

High School: Marine and Aquatic Science II

Adopted 2018

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5. Primary Producers MAQ.5

5A. Students will explore the biodiversity and interactions among aquatic life. MAQ.5A

1. Survey common primary producers and their roles in primary production in relation to geographical distribution within various aquatic ecosystems. MAQ.5A.1
2. List and describe common autotrophs that may be found in particular aquatic ecosystems, including prokaryotes (e.g., Cyanobacteria and Archaeobacteria), protists (e.g., diatoms, dinoflagellates, green algae, kelp, sargassum, and red algae), and plants (e.g., cord grasses, reeds, seagrasses, and mangroves). MAQ.5A.2
3. Recognize characteristics that are shared and derived using graphical representations of primary-producer evolution and develop cladograms/phylogenetic trees. MAQ.5A.3
4. Use dichotomous keys to identify sample producers within an aquatic ecosystem. MAQ.5A.4
5. Paraphrase energy conversion processes (e.g., photosynthesis and chemosynthesis). MAQ.5A.5
6. Enrichment: Research, analyze, and communicate historical and current methodologies for measuring primary productivity. Use an engineering design process to design and develop improvements to measure primary productivity (e.g., the light and dark bottle method and satellite data). MAQ.5A.6

6. Invertebrate Consumers MAQ.6

6A. Students will investigate characteristics of aquatic invertebrates. MAQ.6A

1. Characterize aquatic representatives of the following taxa: Protozoa (e.g., foraminiferians, radiolarians, amoeba, and paramecium), Porifera, Cnidaria, Platyhelminthes, Nematoda, Annelida, Rotifera, Mollusca, Arthropoda, Bryozoa, Brachiopoda, and Echinodermata. MAQ.6A.1
2. Identify characteristics that are shared and derived using graphical representations of animal evolution (i.e., cladograms and phylogenetic trees) and develop cladograms and phylogenetic trees. MAQ.6A.2
3. Develop a dichotomous classification key to be used in the identification of sample aquatic invertebrates. MAQ.6A.3
4. Compare and contrast major body plans (e.g., asymmetry, radial, bilateral symmetry, acoelomate, pseudocoelomate, and eucoelomate). MAQ.6A.4
5. Explain various life cycles found among animals (e.g., polyp and medusa in cnidarians, multiple hosts and stages in the platyhelminthic life cycle, and arthropod metamorphosis). MAQ.6A.5
6. Dissect representative taxa (e.g., clam and squid), collect data, compare their internal and external anatomy, analyze, explain, and communicate results. MAQ.6A.6
7. Using key morphological and physiological adaptations found within animal taxa, assess how animals interact with their environment to determine their ecological roles. MAQ.6A.7
8. Enrichment: Given a niche in a specific environment, use an engineering design process to design an animal, listing characteristics based on your knowledge of shared and derived characters, internal and external anatomy, and how the animal would adapt morphologically and physiologically relative to its ecological role and specific environment. MAQ.6A.8

7. Vertebrate Consumers MAQ.7

7A. Students will investigate characteristics of aquatic invertebrates. MAQ.7A

1. Characterize aquatic representatives of the following taxa: Hemichordata, Urochordata, Cephalochordata, and Vertebrata (including Agnatha, Chondrichthyes, Osteichthyes, Amphibia, Reptilia, Aves, and Mammalia). MAQ.7A.1
2. Identify characteristics that are shared and derived using graphical representation of animal evolution, and develop cladograms/phylogenetic trees. MAQ.7A.2
3. Utilize a dichotomous key to identify select aquatic vertebrates. MAQ.7A.3
4. Differentiate various life cycles found among animals (e.g., egg, tadpole, and adult stages of the amphibian life cycle; leathery eggs on land in reptiles; hard-shelled eggs in Aves; placental, marsupial, or monotremes in mammals; viviparous, ovoviviparous, and oviparous animals). MAQ.7A.4
5. Dissect representative taxa (e.g., shark, fish); collect data; compare their internal and external anatomy; and analyze, explain, and communicate results. MAQ.7A.5
6. Using key morphological and physiological adaptations found within aquatic vertebrate taxa, assess how animals interact with their environment to determine their ecological roles. MAQ.7A.6
7. Enrichment: Given a niche in a specific environment, use an engineering design process to design an animal, listing characteristics based on your knowledge of shared and derived characteristics, internal and external anatomy, and how the animal would adapt morphologically and physiologically relative to its ecological role and specific environment. MAQ.7A.7