

Content Area: Science

Course Title: Environmental/Marine Science

Grade Level: 11/12

Unit Plan 1

**Introduction to Environmental
Science/Marine Science**

Unit Plan 2

Charts/Navigation/Bathymetry

Unit Plan 3

Marine Resources

Unit Plan 4

Survey of Marine Organisms

Unit Plan 5

Marine Mammals

Date Created: 5-26-11

Board Approved on:

Unit Overview

Content Area: Environmental Science/Marine Biology

Unit Title: Charts/Navigation/Bathymetry

Target Course/Grade Level: 11/12

Unit Summary:

In the realm of marine science field, much of the work that is done is fieldwork. It is imperative that students be comfortable navigating their way around the marine environment both using traditional dead reckoning, and bathymetry as well as using GPS technology. With this overlying theme students will be instructed on how to navigate using paper charts, how to create and interpret bathymetric charts, culminating in the instruction, understanding and use of GPS technology.

Primary interdisciplinary connections:

21st century themes:

For further clarification refer to NJ class standard Introductions @ www.njccs.org

Learning Targets

Content Standards

CPI #	Cumulative Progress Indicator (CPI)
5.1.12 A-C	Science Practices: All students will understand that science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines and revises knowledge. The four science practices strands encompass the knowledge and reasoning skills that student must acquire to be proficient in science.

Unit Essential Questions

- **While fieldwork is paramount in the marine science/environmental science field. Explain why knowledge of traditional navigation is a key skill to possess.**
- **Explain why GPS technology is tantamount for fieldwork.**
- **Why is where you are on earth and where you are going so important?**

Unit Enduring Understandings

Students will understand that...

- **Navigation is key to fieldwork**
- **Choosing the proper tools to navigate in necessary**
- **Speed time and distance are invaluable calculations in navigation.**
- **GPS is based on a simple concept of $d=st$**
- **Bathymetry is just another use of graphical data**

<ul style="list-style-type: none"> • Why are the use of bathymetric lines key when using a chart for research purposes. 	
<p>Unit Objectives <i>Students will know...</i></p> <ul style="list-style-type: none"> • Dead Reckoning • How to plot latitude and longitude • Compass courses • Distance (nm) • Speed (Kts) • Follow directions and multiple courses • How GPS works • How to use a GPS unit • How to interpret Bath lines • How to create Bath lines on a chart 	<p>Unit Objectives <i>Students will be able to...</i></p> <ul style="list-style-type: none"> • Plot a point given the latitude and longitude coordinates • Determine the compass course between 2 points • Determine the speed, time and distance as it relates to multiple legs of a journey. • Plot a multi-leg course on a chart and end at a predetermined spot on the chart • Understand how GPS works • Understand why GPS works • Proficiently use a GPS receiver for both given LAT/LONG and unknown • Decipher and draw bathymetric lines on a chart • Understand the importance of Bathymetric lines in the interpretation of oceanographic data.

Formative Assessments

- Observations
- GPS practice assesment
- Navigation practice assesment
- Quizzes
- Guided practice
-

Summative Assessments

- GPS Practical Assesment
- Navigation authentic practical assessment
- Quarterly exam
-

Modifications (ELLs, Special Education, Gifted and Talented)

- **Extra help sessions**
- **In class one on one tutoring**
- **Peer tutoring**
- **Modification of some assignments**
- Follow all IEP modifications/504 plan

Curriculum development Resources/Instructional Materials/Equipment Needed Teacher Resources:**Texts:****Chapman's Piloting****Various charts****Oceanography activities****Teacher Notes:**

Unit Overview

Content Area: Environmental/Marine Science

Unit Title: Introduction to Environmental/marine science

Target Course/Grade Level: 11/12

Unit Summary:

This unit’s goal is to introduce the beginnings of marine study, basic safety, and basic salinity and water chemistry. The goals are to prepare students for safe lab work, allow them to delve into the basic science history of the marine world, and finally understand salinity, and water chemistry. Students will also learn various field sampling techniques.

Primary interdisciplinary connections:

21st century themes:

For further clarification refer to NJ class standard Introductions @ www.njccs.org

Learning Targets

Content Standards

CPI #	Cumulative Progress Indicator (CPI)
5.1.12.A.1	Science Practices: All students will understand that science is both a body of knowledge and an evidence-based , model-building enterprise that continually extends, refines and revises knowledge. The four science practices strands encompass the knowledge and reasoning skills that student must acquire to be proficient in science.

