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WEB OF LIFE

OVERVIEW A myriad of species, including people, utilize and inhabit the marine environment. During this activity, students will discover the interrelationships these species share by examining feeding habits and assembling typical marine food chains.

OBJECTIVES Following completion of this lesson, the students will be able to:

1. Identify some basic marine species native to New Jersey;
2. Recognize that marine species are dependent upon each other for food;
3. Appreciate the complexity of the marine food web and,
4. Understand that humans are dependent on the marine food web and can contribute to its preservation or demise.

GRADE LEVELS 3rd-12th grades

NJCC STANDARDS

Science Indicators:
5.1: End of Grade 4: A1, B1, B2; **5.3:** End of Grade 4: A1, A2;
5.5: End of Grade 2: A1, A2, B1, End of Grade 4: A3, B1, B2,
End of Grade 6: C1, End of Grade 8: B2; **5.7:** End of Grade 2: A2,
End of Grade 4: A2, B1, B2; **5.10:** End of Grade 2: A1,
End of Grade 4: B1, End of Grade 6: A1, B1
Mathematics Indicators:
4.2: 2A4, 4A5, 4D5; **4.3:** 2A1, 2B1, 4A1, 4B1; **4.4:** 12C3;
4.5A: 2, 3, 4; **4.5C:** 3; **4.5D:** 1, 2, 3; **4.5E:** 1

MATERIALS

- A large (100' minimum) ball of rope, string or yarn.
- 1 set of food web cards (included in this lesson plan).
- A representation of the sun (drawing, cut-out, photo).

PROCEDURES Students form a circle and select a food web card at random. From the center of the circle, the teacher points out the features of the card including its inclusion of a picture of a common, local marine species, its common and scientific name, a list of what it eats and in most cases, a list of what it is eaten by. The teacher should include a brief review of **food chains** and give an overview of the activity. The teacher then asks the students if they know how the marine food web gets going or where does the initial energy come form?(the sun). The teacher holds up the diagram of the sun and starts the food web going by asking the students to look at their cards and find the organism that gets its energy from the sun or is a **producer** (phytoplankton). Holding onto the end of the rope, string or yarn, the teacher hands the rest of the ball to the student holding the phytoplankton card.

Students look at their cards again to see who is holding a card depicting an organism that depends on phytoplankton (zooplankton) and the ball is handed to that student. Students continue in this manner until they reach a top **predator** card (human, egret, and osprey). At that point, the action is reversed and a new chain is formed starting with the top predator. All the while, students hold onto their portion of the rope. Eventually an intricate, interconnected web forms. When all cards have been used, have students hold the rope above their heads to discover for themselves the many interrelationships represented in their "food web." You can also have students give their portion of rope a gentle tug, so students can "feel" how they are all connected.

BACKGROUND

Plankton is at the base of the marine and estuarine food web. Phytoplankton's ability to use the sun energy as "food" allows it to provide food for many different primary consumers. Zooplankton provides food energy for many larger consumers. The amount of energy available to larger organisms depends on this base of plankton. From these microscopic beginnings, an interdependence of species results, eventually working its way up to top predators (humans, ospreys, egrets).

VOCABULARY

Consumer - An organism that gets food from eating other organisms.

Food Chain - The transfer of food energy from one organism to another.

Predator - An animal that hunts and captures other animals for food.

Producer - An organism that makes its own food from the energy of the sun, such as phytoplankton. Producers form the base of the food web.

Plankton, (Phyto and Zoo) - Microscopic plants (phytoplankton) and animals (zooplankton) that are free floating drifters with their movements controlled by ocean tides and currents; an important food source in the marine food web.

EXTENSIONS

- Use the cards to form a human pyramid of food with many producers at the base. You will have to reproduce extra producer species cards to accomplish this. This variation can be used to demonstrate the transfer of energy that occurs within the marine food web.
- While students are still holding their completed web, suggest an event that would disrupt the food web, for example all silversides die (student holding silverside card drops his/her portion of the rope) as a result of a red-tide (over-abundance of a particular type of phytoplankton). What happens to the web when just one species is removed? (eventually breaks it down entirely). Have students research other events and actions that have a direct effect on the health of food webs.

