



WET & WILD LIFECYCLES

LESSON PLAN

Content area: Lifecycles

Audience: K-2, also appropriate for K-3 review

NC Standard Course of Study Correlations (Science):

K.L.1.2; 1.L.1.1; 1.L.1.2;
1.L.2.2; 2.L.1.1; 2.L.1.2

Setting: Classroom and/or wetland habitat

Duration: 0.75 to 2 hours

Objectives: Students will:

1. Correctly sequence pictures of the following animal life cycles: striped bass, dragonflies and mussels.
2. Describe how striped bass, dragonflies and mussels help one another in an aquatic habitat.

Key terms: aquatic life cycles, fisheries habitat, striped bass, mussels, aquatic insects, dragonflies

Classroom materials:

- Small/medium nets
- Containers for holding aquatic animals
- Fishbowl/trays
- Markers or crayons
- Scissors
- Glue sticks
- Aquatic Life Cycle Playing boards & life cycle playing cards (see directions on how to make)

Overview:

In this lesson students learn how three native North Carolina species depend on one another through the food chain and the role they provide in their shared habitat. Striped Bass feed on dragonflies, freshwater mussels filter the water keeping it clean for the striped bass and striped bass help move young mussels from area of the habitat to another. Detailed background information can be found at the end of the lesson plan.

Show Aquatic Life Cycles PowerPoint, which includes the life cycle of Striped Bass, dragonfly nymphs and freshwater mussels and how they depend on one another in the habitat.

Outdoor Activity:

Students explore a wetland environment and use equipment fisheries biologists use to investigate what animals are living in this habitat.

1. Group students together and provide each group with nets and containers to catch aquatic animals. Tell the students that fisheries biologists use similar equipment to capture animals in the wetlands they study. Allow students enough time to capture as many animals as possible.
2. Transfer animals collected from the larger container to a fishbowl or tray for examination. Students use the Aquatic ID Sheet (in appendix) to identify the animals. Ask the students if they can identify the dragonfly nymphs. Do the students think the water is healthy enough for dragonflies, mussels and fish to live in it?

Indoor Alternative to Outdoor Activity:

1. Prior to class, visit a wetland, pond or small creek habitat and collect animals for students to identify (see Aquatic ID sheet for examples of what you may find). Divide the animals into two large containers.
2. Using small nets, have students take turns dipping nets into containers to collect animals and transfer them to petri dishes for closer observation.
3. Students use magnifying glasses or dissecting scopes to view animals. Students circle the animals they identify on their Aquatic Invertebrate ID Sheet. Focus on all students recognizing and being able to identify a dragonfly nymph.
4. As a group, discuss findings and have students report in what life cycle stage they think the animals are.

Aquatic Life Cycle Relay Race:

1. Prior to class, make two sets of playing boards and life cycle stage cards for two teams using matching colors across sets. Cut out small arrows (not included here) and life cycle stage cards. Glue the small arrows to three, large pieces of colored paper or felt (36" x 36") to form three boards per set. Leave spaces in between each arrow large enough for life cycle stage cards. Attach Velcro strips in the spaces between each



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Printable materials:

- Aquatic ID Sheet
- Aquatic Life Cycle Relay Race Cards
- Aquatic Connections Craft Sheet

Extension materials (if unable to complete outdoor activity):

- Two large containers for dipping with small nets
- Petri dishes
- Dissecting scopes

arrow. Glue a curved arrow pointing from the last Velcro strip to the first. Glue the life cycle stage cards to separate pieces of colored paper or felt with Velcro backing so that there are two complete sets of each of the three life cycles. There should be a total of 12 cards per set (4 cards per animal).

2. Divide the class into two teams and form the teams into lines.

3. Place each team's playing boards at the opposite end of the room. Place each team's life cycle stage cards in a basket midway between the start of the line and the playing boards.

4. Playing directions: each of the three animals has a life cycle that has been broken down into four stages. Each stage must be placed on the board in the correct location. Have one student on each team start the race by selecting a card from his/her team's basket. The student will place the card on any of the three playing boards to start, and subsequent students choose the appropriate card from the basket to complete that life cycle. The race will continue until all life cycles have been completed and all cards are placed in the correct locations on the playing boards.

5. Review completed boards —do this as a group and re-enforce the lifecycle stages.

Aquatic Connections Craft:

1. Each student receives one habitat board, one bass, and one dragonfly nymph (see appendix for these materials).

2. Students read each sentence on the habitat board.

3. Color the habitat board, striped bass and dragonfly nymph.

4. Students cut out the striped bass and dragonfly nymph and glue them in the correct locations on the board. The striped bass should go nose first, close to the large mussels on the left side of the habitat and the dragonfly nymph goes in the plants on the right side of the board.

