



A Quarterly Publication from the Division of Fish and Wildlife, RI Department of Environmental Management

Our Own Endangered Species: The American Burying Beetle *by Christopher Raithel*

A swooping hawk separated the baby pheasant from its mother and siblings. Now, the chick's plaintive peeps go unanswered. A cool drizzle falls as the last moments of daylight ebb away. Struggling for warmth, the chick nestles into a clump of grass. There is no relief there. Its feathers soaked, the chick loses body heat rapidly and shivering can't compensate. Finally, weak beyond recovery, it puts its head down and dies in the thick grass. An hour passes, then two. With the rain clouds now parted and the moon shining brightly, a thick *bzztt* of beating wings pierces the still night as a large beetle drops to the ground near the dead pheasant. It cautiously approaches, orange-knobbed antennae waving to test the thin breeze. All seems well. The



Fig. 1. Adult American burying beetle. There are several similar beetles, but the large size, orange thorax, and orange antennal clubs identify this species.

beetle climbs the carcass and begins to broadcast alluring scents into the air. Soon other beetles arrive. In an insect version of "king of the hill," male and female beetles fight until a single pair remains. They have claimed the prize but now they have to keep it. The pheasant chick picked a difficult place to die, so the beetles decide to move it. One beetle crawls beneath the carcass; the other anchors itself by grabbing some strong grass with its rear legs and then clutches the pheasant's body with its front legs. One beetle heaves while the other pulls and the pheasant's body moves spasmodically, bit by bit. This feat of muscular leverage would make even Archimedes proud, because the dead

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Aquatic Explorations in Jerusalem *by Kimberly Sullivan*

Fall is one of the best times of the year to bring school or troop groups to the seashore! Not only are the striped bass moving out of the bay and ponds, but some southerly neighbors also tend to move in for a visit.

Autumn finds the waters in and around Narragansett Bay filled with southern species making their way up via the Gulf Stream current and into the Aquatic Resource Education net. Rhode Island is the northern edge of the range of many mid-Atlantic species like the Blue Crab. Some species that we have caught in the past include pipefish, lizard fish and skip jacks, seahorses and butterfly fish. After the water slowly heats over the summer, these rare species visit Rhode Island's coastal waters, and now would be the perfect opportunity to see the critters first hand.



For the past 23 years DEM's Aquatic Resource Education program has been offering marine programs at our Coastal Laboratory in Jerusalem, which affords a safe and protected area for students

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THE DIVISION OF FISH AND WILDLIFE MISSION STATEMENT:

Our mission is to ensure that the Freshwater, Marine and Wildlife resources of the State of Rhode Island will be conserved and managed for equitable and sustainable use.



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The American Burying Beetle by C. RaitheI continued

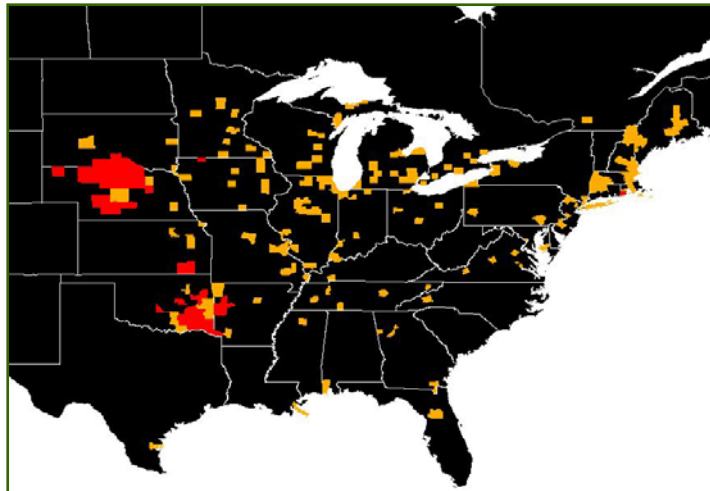


Fig. 2. American burying beetle distribution. The orange polygons are areas where *Nicrophorus americanus* was recorded historically. The red polygons depict its distribution since 1985.

pheasant outweighs the beetles by at least 100 times. With the carcass now in a more favorable position, the beetles work frantically to scoop soil from beneath it. As they dig, the pheasant's body slowly drops into a shallow hole. The beetles cover over the top of the carcass, plucking the body as they go, until by morning there is only a small patch of disturbed ground and a few feathers to mark the dramatic events of the night before.