REV. 11/11/10

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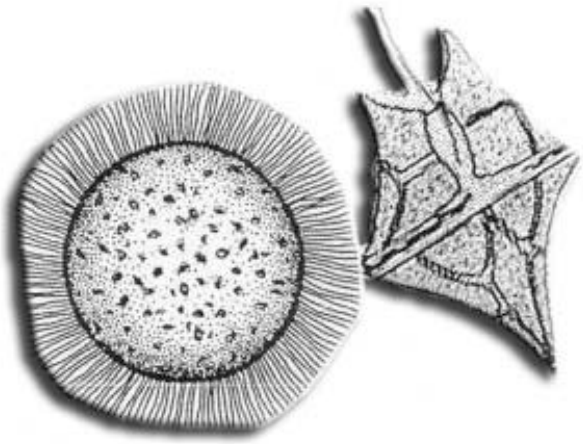
Phytoplankton

Eats: Sunlight

Eaten By:
Shore Shrimp
Menhaden
Atlantic Silverside
Soft-Shelled Clam
Hard-Shelled Clam
Zooplankton
Striped Mummichog
Sand Shrimp

Phytoplankton



Eats: Sunlight

Eaten By:
Shore Shrimp
Menhaden
Atlantic Silverside
Soft-Shelled Clam
Hard-Shelled Clam
Zooplankton
Striped Mummichog
Sand Shrimp

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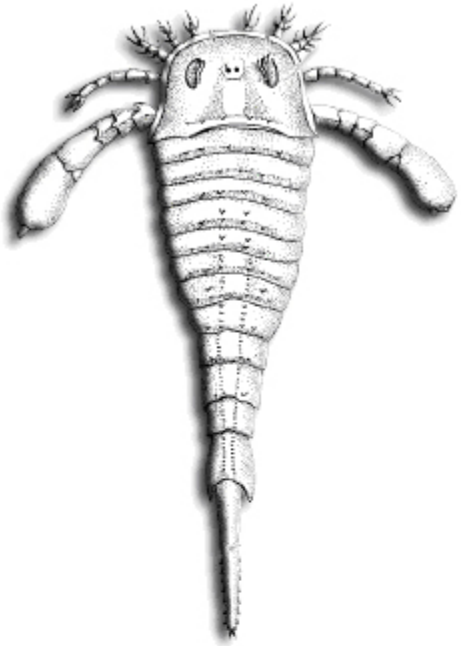


Zooplankton

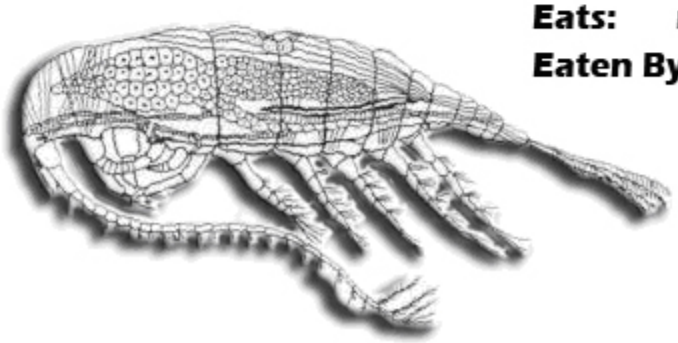
Eats: Phytoplankton

Eaten By:
Shore Shrimp
Sand Shrimp
Menhaden
Atlantic Silverside
Soft-Shelled Clam
Hard-Shelled Clam
Three-Spine Stickleback
Striped Mummichog

Zooplankton

Eats: Phytoplankton

Eaten By:
Shore Shrimp
Sand Shrimp
Menhaden
Atlantic Silverside
Soft-Shelled Clam
Hard-Shelled Clam
Three-Spine Stickleback
Striped Mummichog



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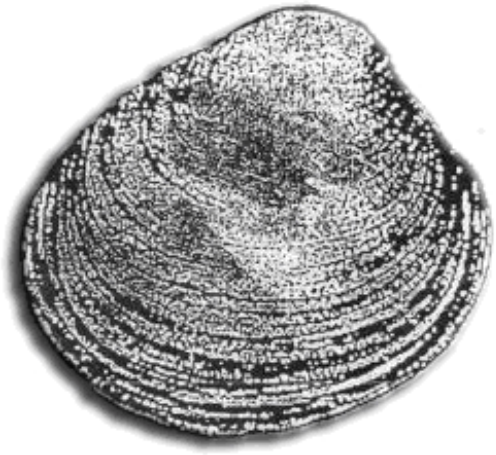
Soft-Shelled Clam
(Mya arenaria)