Evaluation:

1. How do mussels help fish and dragonflies in a wetland?
2. How do striped bass help mussels?

Additional resources:

[North Carolina Wildlife Resources Commission Striped Bass Species Profile](#)

[Life History of Freshwater Mussels](#)

[Dragonfly Life Cycle](#)

[North Carolina Environmental Education Grants](#)

[Project WILD](#)



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BACKGROUND INFORMATION

Freshwater mussels live in freshwater lakes, streams, and rivers. Although similar to clams, most mussels require a fish host in their lifecycle, while clams do not. Mussels, which are not very mobile, use fish to transport their young to other locations. In turn, the mussels help the fish by filtering the water, keeping it cleaner and making it easier for fish to live and breathe. Male mussels fertilize a female mussel's eggs using the current of the water. Once fertilized, the eggs stay inside the female until the immature mussels, called glochidia, are ready for release. The glochidia do not look much like mussels at this point. The female must attract the appropriate fish host so the glochidia can attach to gills of the fish. Female mussels have "lures" that attract a suitable fish. Once the fish is lured in close enough, the female clamps down on the fish's snout and "breathes" the glochidia into the fish's mouth. The glochidia attach to the fins, gills, and skin of the fish, but do not cause the fish any harm.

Within a few weeks the glochidia have grown and matured enough to go through their metamorphosis into juvenile mussels. Metamorphosis is the process by which juvenile animals change into adult animals. Once the glochidia have transformed into juvenile mussels, they fall off the fish and bury into the bottom of the lake, stream or river.

One type of fish that benefits from the mussel is the striped bass. The striped bass is a special fish because it can live in freshwater and saltwater at different stages of its life cycle. In the spring, as the ocean water warms up, adult striped bass start swimming in from the ocean into the rivers. They swim many miles upstream looking for faster flowing water with rocks. Once in their birthplace along the river, they spawn, and the female bass release their eggs. The eggs must tumble and roll in the water and not sit on the bottom or they will die. About 1 to 3 days later, the eggs hatch into fry (young fish). The fry do not have mouths and must be fed by the yolk in the egg for about a week while their mouth forms. They must continue to tumble and roll in the water to survive. Once their mouth develops, they eat very small animals, like dragonfly larvae. They continue to swim downstream as they grow. Juveniles live in the lower river and in sounds with brackish water. Immature adults start to migrate into cooler, deeper ocean water. Males mature around 2 years old and females mature around 3 years old and the cycle starts over again. Striped bass do not breed every year.

Dragonflies are also dependent on the water for their life cycle. Adult dragonflies feed in lakes, ponds and rivers. They breed there as well. The female dragonflies lay their eggs on vegetation in the water. When the eggs hatch, the dragonflies are called nymphs. The nymphs live in the water until they are ready to complete their metamorphosis into adults, and the cycle repeats itself.

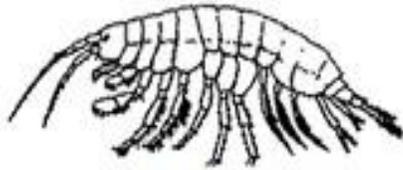
Mussels, striped bass and dragonflies all play important roles in wetland areas. In water that is not polluted, mussels live along the bottom, cleaning and filtering the cloudy water. This helps to keep the water clean and clear for both the striped bass and the dragonfly nymphs. The mussels must have fish, like the striped bass, around for their young to attach to and move to another area of the river. The fish must have the dragonfly nymphs around for food. Humans fish for striped bass for food, and we can use dragonflies as bait to catch the bass.

Fisheries biologists, like the ones at the North Carolina Wildlife Resources Commission, study mussels and aquatic invertebrates, like dragonfly nymphs, to determine how healthy our waterways are. Striped bass numbers are directly related to food availability and access to healthy habitats. Each year, our fisheries biologists go out and sample for striped bass. They measure, weigh, tag and count them to get an idea of how healthy the fish are. From this information, size and creel limits are set each year to help keep populations healthy. The Wildlife Resources Commission also works with dam owners along rivers where striped bass migrate up to make sure the rivers are flowing fast enough for the bass to spawn successfully. Money to do this sort of research comes from the anglers, people who fish. Every time someone purchases fishing-related items, some of that money goes toward aquatic research and habitat restoration, so that biologists can continue to study these important animals.

