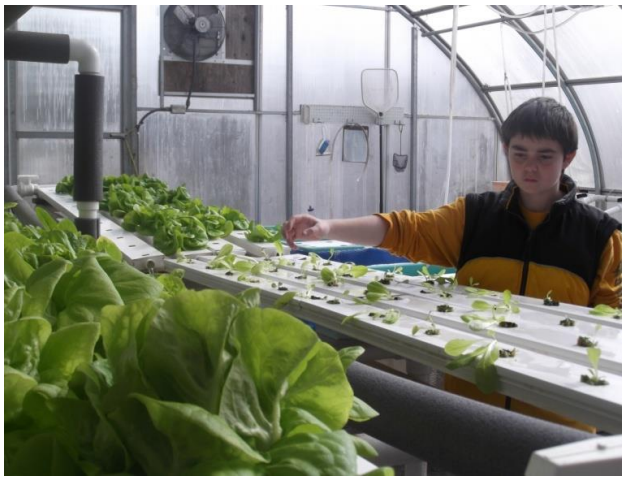
Short-Term Academic Programs

Herring Gut Learning Center's Short-Term Academic Programs are 6-8 class investigations into marine, aquatic, and environmental subjects relevant to the Gulf of Maine. The goal of these programs is to engage students in authentic scientific inquiry of our local ecosystems and trends in aquaculture. Collaboration between school teachers and Herring Gut educators is encouraged to shape programs that assist teachers in instructing their science curriculum more effectively. These investigations integrate science and observation skills, exploration into the history of local ecosystems, and mathematical analysis of real-world data collected by the students. Students in midcoast Maine have a clear connection to the surrounding coastline and marine environment by simply living in this community. Our coastal ecosystems are facing severe challenges due to pollution, ocean acidification, human development, invasive species, etc. The short-term academic "investigations" developed by Herring Gut staff explore these issues and challenge students to think critically about future impacts and solutions. Students are engaged in learning because they are taking an active role in their communities by applying their learning to real-world issues. Herring Gut's short-term "investigation" programs foster community resiliency by encouraging students to observe, measure, and think critically about change occurring in their communities and ways to adapt to that change.

Enclosed are the program descriptions for the six short-term academic "investigation" programs developed by Herring Gut staff. We are looking forward to collaboration and discussion with interested teachers around these programs and other potential ideas. Together we can create dynamic and engaging learning experiences for local students while inspiring them to think about their connection to the marine environment that is such an important part of our community.

Aquaponics Investigations



Program Description

Aquaponics Investigations is a program offering teachers and their students' opportunities to explore the cultivation of plants and aquatic animals in a re-circulating system. A combination of aquaculture and hydroponics, aquaponics combines fish, plants, and bacteria producing a sustainable ecosystem where both plants and fish can thrive. Students learn the history of aquaculture, examine types of systems, analyze water quality tests, plant and monitor the growth of plants, and other hands on activities. Aquaponics allows students to learn basic information of chemistry, biology, and physical science. This program includes a complete classroom aquaponics kit including tank, filter, pump, planting material and water quality test kit. The kit is assembled in the classroom at school where students monitor and manage it for the duration of the program. Depending on class size more than one aquaponics kit would be available.

Location

Classes are held at Herring Gut Learning Center in Port Clyde, ME and the teacher's home classroom.

When

Six to eight class programs are scheduled throughout the year.

Topics covered include:

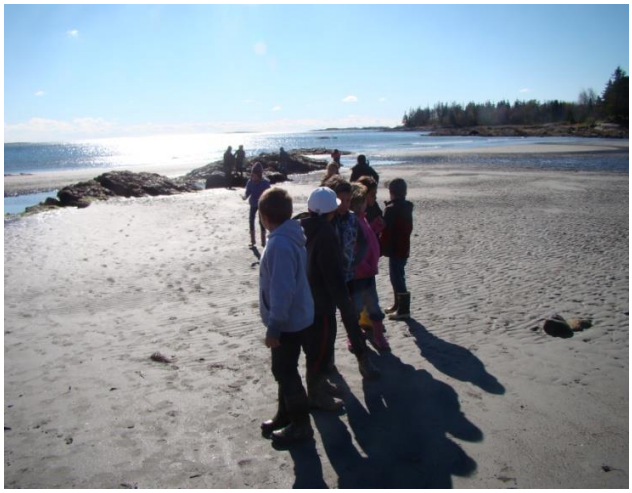
- Aquaculture overview
- The role of fish/Types of fish/ Fish biology through dissection
- Growing plants from seed/roots, shoots, and leaves
- Bacteria culture/Starting a bacteria colony and keeping it healthy
- Recirculating systems and system design
- Chemistry of water/ Testing water quality/Analyzing results
- Nitrification cycle

Possible capstone projects

Field trip to University of Maine's Aquaculture Center in Franklin, Maine.