Eats: Phytoplankton
Zooplankton

Eaten By: Blue Crab
Northern Moon Snail
Striped Bass
Horseshoe Crab
Ring-Billed Gull
Humans



Hard-Shelled Clam
(Mercenaria mercenaria)

Eats: Phytoplankton
Zooplankton

Eaten By: Blue Crab
Northern Moon Snail
Horseshoe Crab
Ring-Billed Gull
Humans

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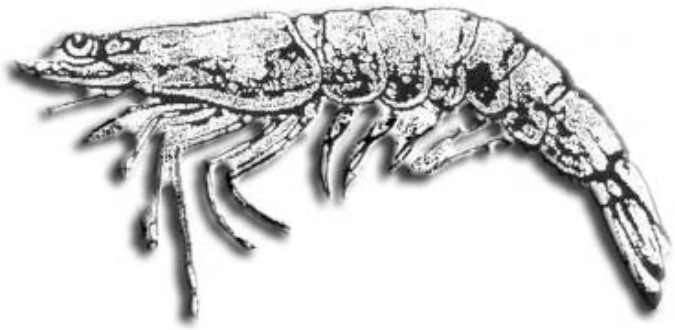
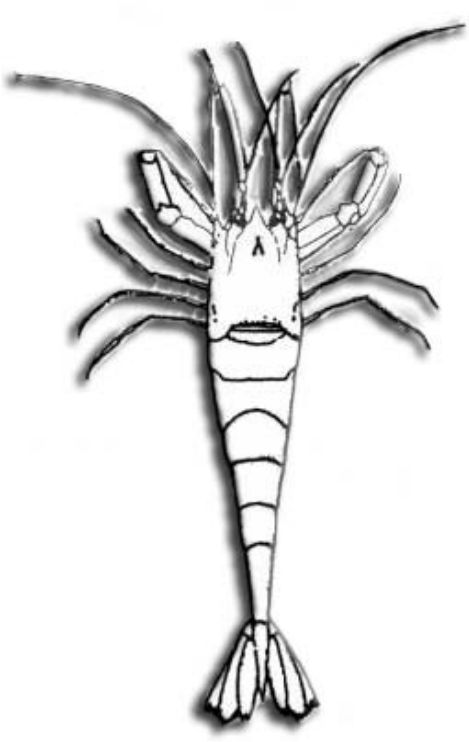
Shore Shrimp
(Palaemonetes sp..)



Eats:
Phytoplankton
Zooplankton

Eaten By:
Blue Crab
Weakfish
Summer Flounder
Bluefish
Three-Spine Stickleback
Atlantic Silverside
Striped Mummichog
Snowy Egret



Sand Shrimp
(Crangon septemspinosa.)

Eats:
Phytoplankton
Zooplankton

Eaten By:
Great Blue Heron
Weakfish
Summer Flounder
Bluefish
Horseshoe Crab
Atlantic Silverside
Striped Mummichog
Snowy Egret
Blue Crab
Three-Spine Stickleback

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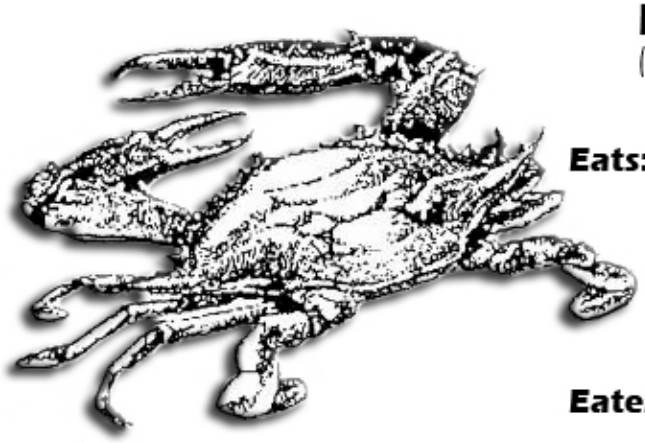
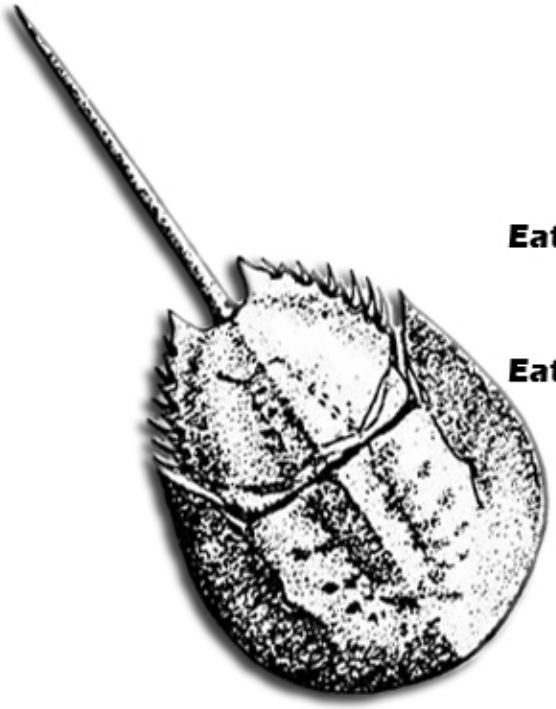