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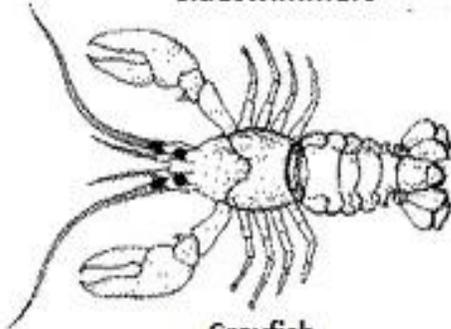
AQUATIC IDENTIFICATION SHEET



Sideswimmers



Planarian



Crayfish



Water Penny Larva



Tadpole



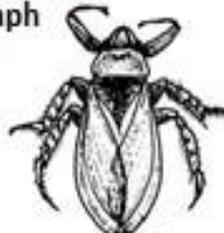
Black Fly Larva



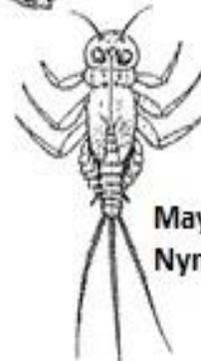
Damselfly Nymph



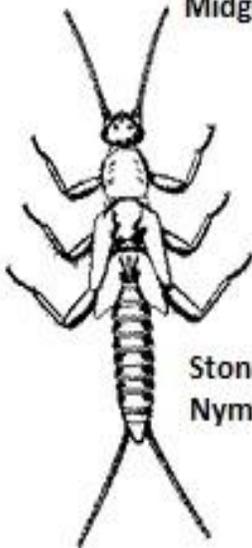
Midge larva



Waterbug



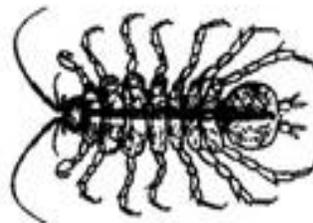
Mayfly Nymph



Stonefly Nymph



Beetle larva



Aquatic Sowbug



Dragonfly Nymph

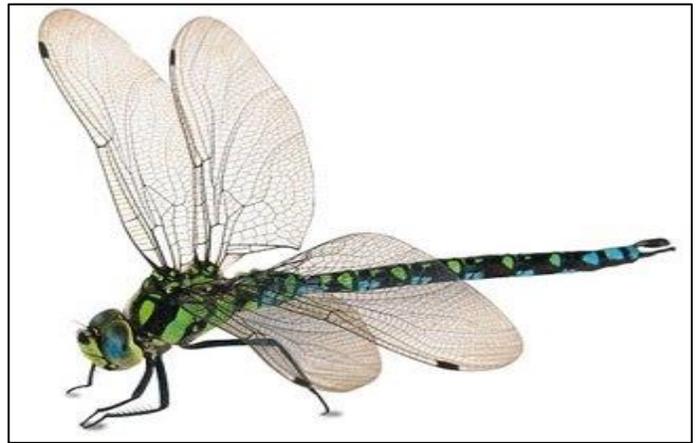
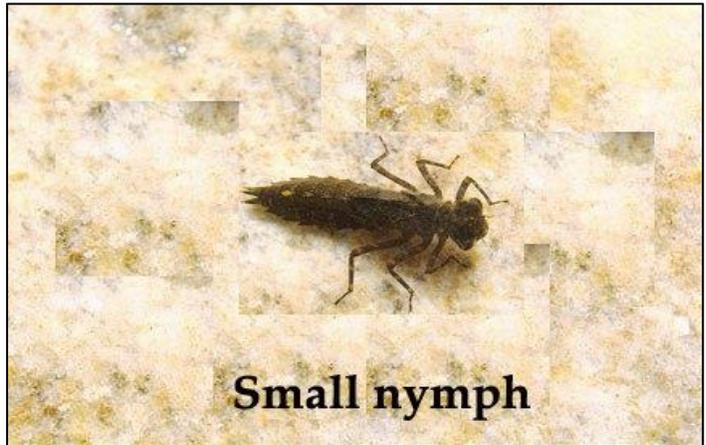
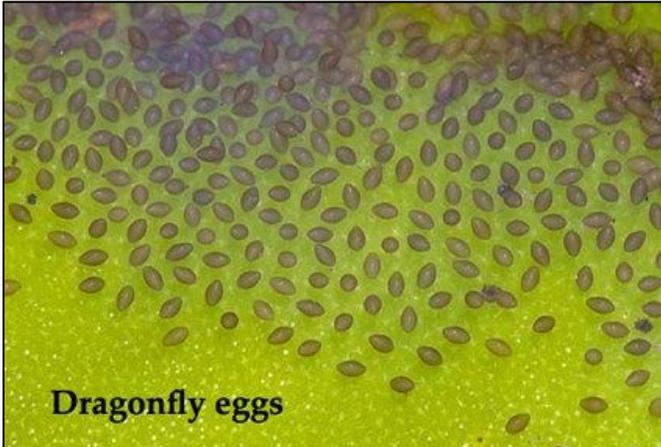


