DEERING ESTATE

Marine Conservation Science and Policy

Lesson Breakdown

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Thematic Unit	Lesson Focus	Lesson Summary
Ocean and Coastal Habitats	Ocean Zones	Students will explore the different ocean zones and the variety of life found in them. Students will learn to: • Identify the five ocean zones. • Compare and contrast the conditions in the different zones. • Demonstrate knowledge of the five different ocean zones. **Activity: In small groups, students will draw and label a scale diagram of the ocean zones.**
	Ocean Features and Coastal Landforms	Students will explore some of the main features of the ocean and coastal landforms and examine interactions that are globally significant. Students will learn to: • Identify ocean and coastal features. • Analyze the importance of these features and how their interactions affect humans. • Summarize their knowledge of ocean and coastal landforms. **Activity: In small groups, students will elaborate a news report summarizing their knowledge of ocean and coastal landforms.**
	Intertidal Zone	Students will explore the intertidal zone and discover some of the unique qualities of this ecosystem. Students will learn to: • Identify the four subzones of the intertidal zone. • Identify some of the organisms that live in this habitat and the challenges they face. • Demonstrate knowledge of food chains and the interconnectedness of organisms. **Activity: In small groups, students will connect their knowledge through the jigsaw method and elaborate a food web.**
	Salt Marsh	Students will explore the salt marsh and the animals that inhabit this important ecosystem. Students will learn to: • Identify the four zones of a salt marsh. • Recognize threats to this habitat and elaborate ways to protect it. • Demonstrate knowledge and analyze the importance of this ecosystem. **Activity: In small groups, students will create an educational poster explaining the salt marsh and its importance.**
	Sandy Beaches	Students will explore the features of sandy beaches, reflecting on the importance of this ecosystem as well as threats and conservation efforts. Students will learn to: • Identify some features that form a beach and some of the animals that inhabit this community. • Explain the importance of this ecosystem and some threats that it faces. • Elaborate a visual representation of the beach habitat and discuss how this habitat can be protected for future generations. **Activity: Students will illustrate individual squares to be pieced together to form a class beach blanket.**

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Ocean and Coastal Habitats	Mangroves	Students will explore the mangrove ecosystem and some of the animals that live in this habitat. Students will learn to: • Identify three species of mangroves and some animals that live in this habitat. • Analyze the importance of this ecosystem and the pressures that threaten it. • Explain the key features of mangroves and how to protect them. **Activity: In small groups, elaborate an educational commercial about mangroves.**
	Barrier Islands	Students will explore the barrier islands and some of the habitats, animals and plants found on these formations. Students will learn to: • Identify the main features of a barrier island. • Identify the different habitat found on a barrier island and some of the organisms that live there. • Demonstrate knowledge and explain the importance of the barrier islands. **Activity: In small groups, elaborate a visual representation of a barrier island.**
	Seagrasses	Students will discover special features of seagrass and explore the coastal ecosystem of the seagrass meadow, Students will learn to: • Identify features of seagrass meadows and animals that live in this habitat. • Analyze the importance of this ecosystem and elaborate ways to protect it. • Demonstrate knowledge of seagrass meadows and analyze their importance. **Activity: In small groups, students will create seagrass meadow vocabulary cards for every letter of the alphabet.**
	Coral Reefs	Students will explore the coral reef and discover some of he organisms that live in this habitat. Students will learn to: • Identify features of a coral reef and some animals that live in this habitat. • Analyze the importance of this ecosystem. • Demonstrate knowledge and elaborate ways to protect this important habitat. **Activity: In small groups, students will create an educational brochure explaining key features of the coral reef.**
	The Everglades	Students will be introduced to the various habitats that make up the greater Everglades ecosystem and explore the significance of this ecosystem. Students will learn to • Identify several main features of the Everglades. • Identify animals that live in the Everglades habitats and the resources they depend on. • Demonstrate knowledge and analyze the significance of the Everglades. **Activity: Students will compose an original poem about the Everglades.**

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Marine Life	Introduction to Zoology and Fish Classification	Students will explore the field of zoology and the importance of classification. They will be introduced to the three classes of fish and practice classifying them. Students will learn to: • Identify the field of zoology and describe classification. • Explain some of the characteristics of fish and how they are distinguished. • Use the scientific method to observe and classify the three classes of fish by their distinguishing characteristics. **Activity: In small groups, students will work as a scientific community by classifying fish according to their physical characteristics.**
	Morphology and Echinoderms	Students will be introduced to the external anatomy and the study of marine species morphology. Students will learn to: • Define morphology and how it is applied. • Identify the main body forms and characteristics of echinoderms. • Demonstrate their knowledge by identifying the external body parts of a specimen and forming a hypothesis based on its morphology. **Activity: In small groups, students will identify the external body parts of an echinoderm specimen and form a classification hypothesis based on its morphology.**
	Plankton Communities	Students will study the different types of plankton and identify the characteristics that distinguish these groups. Students will learn to: • Identify the four types of plankton. • Explain three differences between phytoplankton and zooplankton. • Explain three reasons that plankton communities are important. **Activity: In small groups, students will use microscopes and water samples to analyze local plankton species.**
	Cartilaginous Fish & Shark Dissection	Students will research the cartilaginous fish class and their defining characteristics. Students will learn to: • Identify the defining features of the cartilaginous fish. • Explain what resources they depend on and where they can be found. • Demonstrate knowledge by researching and presenting a species of cartilaginous fish. **Activity: In small groups, students will dissect a dogfish.**
	Marine Mammals	Students will discuss marine mammals and factors that make these animals distinct, and form a solution to a threat marine mammals face. Students will learn to: • Identify South Florida marine mammals and describe their distinguishing features. • Explain the importance of these animals to South Florida food webs and economies. • Describe 3 threats these animals face and build a model that can resolve one threat. **Activity: In small groups, students will invent and build a model to prevent propeller damage to marine mammals and other organisms.**

