

Long Island Sound Activities

The following student activities were designed using available Long Island Sound resources. The resources listed below will be required for the activities in this chapter unless otherwise mentioned.

Page

- 17** *Invasive Species of Long Island Sound*
Poster available from Connecticut Sea Grant.
(860) 405-9128 web2.uconn.edu/seagrant
web2.uconn.edu/seagrant/whatwedo/ais
- 19** *Long Island Sound Worth Fighting For!*
DVD available by loan from Connecticut Sea Grant.
(860) 405-9128 web2.uconn.edu/seagrant
Teacher Dialogue guide also available from Connecticut Sea Grant.
- 21** *Sound Health 2008*
Hard copies available from Long Island Sound Study (203) 977-1541
and online at: www.longislandsoundstudy.net/soundhealth/index.htm
Hard copies also available from Connecticut Sea Grant.
(860) 405-9128 web2.uconn.edu/seagrant
- 23** *The Living Sound*
VHS video available on video loan from Connecticut Sea Grant.
(860) 405-9128 web2.uconn.edu/seagrant
- 25** *Sound Facts and Activities* - reprinted courtesy of Connecticut Sea Grant and
The Day (New London).
Additional Sound Facts available on the Long Island Sound Educational Resources
CD from Connecticut Sea Grant.
(860) 405-9128 web2.uconn.edu/seagrant
- 29** *Lobster Fun Facts* - reprinted courtesy of Connecticut Sea Grant.
See the rest of the *Wrack Lines* issue these were featured in:
web2.uconn.edu/seagrant/publications/magazines/wracklines/fallwinter04

Invasive Species of Long Island Sound

Student Activity

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Name: _____ Date: _____

Directions: Examine the poster (front and back) entitled *Invasive Species of Long Island Sound*, and answer the following questions.

1. What is meant by an invasive species?

2. Give six synonyms for the words "invasive species".
 - a.
 - b.
 - c.
 - d.
 - e.
 - f.

3. The freshwater zebra mussel is a problem in the Great Lakes (not in marine waters). Describe three ways that this species is a problem.
 - a.

 - b.

 - c.

4. Some invasive species bring disease. Explain how this is a problem with oysters in Chesapeake Bay and Long Island Sound.

5. How do introductions of invasive species influence biodiversity of a local marine habitat?

6. Give one example of an intentional introduction of a non-native species to an area.

7. Are most introductions of non-native species intentional or accidental?

Invasive Species of Long Island Sound

Student Activity

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8. For marine organisms, the most common forms of introduction are ballast water and hull fouling. Explain what each of these is and how each of these can introduce non-native species.

Your teacher will give you the name of an invasive species in Long Island Sound. Use the back of the poster for questions # 9 - 12 and then the internet to answer questions # 13 – 17 about your particular invasive species.

My invasive species is _____

9. What is the scientific name (genus and species)?

10. In what kingdom is it found?

11. In what phylum or division is it found?

12. Approximately when was it introduced to Long Island Sound?

13. How was it introduced to Long Island Sound?

14. For which native Long Island Sound specie(s) is your invasive species a problem?

15. How is your species a problem for other species?

16. Are there currently efforts to deal with or eradicate your invasive species?

17. What are scientists or managers doing to deal with your species? In other words, what actions are being taken?

Long Island Sound Worth Fighting For!

Student Handout

Name: _____ Date: _____

Directions: Answer the following questions after watching the video, *Long Island Sound Worth Fighting For!*

1. What makes Long Island Sound an estuary?
2. Why are estuaries important to us?
3. What is a "Sound"?
4. Why do we have such a diversity of animals in Long Island Sound?
5. What is the watershed of Long Island Sound?
6. What causes hypoxia?
7. What brought Native Americans to the coast of Long Island Sound?
8. What young American captain said "I regret that I have but one life to give for my country" (not mentioned in movie)?
9. What animal supported New London and Waterford in the 1850s?

Long Island Sound Worth Fighting For!

Student Handout

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10. What are most of the rocks in Long Island Sound named after?

11. In 1904 what happened to the *General Slocum*?

12. During Prohibition what were fisherman doing for extra money?

13. What drove the fishing fleet from New London?

14. What percent of Americans live within 50 miles of Long Island Sound?

15. What is the value of the fish and shellfish taken from Long Island Sound each year?

16. Why is it difficult for people to agree upon the health of Long Island Sound?

17. List five things that can be done to help Long Island Sound.
 - a.
 - b.
 - c.
 - d.
 - e.

Sound Health 2008

Student Handout

Name: _____ Date: _____

Directions: Use the Long Island Sound Study publication *Sound Health 2008* to answer the following questions.

