

Pollution Science: Environmental Impacts on Fauna

Pollution Science · Answer Key · 17 Questions

1. Which heavy metal, commonly released from industrial activities and coal combustion, bioaccumulates in aquatic organisms, leading to neurological damage and reproductive failure in top predators like predatory fish and marine mammals?

- A) Lead (Pb)
- B) Cadmium (Cd)
- C) Mercury (Hg)**
- D) Arsenic (As)

2. Bio-amplification of Persistent Organic Pollutants (POPs), such as DDT and PCBs, is most pronounced in which trophic level within an ecosystem?

- A) Primary producers (e.g., phytoplankton)
- B) Primary consumers (herbivores)
- C) Secondary consumers (carnivores)
- D) Apex predators (tertiary or quaternary consumers)**

3. Acid rain, primarily caused by sulfur dioxide (SO₂) and nitrogen oxides (NO_x) emissions, can significantly lower the pH of freshwater lakes. What is a direct ecological consequence observed in fish populations in such acidified waters?

- A) Increased egg viability and hatching success
- B) Thickening of eggshells leading to fragility
- C) Impaired gill function and reduced oxygen uptake**
- D) Enhanced growth rates due to nutrient enrichment

4. Microplastics have been found to cause physical harm to marine animals. In seabirds, ingestion of microplastics can lead to which specific physiological issue?

- A) Increased buoyancy
- B) Reduced nutrient absorption and false sense of satiation**
- C) Enhanced digestion of food
- D) Improved insulation against cold temperatures

5. The phenomenon of 'eutrophication' in aquatic ecosystems, often exacerbated by agricultural runoff containing excess phosphorus and nitrogen, primarily leads to a dramatic increase in the population of what?

- A) Large predatory fish
- B) Zooplankton
- C) Benthic invertebrates
- D) Phytoplankton and algae**

6. Ozone depletion in the stratosphere, primarily due to chlorofluorocarbons (CFCs), results in increased ultraviolet (UV-B) radiation reaching the Earth's surface. Which group of marine organisms is particularly vulnerable to this increased UV radiation, experiencing impaired photosynthesis and DNA damage?

- A) Marine mammals
- B) Deep-sea fish
- C) Phytoplankton**
- D) Corals

7. Endocrine-disrupting chemicals (EDCs) found in water pollution, such as bisphenol A (BPA) and certain pesticides, can interfere with the hormonal systems of wildlife. In male fish, exposure to EDCs can lead to which observed abnormality?

- A) Increased sperm production
- B) Development of female reproductive characteristics (feminization)**
- C) Enhanced immune response
- D) Accelerated sexual maturation

8. Light pollution, the excessive and misdirected artificial light at night, can disrupt the circadian rhythms and migratory patterns of many species. For nocturnal insects, this can lead to:

- A) Enhanced navigation using artificial light sources
- B) Increased predation by diurnal animals
- C) Disruption of mating signals and increased vulnerability to predators**
- D) Faster development of larvae

9. Noise pollution from shipping and seismic surveys in marine environments can have significant impacts on cetaceans (whales and dolphins). A documented consequence of chronic underwater noise exposure is:

- A) Improved echolocation efficiency
- B) Increased foraging success
- C) Displacement from critical habitats and disruption of communication**
- D) Enhanced mating vocalizations

10. The accumulation of plastic debris in the marine environment, particularly in gyres, creates 'plastic islands'. These islands can act as rafts for invasive species, facilitating their transport to new regions. This process is known as:

- A) Ocean acidification
- B) Biomagnification
- C) Oceanic dispersal of invasive species**
- D) Coral bleaching

11. Particulate matter (PM_{2.5}) from air pollution has been linked to respiratory issues in terrestrial animals. Studies on wild birds have shown that exposure can lead to:

- A) Improved lung capacity
- B) Increased resistance to airborne pathogens
- C) Reduced immune function and increased susceptibility to respiratory infections**
- D) Enhanced oxygen transport in the blood

12. Thermal pollution, often from power plants discharging heated water into rivers and lakes, can have detrimental effects on aquatic life. A direct consequence for fish in warmer water is:

- A) Increased dissolved oxygen levels
- B) Reduced metabolic rates and growth
- C) Decreased tolerance to diseases and toxins**
- D) Stimulation of spawning

13. Siltation, the deposition of fine sediment particles into rivers and streams, often from deforestation and agricultural practices, can smother aquatic habitats. What specific impact does this have on benthic macroinvertebrates (e.g., insect larvae, worms)?

- A) Increased availability of food sources
- B) Creation of new microhabitats for spawning
- C) Reduced habitat complexity and loss of interstitial spaces**
- D) Enhanced oxygenation of the substrate

14. Certain pesticides, like neonicotinoids, have been implicated in declines of insect populations, particularly bees. A significant observed effect on bee colonies is:

- A) Increased colony size and productivity
- B) Improved navigation and foraging behavior
- C) Impaired learning and memory, leading to colony collapse disorder**
- D) Enhanced immune response to diseases

15. The presence of pharmaceuticals and personal care products (PPCPs) in wastewater, even at low concentrations, can affect aquatic organisms. Studies on fish have shown that exposure to some antidepressants can lead to:

- A) Increased boldness and reduced predator avoidance**
- B) Enhanced social bonding within schools
- C) Improved foraging efficiency
- D) Increased reproductive success

16. Oil spills in marine environments pose a severe threat to seabirds. The physical coating of feathers with oil leads to:

- A) Improved waterproofing and insulation
- B) Increased buoyancy and flight efficiency
- C) Loss of waterproofing and insulation, leading to hypothermia**
- D) Enhanced ability to camouflage

17. Heavy metals like arsenic can enter terrestrial food chains through contaminated soil and water. In grazing animals, chronic exposure can lead to:

- A) Improved bone density
- B) Increased appetite and weight gain
- C) Neurological disorders and internal organ damage**
- D) Enhanced fur growth and quality