Unfortunately, this vignette is occurring much less often these days, because the beetle described above is the American burying beetle (*Nicrophorus americanus*), one of the rarest beetles in the world. This was not always so. The American burying beetle was once widespread and locally abundant until about 1920 (Fig. 1). Then it disappeared from a vast portion of its range. By the mid-1980s, the American burying beetle was known only from a few locations in Oklahoma and Block Island, and as a result was listed as an endangered species by the U.S. Fish and Wildlife Service (FWS) (Fig. 2). Burying beetles are found in many parts of the world. In North America there are about 15 species, of which about six occur in Rhode Island. All species of burying beetles are similar in body shape, appearance (usually black with orange markings - Fig. 1) and their attraction to dead animals. While their diet is cosmopolitan, consisting of other arthropods or any dead flesh they may encounter, their requirements for reproduction are exacting - they need fresh carrion

to rear their young. Because many animals, including ants, flies and scavenging vertebrates also like to snack on carrion, burying beetles sequester their find below ground, where it can be theirs alone. After they bury a suitable carcass, the beetles lay bare the remaining skin and smear it with secretions. These compounds have strong anti-microbial properties that inhibit decay.

They then wrap the carcass up into a nice tight packet that resembles a large

meatball, on which the female lays about 25 eggs. Burying beetles are surely fascinating, but one thing that really sets them apart from other insects is their behavior of tending the young. The larval beetles, which resemble large grubs (Fig. 3), actually beg for food and are fed by the parents as baby birds are. The adults also remain with the young to defend them from attack. The amount of parental investment is enormous for relatively few young.

When a species is designated as threatened or endangered by the FWS, those states where it was found become cooperators and perform actions relevant to population recovery. Typically, funding for such work is available via Section 6 of the Endangered Species Act. Therefore, because Rhode Island had one of the last known populations of the American burying beetle, we inherited a large portion of the planning and recovery responsibilities for it. One of these recovery tasks is to count our American burying beetle population every year. Beginning in 1991, the FWS contracted a burying beetle expert to design a monitoring array on Block Island. Since that time the RIDFW and the FWS have generated an annual population estimate of the American burying beetle. This work constitutes one of the longest monitoring efforts for any North American insect. The monitoring array consists of 50 baited pitfall traps arranged in three transects in the southwest section of Block Island. The traps are opened at night and checked the following morning. All

Continued on next page

The American Burying Beetle *by Christopher Raithel* continued

beetles are processed by sexing and measuring and then marked in a way that allows us to track their annual capture history.

It is an understatement to say that the American burying beetle is a very difficult species to understand. Its entire life history, the product of millions of years of adaptation, is designed to make it invisible except to other beetles. Humans cannot directly observe it under natural field conditions. This makes monitoring a little tricky. American burying beetles can be easily attracted to bait or lights, but monitoring a population in this way requires substantial interpretation of trap results. In other words, unless you trap them all, trapping results are some subset of the actual population. But what do the numbers really mean? We've spent a fair amount of time trying to answer this question. We know that beetle activity (and therefore the availability for capture) is influenced by the weather. They don't fly when it is cold, wet, or windy. In some years the weather has not cooperated and inhibited data collection. Also, when doing mark-and-recapture estimations, there are nasty little things known as confidence limits. It is easy to generate an estimate and to infer a trend from a series of them, but confidence limits are a way to evaluate how much you should trust the results. Un-



Fig. 3. A brood of American burying beetle larvae.



Fig. 4. Carrion provision on Block Island. Michael Amaral (FWS) gives a fish carcass to the beetles.

fortunately (again), the confidence limits we have generated are pretty large, meaning that our faith in the numbers should be low. This limitation is a function of several processes, and we are trying to improve the survey by increasing our sample of trapped animals.

So, there's a lot we don't know, but we have been able to make several inferences (educated guesses) about the conservation status and recovery potential of the American burying beetle. The reason this species is still found in Rhode Island but vanished from most of North America comes down to two words – Block Island. This animal defies conventional wisdom for species management because its "habitat" may not be a vegetation type or some other easily observed physical feature, but rather a string of probabilities – that a carcass of a certain size will be created, will remain available, and then be used effectively by American burying beetles. Block Island still has robust bird populations and no vertebrate scavengers, so the formulae for successful beetle

reproduction is more favorable there than elsewhere in eastern North America. The Block Island population of American burying beetles is probably about 3,000 individuals in a given year, and it has been relatively stable. We have implemented several actions that should augment the Block Island American burying beetles. The most important of these is the provisioning of carrion. We bring several dead quail to Block Island each year and "give" them to the beetles to guarantee that they use them successfully. If carrion is limiting the population, then providing "extra" carcasses should help them. This is what we've seen; since carrion supplementation began in earnest in 1994, the beetle population has tracked upward.