Blue Crab
(Callinectes sapidus)

Eats:
Atlantic Silverside
Soft-Shelled Clam
Hard-Shelled Clam
Shore Shrimp
Sand Shrimp
Northern Moon Snail
Flat-Clawed Hermit Crab

Eaten By:
Northern Lobster
Weakfish
Summer Flounder
Piping Plover
Humans
Bluefish



Horseshoe Crab
(Limulus polyphemus)

Eats:
Soft-Shelled Clam
Hard-Shelled Clam
Sand Shrimp

Eaten By:
Snowy Egret
Great Blue Heron
Ring Billed Gull

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Flat-Clawed Hermit Crab
(Pagurus pollicaris)

Eats: Atlantic Silverside
Striped Mummichog

Eaten By: Blue Crab
Northern Lobster

*Paguarus pollicaris is a scavenger

Northern Moon Snail
(Lunatia heros)

Eats: Soft-Shelled Clam
Hard-Shelled Clam
Northern Moon Snail

Eaten By: Blue Crab
Northern Lobster
Piping Plover
Other Moon Snails

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Atlantic Silverside
(Menidea menidea)

Eats:
- Phytoplankton
- Zooplankton
- Shore Shrimp
- Sand Shrimp

Eaten By:
- Three-Spine Stickleback
- Striped Bass
- Summer Flounder
- Bluefish
- Menhaden
- Snowy Egret
- Flat-Clawed Hermit Crab
- Great Blue Heron
- Northern Lobster
- Blue Crab
- Weakfish
- Ring-Billed Gull

Striped Mummichog
(Fundulus majalis)

Eats:
- Phytoplankton
- Zooplankton
- Grass Shrimp
- Sand Shrimp

Eaten By:
- Weakfish
- Striped Bass
- Summer Flounder
- Bluefish
- Menhaden
- Northern Lobster
- Flat-Clawed Hermit Crab

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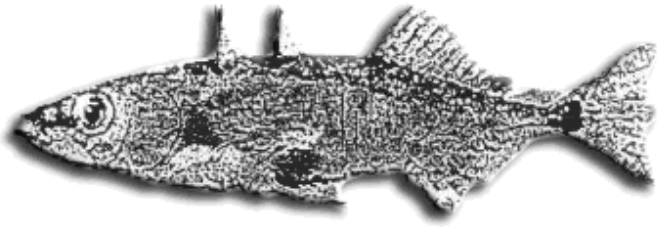
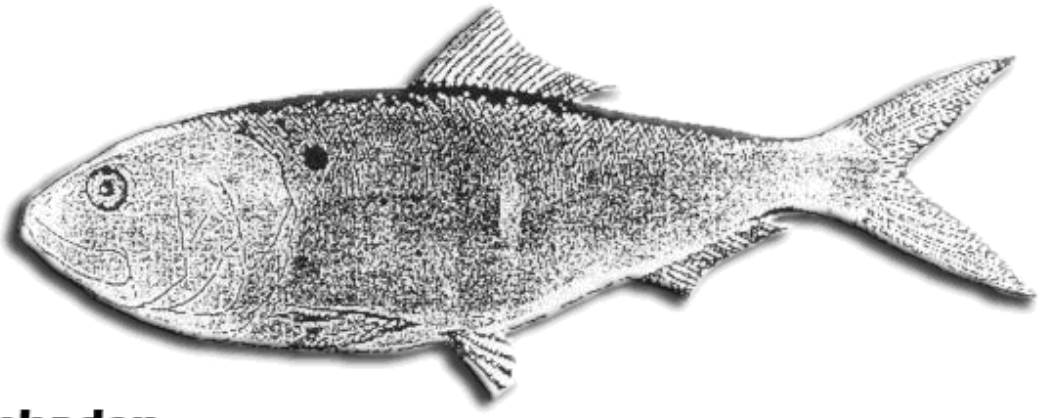