Unit Essential Questions

- **Why is the ocean salty?**
- **How are nitrates and nitrites related?**
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- **How is water chemistry related to life**

Unit Enduring Understandings

Students will understand that...

- **Science Lab safety is meant to protect the students and the students in the class**
- **Salinity in the ocean is an ongoing process**
- **Marine science has progressed as all sciences have due to the work of many before us.**

<p>processes in marine organisms?</p> <ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> • Water chemistry is key to understanding why organisms live where they live. •
<p>Unit Objectives <i>Students will know...</i></p> <ul style="list-style-type: none"> • Basic lab safety techniques • Basic dissection safety • The basic route of the challenger mission • Early marine researchers and pioneers • Where the salt in the ocean came from • What dissolved oxygen, nitrate, nitrite, do for an ecosystem and why we test for them. • 	<p>Unit Objectives <i>Students will be able to...</i></p> <ul style="list-style-type: none"> • Test salinity in water using 4 different methods • Test water chemistry using titration techniques • Seine • Use field guides • Measure turbidity

Formative Assessments

- observations
- lab techniques
- Lab reports
- homework
- technique spot checks
- data collections and organization

Summative Assessments

- unit tests
- practical tests
- quarterly exams

Modifications (ELLs, Special Education, Gifted and Talented)

- **Extra help sessions**
- **In class one on one tutoring**
- **Peer tutoring**
- **Modification of some assignments**
- Follow all IEP modifications/504 plan

Curriculum development Resources/Instructional Materials/Equipment Needed Teacher Resources:

Lamotte test kits

Refractometer

Teacher Notes:

Unit Overview

Content Area: Environmental/Marine Science

Unit Title: Marine Resources

Target Course/Grade Level:

Unit Summary

The unit is designed to expose and immerse students in the realm of marine resources. The emphasis will be on USING the marine environment properly and not preservation, but conservation. The ocean offers so much that we use, most of which is renewable, so how do we as the human race responsibly use the resources that the ocean provides. Students will also be involved in creating, writing, and ratifying a management policy that will be tested in a virtual situation.

Primary interdisciplinary connections:

21st century themes:

For further clarification refer to NJ class standard Introductions @ www.njccs.org

Learning Targets

Content Standards

CPI #	Cumulative Progress Indicator (CPI)
5.1.12.A.1	Science Practices: All students will understand that science is both a body of knowledge and an evidence-based , model-building enterprise that continually extends, refines and revises knowledge. The four science practices strands encompass the knowledge and reasoning skills that student must acquire to be proficient in science.

Unit Essential Questions

- **What is maximum sustainable yield and how can it be achieved with a renewable resource.**
- **Explain the difference between conservation and preservation**
- **How has the popularity of commercial fishing television shows changed the way people feel about commercial fishing?**

Unit Enduring Understandings

Students will understand that...

- **MSY is essential in understanding how best to utilize a resource.**
- **Conservation and preservation are 2 very different approaches to resources**
- **Use but don't abuse is key to understanding the marine resources**

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Unit Objectives <i>Students will know...</i> <ul style="list-style-type: none"> • What MSY is • How MSY relates to resource management. • The process of policy making • How best to conserve a resource • How best to preserve a resource 	Unit Objectives <i>Students will be able to...</i> <ul style="list-style-type: none"> • Graph catch, population, and regeneration data • Calculate MSY based on obtained data • Write management policy • Work in a large group setting to agree on a resource management proposal.

Formative Assessments

- Game Play
- Daily routine
- Fishbanks quick quiz
- Graph interpolation exercise

Summative Assessments

- Management policy paper
- Fishbanks test
- Resource management test
- Quarterly Exams

Modifications (ELLs, Special Education, Gifted and Talented)

- **Extra help sessions**
- **In class one on one tutoring**
- **Peer tutoring**
- **Modification of some assignments**
- Follow all IEP modifications/504 plan

Curriculum development Resources/Instructional Materials/Equipment Needed Teacher Resources:

Fishbanks Computer simulation

Teacher Notes:

Unit Overview

Content Area: Environmental/Marine Science

Unit Title: Survey of Marine Organisms

Target Course/Grade Level: 11/12

Unit Summary

Using the Taxonomic level of Class, students will explore the characteristics and biological processes of marine fish, cephalopods, and bivalves. Each class will be explored both externally and internally through a representative dissection. As well as how gills work, liver, osmotic regulation, and blood flow. The unit is designed to survey the main marine classes and expose students to those classes.

