

Aquatics

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policy range aquatics soil forestry wildlife





Plunge into the World of Aquatics



Did you know that two atoms of hydrogen plus one atom of oxygen produces a molecule of water or H₂O? Wow!

It is amazing that zillions of these tiny water molecules can fill up a puddle, pond, lake, river, and all the oceans of the world. Can you believe that something so small is essential for human and animal survival?

Here in Nebraska...

-  Clean water is one of Nebraska's most valuable resources.
-  Sixteen thousand miles of rivers and streams as well as 152,000 acres of lakes provide opportunities for many different uses, such as agriculture, industry, recreation, fish, wildlife, and human consumption.
-  The High Plains Aquifer System underlies about 85% of Nebraska and supplies 95% of all groundwater used here.
-  Nebraska's groundwater provides 82% of the state with drinking water.

Due to concerns about surface and groundwater quality, it is imperative for people to understand the processes which affect our water system. A knowledge of physical, chemical, and biological interactions will help students understand that there is a "whole world" of water management problems which professionals address daily.

That is why you need to understand the world of aquatics!

Aquatics

Objective #1: Physical & Chemical Properties

Understanding of the physical and chemical attributes of water including:

Look these terms up

Density, composition, physical phase, dissolved oxygen, salinity, alkalinity, temperature, pH, specific conductance, temperature, turbidity, hardness and suspended sediment.

Principles to Know:

- What are the two primary nutrients that affect water quality?
- Describe two methods of measuring dissolved oxygen in a water sample.
- Explain what specific characteristic of water makes it possible for aquatic species to survive when a lake freezes over.
- What are the biological indicator species used for? List two types of these organisms.

Reference Material:

- *Handbook of Common Methods in Limnology, Owen T. Lind.
- *Common Water Measurements(<http://fs1dgadrv.er.usgs.gov/edu/characteristics.html>)
- *Intro to Hydrology(http://geog.ouc.bc.ca/conted/onlinecourses/geog_111/6a.html)

Sample Question:

Alkalinity is a measure of:

- a) the concentration of nutrients in water.
- b) the acidity of water.
- c) the buffering capacity of water.
- d) the concentration of dissolved salts in water.

Objective #2: Point and Non-Point Source Pollution

Principles to Know:

- Identify types of urban nonpoint source pollution and their causes.
- Differentiate between nonpoint and point source pollution and know the different sources, consequences, management and legislation affecting each.
- Understand local watersheds impact in the problem.
- Determine the impacts on our Natural Resources.

Reference Material

- *<http://www.epa.gov/epahome/laws.htm>
- *<http://www.epa.gov/OWOW/NPS/index.html>

Sample Questions:

1. Nonpoint source pollution refers to agriculture and not to any urban activities.
 - a) true
 - b) false

2. Section 319 of the Clean Water Act is significant because, unlike the rest of the CWA, it addresses:
 - a) degradation of wetlands
 - b) factory point source discharge
 - c) nonpoint source pollution
 - d) waste water system discharge

3. Which of the following conservation practices have proven effective at reducing runoff from agricultural fields
 - a) grassed waterways
 - b) terraces
 - c) conservation tillage
 - d) field borders or filter strips
 - e) all of the above

Objective #3:

--Identify what a watershed is and be able to follow the hydrologic cycle through a watershed.

Reference Material:

*<http://www.cticpurdue.edu/CTIC/CTIC.html>

*<http://www.epa.gov/owow/nps/index.html>

Sample Questions:

1. What is the process by which moisture is added to the atmosphere?
 - a) evaporation
 - b) infiltration
 - c) condensation
 - d) precipitation

2. Evaporation from soils, plant surfaces, and water bodies, together with water losses through plant leaves, are known collectively as
 - a) evaporation
 - b) precipitation
 - c) evapotranspiration
 - d) transpiration

Objective #4:

Principles to Know:

- Understand the significance of Nebraska's water resources (e.g. Sandhill lakes, ground water, wetlands) how they are classified, used, and defining characteristics they possess.
- Identify the positive and negative conditions for Nebraska lakes and aquatic species. This means knowing beneficial habitat for certain species and understanding the relationship among species, as well as conditions which threaten those relationships.
- Know the distinction between saline and alkaline wetlands.
- Understand the difference between Oligotrophic and Eutrophic lakes.