1. What is the LISS?
2. What is hypoxia?
3. What causes hypoxia?
4. Where in Long Island Sound does hypoxia happen most frequently? Why?
5. Why are some male fish developing female traits?
6. Look at the graphs on page 4 and summarize the trend in toxic contaminants in Long Island Sound.
7. What are pathogens and how do they get in Long Island Sound?
8. What weather factor influences beach closures due to pathogens?
9. Why are shellfish beds in Jordan Cove closed after a rain storm?

Sound Health 2008

Student Handout

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10. List three possible impacts of climate change on Long Island Sound.

11. Compare the general health of the three basins in Long Island Sound (pages 8-9).

12. Why do you think the East and West basins in Long Island Sound have such different health conditions?

13. Summarize the fish consumption advisories on page 10.

14. What has probably caused the population of bluebacked herring to decline?

15. What caused the decline in osprey? How many osprey are around Long Island Sound now?

16. What is happening to Long Island Sound's salt marshes (page13)?

17. Why does water quality in Long Island Sound decline with human development?

18. List 10 things you can do to help save Long Island Sound.

The Living Sound

Student Handout

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Name: _____ Date: _____

Directions: Answer the questions after watching the video, *The Living Sound*.

1. What endangered osprey in the past? Give two examples.

2. What currently threatens the osprey?

3. List five things that make Long Island Sound an important place.
 - a.

 - b.

 - c.

 - d.

 - e.

4. What is at the base of all food chains in the ocean?

5. How do phytoplankton cause hypoxia?

6. What is non-point source pollution?

7. List four migrating species that enter Long Island Sound.
 - a.

 - b.

 - c.

 - d.

The Living Sound

Student Handout

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8. Why were the striped bass in danger years ago?

9. How can scales tell us the age of a bluefish?

10. Why do oyster beds need to be cleaner than the water we swim in?

11. List three ways that you can reduce waste going into Long Island Sound.
 - a.
 - b.
 - c.

12. List three benefits of salt marshes.
 - a.
 - b.
 - c.

13. Why is the presence of *Phragmites* (tall reeds) an indicator of a marsh in trouble?

14. Why are plovers and terns endangered?

15. List 10 things that you can do to protect Long Island Sound.

Sound Facts and Activities

Fun Facts About Long Island Sound

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The colorful Sound Facts graphics in this section were created to raise public awareness of Long Island Sound, but the concepts apply to most estuaries. They originally appeared as a weekly graphic feature in *The Day* (New London) newspaper. Many of the original features, by Peg Van Patten, Milton Moore, and Eamon O'Muin, have been compiled into a booklet available from Connecticut Sea Grant (a project funded by Connecticut Sea Grant and the E.P.A. Long Island Sound Study). The activities on the following pages were also featured in *Nor'easter Magazine*, Vol. 10, #1 & 2, 1998.



DID YOU KNOW?

The oceans contain 97% of all the water on earth.

