

Name \_\_\_\_\_

Date \_\_\_\_\_

# Water Quality Degradation in the Ocean Answer Key

Use the following online resources to answer the questions.

- National Geographic “Dead Zone” encyclopedic entry
- Woods Hole Oceanographic Institution “Harmful Algae” site. The “Impacts” tab will also provide helpful information.

## Part 1. Harmful Algal Blooms (HABs)

1. What are phytoplankton? Phytoplankton, or algae, are aquatic, photosynthetic organisms that float at or drift below the water surface. They form the base of the aquatic food web and affect the chemical processes of photosynthesis, respiration, and decomposition occurring in aquatic ecosystems.
2. What are Harmful Algal Blooms (HABs)? Harmful algal blooms (HABs) are dense accumulations of phytoplankton, or algae, that have negative impacts on other organisms.
3. What are some of the negative effects of HAB formation? HABs can cause the release of toxins that lead to: sickness and death of birds, dogs, and other animals; poor or unsafe water quality conditions; and human illness. Some HABs have other negative effects, including water color changes, water odor, and hypoxia.

## Part 2. Toxic Algae

4. Describe the relationship between HABs and toxic phytoplankton. HABs contain specific types of phytoplankton that produce and release toxins. These toxins can be directly ingested by organisms or biomagnified up through levels of the food chain, where they become even more toxic.
5. What is biomagnification? Biomagnification is a result of the accumulation of phytoplankton toxins at higher and higher trophic levels of the food chain.
6. Describe the relationship between HABs and shellfish poisoning. Toxins can accumulate quickly in shellfish due to their use of filter feeding, in which large volumes of water are filtered to consume high concentrations of phytoplankton. If the phytoplankton consumed are toxic, then the shellfish can bioaccumulate that toxin.

# Water Quality Degradation in the Ocean

## Answer Key, continued

7. Briefly describe one current event related to toxic algae *within* the United States. \_\_\_\_\_

Answers will vary.

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8. Briefly describe one current event related to toxic algae *outside of* the United States.

Answers will vary.

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### Part 3. Dead Zones

9. Describe the relationship between HABs and eutrophication, or nutrient loading.

Eutrophication due to excess nutrient runoff and cycling within the water column increases nutrient availability to phytoplankton that comprise HABs. When phytoplankton have plenty of nutrients to sustain them and they are not nutrient-limited, they can bloom, as long as their other requirements (light, temperature) are being met.

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10. What is a dead zone? A dead zone is a hypoxic, or low oxygen, area in an aquatic ecosystem that can deprive organisms of the oxygen needed for respiration. This can lead to fish kills and, eventually, anoxic (without oxygen) conditions unable to support life.
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11. Describe the relationship between HABs and hypoxia, or oxygen depletion. Hypoxia can result when increased phytoplankton biomass from HABs begins to die and is decomposed by bacteria. The bacteria respire and deplete the water of oxygen. Although phytoplankton are photosynthesizing, the respiration rates (of bacteria and phytoplankton at night) are greater than photosynthesis rates, leading to hypoxia.
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12. Briefly describe one water quality improvement success story *within* the United States.

Answers will vary.

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