Endangered species biologists are often asked variants of the questions, "What good is it? Why would we spend money on a beetle? What does it do for us?" Over the years I've fielded my share of such queries and have developed a menu of responses from which I try to pick the most appropriate for a given situation. Here I offer the following as a sort of pre-emptive strike. I don't know the value that any single organism contributes to the panoply of life on earth, but I do believe that there *is* such a value. American burying beetles are beautiful, interesting and very cool. Working with them has taught me much about the awesome diversity and vulnerability of life on earth.

Species Spotlight: Striped Bass *Morone saxatilis* By Scott Olszewski



Image:USFWS

The Striped Bass is one of the most sought-after game fish in the United States. Commonly referred to as “Rockfish” in the mid-Atlantic region and “Striper” in the northeast, this species has gone through multiple periods of high and low abundance. Around 1900, records indicate that abundance was so high the fish were used as fertilizer in the farming industry. Eventually, overfishing and environmental conditions lead to a near stock collapse in the 1980s. In 1982, the striped bass population was estimated at less than nine million fish. Through strict management, the stock was rebuilt to an estimated 70 million fish in 2004. Although the population has decreased slightly since, biomass remains well above the threshold and target levels of abundance (Figure 1). Currently the striped bass stock, based on the most recent (2009) Atlantic States Marine Fisheries Commission stock assessment indicated that striped bass are not overfished and overfishing is not occurring leading some to refer to the striped bass fishery as one of the true success stories of fisheries management.

HABITAT AND RANGE: The striped bass is a coastal species within the family of temperate basses, Moronidae. Unless migrations or the pursuit of food directs schools of fish across open ocean environments, striped bass are not usually found greater than 15 miles from shore. The striped bass is an anadromous species meaning they migrate from sea to fresh water rivers to spawn, and range from the Gulf of St. Lawrence along the east coast to Florida and the Gulf of Mexico. Both spawning and juvenile populations of striped bass frequent enclosed bays and rivers at various times of the year either to spawn or feed. Striped bass tend to congregate around rocky outcroppings and submerged boulders in and around the surf line. Bass are also often found in areas of swift currents in and around breach-way channels. Only after the first two years of life will striped bass migrate. Spring and summer migrations send schools of striped bass north into the Gulf

of Maine, while fall and winter migrations take fish back south where wintering mainly takes place from the Hudson River through New Jersey, the Delaware and Chesapeake bays and south through the Carolinas. Small aggregations of striped bass have been observed overwintering in the vicinity of power plant discharge areas where water temperatures remain within their tolerance of 6-25 °C (43-76 °F). The striped bass has also been successfully introduced in numerous inland lakes and reservoirs and to the Pacific coast, where it now occurs from Mexico to British Columbia (Mass. DMF).

DESCRIPTION, GROWTH AND REPRODUCTION: The upper body of the striped bass is usually blueish to dark olive, and the sides and belly are silver to white. Seven or eight narrow horizontal stripes extend from the back of the head to the base of the tail giving this bass its name, and are the most easily recognized characteristic of this species. Striped bass can live up to 40 years and can reach weights greater than 100 pounds, although individuals larger than 50 pounds are considered rare (Mass. DMF). The Rhode Island State record Striped Bass was caught in July 2008 off Block Island. It weighed 76 pounds 14 ounces and measured 54.75 inches in length. The all-tackle angling record fish was taken in 1972 in the State of New Jersey. It weighed 78 pounds 8 ounces and measured 72 inches in length.