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AQUATIC LIFECYCLE RELAY RACE PLAYING CARDS

Dragonfly Life Cycle Cards

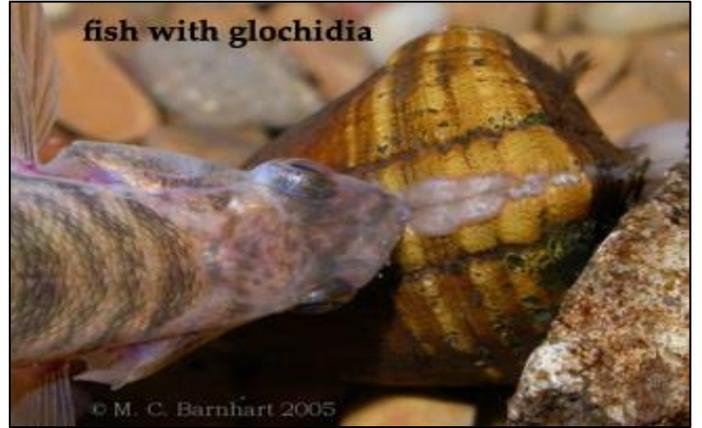




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Mussel Life Cycle Cards

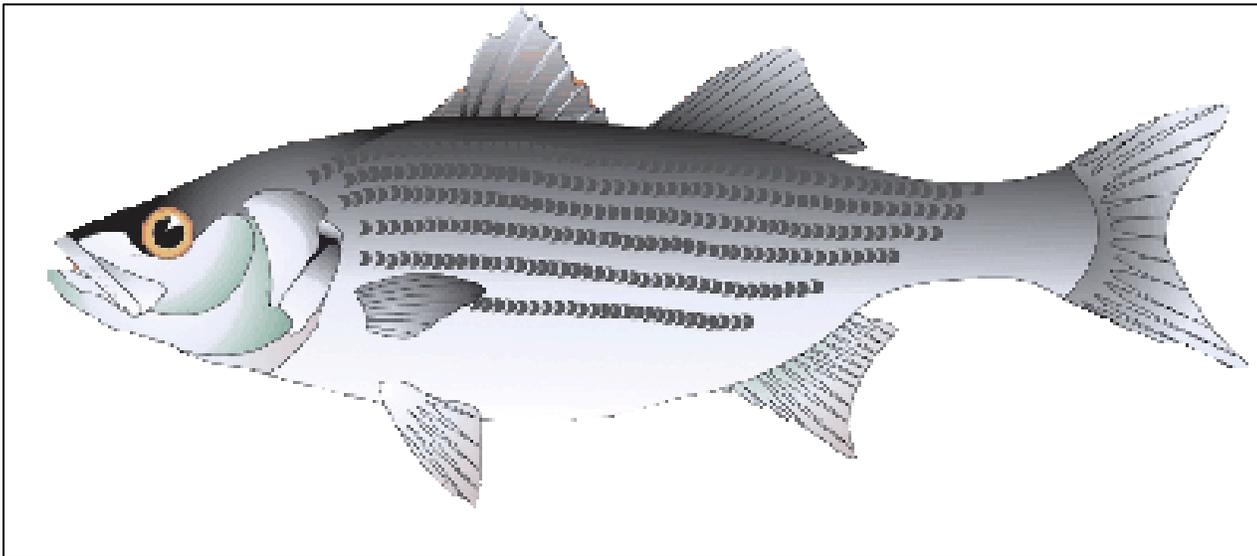
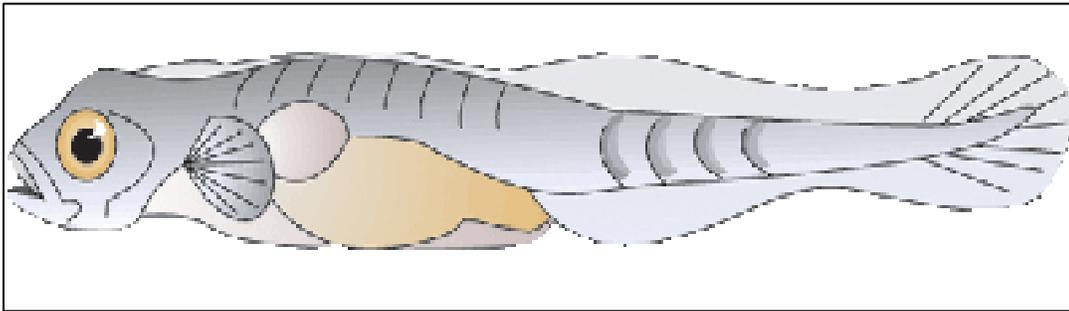
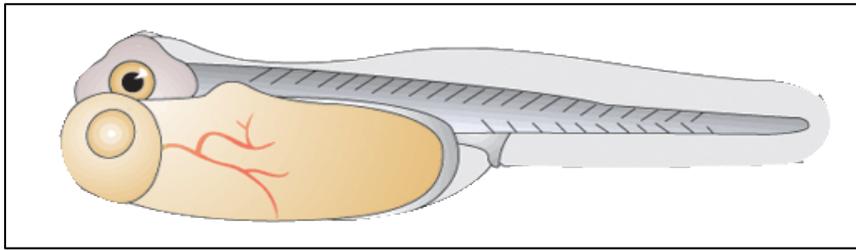
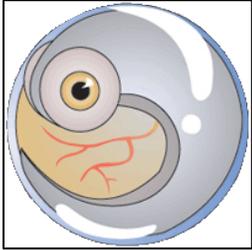




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Bass Life Cycle Cards

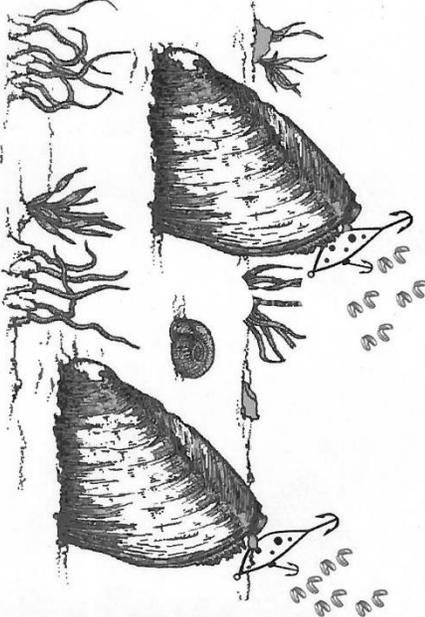
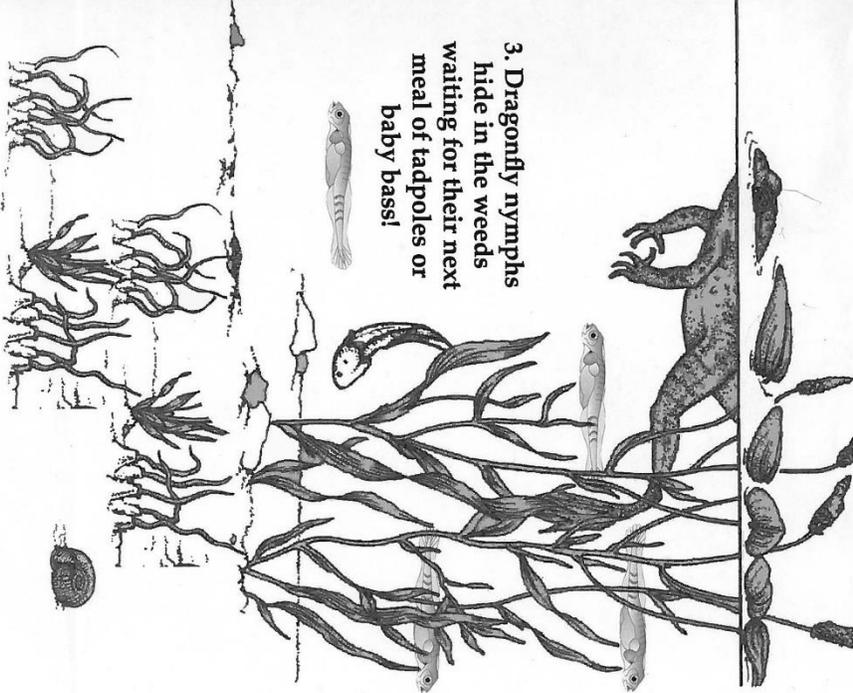




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Striped Bass, Dragonfly and Mussel Habitat Board

 <p>1. Mother mussels lure the striped bass to them.</p>	 <p>2. Baby mussels swarm out and hitch a ride on striped bass to find a new place to live and grow.</p>
 <p>3. Dragonfly nymphs hide in the weeds waiting for their next meal of tadpoles or baby bass!</p>	

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HABITAT BOARD - STRIPED BASS AND DRAGONFLY NYMPH

