

Lesson 2: Amazing Algae

Subject

Algal Biodiversity

Materials/Teacher Preparation

- Compound microscopes
- Prepared slides
- Algae cultures (both diatoms and flagellates)
- Plankton tow and sample
- [Lesson Slideshow](#)
- Optional: Live tank with clams and oysters

Size/setting/duration

Full Class/Indoor/50 minutes

Background

Both algae and plants use photosynthesis to create energy, although plants have roots, stems, and some form of vascular tissue (veins in leaves) and algae do not. Algae can vary widely, but we tend to group the larger species into “seaweeds”. Seaweeds can be divided into three major groups based on the pigment of their photosynthetic cells: Chlorophyta (green), Phaeophyta (brown), and Rhodophyta (red). Algae contain different pigments that absorb different wave-lengths of light depending on their chemical structure which makes them adapted for different depths.

Phytoplankton, microscopic marine algae, are essential to life in the ocean since they act as the base of the food chain. It takes a healthy algae population to support diversity up the food chain and the ecosystem as a whole. Changes in the balance of the ecosystem, such as warmer temperatures, low dissolved oxygen, and high levels of nutrients can cause algal blooms which impact aquatic biodiversity. Certain algal species can cause Paralytic Shellfish Poisoning (PSP) or other types of harmful algal blooms (HAB) which can impact the ecosystems when algal blooms occur. The two main classes of phytoplankton are dinoflagellates, which uses a flagellum to move, and diatoms, which are more rigid and made of interlocking chains that rely on ocean currents to move.

Overview

Key Questions:

- What are the major threats to aquatic biodiversity?
- How can we protect and sustain marine biodiversity?

- How should we manage and sustain marine fisheries?
- What should be our priorities for sustaining aquatic biodiversity?

Procedure

- Land Acknowledgement: Let’s take a moment to recognize where we are. The Coast Salish Peoples have a saying "when the tide is out, the table is set." The Coast Salish People rely on natural resources of the Salish Sea and have been stewards of this land and the traditional and customary fishing grounds for thousands of years and these resources continue to be used today.
- (5 min) Discuss/present: [Amazing Algae Powerpoint](#).
 - What defines algae? What makes it different than plants? Discuss the diversity of algae in the PNW. Algae can be microscopic or large kelp forests. Bring up ecosystem services - carbon sinks
- (5 min) Allow students to view seaweed samples (labelled by previous class) to see biodiversity and some adaptations.
- (5 min) Give background on phytoplankton (included in powerpoint)
 - It is the base of the food chain (display by feeding the live tank)
 - How to identify the 2 main categories of phytoplankton (dinoflagellates and diatoms).
- (20 min) Students observe algae in microscopes. Diagram and identify two samples.
- (5 min) Presentation about HAB and PSP and the effects on biodiversity
 - Threats include: increasing temperature, lower dissolved oxygen (hypoxia), and an increase in nutrients, toxic pollutants
 - [DOE Water Quality Standards](#).
- (5 min) Discuss Salish Sea Challenge and actions they can take to help sustain biodiversity.

Next Generation Science Standards

Performance Expectations		
HS-LS2 Ecosystems: Interactions, Energy, and Dynamics Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.		
Scientific and Engineering Practices	Disciplinary Core Ideas	Cross-cutting Concepts
Using Mathematics and Computational Thinking Scientific Knowledge is Open to Revision in Light of New Evidence	LS2.A: Interdependent Relationships in Ecosystems	Scale, Proportion, and Quantity

	LS2.C: Ecosystem Dynamics, Functioning, and Resilience	
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Other Standards

Graphics

Vocabulary

- Algae
- Phytoplankton
- Dinoflagellate
- Diatom

Extensions

- Extension questions for students to discuss/write about include:
 - Form and Function: Algae's structure differs from that of terrestrial (land) plants. Name one major difference in structure and explain how it works in the life cycle of the algae.
 - Communities: Algae plays an important role in environmental communities. Evaluate this importance and describe what role algae plays in the success of intertidal animal and plant communities.
 - Food Connections: Many creatures in the intertidal eat algae as a primary part of their diet. List two and describe what method they use to eat it.
 - Students can also use a biodiversity calculator [here](#) or [here](#) to determine the biodiversity from the species data that the previous class collected. This can also be used for GSSC or [MRC clam survey data](#). GSSC clam survey data powerpoint [here](#).

Worksheet

Students should put work in science notebooks. Each student should have at least two labelled scientific drawings. Include scientific nomenclature to genus. Identify and label at least 1 adaptation the organism has to be successful in its habitat.

Resources

https://archive.fisheries.noaa.gov/wcr/habitat/fish_habitat/kelp_forest_habitat_types.htm

<https://ecology.wa.gov/Water-Shorelines/Water-quality/Water-quality-standards>

<https://www.whatcomcountymrc.org/projects/sound-iq/>

<https://www.whatcomcountymrc.org/projects/clam-surveys/>

<https://www.nwfsc.noaa.gov/publications/documents/WSI%20factsheet.pdf>

<https://wdfw.wa.gov/species-habitats/species/haliotis-kamtschatkana>

<https://www.eopugetsound.org/magazine/is/olympia-oysters-comeback>

<https://www.doh.wa.gov/CommunityandEnvironment/Shellfish/RecreationalShellfish/Illnesses/Biotoxins/ParalyticShellfishPoison>