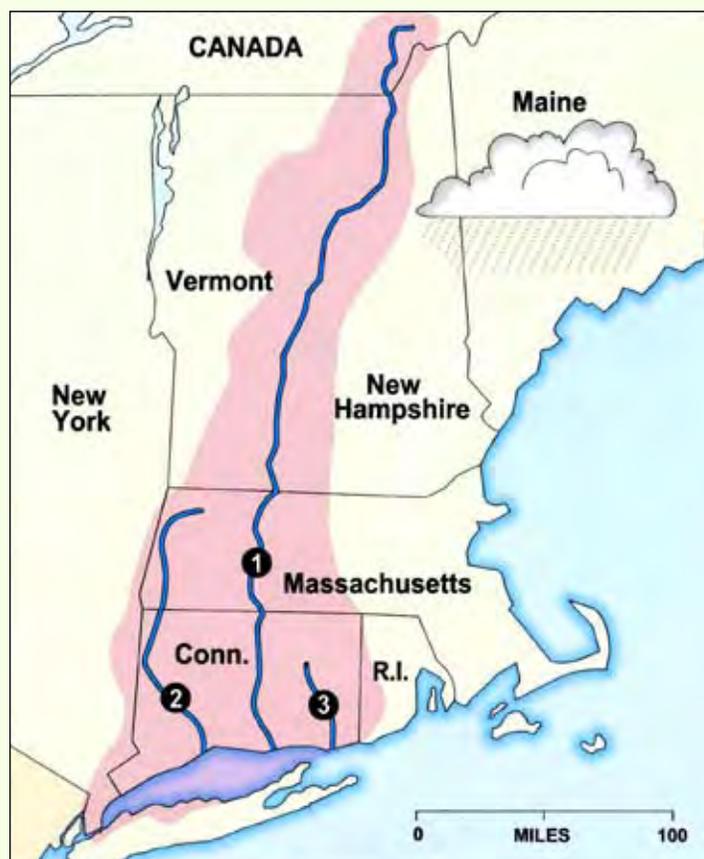
Contributed by Connecticut Sea Grant

Be a Watershed Detective!

Within a vast watershed like Long Island Sound's, there are many smaller watersheds, related to lakes, rivers, and streams. The boundaries of these watersheds are quite different from the boundaries between towns and states. Learn about your watershed by discovering where the water from your yard and neighborhood goes.

Next time it rains heavily, put on your galoshes and follow the water to see which direction it flows! Then note the storm drains on your street and find out where they lead. (Your town hall may be able to help.) Draw a simple map showing your local water bodies and watershed. Mark sites such as storm drains and major land uses that might impact the water. You might want to display your results in a library or town hall.

Sound Facts



We are the watershed

Do you live in the watershed of Long Island Sound? You do if you live anywhere in Connecticut, southwestern Rhode Island, or any other area shaded on the map. A watershed is land that collects rain water, sediments and dissolved materials that flow to rivers, their tributaries, and estuaries. The three rivers shown are ① the Connecticut, ② the Housatonic and ③ the Thames.

The Sound's watershed extends into Canada, covering an area of 15,820 square miles inhabited by 14.6 million people. Any pollutants entering the water in this vast area can ultimately harm the Sound.

Sound Facts and Activities

Fun Facts About Long Island Sound

Sound Facts

There's gold in them thar waves

In addition to salt, the sea water in Long Island Sound contains small amounts of many trace elements, including metals such as gold. While the gold in sea water accounts for only 3 parts per trillion by weight, the volume of the Sound is quite large. If all of the gold could be extracted it would add up to more than 440 pounds, worth well over \$2 million dollars. A warning to prospective prospectors – the gold is so widely dispersed in such small quantities, you'd probably go broke collecting it.



Source: Peg Van Patten, E. O'Muin/Connecticut Sea Grant Milton Moore/The Day

Hidden Riches

The first step in discovering how much treasure lies hidden beneath the waves of Long Island Sound, or any other estuary, is to figure out how much sea water it holds. So calculate the volume of water in the Long Island Sound basin. Give your answer in cubic meters. Hint: Assume that the estuary is a shallow rectangular box, about 110 miles long by 13 miles wide (on average) and typically 60 feet deep. Recall that there are 5,280 feet in a mile, and 0.305 meters in a foot.

Answer: about 68 billion cubic meters (6.8×10^{10} cubic meters)

More Fun:

Write a story about pirates! Then go to the library and find out about real pirates, such as Captain Kidd, who is rumored to have buried treasure on the shores of Long Island Sound.

The Ocean is a Salty Soup

Seawater in the open ocean is said to have a salinity of 3.5 percent, or 35 parts per thousand (ppt), as oceanographers put it. William Dittmar, a marine chemist, pointed out the "Constancy of Composition" of seawater when it comes to the major dissolved constituents. Thus if one seawater sample had a salinity of only 32 ppt compared to an open ocean sample with a salinity of 35 ppt, then the first sample would contain only 91 percent of the sodium contained in the open ocean sample. If an open ocean sample consists of 0.13 percent magnesium by weight, then what percentage of a coastal seawater sample of 28 ppt salinity is made up of that light metal?

The 3.5% Solution

Label one clear glass measuring cup or beaker "fresh water" and another "salt water." Fill each with enough water to submerge an egg. Pour 12 teaspoons of salt into the salt water beaker and stir. Place an egg into each beaker. *What happens?*

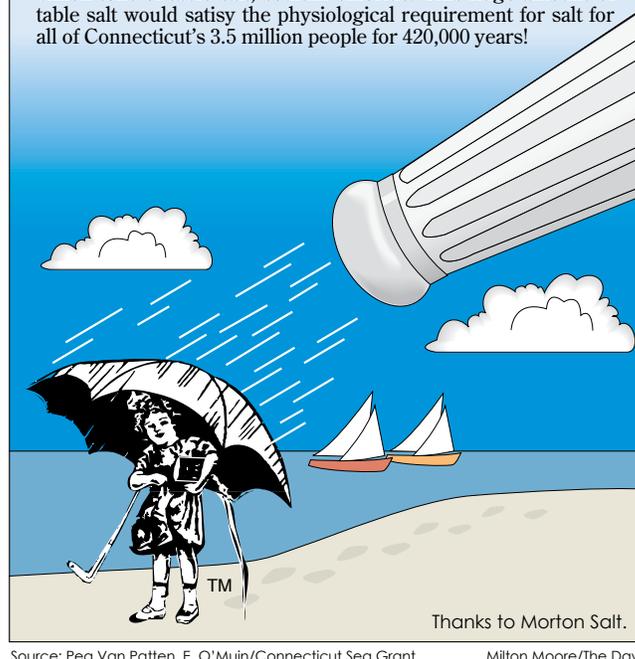
The egg sank in fresh water but floated in the salty water because salt water is more dense and produces greater buoyancy. How might this affect sea life in a salt water environment?

Buoyancy

Sound Facts

Salt to taste

Dissolved in the 67 billion tons of water in Long Island Sound are almost 2 billion tons of sea salt, which gives the waters of the Sound a saltiness — or salinity — of 28 parts per thousand on average. Included among the components of this sea salt are 1.5 billion tons of table salt, sodium chloride. This huge amount of table salt would satisfy the physiological requirement for salt for all of Connecticut's 3.5 million people for 420,000 years!



Source: Peg Van Patten, E. O'Muin/Connecticut Sea Grant Milton Moore/The Day

Thanks to Morton Salt.

Answer: 0.104%

Sound Facts and Activities

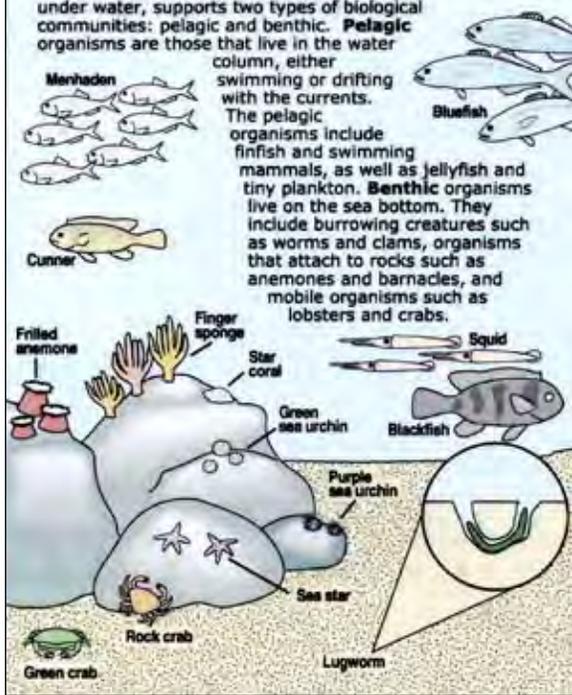
Fun Facts About Long Island Sound

Sound Facts

Upstairs, downstairs

The area of the Sound below the intertidal zone, where marine life is always submerged under water, supports two types of biological communities: pelagic and benthic. **Pelagic** organisms are those that live in the water column, either swimming or drifting with the currents.

The pelagic organisms include finfish and swimming mammals, as well as jellyfish and tiny plankton. **Benthic** organisms live on the sea bottom. They include burrowing creatures such as worms and clams, organisms that attach to rocks such as anemones and barnacles, and mobile organisms such as lobsters and crabs.



Upstairs, downstairs

From the burrowing invertebrate animals of the benthic community to the finfish swimming up above, see if you can create a model living community using a flannel board. Cover a large piece of foam board or heavy cardboard with a length of blue flannel from a fabric store. This will represent Long Island Sound. Set the board on an easel or other stand so everyone can reach it. Use different colors of flannel fabric to cut out the animals that live both "upstairs and downstairs" as well as an area of a sandy bottom and rocks. The flannel cutouts will stick directly on the flannel-covered board as long as the cutouts are not too heavy. You might want to explore alternative materials such as velcro for backing the cutouts or a pegboard with hooks.