Three-Spine Stickleback
(Gasterosteus aculeatus)

Eats:
- Zooplankton
- Atlantic Silverside
- Shore Shrimp
- Sand Shrimp

Eaten By:
- Weakfish
- Striped Bass
- Bluefish
- Great Blue Heron
- Menhaden



Menhaden
(Brevoortia tryannus)

Eats:
- Phytoplankton
- Zooplankton
- Three-Spine Stickleback
- Striped Mummichog
- Atlantic Silverside

Eaten By:
- Osprey
- Striped Bass
- Humans
- Bluefish
- Weakfish

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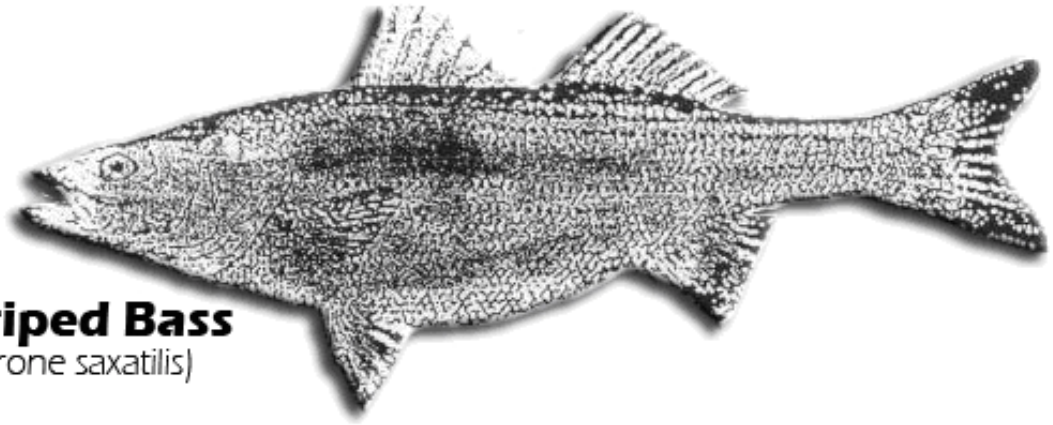
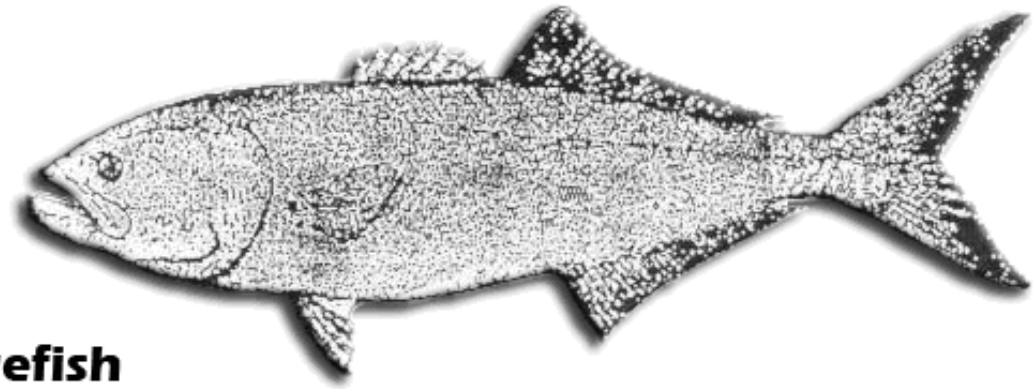


Striped Bass
(Morone saxatilis)

Eats:
Soft-Shelled Clam
Menhaden
Three-Spine Stickleback
Striped Mummichog
Atlantic Silverside

Eaten By:
Osprey
Humans



Bluefish
(Pomatomus saltrix)

Eats:
Shore Shrimp
Sand Shrimp
Blue Crab
Menhaden
Atlantic Silverside
Three-Spine Stickleback
Striped Mummichog
Northern Lobster

