Ledyard Public Schools
Science curriculum

Marine Science 1

1455

Instructional Council Approval October 24, 2005

The Oceanography of Coastal Southeastern Connecticut

Suggested Time: about 14 class periods (1/3 of the course)

Essential Question

What are the characteristics of the physical and chemical environment of Coastal Southeastern Connecticut?

Focus Questions

1. What physical marine systems are found in the coastal southeastern Connecticut area?
   Learning objectives- The Student will be able to:
   a. explain the geologic (glacial) history of coastal southeastern Connecticut.
   b. identify the types and characteristics of marine systems found in coastal southeastern Connecticut.

2. What are the dynamics of marine systems?
   Learning objectives- The Student will be able to:
   a. discuss the movement of water in an estuarine system.
   b. discuss salt marsh formation and characteristics.
   c. demonstrate the effects of wind and waves on the coastline.
   d. discuss the effects of extreme weather on coastlines

Assessment:

Science assessment includes: tests, which assess content knowledge and application, skill acquisition and application of knowledge at all levels of critical thinking; quizzes; formal laboratory assessments as full lab reports, parts of lab reports or quiz type lab assessments; a variety of written, oral and visual presentations; as well as a variety of other individual and group work assessments. All tests must include free response questions (or constructed response) as well as appropriate content and/or skill assessment and, except where inappropriate, must be balanced in terms of the critical thinking skills expected of students. Laboratory reports (or parts) will follow the Ledyard High School standard Laboratory format. Other Laboratory assessments should reflect CAPT Style multiple choice and / or open-ended questions.

Required Activities:

The following types of laboratory activities are required. Titles in parentheses are suggested and lab procedures for these activities are available.

Physical oceanography project- Students do poster, power point, tri-fold brochure, etc. covering topics such as coastal erosion, dredging, Effects of dams on anadromous fish, etc.
Oceanographic modeling (3-D model or chart of shoreline of LIS

Resources

Students: Long Island Sound: An Atlas of Natural resources, 1977

Teachers: Investigating the Marine Environment: vol. 1-3,
Weiss, Howard and Michael Dorsey, 1979.

Curriculum Alignment with State of Connecticut Science Standards

All areas address State Standards for Scientific Inquiry, Literacy and Numeracy

Focus Question	Content Standard	Supportive Concepts
1. Physical Marine Systems	E2, E3B	E(11, 20, 21, 25)
2. Marine System Dynamics	E2, E3B, E4, P4, B3	E(11, 20, 21, 25), P(17-19), B33
3. Seawater	E3B, C2	E(20, 21), C(7, 9, 14)

Marine Organisms
of
Coastal Southeastern Connecticut

Suggested Time: about 14 class periods (1/3 of the course)

Essential Questions

1. What marine organisms are common Coastal Southeastern Connecticut?
2. What are the characteristics and behavior of common marine organisms of Coastal Southeastern Connecticut?

Focus Questions

1. How are marine organisms common to Coastal Southeastern Connecticut classified?
   Learning Objectives – The Student will be able to:
   a. identify plankton, marine algae, dune and marsh plants common to Coastal Southeastern Connecticut.
   b. identify and classify invertebrates common to Coastal Southeastern Connecticut
   c. identify and classify vertebrates common to Coastal Southeastern Connecticut

2. What structures, functions and behaviors make organisms of coastal Southeastern Connecticut unique?
   Learning Objectives – The Student will be able to:
   a. compare the structure, behavior and adaptations of certain invertebrates common to Coastal Southeastern Connecticut
   b. compare the structure, behavior and adaptations of certain vertebrates common to Coastal Southeastern Connecticut.
   c. compare and contrast physical structure and function of selected marine organisms

3. What adaptations allow marine organisms to exist in an environment?
   Learning Objectives – The Student will be able to:
   a. analyze the adaptations certain marine organisms have made to environmental conditions (i.e. Resistance to water loss, maintenance of heat balance, Mechanical stress, salinity stress, etc)
   b. discuss the concepts of Succession and zonation
   c. discuss adaptations that enhance survival and reproduction.

Assessment:

Science assessment includes: tests, which assess content knowledge and application, skill acquisition and application of knowledge at all levels of critical thinking; quizzes; formal laboratory assessments as full lab reports, parts of lab reports or quiz type lab assessments; a variety of written, oral and visual presentations; as well as a variety of other individual and group work assessments. All tests must include free response questions (or constructed response) as well as appropriate content and/or skill assessment and, except where inappropriate, must be balanced in terms of the critical thinking skills expected of students. Laboratory reports (or parts) will follow the Ledyard High School standard Laboratory format. Other Laboratory assessments should reflect CAPT Style multiple choice and / or open-ended questions.

Required Activities:

The following types of laboratory activities are required. Titles in parentheses are suggested and lab procedures for these activities are available.