Once all the pieces are assembled, you can create your own game of "Upstairs, downstairs." For example, you might form two teams, each with half of the animal cutouts. Each team member would be responsible for placing an animal either in the benthic or pelagic community on the flannel board. You might challenge one another to name each of the animals correctly as you place them or create artistic labels for each. Add more animals that you might know about. Use the flannel board to create a story about the living resources in Long Island Sound.

Contributed by New York Sea Grant

Jelly Fun

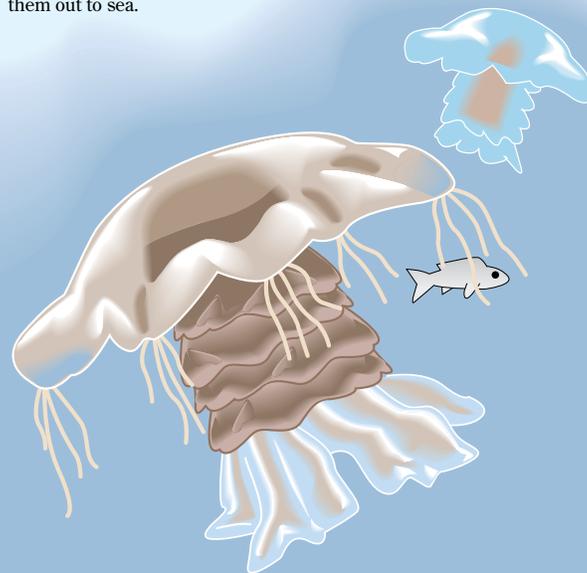
Test your knowledge about jellyfish in this true-or-false quiz:

1. A jellyfish is a type of fish.
2. All jellyfish sting.
3. You're safe from being stung by a jellyfish once it dies.
4. Adult moon jellyfish live for 7–10 years.
5. The biggest jellyfish can reach 8 feet across.
6. Sea turtles, ocean sunfish, and sea slugs aren't the only animals that eat jellyfish. Some people eat them too.
7. Jellyfish appeared on earth about 65 million years after dinosaurs became extinct.
8. Jellyfish are considered to be plankton, as is most of the food that they eat.
9. Jellyfish don't have gills or lungs.
10. Coral and anemones are related to jellyfish.

Sound Facts

Stinging jellyfish

Warm summer waters attract an unwelcome visitor to Long Island Sound, the **lion's mane jellyfish**. This jellyfish, easily identifiable by its eight-lobed umbrella and reddish color, is a plague to swimmers. Its eight clusters of tentacles cause burning and itching when touched. In the Sound, they range from 4 inches to a foot in size, but in Arctic waters, they may grow to a diameter of 8 feet. Many small fish swim with the jellyfish, seeking shelter from predators under its umbrella. The red jellyfish will leave shortly as northerly winds and cooler waters drive them out to sea.



Source: Connecticut Sea Grant

Milton Moore/The Day

Answers: 1. False 2. False 3. False 4. False. In the wild they live for only one summer. 5. True (the lion's mane jelly) 6. True 7. False. Jellyfish showed up 650 million years ago, which was 40 million years before the dinosaurs. 8. True 9. True. They absorb oxygen directly through the thin walls of their outer membrane. 10. True

Contributed by The Maritime Aquarium and Connecticut Sea Grant

Sound Facts and Activities

Fun Facts About Long Island Sound

Those Amazing Algae

Kelp has been valued for its health benefits for centuries. In fact, ancient Egyptians are thought to have used kelp to treat breast cancer. Because alginate in kelp binds with some radioactive elements, allowing heavy metals to be released from the body, kelp diets are being used as treatment for some of the children experiencing radiation illnesses related to the Chernobyl nuclear power plant disaster that occurred in Russia in 1986.

Contributed by Connecticut Sea Grant

Kelp = Help for Chernobyl victims



Seaweed farmer Ike Levine, CEO of Coastal Plantations, Inc.

Contributed by Connecticut Sea Grant

What would a seaweed farmer look like?

Draw a picture and write a story about a seaweed farmer.