The migratory stock spawns annually during April to June after fish migrate into fresh or brackish water. Water temperatures during spawning are 10-23 °C (58-73 °F); peak spawning temperature is 15-20 °C (59-68 °F) (NMFS 2006). Females attain a larger



Striped bass migration patterns. (Massachusetts DMF)

The migratory stock spawns annually during April to June after fish migrate into fresh or brackish water. Water temperatures during spawning are 10-23 °C

Continued on page 5

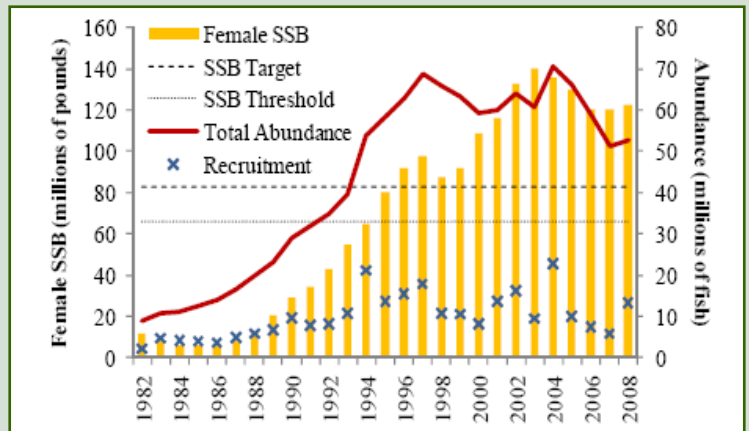


Figure 1. Estimated female spawning stock biomass (SSB), total abundance, and recruitment (age-1 abundance) of striped bass from the 2009 statistical catch at age model (ASMFC 2009).

Species Spotlight: Striped Bass by Scott Olzsewski continued



Photo: C. Bell

maximum size than males; and most striped bass over 30 pounds are female. Females do not reach sexual maturity prior to the age of four, and some not until the age of six. The number of eggs produced by a female striped bass is in direct proportion to its body size. A 12-pound female may produce about 850,000 eggs, while a 55-pound female may produce upwards of 4,200,000 eggs. Males reach sexual maturity at two to three years of age (Massachusetts DMF).

YOY (young of the year) spend the first year of life in the coastal estuaries where they were spawned and are monitored in various state surveys. The State of Maryland YOY beach seine survey is an accepted indicator of juvenile year class strength and used by the ASMFC technical committee in the striped bass stock assessment to document annual variation and long-term trends in abundance and distribution. (Figure 2, Maryland DNR)

FEEDING: Striped Bass are opportunistic feeders and will prey upon almost anything that presents itself, including smaller fish and invertebrates. Lists of stomach contents include sea lamprey, eel, shad, alewife, herring, menhaden, anchovy, smelt, hake, mullet, perch, croakers, weakfish, sand lance, lobsters, crabs, squid, clams and an assortment of various worms (Collette and MacPhee 2002). However

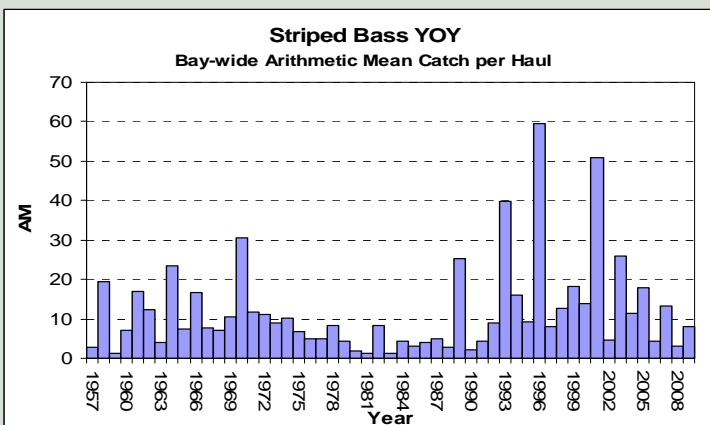


Figure 2. Young of the Year (YOY) Juvenile beach seine survey index (Maryland DNR. 2010).

diets were made up mostly of local species depending on seasonal prey availability.

FISHERIES AND STOCK STATUS: Striped Bass fisheries in the State of Rhode Island are divided into a recreational fishery and commercial fishery. The recreational fishery is managed by a minimum size of 28 inches, a two fish possession limit and no closed season. The commercial fishery is broken up into two categories. The floating fish trap fishery, with a 26 inch minimum size, harvests 39% of the annual commercial quota and the general category fishery, with a 34 inch minimum size and a spring and fall fishery, which harvests the remaining 61% of the annual quota.

State of Rhode Island marine fisheries biologists collect striped bass age data through a port sampling program each spring and summer. Data is collected through information collected at fish dealers and from commercial fisheries. This information is

used to determine the size structure of the recreational and commercial catch, incorporated into the Commission stock assessment and used to gauge the overall health of the striped bass stock.