Reference Material:

*NGPC Web Page (<http://ngp.ngpc.state.ne.us/gp.html>)

Sample Questions:

1. The soils found in wetlands which help in their designation are:
 - a) clay soils
 - b) hydric soils
 - c) sandy soils
 - d) wet soils

2. The Ogallala Aquifer stands in cavernous lakes and flows in underground rivers.
 - a) true
 - b) false

Objective #5:

Principles to Know:

- Explain aquifer characteristics such as permeability, hydraulic conductivity, transmissivity, etc.
- Define groundwater quality risk factors (what geological or chemical conditions make groundwater vulnerable to contamination; these can be geologic characteristics or chemical characteristics).

Reference Material:

- *NE Cooperative Extension publication EC 94-135
- *Understanding Pesticides and Water Quality in Nebraska.
- *Contact US Geological Survey or check their web page.

Sample Questions

1. The total void space between the grains or the cracks and solution cavities that can fill with the water is termed
 - a) permeability
 - b) porosity
 - c) capillary fringe
 - d) water table
2. Which of the following set of factors would create the most vulnerable situation for groundwater?
 - a) shallow water table, irrigated farm land, clay soils
 - b) Porous soil, shallow water table, chemical with long half-life.
 - c) chemical with low solubility, soil with high organic matter, near surface water
 - d) chemical with high solubility, flat land, deep water table
3. Darcy's law assumes _____ flow, which means that the water will follow distinct flow lines rather than mix with other flow lines.
 - a) turbulent
 - b) laminar
4. In a groundwater recharge zone, the pressure head _____ with increasing depth; in a discharge zone, the pressure head _____ with increasing depth.
 - a) increases, decreases
 - b) decreases, increases
 - c) increases, increases
 - d) decreases, decreases

Objective #6:

Principles to Know:

- Interpret hydrograph and bathymetric (**lake profile**) map data.
- Know the difference between oligotrophic and eutrophic lakes.

Reference Material

**Soil and Water Conservation Systems, by: Schwab, Fangmeier, Elliot, Wetzzel.*

Sample Questions

1. On a hydrograph, what does the area under the curve equal?
 - a) peak runoff rate
 - b) time since start of a storm
 - c) rainfall intensity
 - d) total runoff

2. A hydrograph is a
- a) graph of watershed runoff versus time
 - b) graph of watershed depth
 - c) graph of rainfall intensity
 - d) graph of storm duration

Objective #7:

Principles to Know

- Be familiar with native fish of Nebraska, their defining characteristics and preferred habitats.
- Know specific indicator species for pollution and stress tolerance.
- Understand how predator/prey relationships control populations.

Sample Questions

1. The age of a fish may be determined by analyzing
 - a) scales
 - b) otoliths
 - c) spines
 - d) all of the above

2. Gills can function to
 - a) take up oxygen
 - b) maintain osmotic balance
 - c) eliminate wastes
 - d) all of the above

3. Which of the following are sight feeders?
 - a) Walleye, quillback carpsucker, northern pike
 - b) Channel catfish, northern pike, white crappie
 - c) Quillback carpsucker, northern pike, burbot
 - d) Walleye, northern pike, white crappie

Reference Material

- **Fresh Water Fish of North America, Peterson Guide*
- *Game and Parks (<http://ngp.ngpc.state.ne.us/gp.html>)

answers

Objectives: 1) c, 2) b,c,e, 3) a, c, 4) b,b, 5) b,b,b,b, 6) d,a, 7) d,d,d