Primary interdisciplinary connections:

21st century themes:

For further clarification refer to NJ class standard Introductions @ www.njccs.org

Learning Targets

Content Standards

CPI #	Cumulative Progress Indicator (CPI)
5.1.12.A.1	Science Practices: All students will understand that science is both a body of knowledge and an evidence-based , model-building enterprise that continually extends, refines and revises knowledge. The four science practices strands encompass the knowledge and reasoning skills that student must acquire to be proficient in science.

Unit Essential Questions

- Can fish drown?
- Why and how do fish constantly battle osmosis?

Unit Enduring Understandings

Students will understand that...

- Fish can drown
- Osmosis is a real problem for fish and they have ingenious ways to resolve the problem

<ul style="list-style-type: none"> • Explain and give examples of what the statement “form follows function” means. • Why do all the organisms we studied have similar organs? Theorize why. 	<ul style="list-style-type: none"> • Form follow function ALWAYS
<p>Unit Objectives <i>Students will know...</i></p> <ul style="list-style-type: none"> • The basic internal and external anatomy of the 3 classes of fish, cephalopod and bivalves • How fish respire • Counter-current blood flow • Osmotic regulation in marine organisms • Characteristics of each class of fish • Characteristics of mollusks 	<p>Unit Objectives <i>Students will be able to...</i></p> <ul style="list-style-type: none"> • Dissect • Identify internal and external structures • Explain counter-current blood flow • Model osmotic regulation • Compare and contrast the fish classes

Formative Assessments

- Dissection questions
- Dissection ID
- Diagrams
- quizzes
- lab reports
- models

Summative Assessments

- practical exams
- tests
- quizzes
- lab summaries
- Quarterly Exams

Modifications (ELLs, Special Education, Gifted and Talented)

- Extra help sessions
- In class one on one tutoring
- Peer tutoring
- Modification of some assignments
- Follow all IEP modifications/504 plan

Curriculum development Resources/Instructional Materials/Equipment Needed Teacher Resources:

Dissection Guides**Clam modeling**

Teacher Notes:

Unit Overview

Content Area: Environmental Science/Marine Science

Unit Title: Marine Mammals

Target Course/Grade Level: 11/12

Unit Summary

Marine mammals are a hotbed for global environmentalist. Using copious amounts of video clips and internet resources students will explore both suborders of the cetaceans, how each is both similar and different anatomy, the similar and different behaviors each exhibits, and how cetacean research applies to them. Pinnipeds will also be explored with all three families being discussed.

Primary interdisciplinary connections:

21st century themes:

For further clarification refer to NJ class standard Introductions @ www.njccs.org

Learning Targets

Content Standards

CPI #	Cumulative Progress Indicator (CPI)
5.1.12.A.1	Science Practices: All students will understand that science is both a body of knowledge and an evidence-based , model-building enterprise that continually extends, refines and revises knowledge. The four science practices strands encompass the knowledge and reasoning skills that student must acquire to be proficient in science.

Unit Essential Questions

- How are whales similar to humans?
- In both suborders of whales, what form follows what function?
- Why protect whales?
- Is hunting whales ethical? Why or why not?
- What function does the seal and sea

Unit Enduring Understandings

Students will understand that...

- The 2 suborders of whales are vastly different
- What are the differences between both suborders
- Whales are mammals like us, but with different adaptations
- Some whales hear through their lower jaw, as can humans

<p>lion share? What are their differences?</p> <ul style="list-style-type: none"> • 	
<p>Unit Objectives <i>Students will know...</i></p> <ul style="list-style-type: none"> • The characteristics of the 2 suborders of whales • The reason why whales are hunted still • The socioeconomic impact of whaling and loss of whaling • Differences between the 3 pinniped families • 	<p>Unit Objectives <i>Students will be able to...</i></p> <ul style="list-style-type: none"> • ID the suborder of whales based on physical attributes • Explore why whales are hunted and their feelings on the topic • Id the family of pinniped based on physical attributes • Define the terms associated with whale research • Explore their role in whale conservation • Test the theory that humans can hear through parts other than their ears.

Formative Assessments

- Lab write-ups
- Quick ID quizzes
- Article summaries
- quizzes
- models
- electronic presentations

Summative Assessments

- Exams
- Final exams
- Visual assessments
- In class opinion discussions

Modifications (ELLs, Special Education, Gifted and Talented)

- **Extra help sessions**
- **In class one on one tutoring**
- **Peer tutoring**
- **Modification of some assignments**
- Follow all IEP modifications/504 plan

Curriculum development Resources/Instructional Materials/Equipment Needed Teacher Resources:

Teacher Notes: