

Stream Cleaner Environmental Forum Worksheets

#3. Water Quality Science

<http://www.cacaponinstitute.org/high.htm>

1. Scientists who are dedicated to studying the water quality of the Chesapeake Bay focus exclusively on the water in the Bay itself. *Circle the correct answer:* True False

Questions 2-8 are based on Native Guide Neil Gillies essay on the challenges of studying non-point source pollution. Are the following statements true or false? Check one.

Question	True	False
2. Non point pollution is relatively constant		
3. Phosphorus can become sediment-bound		
4. Phosphorus remains in the water column almost indefinitely (for a long time)		
5. Over 90% of the annual phosphorus load can be delivered in a few severe storms.		
6. Nitrate-Nitrogen is natural and abundant in the environment.		
7. Nitrate-N moves easily in groundwater and is more persistent the phosphorus.		
8. Nitrate dissolves in water so heavy rain means lower loads.		

Answer Questions 9-15 by interpreting the graphs provided by Native Guide Neil Gillies.

9. The first graph plots phosphorus concentrations against 30 days cumulative rainfall. Phosphorus **concentration** is typically higher during wet periods.

Circle the correct answer: True False No-pattern

10. The second graph plots nitrate-nitrogen concentrations against 30 days cumulative rainfall. Nitrate-nitrogen **concentrations** are typically higher during wet periods.

Circle the correct answer: True False No-pattern

11. The third graph plots phosphorus **concentration** against stream flow. Phosphorus concentrations are typically higher during high water periods.

Circle the correct answer: True False No-pattern

12. The fourth graph plots phosphorus **load** against stream flow. Phosphorus loads are typically higher during high water periods. *Circle the correct answer:* True False No-pattern

13. The fifth graph plots nitrate **concentration** against stream flow. Nitrate concentrations are typically higher during high water periods. *Circle the correct answer:* True False No-pattern

14. The sixth graph plots nitrate **load** against stream flow. Nitrate loads are typically higher during high water periods. *Circle the correct answer:* True False No-pattern

15. The last two graphs plot the Anatomy of a Storm. Compare the "behavior" of nitrate and phosphorus and pick the correct statement. *Circle the correct answer:*

- a. Both nitrate and phosphorus loads rise and fall quickly.
- b. Both nitrate and phosphorus loads rise quickly and then stay high.
- c. Both nitrate and phosphorus loads rise quickly, then nitrate stays high longer than phosphorus.
- d. Both nitrate and phosphorus loads rise quickly, then phosphorus stays high longer than nitrate.

16. Which Federal agency is leading the effort to study water quality in the large rivers that flow into the Chesapeake Bay? *Circle the correct answer:*

- a. NOAA
- b. USGS
- c. NIMBY
- d. NASA
- e. USDA
- f. None, the states have their own agencies.

Questions 17-18 are based on the Chesapeake Bay River Input Monitoring Program's graphic overview of the nitrogen and phosphorus concentrations and load contributions from each major river basin (click on the graph icon at the upper left of the link). *Circle the correct answer:*

17. Which river has the highest median **concentration** of Total Nitrogen?

- a. Susquehanna
- b. Potomac
- c. Patuxent
- d. James

18. Which river delivers the largest **load** of Total Nitrogen?

- a. Susquehanna
- b. Potomac
- c. Patuxent
- d. James

19. Why is it that the river that delivers the largest **load** of Total Nitrogen does not have the highest **concentration**?

- a. Because load and concentration are not related.
- b. Because load is related to streamflow, and the stream with the largest load had very large flow.
- c. Because concentration is related to streamflow, and the higher the flow the higher the concentration.
- d. No Pattern

20. Nitrogen and phosphorus are of particular importance to the health of the Bay because they... (*Circle the correct answer*):

- a. Are unnatural and poison fish
- b. Cause excessive growth of algae
- c. Form an oily layer that blocks oxygen
- d. Can get into drinking water supplies

21. Dissolved Oxygen is... (*Circle the correct answer*):

- a. The amount of oxygen that is present in water.
- b. A scientific process to extract CO₂ from the sea.
- c. A leading cause of global warming.
- d. An unlikely event that causes fish to rise to the water surface.

Questions 22-25 refer to the "dissolved oxygen from the Chesapeake Bay Program" link.

22. Dissolved Oxygen is important because aquatic animals need oxygen to live.

Circle the correct answer: True False

23. What is the minimum amount of dissolved oxygen a blue crab needs to live? *Circle correct answer:*

- a. 1 mg/l
- b. 3 mg/l
- c. 10 mg/l
- d. There is no "minimum"

24. What is the minimum amount of dissolved oxygen a striped bass needs to live? *Circle correct answer:*

- a. 1 mg/l
- b. 3 mg/l
- c. 6 mg/l
- d. There is no "minimum"

25. Which Bay animals can live in the anoxic (no-oxygen) conditions. *Circle correct answer:*

- a. Worms
- b. Clams
- c. None.