Sound Facts

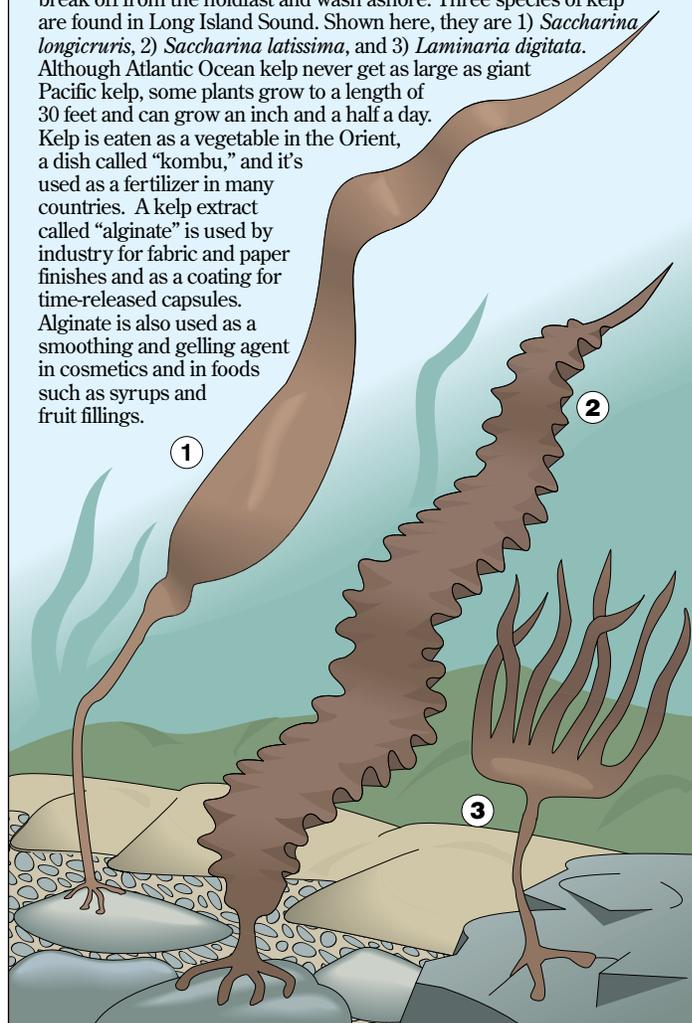
Common and useful kelp

Kelp are subtidal brown algae that attach to rocks by means of a claw-like structure called a "holdfast." During a storm, ruffy banners of kelp may break off from the holdfast and wash ashore. Three species of kelp are found in Long Island Sound. Shown here, they are 1) *Saccharina longicruris*, 2) *Saccharina latissima*, and 3) *Laminaria digitata*.

Although Atlantic Ocean kelp never get as large as giant Pacific kelp, some plants grow to a length of 30 feet and can grow an inch and a half a day.

Kelp is eaten as a vegetable in the Orient, a dish called "kombu," and it's used as a fertilizer in many countries. A kelp extract called "alginate" is used by industry for fabric and paper finishes and as a coating for time-released capsules.

Alginate is also used as a smoothing and gelling agent in cosmetics and in foods such as syrups and fruit fillings.



Source: Peg Van Patten/Connecticut Sea Grant

Milton Moore/The Day

- Kelp
- Holdfast
- Alginate
- Cosmetic
- Ice Cream
- Chocolate Milk
- Salad Dressing
- Algae
- Kombu
- Ocean
- Yogurt
- Catsup
- Syrup

More Fun:

What foods and other products in your home use seaweed to make them creamy or gooey? Hint: ice cream, syrups, fruit fillings, chocolate milk, toothpaste, and soap, to name a few. Check packages in the grocery store for products containing the ingredients "agar", "alginate", or "carrageenan."

Contributed by The Maritime Aquarium and Connecticut Sea Grant

Lobster Fun Facts

Student Handout

The following activities were originally featured in *Wrack Lines* 4:2. Visit web2.uconn.edu/seagrant/publications/magazines/wracklines/fallwinter04 to view this issue and learn about Sea Grant funded research focused on American lobster health as well as the Long Island Sound Lobster die-off of 1999.