Estimating population size activity (Seal or Gull Population Study)
Population size PGA (Seal or Gull)
Identification, recording and evaluation of physical characteristics, habits and ranges of...
- Non-mollusk invertebrates
- Mollusks
- Crustaceans
- Fishes
- Algae and marine/shoreline plants

Resources

Students: Fishes of the Gulf of Maine, Bigelow & Schroder. 1953.
How to Know the Seaweeds, Dawson, Yale. 1956
Field Guide to the Atlantic Seashore, Gosner, Kenneth. , 1978
North American Seashore Creatures, Meinkoth, Norman. 1998
North American Sea Shells, Rehder, Harald. 1997
Coastal Plants from Cape Cod to Cape Canaveral, Stuckey & Gould. 2000
Seaweeds of the Connecticut Shore: A Wader's Guide, Taylor, Sally. 1972
Marine Animals of Southern New England and New York, Weiss, Howard. 1995
www.algae.uconn.edu. Seaweed Data Base.

Teachers: Investigating the Marine Environment: vol. 1-3,
Weiss, Howard and Michael Dorsey, 1979

Curriculum Alignment with State of Connecticut Science Standards

All areas address State Standards for Scientific Inquiry, Literacy and Numeracy

Focus Question	Content Standard	Supportive Concepts
1. Marine Organisms	B3	B(30, 31, 32, 34, 35)
2. Structure, Function	B3, B4A, B4B, B5A 10.5	B(36, 37, 41, 47), D42
3. Adaptations of Organisms	B3, B5A, 10.5	B(36, 47), D42

The Marine Ecology of Coastal Southeastern Connecticut

Suggested Time- about 14 class periods (1/3 of the course)

Essential Question

What are the population dynamics within the communities and ecosystems of Coastal Southeastern Connecticut?

Focus Questions

1. What are the characteristics of the common ecosystems of Coastal Southeastern Connecticut?
   Learning objectives- The Student will be able to:
   a. identify the types of ecosystems that are found in Coastal Southeastern Connecticut
   b. explain and diagram how energy is obtained and recycled among ecosystem trophic levels.
   c. evaluate the biotic and abiotic factors that characterize an ecosystem.
   d. discuss factors that influence primary productivity

2. What is Population Dynamics?
   Learning objectives- The Student will be able to:
   a. compare and contrast community structure and distribution for different populations
   b. evaluate the diversity of a community.
   c. predict changes that take place within a community.

3. How do populations of Coastal Southeastern Connecticut Organisms interact with other populations of organisms and the ecosystem?
   Learning objectives- The Student will be able to:
   a. discuss adaptations and behaviors of organisms common to Coastal Southeastern Connecticut that influence how the organism interacts with other organisms and the environment.
   b. determine how adaptations and behaviors enhance reproductive success.

4. How does human activity impact populations and ecosystems of Coastal Southeastern Connecticut?
   Learning objectives- The Student will be able to:
   a. evaluate the effect of human activity on ecosystems of Coastal Southeastern Connecticut.
   b. predict the effect of continued human activity or remediation of human activity on populations and ecosystems.
   c. predict the effect of loss of biodiversity on an ecosystem and its impact in Coastal Southeastern Connecticut.

Assessment

Science assessment includes: tests, which assess content knowledge and application, skill acquisition and application of knowledge at all levels of critical thinking; quizzes; formal laboratory assessments as full lab reports, parts of lab reports or quiz type lab assessments; a variety of written, oral and visual presentations; as well as a variety of other individual and group work assessments. All tests must include free response questions (or constructed response) as well as appropriate content and/or skill assessment and, except where inappropriate, must be balanced in terms of the critical thinking skills expected of students. Laboratory reports (or parts) will follow the Ledyard High School standard Laboratory format. Other Laboratory assessments should reflect CAPT Style multiple choice and / or open-ended questions.

Required Activities:

Ecosystem Project/Paper: Students produce a poster detailing the local environment of the tank they are caring for in class. Short facts on plants and animals and physical characteristics are shown. The Paper includes physical and biological parameters and includes analysis of data that pertains to the ecosystem.

behaviors and dispersion patterns of gulls. Trip to Gull Rookery (S. Dumpling Island)-

Recommended Activities –

Power point or other media project on a human impact on LIS
(such as mercury bioaccumulation, wetlands filling, overfishing, marine life entanglement in floatable debris, etc.)

Resources

Students: Long Island Sound: An Atlas of Natural resources, 1977

Teachers: Investigating the Marine Environment: vol. 1-3,
Weiss, Howard and Michael Dorsey, 1979

Curriculum Alignment with State of Connecticut Science Standards

All areas address State Standards for Scientific Inquiry, Literacy and Numeracy

Focus Question	Content Standard	Supportive Concepts
1. Population Dynamics	10.5, 10.6, B3	D43, D44, B(30, 32, 34)
2. Population Interactions	10.6, B4B	D44, B(32, 34, 35, 36, 42)
3. Human Impact	10.6, B3	B(31)