

# Web Introduction to DEI\* FOR LESSON 1

(The Downeast Institute for Applied Marine Research and Education)  
Home page – <http://www.downeastinstitute.org/>

\*Our website is updated periodically. Before using this exercise with a class, check the website for updates.

**1) Click to “Mission” in “About Us.”** In what 3 ways does DEI hope to improve the quality of life for people of downeast and coastal Maine?

DEI hopes to improve the quality of life for the people of downeast and coastal Maine through applied marine research, technology transfer, and public marine resource education.

**2) Click on “History” in “About Us.”** In 1987, in the town of Beals in Washington county in Maine (state), Dr. Brian Beal became involved with local clammers and town officials who were concerned about the declines in *Mya arenaria*, the soft-shell clam.

3) Located on Perio Point, Beals, Maine, BIRSH stood for Beals Island Regional Shellfish Hatchery and was the first public shellfish hatchery.

4) Over the next 16 years, hundreds of millions of clams were raised for 40 towns.

5) List 3 technical processes of clam production that were developed at BIRSH.

Three technical processes of clam production that were developed at BIRSH were growing clams, overwintering clams, and seeding clam flats.

6) Scroll down through the photos in “History.” Briefly describe DEI’s (formerly BIRSH) present location and facility.

There are many acceptable answers. DEI is located on Black Duck Cove on Beals, Maine. The facility is located on 8.5 acres of land with 2000 feet of deep-water frontage. The facility has a shellfish hatchery, seawater and freshwater laboratory, and marine education center. There are plans to expand in the future. Currently a new pier is under construction.

7) Click to “Current Pier Project” in “About Us.” The replacement pier will measure 30 feet by 100 feet and is constructed of 100% fiber composite. At extreme low tide, there will be a water depth of 10 feet.

8) Click to “Staff” in “About Us.” Staff members at DEI include: Staff members at DEI are Dr. Phil Yund, Dr. Brian Beal, George Protopopescu, Kyle Pepperman, and Cody Jourdet.

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9) **Click to “Our Senior Scientist.”** His name is \_\_\_**Dr. Phil Yund**\_\_\_ and his research is in **\_marine ecology and fisheries ecology\_**.

10) DEI is affiliated with a local college, **\_ University of Maine at Machias \_**, which has its Marine Field Station at Black Duck Cove.

11) **Click to “Board of Directors.”** List one of them. **Several choices are available.**

12) **Click on “DEI’s Future.”** Why does DEI plan to add a marine research laboratory? Dormitory and dining hall?

**DEI plans to add a fully equipped marine research laboratory for local fisherman, marine entrepreneurs, marine scientists, and students to use. A dormitory and dining hall is planned for longer stays.**

13) **Click on “Summer Employment.”** What employment opportunities are available for this year? **Two positions for undergraduate students are available at this time; One in the study of the growth rates and survival of two species of blue mussels; one in the study of the coastal circulation around Great Wass Island.**

14) **Click on “Current Research.”** Briefly describe one of the current research projects at DEI. Use the back of this page.

**DEI is growing soft shell clam for introduction into the wild environment at various locations, using many techniques for survival; DEI, with the help of local fishermen, is moving wild scallops into closed areas to see if the scallops will survive and grow; DEI is working with a local clammer in a farming project using hard shell clams; DEI is involved in a lobster project using tidal pounds to grow young lobsters; DEI has successfully brought clams from the Gulf of St. Lawrence to the lab to examine the fate and growth of this raw sushi delicacy, popular for its red-colored foot**

**SOFT-SHELL CLAMS – For the past 20 years, DEI has produced and continues to produce seed clams for shellfish conservation committees in Maine, New Hampshire, Massachusetts, and Eastern Canada. DEI continues to be involved in experiments and research with soft-shell clams, completing projects with Edmunds, Stockton Springs, and Hampton Harbor, New Hampshire.**

**SCALLOPS – In conjunction with Jonesport and Beals fishermen, Maine DMR, and the University of Maine Sea Grant Extension, DEI is involved in a project that has two main concentrations: 1) moving scallops into areas currently closed to digging as an attempt to bring back a once lucrative industry 2) collecting wild scallop spat (seed) using collectors that have been tried in Canada, Chile, and Japan. The project is funded by the Northeast Consortium (UNH, UM, MIT, and Wood’s Hole)**

**HARD CLAMS – *Mercenaria mercenaria*-DEI is working with Mr. Joseph Porada in a clam-farming project on lease sites in Goose Cove. With funding from the Maine Technology Institute, DEI successfully spawned adult hard clams using brood stock collected in Trenton. Employing many techniques similar to those used in rearing soft-shell**

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clams, DEI raised, over wintered, and seeded the hard clams at Goose Cove. Dr. Beal and the staff will continue to work with Mr. Porada.

LOBSTERS – Working under a grant from Maine DMR, DEI is trying to determine how fast lobsters grow and whether their growth is influenced by the region or substrate on which they settle. Cages of juvenile lobsters were deployed at York, Boothbay, Tenants Harbor, Stonington, Beals, and Cutler. Two measures of aging will be taken.

With funding from the Washington County Fund of the Maine Community Foundation, a second study is the feasibility of raising lobsters in tidal pounds for stock enhancement purposes. Dr. Beal and Dr. Robert Bayer, Director of the Lobster Institute at UM will hatch and rear lobsters. The effort is aimed at discovering alternatives if Maine's lobster fishery should suffer a decline.

**15) Click on “Published Research.” List one research topic.** (Your teacher may have you read and summarize the findings of one of the published articles.) **If the instructor wishes, this question can be completed in Lesson 19.**

Published Research on DEI website (by DEI staff members as of 2-8-11)

## USE WITH LESSON 1 AND LESSON 19

DEI staff members have several published projects. More information can be found on the website at [www.downeastinstitute.org](http://www.downeastinstitute.org) under “Published Research”. The summaries presented here give a very brief synopsis of other avenues of research pursued by staff members at DEI and elsewhere.

Beal, B.F.; Bayer, R.; Kraus, M. G.; Chapman, S.R.

1999. A unique shell marker in juvenile, hatchery-reared individuals of the soft-shell clam, *Mya arenaria* L., Fishery Bulletin 97(2), 380-386.

Hatchery- reared clams that have been placed in a flat and collected at a later date have distinct shell markings that shows their initial lengths at placement.

Beal, B.F.

1983. Predation of juveniles of the hard clam, *Mercenaria mercenaria* (Linne) by the snapping shrimp *Alpheus heterochaelis* Say and *Alpheus normanni*.

Summary of a study that showed 2 species of snapping shrimp crushed and consumed clams in a lab setting; the results imply that previous studies on blue crab predation may have overestimated crab predation, as the shell damage to the clam is the same.

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Kraus, M.G.; Beal, B.F.; McMartin, L.

1992. A comparison of growth rates in the ocean quahog, *Artica islandica* (Linnaeus, 1767) between field and laboratory populations shows the potential of culturing them in shallow water sites protected from predators.

Vadas, R.L.; Beal, B.F.

1987. Green algal ropes, a novel estuarine phenomenon in the Gulf of Maine, embedded itself in the substrate. The authors who observed this discussed the possible negative effects on bivalves.

Beal, B.F.; Parker, M.R.; Vencile, K.W.

2001. A study on the survival and growth of juvenile soft shell clams was done to discover if competition or predation is more important in regulating populations of soft shell clams in a particular area. Predation seemed to be the more important factor in this study.

Beal, B.F.; Lithgow, C.D.; Shaw, D.P.; Renshaw, S.; Ouellette, D.

1995. Over-wintering hatchery-reared clams by suspending them in mesh bags in a makeshift shelving unit made of lobster trap wire, reduced clam mortality compared to juveniles placed in the flat during a seeding in the fall season.

Beal, B.F.

2002. Small scale field impoundments of soft-shell clams, *Mya arenaria*, were successfully completed, to hold clams over a period of time until their commercial value increased.

Beal, B.F.; Kraus, M.G.

2002. A yearlong study was done on the interactive effects of initial size, stocking density, and type of predator deterrent netting on the survival and growth of cultured juveniles of the soft-shell clam *Mya arenaria*, some protected by netting from predation and some not. Protected clams had a higher survival rate; growth was about 18 mm; results seem to show that juveniles of 8-10 mm could be planted as suggested in the study and then in the late fall season remove the net and let nature take its course. It would take 2 to 4 years to grow the clams to the legal size depending on location and seawater temperature.

Beal, B.F.; Mercer, J.P.; O'Conghaile, A.

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2002. The survival rate of hatchery-reared European lobster, *Homarus gammaues (L)* in field-based nursery cages on the Irish West Coast was reported on [www.sciencedirect.com](http://www.sciencedirect.com), which summarizes the study of raising Stage XII juvenile lobsters at a low cost, low maintenance method. Results indicate this is an option.

Beal, B.F.; Vencile, K.W.

2001. In a collaboration between clam (*Mya arenaria*) harvesters and bloodworm (*Glycera dibranchiata Ehlers*) diggers, a plot was seeded and monitored to see what effects digging had on the juvenile clams. Predation by horseshoe crab and milky ribbon worm was high, but blood worming did not have a high effect on the mortality of juvenile clams. Bloodworms are shallow burrowers and diggers did not disturb *Mya* when digging for bloodworms; digging for clams, on the other hand, had a high effect on the mortality of the juveniles.

Beal, B.F.; Chapman, S.R.

2001. Methods for rearing Stages I-IV larvae of the American lobster (*Homarus americanus*). Five experiments were conducted using methods similar to those used in Cutler, Maine. Mortality/survival depended on: getting Stage I larvae immediately after release from the female, bubbling the sea water the larvae are kept in to keep them from “eating” each other, and overfeeding them with enriched *Artemia* (brine shrimp)

Beal, B.F.; Chapman, S.R.; Irvine, C.; Bayer, R.C.

1998. A community-based fishermen –sponsored public stock enhancement program. Lobster fishermen voted and Legislature approved a portion of fisherman’s fees to go into a fund for stock enhancement. A hatchery was created in Cutler to raise 175,000 lobsters to Stage IV and V, each year from 1986-1991. With no means to hold the lobsters to a larger size and tag them, the hatchery developed a “blue” lobster strain so tagging wasn’t necessary. Behavior of blue lobsters seemed to be the same as normal.

Vadas, Sr., R.L.; Beal, B.; Dowling T.; Fegley, J.C.

1999. Experimental field tests were conducted in which green sea urchins (*Strongylocentrotus droebachiensis*) were fed a different algal diet to see if it would make a difference in the urchin roe (gonads). Results showed that it would be possible to enhance the sea urchin diet to meet the demand for roe during an off-season.

Beal, B.F.

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2006. A study on *Mya arenaria* to see if density affected growth and survival was conducted at the same time the study was also testing for predation in two different bays at 4 orders of magnitude: embayments, sites within embayments, tidal gradients, and blocks that varied in their proximity to each other. Evidence suggests that predation is the dominant factor controlling clam abundance and distribution patterns in the intertidal zone.

Beal, B.F.

2006. A series of experiments was conducted from 1986 to 2003 to see what biotic and abiotic factors influenced the growth of wild and cultured clams (*Mya arenaria*). A series of experiments was conducted that included: moving clams from slow growing areas to other areas for faster growth, studying the effects of tidal height on wild and cultured clams, studying the effects of spatial variation on cultured clam growth, studying the growth and dispersion of cultured clams in experimental units, studying the effects of *Euspira heros* Say (moon snail) on wild and cultured clams, and studying the species composition of the crustacean predators that forage intertidally. Protective netting (4.2mm openings) increased the survival rate; clams that survived grew slowly at the low tidal mark, but predation by moon snails was high; both green crabs and rock crabs produce the crushing and chipping of clam shells.

Beal, B.F.; Protopopescu, G.; Yeatts, K.; Porada, J.

2009. Experimental field trials on the nursery culture, overwintering, and field grow-out of hatchery reared northern quahogs (hard clam), *Mercenaria mercenaria* (L) in eastern Maine. Information is provided on the processes used and the growth and survival rates. Hard clam farming may help diversify the wild shellfish industry.

16) List the names and contact information for two people if you need more information.  
**Brian Beal at [bbeal@maine.edu](mailto:bbeal@maine.edu) or George Protopopescu at 497-5769**

17) **Click on NSF.** Briefly describe the project made possible by support from the National Science Foundation. Be sure to look at the student photos in this section.

With funding from NSF, DEI has constructed an educational center, developed a marine science curriculum, hosted workshops for educators and students, and helped arrange a Marine Science Fair for local schools involved in a DEI clam project. This summer of 2012, DEI plans to host a summer day camp for students. It has hosted two prior day camps for local schools.

18) **Click on Directions.** Print this page to make sure you know how to find us for your visit to DEI.