

Directions for Playing “Hatch to Catch”

http://www.bigelow.org/hatch_to_catch/

Make sure that the entire group follows the scenario listed below. The simulation is exciting and fun to use, but can be a bit cumbersome until fully explored. Ensure the participants that they will have ample time in the afternoon to explore the simulation independently.

Explain that this activity can easily become a discovery learning activity with students, but in the interest of time this morning, it will be presented as a guided tour.

Post the following “rules” in the room, either on a large sheet of paper or board and review with group before starting.

Lobster “rules” to remember:

- 1) Temperature controls how long the larvae will take to develop through stages.
- 2) Speed determines how far the larvae will travel before they are ready to settle.
- 3) Settled lobsters grow more quickly in warmer waters, in general, Gulf of Maine waters are colder at depth.
- 4) Think about the bottom type lobsters might need for protection. Choose from ledge, sand, cobble, mud or diverse.

Scenario 1 - Nova Scotia

Access Hatch to Catch (http://www.bigelow.org/hatch_to_catch/)

Read the first screen and click “Continue”

Read the second screen and click “I’m Ready to Play”

Click “Chose Hatch Area”

Click “Go ‘ta’ Nova Scotia”

Click “Offshore” Spot

Watch animation run to see which direction the currents are pushing the larvae. Each dot represents 5 days of travel.

Click “Data/Settle”

Read the stats.

Click on “Settle Here”

Click on “Settle Now”

On your data sheet, record settling depth, water temperature, bottom type and how many original lobsters grew and to what stage did they mature. Would this be a good place for lobster larvae to settle?

Click the “back” button on your browser.

Click “Delay 3 Days”

On your data sheet, record settling depth, water temperature, bottom type and how many original lobsters grew and to what stage did they mature. Would this be a good place for lobster larvae to settle?

Click the “back” button on your browser

Click “Delay 6 Days”

On your data sheet, record settling depth, water temperature, bottom type and how many original lobsters grew and to what stage did they mature. Would this be a good place for lobster larvae to settle?

What are some of the needs/limiting factors for successful life cycles of lobsters?

Currents

Depth

Temperature

Bottom type

Allow participants to discover this while working through the activity, but ensure that all participants understand limiting factors before the scientist presentation.

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Nova Scotia – Offshore

“Settle Now”

Settling depth:

Water temperature:

Bottom type:

How many original lobsters grew and to what stage did they mature.

Would this be a good place for lobster larvae to settle?

“Delay 3 Days”

Settling depth:

Water temperature:

Bottom type:

How many original lobsters grew and to what stage did they mature.

Would this be a good place for lobster larvae to settle?

“Delay 6 Days”

Settling depth:

Water temperature:

Bottom type:

How many original lobsters grew and to what stage did they mature.

Would this be a good place for lobster larvae to settle?

What are the needs/limiting factors for successful life cycles of lobsters?

Do you think other species might have similar limiting factors?

How might real time data help lobster/fisheries resource managers?

Larval Lobster Recruitment

Objectives

Students will be able to:

- determine factors necessary for successful lobster maturation
- interpret real time data to predict areas where lobster larvae may thrive

Materials

Computers with Internet access

Worksheet

Map of coastal area of interest

Background

The American lobster, *Homarus americanus*, has a complex life history (Lobster Conservancy Life Cycle Chart <http://www.lobsters.org/research/research.html>) which includes a planktonic larval phase and a large-bodied benthic phase. Larval and post-larval lobsters can drift in the water column for a couple of months before settling on the bottom. Once they do settle, they find shelter in beds of cobbles and boulders until they are large enough to defend themselves.