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Ocean Connections	Marine Biodiversity	Students will explore three habitats to compare and contrast different levels of biodiversity. Students will learn to: • Use the scientific method to sample for biodiversity. • Evaluate differences in habitat that encourage more species variety and form biodiversity hotspots. • Analyze the importance of marine biodiversity and conservation methods. **Activity: In small groups, students will use explore, quantify and analyze the biodiversity of lawn, garden and forest habitats.**
	Trophic Structure	Students will explore the concept of trophic levels by elaborating a marine food web. Students will learn to: • Identify the different trophic levels. • Explain energy flow along the trophic levels. • Analyze the importance of food web components and discuss how humans affect this system. **Activity: In small groups, students will elaborate a food web mobile.**
	Species Interactions	Students will explore the different species interactions through examples in the marine environment. Students will learn to: • Identify the different types of species interactions. • Identify factors that influence these interactions. • Analyze the importance of these interactions on an ecosystem and global level. **Activity: In small groups, research and analyze the interactions of organisms within a marine ecosystem.**
	Population Sampling	Students will explore the population dynamics and the factors that influence them. Students will learn to: • Define species population. • Identify factors that influence population. • Implement a population sampling technique and discuss the importance of the scientific method in establishing conservation plans. **Activity: In small groups, students will practice a population sampling technique and elaborate a fish conservation plan.**
	Ocean Resources	Students will explore ocean resources and their importance. Students will learn to: • Define a resource and identify three resources provided by the ocean. • Identify the importance of ocean resources. • Analyze the importance of ocean resources and explain how they can be protected for future generations. **Activity: In small groups, students will elaborate a poster collage educating others on the conservation of ocean resources.**

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Marine Issues	Coastal Development	Students will explore the concept of coastal development and analyze coastal development impacts and management strategies Students will learn to: • Identify coastal development. • Analyze environmental issues associated with coastal development. • Analyze the human impacts on coastal ecosystems and compare and contrast different coastal management strategies. **Activity: In small groups, students will analyze a coastal development case study and elaborate a coastal management solution.**
	Fishing and Bycatch	Students will explore the state of global fisheries and attempt to create a sustainable fishery. Students will learn to: • Define bycatch and fisheries. • Identify factors influencing global fishery sustainability. • Discuss methods that can protect fisheries for future generations. **Activity: In small groups, students will play a fisheries game and elaborate a sustainable fisheries management plan.**
	Pollution, Water Quality, and Bioaccumulation	Students will explore different sources of pollution and analyze the effects of water pollution on humans and ecosystems. Students will learn to: • Define pollution and bioaccumulation. • Identify sources of pollution and factors that affect water quality. • Elaborate a water management plan and discuss water quality protection. **Activity: In pairs, students will analyze the uses of land along rivers through a puzzle, and create a sustainable community water management plan.**
	Invasive Species	Students will examine invasive species and the effects they are having on the Everglades and native species. Students will learn to: • Define native, non-native and invasive species. • Identify factors that allow species to become invasive and consequences of their introduction. • Analyze the importance of maintaining native species and elaborate ways to prevent the introduction of invasives. **Activity: In small groups, students will research invasive species in the Everglades and demonstrate their knowledge by creating a wanted poster.**
	Climate Change	Students will explore the causes and effects of climate change and elaborate a climate change prevention plan. Students will learn to: • Define climate change and its causal factors. • Analyze the global effects of climate change. • Identify climate change prevention measures and analyze the importance of protecting the planet for future generations. **Activity: In small groups, students will elaborate a school emissions reduction plan.**

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Management, Conservation, Research and Actions	Fisheries and Management	Students will explore fisheries and their management strategies. Students will learn to: • Identify different methods of calculating a fish population. • Analyze the efficacy of different management strategies. • Discuss the importance of managing and protecting fisheries. **Activity: In small groups, students will conduct an experiment to assess a fish population and implement a management strategy.**
	Aquaculture	Students will explore different systems of aquaculture. Students will learn to: • Define aquaculture and the basic components of an aquaculture system. • Describe two advantages and two disadvantages of aquaculture. • Discuss the social, economic and environmental impacts of aquaculture. **Activity: In small groups, students will research and describe a local example of aquaculture.**
	Mercury Toxicity Data	Students will explore mercury and the effects of mercury toxicity on organisms. Students will learn to: • Identify mercury and pollution sources. • Explain the effects of the bioaccumulation and biomagnification. • Discuss methods that can help prevent further mercury pollution. **Activity: As a class, students will conduct a biomagnification simulation to explore the effects of mercury on organisms.**
	Tagging and Satellite Tracking	Students will examine tagging and satellite tracking techniques and explore how these technologies apply to marine conservation. Students will be able to: • Identify different tagging and tracking methods. • Explain how tagging and tracking data can improve understanding and protection of marine organisms. • Discuss how tagging and satellite tracking technology can be applied to improve understanding of marine organisms and improve conservation efforts. **Activity: In pairs, students will conduct a tracking simulation and analyze the importance of the data learned.**
	Principles of Conservation and Environmental Stewardship	Students will explore the idea of conservation and environmental stewardship and plan a conservation project. Students will learn to: • Identify natural resources and the principles of conservation. • Analyze the importance of resource conservation. • Apply conservation ethics to help protect the planet. **Activity: In small groups, students will plan a conservation project for their school or community.**