheal system with gills at end of abdomen; external in damselflies, internal in dragonflies

### **E. Behavior**

Adults - male dragonflies defend territories; unique copulatory loop; some males remain with females during oviposition

### **F. Significance**

Important source of food for many fish species. Odonates are also important predators of mosquitoes and other biting flies associated with aquatic habitats.

## **Key to Information**

*(f): Female.*

*(m): Male.*

*SL (Standard Length): The measured straight-line distance from the most forward point of the head to the hidden base of the tail, as indicated by the crease formed when the tail is bent to one side.*

*TL (Total Length): The measured straight-line distance from the most forward point of the head to the end of the tail fin, with the lobes of the tail fin compressed.*

*Reproductive Guild: A group with similar strategies to raise their young (i.e., parental care).*

*Nonguarders: Open substratum spawners: Pelagophils - Large quantities of non-adhesive, near-neutral or buoyant eggs are scattered in open water. No parental care of eggs.*

*Nonguarders: open substratum spawners: Litho-pelagophils - Eggs are deposited on rocks and gravel, but eggs, embryos or larvae become sufficiently buoyant to be carried away from the spawning substrate by water currents. No parental care of eggs.*

*Nonguarders: Open substratum spawners: Phyto-lithophils - Deposit eggs in relatively clearwater habitats on submerged plants, if available, or on other submerged items such as rocks, logs or gravel, where their embryos and larvae develop. No parental care of eggs.*

*Nonguarders: Open substratum spawners: Phytophils - Scatter or deposit eggs with an adhesive membrane that sticks to submerged, alive or dead, aquatic plants or to recently flooded terrestrial vegetation. Sometimes woody debris. No parental care of eggs.*

*Nonguarders: Open substratum spawners: Psammophils - Usually small eggs with an adhesive membrane that are scattered directly on sand and/or the fine roots of plants that hang over the sandy bottom. No parental care of eggs.*

*Nonguarders: Brood Hiders: Lithophils - Eggs are hidden in specially constructed places. In most cases the hiding places (called redds in salmonids) are excavated in gravel by the female. No parental care of eggs*

*Nonguarders: Brood Hiders: Speleophils - Usually few large eggs with an adhesive membrane that are hidden in crevices. No parental care of eggs.*

*Guarders: Substratum choosers: Lithophils - Choose rocks for attachment of their eggs. Eggs are guarded, and possibly and ventilated.*

*Guarders: Substratum choosers: Phytophils - Choose plants for attachment of their eggs. Eggs are guarded, and possibly and ventilated.*

*Guarders: Nest spawners: Polyphils - No particular nest building material or substrate is chosen, however, a nest is constructed and the nest and eggs are guarded.*

*Guarders: Nest spawners: Lithophils - Eggs are deposited on cleaned areas of rocks or in pits dug in gravel. Nest is guarded.*

*Guarders: Nest spawners: Ariadnophils - The nest building male has the ability to spin a viscid thread from a kidney secretion, which binds the nest of different material together. The eggs are guarded and ventilated by the male, who also guards the young once they hatch.*

*Guarders: Nest spawners: Phytophils - Eggs are deposited in nests constructed above or on a soft muddy bottom, often amid algae or other exposed roots of vascular plants. Nest is guarded.*

*Guarders: Nest spawners: Speleophils - These fishes guard a clutch of eggs in natural holes or cavities, in specially constructed burrows, or where deposited on a cleaned area of the undersurface of flat stones.*

### **Fresh Water Eel Family (*Anguillidae*)**

#### **American Eel (*Anguilla rostrata*)**

The American eel has a catadromous life strategy; that is, the eggs hatch in the sea, the young migrate to freshwater to grow, and the adults return to the sea to spawn.

General Habitat(s)	lacustrine; riverine
Pelagic	no
Thermal Regime	coolwater
Trophic Class	top carnivore
Habitat Preference	near cover over muddy, silty bottoms of lakes, rivers and creeks; preferred water temperature ~19.0 °C
Reproductive Guild	Nonguarders: Open substratum spawners: Litho-pelagophils
Spawning Habitat(s)	marine
Spawning Season	winter
Spawning Months	January-March
Spawning Temp	~17° C
Nursery habitat(s)	marine; estuarine; riverine
Diet	na
Age at maturity (yrs)	3-10 (m), 4-18(f)
Adult Length (cm)	25-40 TL (m), 70-100 TL (f)

**Sucker Family (*Catostomidae*)****White Sucker (*Catostomus commersoni*)**

General Habitat(s)	lacustrine; riverine
Pelagic	no
Thermal Regime	coolwater
Trophic Class	generalist feeder
Habitat Preference	rocky pools and riffles of creeks and rivers; lake embayments; preferred water temperature ~22°C
Reproductive Guild	Nonguarders: Open substratum spawners: Litho-pelagophils
Spawning Habitat(s)	lacustrine; riverine, migrate upstream to tributaries, or shoal areas if tributaries are not available
Spawning Season	spring
Spawning Months	April-May
Spawning Temp	~7-10°C
Nursery habitat(s)	lacustrine; riverine
Diet	benthic invertebrates, fish eggs, larval midges, detritus
Age at maturity (yrs)	2-3 (m), 3-4 (f)
Adult Length (cm)	30.5-50.8 TL

**Creek Chubsucker (*Erimyzon oblongus*)**

General Habitat(s)	lacustrine; riverine
Pelagic	no
Thermal Regime	coolwater
Trophic Class	generalist feeder
Habitat Preference	creeks, streams, and lakes with moderate aquatic vegetation
Reproductive Guild	na
Spawning Habitat(s)	lacustrine; riverine, gravel runs; young move to downstream habitats after hatching
Spawning Season	spring
Spawning Months	na
Spawning Temp	na
Nursery habitat(s)	lacustrine; riverine
Diet	plant material, a wide variety of aquatic and terrestrial invertebrates
Age at maturity (yrs)	na
Adult Length (cm)	Usually less than 22.8 TL

**Sunfish and Black Bass Family (*Centrarchidae*)****Rock Bass (*Ambloplites rupestris*)**

General Habitat(s)	lacustrine; riverine
Pelagic	no
Thermal Regime	warmwater
Trophic Class	top carnivore
Habitat Preference	clear, rocky-bottomed runs and flowing pools of small to large rivers with; shallow, rocky and areas of lakes
Reproductive Guild	Guarders: Nest spawners: Polyphils
Spawning Habitat(s)	lacustrine; riverine
Spawning Season	spring
Spawning Months	June
Spawning Temp	~15.5-21.1°C
Nursery habitat(s)	lacustrine; riverine
Diet	generally, smaller individuals consume aquatic invertebrates, primarily zooplankton, and occasionally small fish, larger individuals mainly feed on crayfishes and fishes
Age at maturity (yrs)	1-3
Adult Length (cm)	15.2-30.5 TL

**Banded Sunfish (*Enneacanthus obesus*)**

General Habitat(s)	lacustrine; riverine
Pelagic	no
Thermal Regime	warmwater
Trophic Class	generalist feeder
Habitat Preference	Lowland, weedy lakes, quiet weedy backwaters of lowland brownwater streams.
Reproductive Guild	Guarders: Nest spawners: Polyphils
Spawning Habitat(s)	lacustrine; riverine
Spawning Season	spring-summer
Spawning Months	April-July
Spawning Temp	~11-28°C
Nursery habitat(s)	lacustrine; riverine
Diet	wide range of small aquatic invertebrates, especially those bottom dwelling or in vegetation
Age at maturity (yrs)	1-2
Adult Length (cm)	7.6-8.9 TL

**Redbreast Sunfish** (*Lepomis auritus*)

General Habitat(s)	lacustrine; riverine
Pelagic	na
Thermal Regime	warmwater
Trophic Class	generalist feeder
Habitat Preference	clean water with rocky substrates; ponds, lakes, slow moving sections of streams and rivers; tend to avoid heavily vegetated areas
Reproductive Guild	Guarders: Nest spawners: Polyphils
Spawning Habitat(s)	sheltered areas: rocks and woody debris; build nests in sand or gravel substrate
Spawning Season	spring-summer
Spawning Months	May-august
Spawning Temp	na
Nursery habitat(s)	lacustrine; riverine
Diet	wide variety of larval and adult aquatic insects, including mayflies, caddisflies, midges, flies, mosquitoes, beetles, and dragonflies; scuds, aquatic snowbugs, mollusks, and small fishes occasionally eaten
Age at maturity (yrs)	na
Adult Length (cm)	10.1-20.3 TL

**Pumpkinseed** (*Lepomis gibbosus*)

General Habitat(s)	lacustrine; riverine
Pelagic	no
Thermal Regime	warmwater
Trophic Class	generalist feeder
Habitat Preference	warm, shallow, vegetated lakes and ponds; quiet vegetated pools of creeks and small rivers; preferred water temperature ~26.0°C
Reproductive Guild	Guarders: Nest spawners: Polyphils
Spawning Habitat(s)	lacustrine; riverine; sand or gravel substrate
Spawning Season	spring-summer
Spawning Months	May-August
Spawning Temp	~20-28°C
Nursery habitat(s)	lacustrine; riverine
Diet	wide range of aquatic invertebrates, especially those bottom dwelling or in vegetation
Age at maturity (yrs)	1-3
Adult Length (cm)	12.7-19.0 TL

**Bluegill** (*Lepomis macrochirus*)

General Habitat(s)	lacustrine; riverine
Pelagic	no
Thermal Regime	warmwater
Trophic Class	generalist feeder
Habitat Preference	warm, shallow, vegetated lakes and ponds; quiet vegetated pools of creeks and small rivers; preferred water temperature ~26.0°C
Reproductive Guild	Guarders: Nest spawners: Polyphils
Spawning Habitat(s)	lacustrine; riverine; sand or gravel substrate
Spawning Season	spring-early fall
Spawning Months	May-September
Spawning Temp	~20-28°C
Nursery habitat(s)	lacustrine; riverine
Diet	wide range of aquatic invertebrates, especially those bottom dwelling or in vegetation, small fishes, fish eggs, and aquatic vegetation
Age at maturity (yrs)	1-3
Adult Length (cm)	12.7-23.0 TL

**Smallmouth Bass** (*Micropterus dolomieu*)

General Habitat(s)	lacustrine; riverine
Pelagic	no
Thermal Regime	warmwater
Trophic Class	top carnivore
Habitat Preference	clear, gravel-bottomed runs and flowing pools of small to large rivers; shallow, rocky and sandy areas of lakes; preferred water temperature ~30°C
Reproductive Guild	Guarders: Nest spawners: Polyphils
Spawning Habitat(s)	lacustrine; riverine
Spawning Season	spring
Spawning Months	May-June
Spawning Temp	~13-20°C
Nursery habitat(s)	lacustrine; riverine
Diet	generally, smaller individuals consume aquatic invertebrates, primarily zooplankton, and occasionally small fish, larger smallmouths mainly feed on crayfishes and fishes
Age at maturity (yrs)	3-5 (m), 4-6 (f)
Adult Length (cm)	25.4-40.6 TL

**Largemouth Bass** (*Micropterus salmoides*)

General Habitat(s)	Lacustrine; riverine
Pelagic	no
Thermal Regime	warmwater
Trophic Class	Top carnivore
Habitat Preference	clear, warm, shallow lakes, bays, ponds, marshes and backwaters and pools of creeks and small to large rivers; often associated with soft mud or sand substrate and dense aquatic vegetation; usually at depths <6 m; preferred water temperature ~30°C
Reproductive Guild	Guarders: Nest spawners: Polyphils
Spawning Habitat(s)	Lacustrine; riverine
Spawning Season	Spring
Spawning Months	May-June
Spawning Temp	~17-22°C
Nursery habitat(s)	Lacustrine; riverine
Diet	Young feed primarily on aquatic invertebrates and small fishes, as they mature fish become a greater part of their diet, sometimes larger individuals consume small mammals and birds
Age at maturity (yrs)	3-4(m), 4-5 (f)
Adult Length (cm)	30.5-53.3 TL

**Black Crappie** (*Pomoxis nigromaculatus*)

General Habitat(s)	lacustrine; riverine
Pelagic	no
Thermal Regime	warmwater
Trophic Class	Top carnivore
Habitat Preference	Quiet, weedy waters of lakes, ponds, and streams
Reproductive Guild	Guarders: Nest spawners: Polyphils
Spawning Habitat(s)	lacustrine; riverine; sand or mud bottom, 3-8 feet deep, partly vegetated
Spawning Season	spring
Spawning Months	May-June
Spawning Temp	~14.4-17.7°C
Nursery habitat(s)	lacustrine; riverine
Diet	wide range of aquatic invertebrates, and small fishes
Age at maturity (yrs)	2-4
Adult Length (cm)	12.7-30.5 TL

**Herring Family (*Clupeidae*)****Blueback Herring (*Alosa aestivalis*)**

The blueback herring is an anadromous fish, living in the ocean and migrating to freshwater to spawn. Juveniles remain in freshwater to mid-fall before migrating to sea.

General Habitat(s)	Marine; riverine
Pelagic	yes
Thermal Regime	na
Trophic Class	Generalist feeder
Habitat Preference	Gregarious; little is known about their specific habits and movements in Atlantic coastal waters
Reproductive Guild	Nonguarders: Open substratum spawners: Phytophils
Spawning Habitat(s)	riverine
Spawning Season	Spring-early summer
Spawning Months	Late May-June
Spawning Temp	~17.7-23.8°C
Nursery habitat(s)	riverine
Diet	Freshwater: small invertebrates; Saltwater: planktonic crustaceans, shrimps, and fish larvae
Age at maturity (yrs)	2-3
Adult Length (cm)	~20.0-30.0 TL

**Alwife (*Alosa pseudoherangus*)**

The alwife is an anadromous fish, living in the ocean and migrating to freshwater to spawn. Juveniles remain in freshwater until mid-fall before migrating to sea.

General Habitat(s)	Marine; riverine;
Pelagic	yes
Thermal Regime	na
Trophic Class	Generalist feeder
Habitat Preference	Gregarious; little is known about their specific habits and movements in Atlantic coastal waters
Reproductive Guild	Nonguarders: Open substratum spawners: Phytophils
Spawning Habitat(s)	Lacustrine; riverine
Spawning Season	Spring
Spawning Months	May-early June
Spawning Temp	~8.8-12.2°C
Nursery habitat(s)	Lacustrine; riverine
Diet	Freshwater: small invertebrates; Saltwater: planktonic crustaceans, shrimps, and fish larvae
Age at maturity (yrs)	3-4
Adult Length (cm)	~20.0-30.0 TL

**American Shad** (*Alosa sapidissima*)

The American shad is an anadromous fish, living in the ocean and migrating to freshwater to spawn. Juveniles remain in freshwater until early fall before migrating to sea.

General Habitat(s)	Marine; riverine;
Pelagic	yes
Thermal Regime	na
Trophic Class	Generalist feeder
Habitat Preference	Gregarious; little is known about their specific habits and movements in Atlantic coastal waters
Reproductive Guild	Nonguarders: Open substratum spawners: Phytophils
Spawning Habitat(s)	Lacustrine; riverine
Spawning Season	Spring-early summer
Spawning Months	May-June
Spawning Temp	~14.0-21.0°C
Nursery habitat(s)	riverine
Diet	Freshwater: small invertebrates; Saltwater: planktonic crustaceans, shrimps, and fish larvae
Age at maturity (yrs)	2-5
Adult Length (cm)	~40.0-50.0 TL

