

OREGON ENVIROTHON 2026

TEAM # _____

Aquatic Ecology

Test Total _____ / 50 points

1. Which of the following best describes a watershed? [1 point]

- a. A body of water
- b. An area of land where water drains to a common outlet
- c. A chemical testing site
- d. A type of aquatic ecosystem

2. The water cycle plays a critical role in which of the following? [1 point]

- a. Soil nutrient erosion
- b. Salinization of agricultural lands
- c. Climatic influences
- d. All of the above

3. Match each water quality parameter with its ecological importance. [2 points, ½ point each]

- | | | |
|---------------------|---------|--|
| a. Temperature | ___d___ | i. Indicates nutrient levels and potential pollution |
| b. Dissolved Oxygen | ___a___ | ii. Affects metabolic rates of aquatic organisms |
| c. pH | ___b___ | iii. Critical for aquatic organism survival |
| d. Phosphorus | ___c___ | iv. Determines acidity or alkalinity of water |

Collect a water sample and analyze it using the test kits. Use your results to answer Questions 4 and 5.

4. What values did you measure from this sample for the following parameters? [4 points, 1 point each] Answer depends on sample that day

- a. Temperature: _____
- b. pH: _____
- c. Dissolved oxygen: _____
- d. Phosphate: _____

5. According to the Oregon Water Quality Standards for Salmon and Steelhead, what is the water quality classification for this sample? [1 point] Answer depends on sample that day

- a. Class AA
- b. Class A
- c. Class B

____ / 9 points

6. Briefly explain why each of the following watershed characteristics is important for maintaining a healthy aquatic ecosystem. [3 points, 1 point each explanation]

a. High biodiversity:

Possible answer: A diverse range of species increases ecosystem stability and resilience, enabling the ecosystem to withstand stressors such as climate change or species loss.

b. Vegetation along streambanks:

Possible answer: Vegetation helps stabilize streambanks, reduce erosion, filter pollutants from runoff, and regulate water temperature by providing shade.

c. Natural water flow:

Possible answer: Natural water flow maintains the timing and amount of water in a stream and moves nutrients and sediment, which supports aquatic life cycles and keeps habitats stable.

7. Match each climate scenario with how it affects the water cycle. [3 points]

Climate Scenario

Effect on water cycle

___**d**___ Global warming

___**b**___ Increased drought

___**a**___ Sea level rise

a. Accelerated evaporation rates

b. Reduced groundwater recharge

c. Released atmospheric precipitation

d. Enhanced ozone purification

___ / 6 points

8. What physical characteristic most directly influences the chemical composition of a wetland vernal pool ecosystem? [1 point]

- a. Water temperature
- b. Seasonal duration
- c. Surrounding vegetation density
- d. Substrate composition

9. Which indicator is the most critical for determining the ecological health of a freshwater wetland ecosystem? [1 point]

- a. Water depth
- b. Annual precipitation rate
- c. Macroinvertebrate diversity
- d. Soil pH level

10. Fill in the blank:

Confined aquifers are characterized by water-bearing rock layers that are trapped between impermeable geological formations. [1 point]

11. Short answer: A friend of yours thinks wetlands have little economic value and you want to try to convince them otherwise. Name **two** functions wetlands provide and explain how **each** function economically benefits people or communities. [4 points, 1 point for each function and each explanation]

Possible Answers:

Flood control: Wetlands absorb excess water, reducing damage to homes and infrastructure.

Water purification: Wetlands filter pollutants, lowering water treatment costs.

Fisheries and recreation: Wetlands support fish, wildlife, and tourism, generating income.

Storm protection: Coastal wetlands reduce damage from hurricanes and storm surges, saving money on repairs.

Other reasonable functions also accepted. To get full points, explanation must show how the function cited provides income or reduces costs.

____ / 7 points

12. Which of the following is a function of riparian zones? Identify all correct answers. [2 points for identifying all correct answers, 1 point for partial correct]

- a. Filter sediment, nutrients, and pollutants from surface runoff before they enter waterways
- b. Increase stream water temperature by removing shade
- c. Stabilize streambanks and reduce erosion through root systems
- d. Provide organic matter and habitat that support aquatic food webs
- e. Eliminate the need for floodplains during high-flow events

13. The chart below lists groups of aquatic organisms and different trophic events roles. Match each group to its correct trophic role. [3 points, ½ point each]