Photo: H. Smith

The striped bass population and fishery is considered to be in good condition

and over-fishing is not occurring. With proper conservation and management, fisheries scientists, from state and federal governments along with fishing associations and concerned citizens continue monitoring efforts to protect striped bass by improving conservation strategies and enforcing existing management measures.

REFERENCES:

Atlantic States Marine Fisheries Commission. 2009. Interstate Fishery Management Plan for Striped Bass (2009 Stock Assessment Report for Atlantic Striped Bass).
 Collette B. B. and G. Klein-MacPhee. 2002. *Bigelow and Schroeder's Fishes of the Gulf of Maine*, Third Edition. Smithsonian Books. 882pp.
 Massachusetts Division of Marine Fisheries. 2010. Striped Bass Species Profile.
 Maryland DNR. 2010. YOY Juvenile beach seine survey index.
 NMFS. 2006. Status of Fishery Resources for Striped Bass.

Aquatic Explorations in Jerusalem *by Kimberly Sullivan*



to explore Rhode Island's marine ecosystems. During the field trip, the students have an opportunity to make their own tidepool with marine creatures caught in a seine net. These creatures include common invertebrates such as green crabs, hermit crabs, horseshoe crabs, and fish such as flounder and silversides. Not only does the Jerusalem Coastal Lab afford us the opportunity to beach seine in a protected cove, but it is also located next to Succotash Salt Marsh, where the students have the chance to explore the flora and fauna of the salt marsh and learn why it is important to preserve such beautiful coastal resources. The day culminates in a scavenger hunt where students look for the different creatures mentioned throughout the beach seine and marsh walk.

While the water will stay warm enough to have visitors from our southerly neighbors for a little while longer, the weather won't stay this genteel for long. Book your next marine ecology program this fall. For more information please contact Kimberly Sullivan at 401-539-7333 or Kimberly.sullivan@dem.ri.gov.

Kids Corner! Presented by the Aquatic Resource Education Program

Fall is a great time for salt water fishing. Below are some of Rhode Island's salt water fish species. Use the clues and pictures on page 7 to fill out the crossword. Answers are on page 8.