Thinking Cap

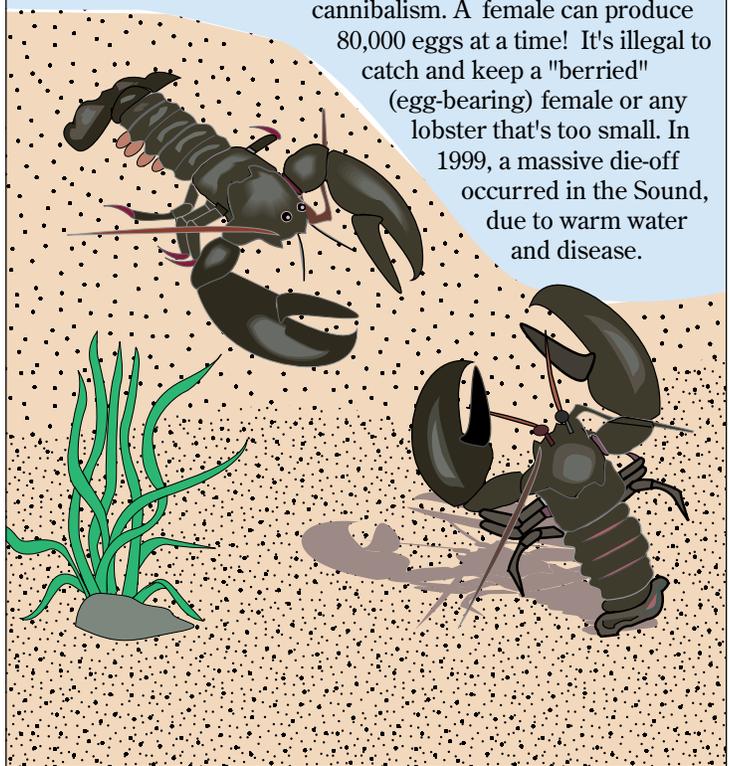
As you read about lobsters in *Wrack Lines* 4:2 and on the following pages answer these questions:

1. Why does the lobster back into its burrow?
2. Who might the predator be?
3. Why is a female lobster carrying eggs said to be "berried"?
4. Do lobsters swim?

Sound Facts

A crusty crustacean

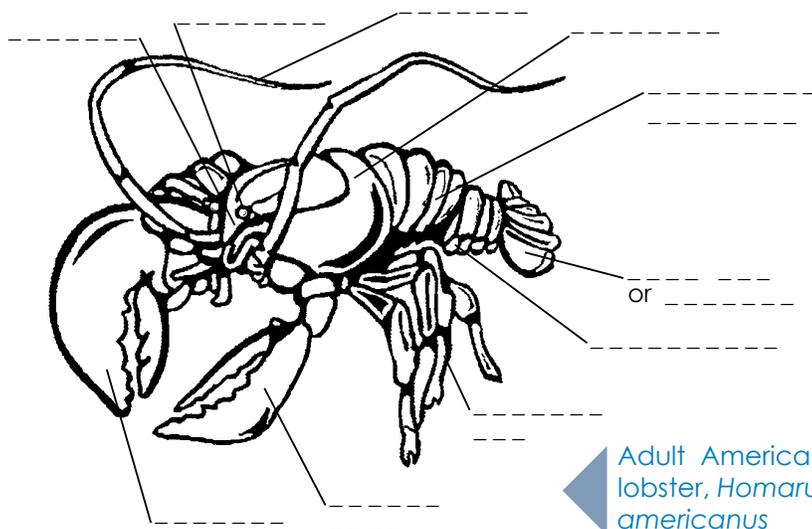
Put up yer dukes and fight! American lobsters, *Homarus americanus*, are aggressive decapod (ten-legged) crustaceans. They assume a fighting posture and wave their large, meaty claws when threatened. Lobsters like to live alone, in burrows or rock crevices. They shed their outer shell, the carapace, many times during their youth—just like you outgrow your shoes. Their diet includes many other sea creatures including their relatives (crabs) and if food is scarce, they may resort to cannibalism. A female can produce 80,000 eggs at a time! It's illegal to catch and keep a "berried" (egg-bearing) female or any lobster that's too small. In 1999, a massive die-off occurred in the Sound, due to warm water and disease.



Source: Peg Van Patten

Connecticut Sea Grant

Name that lobster body part!



Adult American lobster, *Homarus americanus*

Can you name the parts of a lobster's body, filling in the spaces on the drawing at left? Lobsters have a hard outer covering, the shell or "exoskeleton", that is shed many times as they grow. The process is called molting. Their soft flesh is temporarily exposed as they grow a new shell. Like other crustaceans, they have segmented bodies with jointed appendages. Because it has ten legs, it is classified as a decapod (deca=10, pod=foot).