Eaten By:
Osprey
Humans

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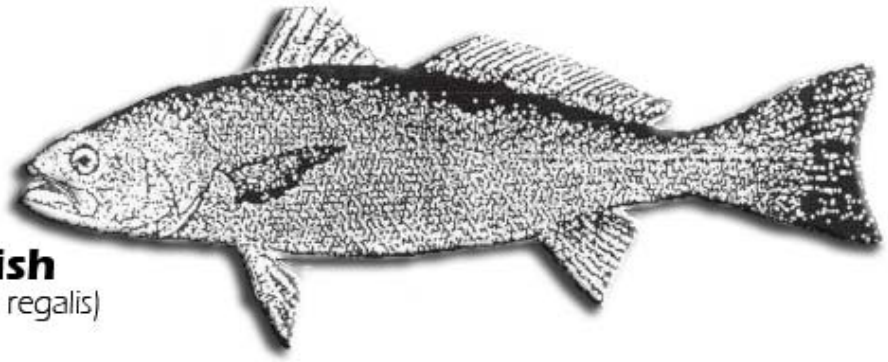
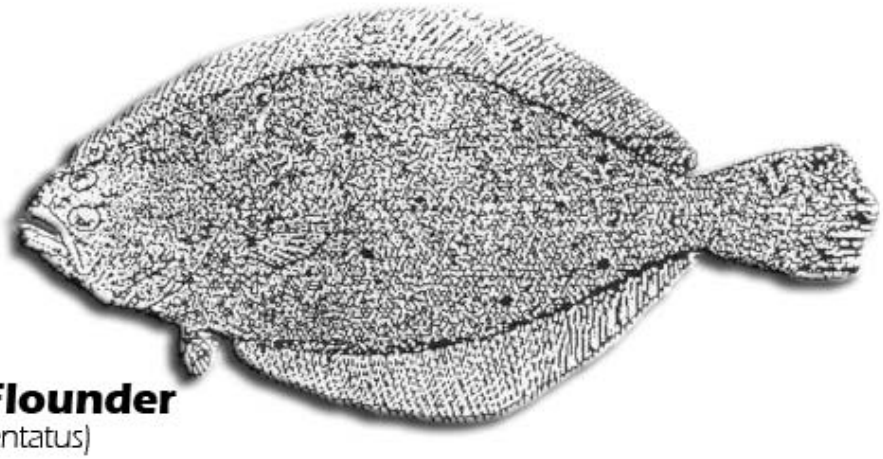


Weakfish
(Cynoscion regalis)

Eats:
Shore Shrimp
Sand Shrimp
Atlantic Silverside
Striped Mummichog
Blue Crab
Menhaden
Three-Spine Stickleback

Eaten By:
Osprey
Humans



Summer Flounder
(Paralichthys dentatus)

Eats:
Shore Shrimp
Sand Shrimp
Blue Crab
Atlantic Silverside
Striped Mummichog

Eaten By:
Osprey
Humans

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Northern Lobster
(Homarus americanus)

Eats:
Atlantic Silverside
Striped Mummichog
Northern Moon Snail
Blue Crab
Flat Clawed Hermit Crab

Eaten By:
Osprey
Humans
Bluefish

Piping Plover
(Charadruis melodus)

Eats:
Northern Moon Snail
Blue Crab

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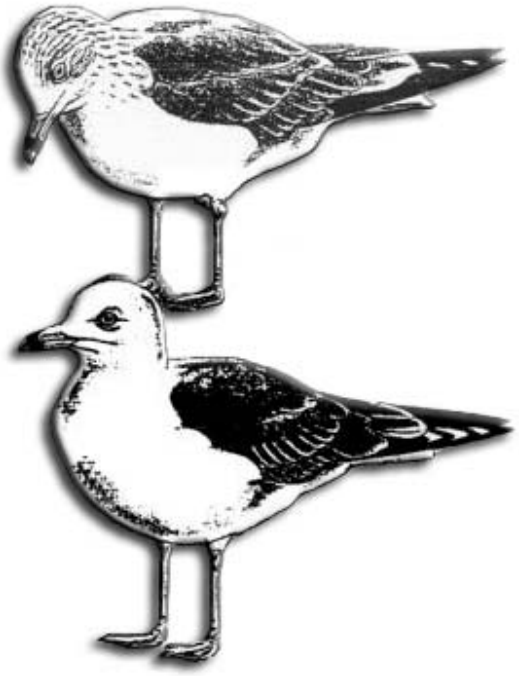
Ring-Billed Gull
(Larus delawarensis)



Eats:
- Hard Shelled Clam
- Soft-Shelled Clam
- Atlantic Silverside
- Horseshoe Crab