Marine Investigations

Program Description



Marine Investigations is a program that gives students an opportunity to explore life on the coast of Maine. Students will investigate marine animals and plants, intertidal ecosystems, and geology to discover how marine organisms have adapted to life in these environments. The class will explore different habitats and observe and interact with the animals and plants that live there. The class also includes three complete aquarium setups and a water quality testing kit that can be assembled in the classroom to house organisms found on explorations. These can be monitored and observed over the duration of the program.

Location

Classes are held at Herring Gut Learning Center, Port Clyde. Other nearby sites visited are Drift Inn Beach and Marshall Point Lighthouse. Some classes also take place in the classroom of the sending school.

When

Spring and Fall semesters

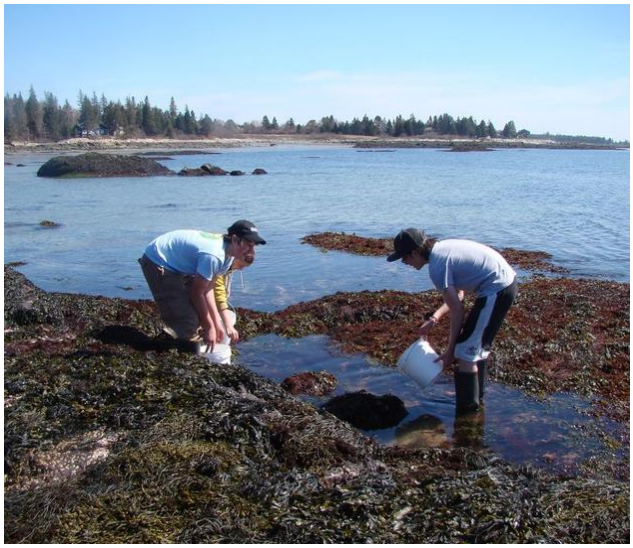
Topics covered could include:

- Explore marine environments
- Compare marine vertebrates/fishes, mammals, and birds
- Examine marine algae and plants
- Test for water quality of the Port Clyde harbor
- Create bathymetric models of oceanographic features
- Construct a plankton net for sampling phytoplankton project

Potential Capstone Projects

Create a never before found adapted species and make a presentation to the school, phytoplankton sampling survey sampling and posting data on Vital Signs, create a field guide to a local beach

Invasive Species Investigations



Program Description

Invasive species are a threat to the health of ecosystems in Maine and often take over habitats and displace native species, leading to a loss of biodiversity. Early American settlers transported invasive species intentionally as food sources or unintentionally as they "hitched" a ride on the hulls or in ballasts of boats. Coastal Maine is impacted by several invasive species. An example of this is the green crab, which displaces native rock crab species and is damaging the soft shell clam industry. Scientists and concerned citizens are coming together to monitor and make decisions about how to manage invasive species in Maine. In this investigation, students will learn to identify invasive species, examine how they impact ecosystems, and will participate in a citizen science monitoring project (Vital Signs) to contribute data to scientists who are studying questions about invasive species. Students will discuss and formulate plans for how the invasive species they find in their communities should be managed.

Location

Marine field sites in Port Clyde (Drift Inn Beach, Marshall Point Lighthouse, public landings, Herring Gut campus), Herring Gut classrooms, some classes can also take place at the sending school

When

Spring and Fall semesters

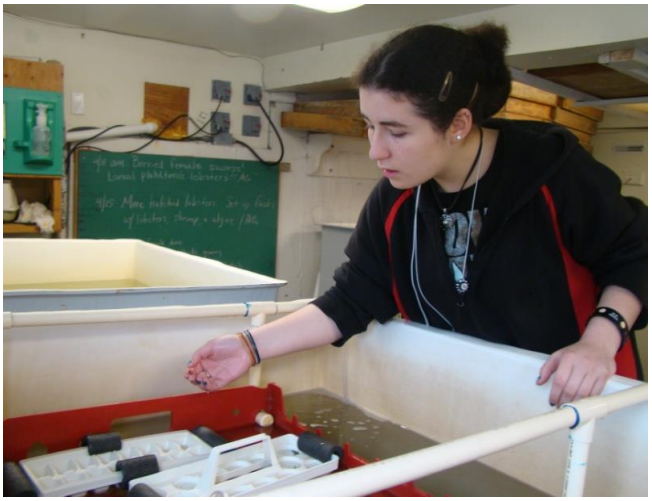
Topics covered could include:

- Introduction to invasive species
- Impact on ecosystems and human health
- Field observation and data record keeping
- Local monitoring of invasive species using Vital Signs program
- Discussion about how to manage local invasive species

Potential Capstone Projects

Local guide to invasive species, presentation to Conservation Commission on how to manage local invasive species, invasive species eradication project

Lobster Investigations



Program Description

Lobster Investigations is a program that explores all things lobster. Students will be immersed in the study of internal and external anatomy, reproduction and life cycle, how lobsters are caught, and the economic importance of the lobster industry to Maine. They will culture Brine Shrimp and observe stages of lobster egg development. They will study a berried female lobster as they manipulate temperature changes to increase larval lobster development, collect newly hatched lobsters, and monitor their growth in flasks in the saltwater lab. Students will also learn about pH, salinity, and water quality and its importance to the health and survival of lobsters. Students will then release the young lobsters at a nearby beach. The program includes three complete aquarium setups and a water quality testing kit for use in the sending school's classroom. Students have the opportunity to observe young lobsters in their classroom.

