Where Producers Thrive

Trace how aquatic habitats shape primary production.

MAQ.5.1 "Survey common primary producers and their roles in primary production in relation to geographical distribution within various aquatic ecosystems."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each named producer, circle a clue to where it grows, and put a star by one way it supplies food or habitat for consumers.

A Survey from Open Water to Shore

1 On a boat far from shore, the ocean may look empty. Yet tiny drifting phytoplankton, including algae and cyanobacteria, use sunlight and dissolved nutrients to make organic matter through photosynthesis. They are common in sunlit surface water, not in the dark deep ocean, and start many marine food webs. Lakes also have phytoplankton in their bright upper layers. Along a lake's shallow edge, rooted plants such as cattails capture light above the water and add new plant material near shore. These producers feed grazers directly or supply dead material that decomposers and other organisms use.

2 Coasts change the list of producers. In cool, nutrient-rich coastal waters, kelp can anchor to rocky bottoms where light reaches its blades. Kelp forests supply food and shelter to animals such as sea urchins and fish. In sheltered, shallow bays with sandy or muddy bottoms, seagrasses take root instead. These flowering plants grow mostly underwater. Some species are exposed briefly at low tide, but prolonged exposure can damage many of them. Seagrass leaves make food, trap particles, and offer nursery habitat for young fish. A change from rock to soft sediment can therefore change which large producer dominates.

3 Where land meets tidal water, producers face repeated flooding and exposure. In many temperate estuaries, salt-marsh grasses such as cordgrass grow on muddy, salty ground. Their leaves and stems add organic matter to coastal food webs, much of it after dead tissue breaks down. In warmer tropical and subtropical estuaries, mangrove trees often line tidal shores, especially where freezing temperatures are rare. Their fallen leaves fuel food webs through decomposers, and their roots provide shelter for fish and crabs. Light, bottom type, salinity, and temperature help explain why different producers occupy different parts of connected aquatic ecosystems.

2 ANSWER WITH EVIDENCE

Use the passage

1. Why might sunlit surface water in both an offshore ocean and a lake contain phytoplankton, while dark deep-ocean water has few photosynthetic producers?

2. How do bottom type and water conditions help explain where kelp and seagrasses grow? Give one way each supports animals.

3. Compare a temperate muddy estuary with a warm tropical tidal shore. Which producer might you find in each, and how does each add material to a food web?

4. In a lake, where would you look for cattails rather than phytoplankton? How can each producer supply material to a food web?

3 YOUR TURN

Your own words

Imagine a survey from sunlit offshore water to a sheltered sandy bay and then a warm, muddy tidal shore. Name a likely primary producer at each stop, and explain how its location and food-web role differ from the others.

Where Producers Thrive

PART 1 · READ AND MARK

Underline each named producer, circle a clue to where it grows, and put a star by one way it supplies food or habitat for consumers. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Why might sunlit surface water in both an offshore ocean and a lake contain phytoplankton, while dark deep-ocean water has few photosynthetic producers?	**Phytoplankton use sunlight to photosynthesize, so they occur in the bright upper water of oceans and lakes. Little light reaches the deep ocean.**
2	How do bottom type and water conditions help explain where kelp and seagrasses grow? Give one way each supports animals.	**Kelp anchors to rock in cool, nutrient-rich coastal water and provides food or shelter. Seagrasses root in soft bottoms in sheltered, shallow bays and provide food or nursery habitat.**
3	Compare a temperate muddy estuary with a warm tropical tidal shore. Which producer might you find in each, and how does each add material to a food web?	**Cordgrass may grow in the temperate estuary, adding leaves and stems that enter the food web, often after decomposition. Mangroves may grow on the warm tidal shore, where fallen leaves fuel decomposer-based food webs.**
4	In a lake, where would you look for cattails rather than phytoplankton? How can each producer supply material to a food web?	**Cattails grow rooted along the shallow edge, while phytoplankton drift in bright upper water. Both make organic matter that can feed grazers or enter food webs after it dies.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

In sunlit offshore water, phytoplankton drift near the surface and make food that supports marine grazers. In the sheltered sandy bay, seagrasses root in the shallow bottom, where their leaves make food and shelter young fish. On the warm, muddy tidal shore, mangroves grow where the water rises and falls. Their fallen leaves feed decomposers, and their roots shelter fish and crabs.

Accept other accurate food-web roles stated in the passage. For the Your Turn task, look for three producers matched to the stated habitats and a distinct role for each.