Column A – Organisms	Column B – Trophic Roles
<u> 2 </u> a. Zooplankton, small herbivorous fish, snails	1. Producer
<u> 4 </u> b. Trout, bass, pike	2. Primary consumer
<u> 3 </u> c. Small predatory fish, insectivorous fish	3. Secondary consumer
<u> 5 </u> d. Sharks, orcas, ospreys	4. Tertiary consumer
<u> 1 </u> e. Aquatic plants, algae	5. Apex predator
<u> 6 </u> f. Bacteria, fungi, aquatic worms	6. Decomposer

14. A freshwater lake in your region supports a variety of fish, aquatic plants and macroinvertebrates. Recently, increased agricultural irrigation and municipal water withdrawals have lowered the lake's water level. What does the carrying capacity of the lake refer to? [1 point]

- a. The total volume of water available in the lake for human use
- b. The maximum population of aquatic organisms that the lake can sustainably support under current environmental conditions
- c. The rate at which water can be replenished naturally by rainfall and inflows
- d. The number of people who can use the lake for recreation without impacting water quality

15. Which of the following is NOT an ecological consequence of nonpoint source pollution in Oregon streams that affects salmon and other native species? [1 point]

- a. Increased turbidity, reducing light penetration for aquatic plants
 - b. Elevated nutrient levels leading to algal blooms and low dissolved oxygen
 - c. Increased availability of food for salmon
 - d. Elevated sediment deposition smothering fish eggs and habitat
- ____ / 7 points

16. Identify and match each of these frog species to its photo below. [2 points, ½ point each]

- a. Red-legged Frog
- a. Bullfrog

- b. Spotted Frog
- c. Tree Frog



1. Spotted Frog

2. Red-legged Frog



3. Chorus Frog

4. Bullfrog

17. Which frog species shown is considered an aquatic nuisance (invasive) species in Oregon's freshwater ecosystems? [1 point]

Bullfrog

18. Which frog species shown is listed as a threatened species in Oregon's freshwater ecosystems? [1 point]

Spotted Frog

 / 4 points

19. Ludwigia (water primrose) is an invasive aquatic plant found in Oregon waterways. Which of the following best describes its impact on aquatic ecosystems? [1 point]
- a. It releases toxins into the water that instantly kill aquatic organism.
 - b. It primarily affects fish migration by creating physical barriers, with little impact on water quality.
 - c. It forms dense mats on the water surface, blocks sunlight to submerged plants, lowers dissolved oxygen, and reduces habitat for native plants and animals.
 - d. It primarily grows along riverbanks, does not survive in water, and has little to no effect on aquatic animals, plants, or ecosystem processes.



20. A farmer manages livestock, row crops, and Christmas trees on their property. Runoff from these operations can contribute to nonpoint source pollution, increasing turbidity and introducing nutrients or other pollutants into nearby water bodies. For each type of farm operation below, identify one management practice the farmer could use to reduce negative impacts on water quality. [3 points, 1 point each]
- a. Livestock: Cover manure piles, install fencing to keep animals out of streams, OR use riparian buffer zones
 - b. Row crops: Plant cover crops, maintain crop residues, OR use contour farming/terracing
 - c. Christmas trees: Use contour planting, inter-row vegetation, OR maintain grassed waterways between rows
21. Which factor most directly explains why some counties in eastern Oregon use significantly more water for agriculture than western Oregon counties? [1 point]
- a. Western Oregon has more groundwater wells than eastern Oregon
 - b. Western Oregon's rivers are less accessible to farmers
 - c. Eastern Oregon has higher annual rainfall than western Oregon
 - d. Eastern Oregon has more arid conditions requiring irrigation for crops

____ / 5 points

22. How does the Clean Water Act help protect water quality in the United States?

Choose the best response. [1 point]

- a. It allows individuals and companies to release pollutants into rivers and streams under certain local permits and conditions
- b. It mandates that all rivers and lakes be entirely free from sediments, nutrients and chemical pollutants at all times across the country
- c. It requires states and the EPA to set water quality standards and regulate pollution from identifiable point sources such as industrial facilities and sewage systems.
- d. It eliminates nonpoint source pollution from urban and agricultural areas immediately after implementation of the law

23. Oregon's Detroit Lake provides drinking water, recreation, and hydroelectric power. In 2026, the U.S. Army Corps of Engineers plans to lower the lake to very low levels for two weeks each year to help young salmon and steelhead migrate downstream. What is a major concern for local communities about this plan? [1 point]

- a. The drawdown could permanently reduce the lake's capacity for hydroelectric power production.
- b. Exposed sediment and murky water may clog municipal water filters, risking water quality for residents.
- c. Adult salmon will immediately return in large numbers, creating overcrowding in the lake.
- d. The lake will be closed to all recreational use indefinitely, permanently eliminating tourism.