Location

Classes are held at Herring Gut Learning Center in Port Clyde, ME. Other nearby sites visited are Drift Inn Beach, Marshall Point Lighthouse Beach. Some classes can also occur at the sending school.

When

Spring semester (usually starting in March).

Topics covered include:

- Observing internal and external anatomy
- Reproduction / life cycle/ stages of growth
- Exploring the lobster habitat
- Name that gear and how lobsters are caught
- Lab experience culturing Brine Shrimp and larval lobsters

Possible extended activities

Visit to the Maine State Aquarium in Booth Bay, a visit by a Dept. of Marine Resource officer to the classroom, a field trip to a lobster Co-op to talk with a lobsterman.

Salt Marsh Investigations

Program Description

Salt marshes are among the most productive and important ecosystems along the coast of Maine, providing a nursery habitat for several commercial fish species, a resting place for migratory birds, and a source of nutrient-rich food for many organisms. Students in this course will discover the many ecosystem services that salt marshes provide, explore salt marsh zonation and the adaptations of salt marsh plants, and learn to identify common salt marsh inhabitants. Students will also learn about historical human impacts on salt marshes and think critically about the implications of human development in these areas. Students will examine ways to reverse and minimize human impacts on local salt marshes and talk to experts about what is going on in their communities to restore these important ecosystems.

Location

St. George School Marsh, Buttermilk Lane Salt Marsh, Weskeag Salt Marsh, Herring Gut classrooms, some classes can also take place in your classroom

When

Fall or Spring semester

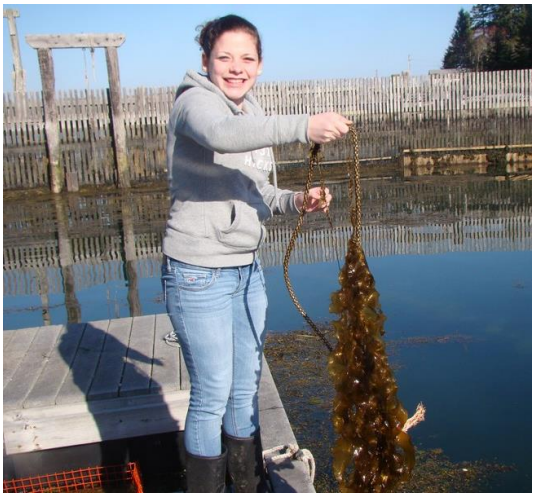
Topics covered could include

- Salt marsh ecology
- Salt marsh plant and animal identification
- Salt marsh formation
- Water cycle
- Water quality monitoring in salt marshes
- Human impacts on salt marshes

Potential capstone projects

Guided tour of a local marsh, field guide to a local marsh, presentation on how to restore tidal flow to marsh in Tenants Harbor

Seaweed Investigations



Program Description

Marine algae are an integral part of our coastal ecosystem in Maine-providing an important habitat, food source, and source of oxygen for the planet. In addition to the ecosystem services they provide, marine algae also play a fundamental role in the everyday lives of humans. Seaweed can be found as an ingredient in products ranging from toothpaste to cosmetics. Recently, companies in Maine have begun growing both macro- and micro-algae for use as both a food source and for experimental research in jet fuel and nutriceuticals. Students in this investigation will learn about the biology of marine algae, its importance in home products, and will be exposed to the burgeoning field of seaweed aquaculture in Maine. Students will develop skills in observation, identification, and record-keeping of seaweed species in Maine as well as laboratory techniques in seaweed aquaculture. Students will be challenged to critically think about algae's potential as a clean, renewable source of energy as well as a method of bioremediation of polluted environments.

Location

Drift Inn Beach, Port Clyde; Marshall Point, Port Clyde; Birch Point State Park, Owl's Head; BioProcess Algae Labs, Port Clyde; Herring Gut campus; some classes can take place at the sending school

When

Fall, Winter, Spring

Topics covered could include:

- Identification of micro- and macro-algae
- Algae adaptations
- Seaweed art pressings
- Construction and use of a plankton tow
- Kelp aquaculture and seaweed cooking lessons

Potential Capstone Projects

Seaweed identification field guide to a local beach, interviews with members of the seaweed industry (harvesters, aquaculturalists, researchers)

Contact Information

Teachers

Your instructors will be Herring Gut educators Ann Boover and Alex Brasili. They have been instructing students from kindergarten to high school about marine biology and current issues affecting the marine environment in Maine. Ann and Alex have a passion for inspiring the next generation of ocean stewards and for offering support to teachers for integrating marine science into their curriculum in dynamic and innovative project-based instruction.

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