Lobster Fun Facts

Student Handout

How well do you know lobsters??

How does a lobster smell?

The lobster smells or senses its food by using four small antennae located on the front of its head and tiny sensing hairs that cover the body.

Do lobsters have teeth?

The teeth of a lobster are in its stomach. This stomach is located close to the mouth, and the food is actually chewed in the stomach between three grinding surfaces called the "gastric mill" that look like molar teeth.

What color are lobsters?

The American lobster is usually greenish brown when alive. However, they also come in blue, yellow, red, and white. Except for the white ones, they all turn red when cooked.

Is lobster blood red?

No. Lobster blood is usually clear to

gray or pale blue color, but it can sometimes be orange, green, or pink.

How big is a lobster egg?

A lobster egg is about the size of the head of a pin.

How many eggs does a female lobster (a "berried" egger) produce?

It depends on the size of a lobster. A one-pound lobster usually has between 8,000 to 12,000 eggs. However, only about one tenth of one percent of those eggs will develop and survive longer than six weeks.

Are lobsters "right-handed", "left-handed", or both?

You can tell by which side the larger crusher claw is on. Lobsters are usually right-handed-the crusher claw is on the right and the smaller pincer or ripper claw is on the left. It is very rare for a lobster to have two crusher claws.

What do lobsters eat?

Lobsters eat primarily live food, which includes crabs, clams, mussels, starfish, sea urchins, and sometimes even other lobsters.

What part of a lobster is measured to determine if it is large enough to keep?

A gauge is placed between the eye socket and the end of the large body shell, called the carapace, to measure the lobster.

What are "shorts" or "snappers"?

They are undersized lobsters that a lobsterman throws back into the ocean so they can grow to legal size.

How old can a lobster be?

No one has found a way to determine the exact age of a lobster, because it sheds its shell, or molts, periodically. However, researchers think that lobsters can live to be 100 years old. In contrast, Long Island Sound lobsters generally live only 5-7 years.

Lobster Word Search!

Find the 26 words listed below in the puzzle and circle them. Words may be backwards, forwards, vertical, horizontal, or diagonal. When you're done, find the secret message hidden in the remaining letters and fill in the spaces.

- | | | |
|----------|------------|------------|
| ANTENNAE | CRUSTACEAN | OCEAN |
| BAIT | DECAPOD | PINCER |
| BERRIED | EGGER | POTS |
| BLUE | EYESTALK | RED |
| BOAT | HOMARUS | SHELLS |
| BOIL | LARVAE | SWIMMERETS |
| CARAPACE | LOBSTERMEN | TOMALLEY |
| CRUSHER | MOLT | TRAPS |
| CLAW | MUD | |

N	E	M	R	E	T	S	B	O	L	L	O	D	P	S
D	E	I	R	R	E	B	N	G	L	I	E	B	I	T
N	A	E	C	A	T	S	U	R	C	C	O	V	N	E
E	T	H	E	L	O	B	S	T	A	I	E	R	C	R
C	S	Y	N	G	N	E	A	P	L	Y	X	T	E	E
N	A	E	C	O	U	N	O	T	U	V	A	R	R	M
P	I	R	T	B	T	D	B	A	I	I	R	A	W	M
O	H	A	A	E	A	L	I	O	L	E	E	P	V	I
T	O	G	N	P	U	I	Y	B	R	A	G	S	C	W
S	M	N	T	E	A	T	T	E	Q	V	G	F	L	S
C	A	L	L	N	O	C	H	N	W	R	E	P	A	L
E	R	O	O	D	J	S	E	F	K	A	K	T	W	I
I	U	A	M	E	U	Q	S	H	E	L	L	S	J	D
T	S	C	I	R	E	Y	E	S	T	A	L	K	U	A
V	G	I	C	J	V	G	Y	E	L	L	A	M	O	T

When you've finished the word search, write the hidden message here: _____!

Lobster Fun Facts - Solutions

Lobster word search solution:



Hidden message: "LONG LIVE THE LOBSTERS"

Thinking Cap answers:

1. The lobster backs into its burrow so that its large claws are facing out - the best position for fighting.
2. The lobster predator could be a bigger lobster, a large fish, an octopus, or perhaps a human.
3. The eggs, which are round and can be many colors, resemble clusters of berries.
4. Although some of the lobsters' legs are adapted for swimming, as adults they prefer to crawl.

Name that lobster body part!