**Carp and Minnow Family (Cyprinidae)****Common Shiner** (*Luxilus cornutus*)

General Habitat(s)	riverine
Pelagic	no
Thermal Regime	coolwater
Trophic Class	generalist feeder
Habitat Preference	pools near riffles in clear, cool creeks and small to large rivers; preferred water temperature ~30°C
Reproductive Guild	Nonguarders: brood hiders: Lithophils
Spawning Habitat(s)	riverine
Spawning Season	spring -summer
Spawning Months	May-July
Spawning Temp	~16- 24°C
Nursery habitat(s)	riverine
Diet	feed mainly at surface or in midwater; opportunistic feeders: aquatic insects both adults and larvae are primary food source, occasionally small fishes and some plant material
Age at maturity (yrs)	1-3
Adult Length (cm)	7-14 TL

**Golden Shiner** (*Notemigonus crysoleucas*)

General Habitat(s)	lacustrine; riverine
Pelagic	no
Thermal Regime	coolwater
Trophic Class	generalist feeder
Habitat Preference	clear, weedy, quiet waters of lakes, ponds, reservoirs, pools in slow moving rivers and streams; preferred water temperature~24°C
Reproductive Guild	Nonguarders: Open substratum spawners: Phytophils
Spawning Habitat(s)	lacustrine; riverine
Spawning Season	summer
Spawning Months	June-August
Spawning Temp	~20-27°C
Nursery habitat(s)	lacustrine; riverine
Diet	feed mainly at surface or in midwater, feed mainly on zooplankton, adults sometimes feed on insects and small fishes
Age at maturity (yrs)	2-3
Adult Length (cm)	10-15 TL

**Bridle Shiner** (*Notropis bifrenatus*)

General Habitat(s)	lacustrine; riverine
Pelagic	no
Thermal Regime	coolwater
Trophic Class	Generalist feeder
Habitat Preference	Weed beds near margins of lakes, backwaters, sluggish weeded streams; slow to moderate current; muddy substrates
Reproductive Guild	Nonguarders: Open substratum spawners: Litho-pelagophils
Spawning Habitat(s)	lacustrine; riverine
Spawning Season	Spring-summer
Spawning Months	May-July
Spawning Temp	~14-27°C
Nursery habitat(s)	lacustrine; riverine
Diet	tend to feed near bottom and consume small crustaceans, small aquatic or terrestrial insects, algae
Age at maturity (yrs)	1-2
Adult Length (cm)	3.5-5 TL

**Blacknose Dace** (*Rhinichthys atratulus*)

General Habitat(s)	riverine
Pelagic	no
Thermal Regime	coolwater
Trophic Class	generalist feeder
Habitat Preference	runs, pools, and riffles; in clear swiftly flowing creeks and small rivers with gravelly substrate
Reproductive Guild	Nonguarders: Open substratum spawners: Litho-pelagophils
Spawning Habitat(s)	riverine
Spawning Season	spring
Spawning Months	May-June
Spawning Temp	~15-22°C
Nursery habitat(s)	riverine
Diet	feed on a wide variety of aquatic invertebrates and terrestrial insects, aquatic fly larvae are a favored prey
Age at maturity (yrs)	1-2
Adult Length (cm)	6-7.6 TL

**Longnose Dace** (*Rhinichthys cataractae*)

General Habitat(s)	lacustrine; riverine
Pelagic	no
Thermal Regime	coolwater
Trophic Class	benthic insectivore
Habitat Preference	Cobble, boulder or gravel riffles of clean swiftly-flowing, creeks and small to medium rivers; rocky shores of lakes; preferred water temperature ~21°C
Reproductive Guild	Nonguarders: Open substratum spawners: Litho-pelagophils
Spawning Habitat(s)	riverine
Spawning Season	spring-summer
Spawning Months	May-July
Spawning Temp	~11-23°C
Nursery habitat(s)	riverine
Diet	diet consists primarily of immature aquatic insects that cling to rocks and boulders; chief predator of larval blackflies and midges, but will also prey on other small aquatic invertebrates
Age at maturity (yrs)	2-3
Adult Length ( cm)	6.5-11.8 TL