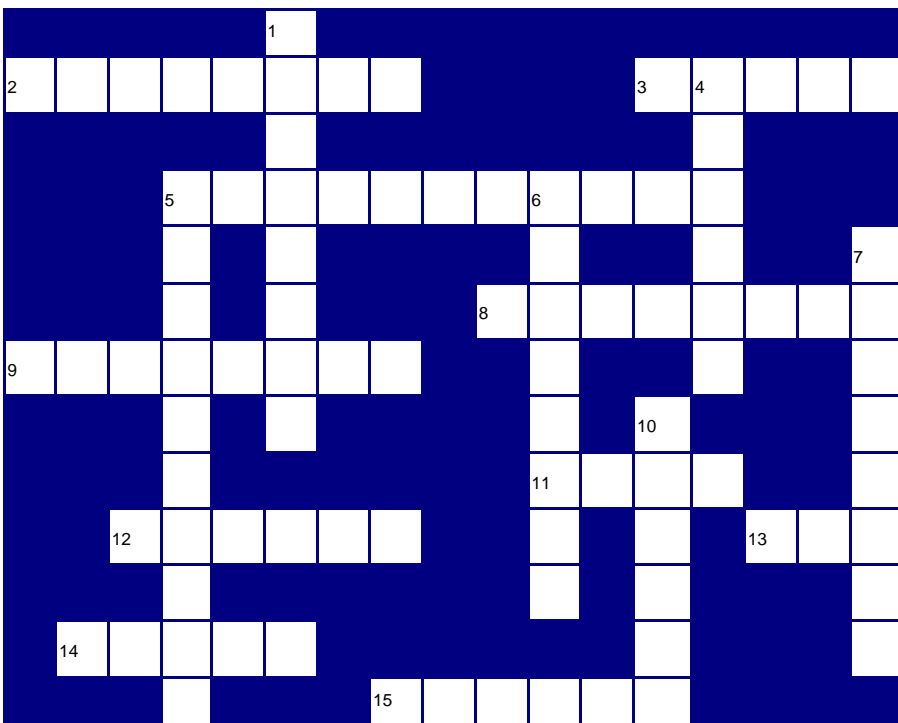
Across

- 2. First name of the fish that has three modified fin rays on either side of it's body and fins like a bird
- 3. _____ fish: possesses a lure from the top of it's head, also known as a monkfish
- 5. A popular fish for anglers that comes into Narragansett Bay in the spring and heads out in the fall easily identified by it's horizontal stripes.
- 8. Atlantic _____.
- 9. Common fish in Narragansett bay during the summer and fall months.
- 11. A smaller silvery salt water fish that has a forked tail or caudal fin.
- 12. A mottled gray and black fish with one long dorsal fin from its head down to its tail.
- 13. Atlantic _____.
- 14. A common name for the summer flounder.
- 15. Type of flounder that faces to the right.

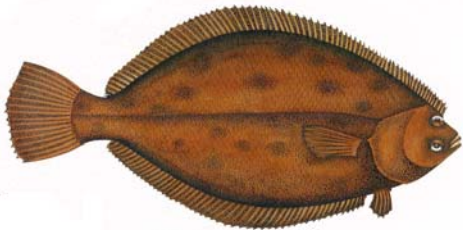
★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★
 ★ **Bonus Question - Name the** ★
 ★ **fish not mentioned in the** ★
 ★ **crossword: _____** ★
 ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

Down

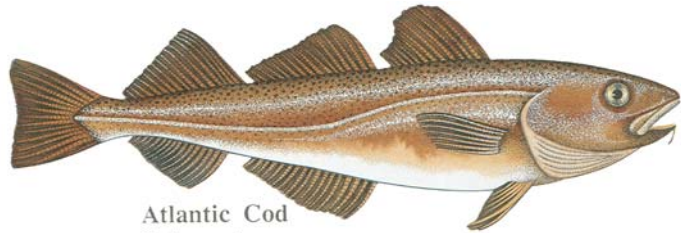
- 1. 2nd and 3rd name of the fish in clue 2 across.
- 4. _____ Toadfish.
- 5. Also known as a Weakfish.
- 6. _____ bass.
- 7. A flat, bottom dwelling fish that is known for it's protective coloration ability and eyes on the same side of it's head.
- 10. Type of flounder that faces to the left.



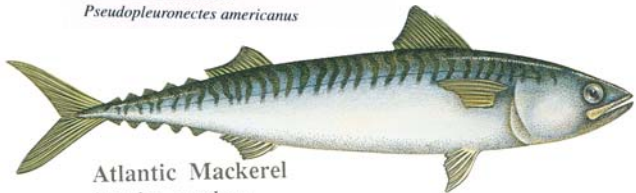
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Winter Flounder
Pseudopleuronectes americanus