To understand lobster recruitment processes, it is important to know where the larvae and postlarvae are coming from, how they are transported to the inshore recruitment habitats, and how the various larval stages are distributed in the water column. Current scientific research in this field involves sampling lobster larvae at various depth levels and then, using circulation models, determine how the vertical distribution of larvae interacts with circulation to affect transport rates and patterns. Information collected through these studies will contribute to ongoing lobster recruitment studies that could be used ultimately to help manage the fishery. (Understanding the Lobster Fishery <http://www.penbay.net/lobster.htm>)

Procedure

- 1) Have students play with the Hatch to Catch simulation from Bigelow Lab in the Gulf of Maine. http://www.bigelow.org/hatch_to_catch/
- 2) What are the four major influences on lobster larvae surviving to maturity?
- 3) Use the real time data links to determine an optimal location for American lobster larvae to settle:

Sea Surface Temperature Data

Gulf of Maine

(http://marine.rutgers.edu/cool/sat_data/?nothumbs=0&product=sst®ion=maine)

(<http://www.gomoos.org/buoy/satellite.html>)

Coastal New Jersey

(http://www.thecoolroom.org/boaters/boat_sst.htm)

Chesapeake Bay

(http://marine.rutgers.edu/cool/sat_data/?product=sst®ion=chess¬humbs=0)

CODAR

Gulf of Maine

(<http://www.gomoos.org/codar/>)

Coastal New Jersey

(http://www.thecoolroom.org/boaters/boat_codar.htm)

Chesapeake Bay

Altimetry Data

(https://www.fnmoc.navy.mil/products/WAM/natl_swht_000.gif)

Gulf of Maine

(<http://www.gomoos.org/waveforecasts/>)

Coastal New Jersey

Chesapeake Bay

Coastal Breezes

Gulf of Maine

(<http://www.gomoos.org/atmosphericconditions/>)

Coastal New Jersey

(http://www.thecoolroom.org/boaters/boat_met.htm)

Chesapeake Bay

4) Is there currently an area in the Gulf of Maine that would be considered an optimal location for American lobster larvae?

5) Would the coastal waters off New Jersey be considered an optimal location for American lobster larvae? Explain.

6) Would the Chesapeake Bay be considered an optimal location for American lobster larvae? Explain.

7) How would you find out what the substrate is in these areas?

8) How might coastal breezes have an impact on optimal locations for lobster larvae?

9) How might real time data and computer modeling help managing the lobster fishery?

Questions?? Ask the Lobster Doc

(<http://www.lobsters.org/ldoc/ldocindx.html>)

Adopt A Lobster - Tagging Lobsters

(<http://www.lobsters.org/misc/adoption.html>)

Assessment

Have students, independently or in groups create a concept map regarding the factors necessary for lobster maturation.

Extension

Other species of lobster all over the world are being studied using similar methods. Explore the following information and use real time data to determine optimal locations for the larvae.

Spiny lobsters

<http://sealevel.jpl.nasa.gov/science/lobster.html>

Florida Sea Surface Temperature

(http://marine.rutgers.edu/cool/sat_data/?nothumbs=0&product=sst®ion=floridacoast)

Florida Altimetry Data

(https://www.fnmoc.navy.mil/products/WAM/natl_swht_000.gif)

Australian Rock Lobster

<http://www.frdc.com.au/pub/reports/files/97-139.htm>

<http://iri.columbia.edu/climate/ENSO/societal/example/Griffin.html>

<http://www.csiro.au/index.asp?type=mediaRelease&id=PrRocklobster>

<http://www.fish.wa.gov.au/comm/broc/lobster/lobcmgy.html>

Australian RTD

(<http://www.aodc.gov.au/>)

1) What are the four major influences on lobster larvae surviving to maturity?

- 1)
- 2)
- 3)
- 4)

2) Based on the real time data, is there currently an area in the Gulf of Maine that would be considered an optimal location for American lobster larvae? Explain.

3) Would the coastal waters off New Jersey be considered an optimal location for American lobster larvae? Explain.

4) Would the Chesapeake Bay be considered an optimal location for American lobster larvae? Explain.

5) How might coastal breezes have an impact on optimal locations for lobster larvae?

6) How might real time data and computer modeling help managing the lobster fishery?