**Fallfish (*Semotilus corporalis*)**

General Habitat(s)	lacustrine; riverine
Pelagic	no
Thermal Regime	coolwater
Trophic Class	generalist feeder
Habitat Preference	gravel and cobble bottom pools and runs of small to medium rivers; margins of lakes, ponds, or reservoirs; preferred water temperature ~22°C
Reproductive Guild	Nonguarders: Brood hiders: Lithophils
Spawning Habitat(s)	riverine: gravel, cobbles; adhesive eggs that stick to the nest
Spawning Season	spring
Spawning Months	May-June
Spawning Temp	~14-19°C
Nursery habitat(s)	riverine
Diet	omnivorous, eating mostly plankton until they reach~ 1.5 inches in TL, gradually switching to larger foods such as: algae, insects, crayfish, and fishes
Age at maturity (yrs)	3 (m), 4 (f)
Adult Length (cm)	15.5-25.5 TL

**Pike and Pickerel Family (*Escidae*)****Redfin Pickerel (*Esox americanus*)**

General Habitat(s)	lacustrine; riverine
Pelagic	no
Thermal Regime	coolwater
Trophic Class	top carnivore
Habitat Preference	typically live in ponds and quiet backwaters of lowland streams; prefers still, shallow waters with dense vegetation; can occur in brackish and acidic waters
Reproductive Guild	Nonguarders: Open substratum spawners: Phytophils
Spawning Habitat(s)	lacustrine; riverine
Spawning Season	spring
Spawning Months	March-May
Spawning Temp	~8-11°C
Nursery habitat(s)	lacustrine; riverine; swampy, marshy, or flooded areas with abundant submerged vegetation
Diet	juveniles feed on smaller invertebrates and fishes, adults are highly piscivorous, large pickerel will eat small mammals, frogs, and snakes
Age at maturity (yrs)	na
Adult Length (cm)	30.0 TL

**Chain Pickerel (*Esox niger*)**

General Habitat(s)	lacustrine; riverine
Pelagic	no
Thermal Regime	coolwater
Trophic Class	top carnivore
Habitat Preference	typically live in ponds and quiet backwaters of medium to large rivers, less common in smaller streams, can occur in brackish waters
Reproductive Guild	Nonguarders: Open substratum spawners: Phytophils
Spawning Habitat(s)	lacustrine; riverine
Spawning Season	spring
Spawning Months	March-May
Spawning Temp	~8-11°C
Nursery habitat(s)	lacustrine; riverine; swampy, marshy, or flooded areas with abundant submerged vegetation
Diet	juveniles feed on smaller invertebrates and fishes, adults are highly piscivorous, large pickerel will eat small mammals, frogs, and snakes
Age at maturity (yrs)	na
Adult Length (cm)	33.0 TL

**Bullhead Catfish Family (*Ictaluridae*)****Yellow Bullhead (*Ameiurus natalis*)**

General Habitat(s)	lacustrine; riverine
Pelagic	no
Thermal Regime	warmwater
Trophic Class	generalist feeder
Habitat Preference	pools and backwaters over soft substrates in sluggish creeks and small to large rivers; oxbows, ponds, impoundments and heavily vegetated areas of shallow bays and small lakes; preferred water temperature ~28°C
Reproductive Guild	Guarders: Nest spawners: Speleophils
Spawning Habitat(s)	lacustrine; riverine
Spawning Season	Spring
Spawning Months	May-June
Spawning Temp	~23-27°C
Nursery habitat(s)	lacustrine; riverine
Diet	insects, crustaceans, mollusks, and small fishes, as well as some plant material
Age at maturity (yrs)	2-3
Adult Length (cm)	17.8-34.3 TL

**Brown Bullhead** (*Ameiurus nebulosus*)

General Habitat(s)	lacustrine; riverine
Pelagic	no
Thermal Regime	warmwater
Trophic Class	generalist feeder
Habitat Preference	pools and sluggish runs over sand to mud substrates in creeks and small to large rivers; impoundments, ponds and lake embayments; preferred water temperature ~25-27°C
Reproductive Guild	Guarders: Nest spawners: Speleophils
Spawning Habitat(s)	lacustrine; riverine
Spawning Season	Spring
Spawning Months	May-June
Spawning Temp	~21-25°C
Nursery habitat(s)	lacustrine; riverine; young remain in areas with aquatic vegetation through the end of their first summer
Diet	omnivores feed on wide variety of animal and plant material
Age at maturity (yrs)	2-3
Adult Length (cm)	19.3-35.6 TL