Atlantic Cod
Gadus morhua



Atlantic Mackerel
Scomber scombrus



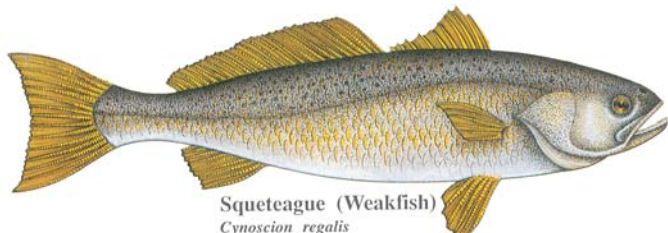
Tautog
Tautoga onitis



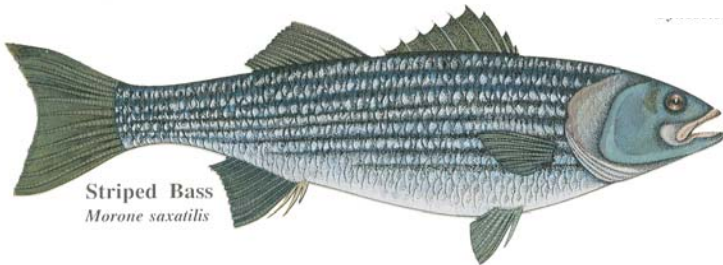
Black Sea Bass
Centropristis striata



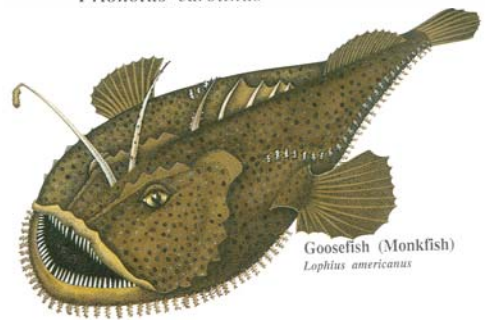
Northern Sea Robin
Prionotus carolinus



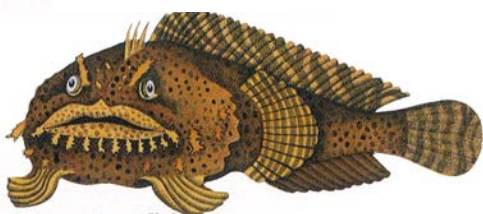
Squeteague (Weakfish)
Cynoscion regalis



Striped Bass
Morone saxatilis



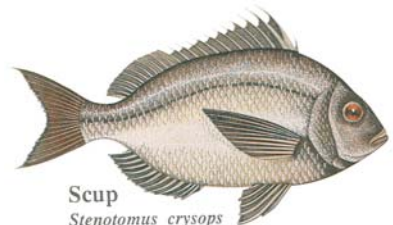
Goosefish (Monkfish)
Lophius americanus



Oyster Toadfish
Opsanus tau



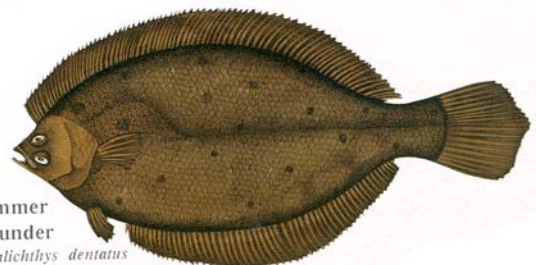
Butterfish
Peprilus triacanthus



Scup
Stenotomus crysops



Bluefish
Pomatomus saltatrix



Summer Flounder
Paralichthys dentatus

Upcoming Aquatic Resource Education Programs

The Aquatic Resource Education program has announced it's fall programming. These workshops are focused on the beginner angler and welcome families with children 10 and older. For more information please contact Kimberly Sullivan at kimberly.sullivan@dem.ri.gov or (401)539-7333.



Thursday, September 23, 2010 – SURF FISHING: THE BASICS, 5:30pm-8:00pm Enjoy an evening learning how to surf fish Rhode Island waters in

this introductory seminar on surf casting and fishing. The session will include a description of tackle and gear need for salt-water fishing, the safety measures one should take fishing in the surf, and lessons in surf casting and knot tying. The evening will conclude with fishing one of Rhode Island's premier fishing areas; Scarborough

Beach in Narragansett. All equipment necessary for a pleasant evening of fishing will be available for your use. Families with children 10 and up are encouraged to participate. **Space is limited and registration is required. Fee: \$10.00/ per person or \$7.00/person for families with 3 or more participants.**



Saturday, September 25, 2010 –INTRODUCTION TO SALTWATER FLY FISHING, 9:00am-3:00pm Its Stripper time and now is your chance to learn the art and science of Fly Fishing, so bring your

waders and join RIDEM for it's annual 'Introduction to Saltwater Fly Fishing program.' Whether you are a beginner or just need a refresher, this all-day workshop will present the ins and outs of fly fishing including lessons on the necessary equipment, fly tying, knot tying, and the art of fly

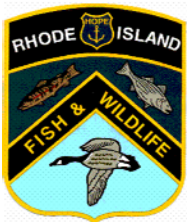
casting. Participants will get to put their new skills to work at one of Rhode Island's extraordinary fishing areas. All equipment and materials are included for the day so pack your lunch and join us at the Kettle Pond Visitor Center in Charlestown, RI. Families with children 10 and up are encouraged to participate. **Space is limited and registration is required. Fee: \$35.00/ per person.**



FALL FLY TYING at North Kingstown Community Center, Mondays, November 8, 15, 22, 29 & December 6, 13, 2010 - 7pm-9pm. Fee \$6.00 per class. Pre-register for all classes and get a class free.

CROSSWORD ANSWER KEY: Across: 2. Northern, 3. Goose, 5. Striped Bass, 8. Mackerel, 9. Bluefish, 11. Scup, 12. Tautog, 13. Cod, 14. Fluke, 15. Winter. Down: 1. Sea Robin, 4. Oyster, 5. Squeteague, 6. Black Sea, 7. Flounder, 10. Summer. Bonus Question: Butterfish.

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