24. Name four pollution sources that can impact waterways – two point sources and two nonpoint sources. [2 points, 1/2 point each]

Point sources of pollution

Nonpoint sources

a.

c.

b.

d.

____ / 4 points

Possible answers to Q24

Point Sources:

- Wastewater treatment plant discharge pipes
- Industrial or factory effluent pipes
- Power plant discharge
- Sewage outfalls
- Landfill leachate pipes
- Mine drainage pipes
- Oil refinery discharge

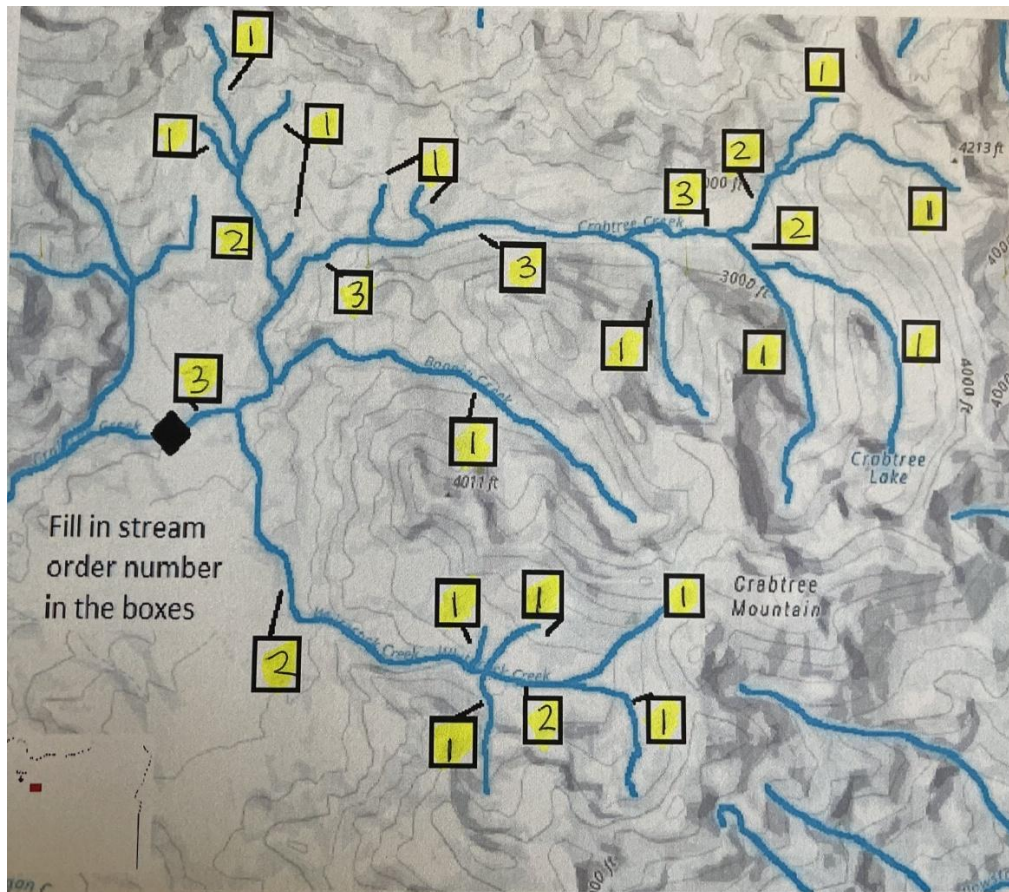
Nonpoint Sources

- Agricultural runoff (fertilizers, pesticides, animal waste)
- Stormwater runoff from roads and highways
- Urban runoff from parking lots and rooftops
- Lawn and garden fertilizer runoff
- Soil erosion from construction sites
- Sediment from deforested areas
- Pet waste washed into storm drains
- Atmospheric deposition

And other reasonable responses

25. Identify the stream order in the following Cascades watershed, using the Strahler Method. [6 points total, ¼ point per box]

- Identify the 1st order tributaries and label these boxes as "1."
- Identify the 2nd order tributaries and label these boxes as "2."
- Identify the 3rd order tributaries and lab these boxes as "3."



____ / 6 points

26. Macroinvertebrate Identification: Identify the two specimens provided using the macroinvertebrate identification key. Circle your answer below. [2 points, 1 point for each species] **Answers: Snail and Stonefly**



MACROINVERTEBRATE IDENTIFICATION KEY



www.CleanStreamsSalem.org

____ / 2 points