**Temperate Bass Family** (*Percichthyidae*)**White Perch** (*Morone americana*)

The white perch has a semi-anadromous life strategy; the fish lives its adult life in saltwater estuary habitats and migrates to tidal freshwater and slightly brackish habitats to spawn in the spring.

General Habitat(s)	Lacustrine; riverine; estuarine
Pelagic	semi
Thermal Regime	coolwater
Trophic Class	Top carnivore
Habitat Preference	Brackish bays, river mouths, estuaries, and muddy ponds accessible from the sea
Reproductive Guild	Nonguarders: Open substratum spawners: Phytophils
Spawning Habitat(s)	Lacustrine; riverine; estuarine
Spawning Season	Spring
Spawning Months	May
Spawning Temp	~12.7-14.9°C
Nursery habitat(s)	Lacustrine; riverine; estuarine; shallow, vegetated or gravel-bottomed shorelines or shallows areas of streams, ponds, or estuaries
Diet	Freshwater: aquatic insects and fishes; Saltwater: shrimps, crabs, small squids, fish fry, and the eggs of other fishes
Age at maturity (yrs)	2-4
Adult Length (cm)	~25.0-35.0 TL

**Perch Family (*Percidae*)****Yellow Perch (*Perca flavescens*)**

General Habitat(s)	Lacustrine; riverine
Pelagic	no
Thermal Regime	coolwater
Trophic Class	Top carnivore
Habitat Preference	lakes, ponds and pools of creeks and small to large rivers with moderate aquatic vegetation and clear water, young inhabit weedy shallows, while adults prefer rock ledges usually at depths less than 9 m; preferred water temperature ~ 21°C
Reproductive Guild	Nonguarders: Open substratum spawners: Phytophils
Spawning Habitat(s)	Lacustrine; riverine: weedy areas
Spawning Season	Spring
Spawning Months	April-May
Spawning Temp	~6-12°C
Nursery habitat(s)	Lacustrine; riverine
Diet	Diurnal carnivores, feeding on small aquatic insects, crustaceans, and small fishes
Age at maturity (yrs)	2-3 (m), 3-4 (f)
Adult Length (cm)	15.2-30.5 TL

**Swamp Darter (*Etheostoma fusiforme*)**

General Habitat(s)	Lacustrine; riverine
Pelagic	no
Thermal Regime	coolwater
Trophic Class	Generalist feeder
Habitat Preference	Heavily weeded, shallow, protected coves of lakes and ponds; patches of vegetation in fast flowing streams
Reproductive Guild	Nonguarders: Open substratum spawners: Phyto-lithophils
Spawning Habitat(s)	Lacustrine; riverine: weedy areas
Spawning Season	Spring
Spawning Months	May
Spawning Temp	~12-15°C
Nursery habitat(s)	Lacustrine; riverine
Diet	Small invertebrates and algae
Age at maturity (yrs)	1
Adult Length (cm)	2.5-5 TL

**Lamprey Family (*Petromyzontidae*)****Sea Lamprey (*Petromyzon marinus*)**

The sea lamprey, an anadromous, jawless fish, enters freshwater to spawn each spring where its juvenile progeny (ammocoete) spend 4-6 years burrowed in the mud filter-feeding on minute organisms before migrating to the ocean as adults.