Osprey
(Pandion haliaetus)

Eats:
- Striped Bass
- Bluefish
- Mendaden
- Summer Flounder
- Weakfish

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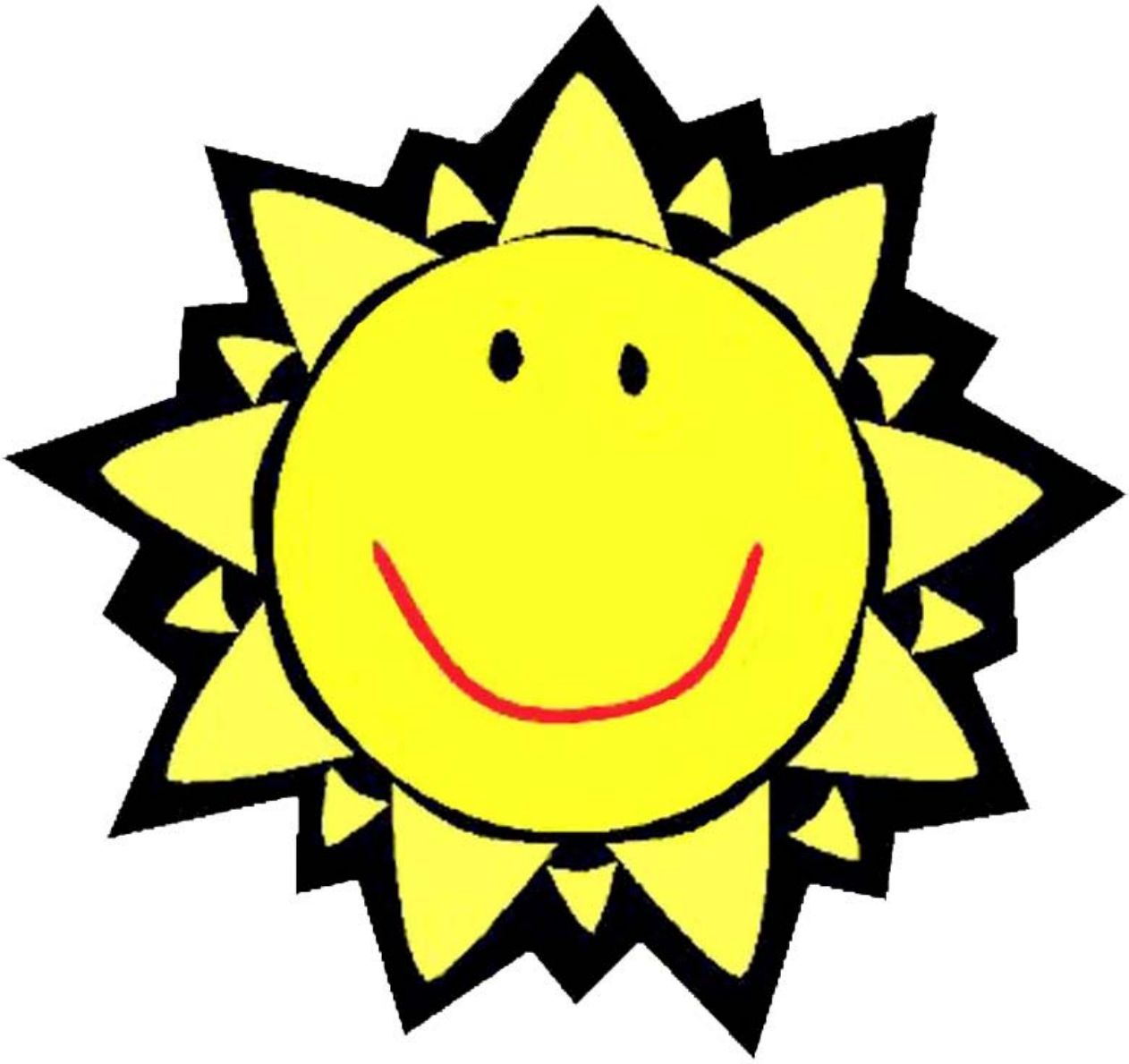
Humans
(Homo sapiens)

Eats:

- Northern Lobster
- Blue Crab
- Bluefish
- Menhaden
- Hard-Shelled Clam
- Striped Bass
- Summer Flounder
- Weakfish
- Soft-Shelled Clam

**Has been known to leave garbage behind



Sun