General Habitat(s)	Marine; riverine;
Pelagic	yes
Thermal Regime	na
Trophic Class	Parasite
Habitat Preference	Little is known about this species specific habitat preferences at sea
Reproductive Guild	Nonguarders: Brood hiders: Lithophils
Spawning Habitat(s)	Riverine; shallow, swift-running, stony stream sections
Spawning Season	Spring-early summer
Spawning Months	May-June
Spawning Temp	~12.0-23.0
Nursery habitat(s)	riverine
Diet	Blood and bodily fluids of host fish
Age at maturity (yrs)	5-8
Adult Length (cm)	~60.0-75.0 TL

**Salmon, Char, and Trout Family (*Salmonidae*)****Rainbow Trout (*Oncorhynchus mykiss*)**

General Habitat(s)	lacustrine; riverine
Pelagic	yes
Thermal Regime	coldwater
Trophic Class	Top carnivore
Habitat Preference	mid-waters of lakes; creeks and rivers with moderate flow, gravelly bottoms and riffle-pool habitat; preferred water temperature 11.3°C
Reproductive Guild	Nonguarders: Brood hiders: Lithophils
Spawning Habitat(s)	riverine
Spawning Season	spring
Spawning Months	March-May
Spawning Temp	~5-13°C
Nursery habitat(s)	Hatchery (reproducing populations in New Hampshire na) In Massachusetts reproducing populations are restricted to coldwater streams with high gradient (more than 75 feet per mile)
Diet	Aquatic and terrestrial insects; piscivory in lake dwelling adults
Age at maturity (yrs)	3-5
Adult length (cm)	36.1-73.4 TL

**Atlantic Salmon** (*Salmo salar*)

The Atlantic Salmon has an anadromous life history. Young salmon remain in freshwater for two or three years, descending to the sea as smolts. At sea, they live for one or two more years before they return to their natal streams to spawn.

General Habitat(s)	lacustrine; riverine; marine
Pelagic	yes
Thermal Regime	coldwater
Trophic Class	top carnivore
Habitat Preference	mid-waters of lakes; rocky runs and pools of small to large rivers; preferred water temperature 16.0°C
Reproductive Guild	Nonguarders: Brood hiders: Lithophils
Spawning Habitat(s)	riverine: highly oxygenated, minimal pollution levels, and silt-free rocky or gravel substrate
Spawning Season	fall
Spawning Months	October- November (return to freshwater typically in May or June)
Spawning Temp	~4-10°C
Nursery habitat(s)	Riverine
Diet	Young Atlantic salmon feed primarily on aquatic and terrestrial insects while they are in freshwater. Adult Atlantic salmon do not feed in fresh water prior to spawning.
Age at maturity (yrs)	3-6
Adult Length (cm)	53.8-74.4 TL

**Brown Trout** (*Salmo trutta*)

General Habitat(s)	lacustrine; riverine
Pelagic	yes
Thermal Regime	coldwater
Trophic Class	top carnivore
Habitat Preference	creeks and rivers with moderate flow, gravelly substrates and riffle-pool habitat, and lake shallows; preferred water temperature ~21°C
Reproductive Guild	Nonguarders: Brood hiders: Lithophils
Spawning Habitat(s)	Riverine: spawning substrate with stones ranging from .25-3 inches in diameter
Spawning Season	fall
Spawning Months	October- December
Spawning Temp	~2-13°C
Nursery habitat(s)	riverine
Diet	juvenile brown trout are primarily insectivorous, until the onset of piscivory
Age at maturity (yrs)	2-4
Adult Length (cm)	25.8-63 TL

**Brook Trout** (*Salvelinus fontinalis*)

General Habitat(s)	lacustrine; riverine
Pelagic	no
Thermal Regime	coldwater
Trophic Class	top carnivore
Habitat Preference	clear, cool, well-oxygenated streams, ponds and lakes with maximum water temperature less than 22°C; preferred water temperature 16.0°C
Reproductive Guild	Nonguarders: Brood hiders: Lithophils
Spawning Habitat(s)	lacustrine; riverine: gravel riffles coarse sand and stone up to 4 inches in diameter
Spawning Season	fall
Spawning Months	September-November
Spawning Temp	~4-10°C
Nursery habitat(s)	lacustrine; riverine
Diet	stream dwelling brook trout are primarily insectivores
Age at maturity (yrs)	15.2-44.2 TL
Adult Length (cm)	2-3