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NOTEBOOK

ANSWER KEY 8.E.1.3 – WATER QUALITY guided notes

8TH GRADE SCIENCE
Ms. Weissert

WATER SYSTEM HEALTH

When it comes to the health of a water system, there are many factors that go into it. The balance between physical, chemical and biological variables determines the health of a water system.

PHYSICAL	CHEMICAL	BIOLOGICAL
• Temperature • Turbidity • Water Movement	• Dissolved oxygen (+ other gases) • pH • Nitrates • Salinity	• Fish • Algae • Insects • Plants

These variables are subject to change from both natural and man-made forces

- Freshwater is a major concern because it is the main source of water for humans and animals
- Our freshwater that we use can be SAFE or POTABLE

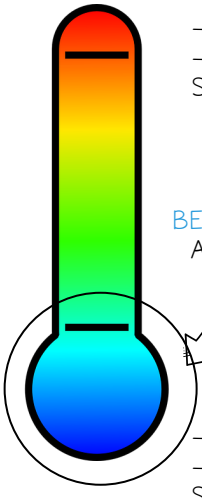
HEALTHY ENOUGH TO BATHE IN AND CLEAN WITH

HEALTHY ENOUGH TO DRINK

PHYSICAL INDICATORS

TEMPERATURE

- The temperature of a body of water determines the organisms that can live there
- Many organisms have a preferred temperature range where they will thrive
  - THINK ABOUT IT! We cannot thrive in an environment that is –50°, but some organisms can!
- As the temperature of the water increases:
  - It is able to dissolve more sediment which can block the light and not allow photosynthesis to occur
  - It dissolves LESS oxygen (because particles are moving too fast and O_2 can escape into the air) and may not contain enough for organisms to survive



TURBIDITY

Turbidity is how clear/cloudy a body of water is.

- Cloudiness is due to the amount of sediment dissolved in the water
- A high turbidity = not potable
  - Can lead to increased temperatures, decreased DO, and impairment of some aquatic organisms

HIGH TURBIDITY (CLOUDY)

LOW TURBIDITY (CLEAR)

CHEMICAL INDICATORS

DISSOLVED OXYGEN

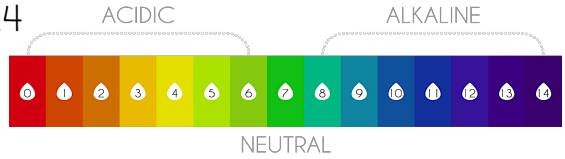
Dissolved oxygen is the amount of oxygen in water that is available for aquatic organisms to use.

- The level of oxygen in surface water is important for many organisms such as zooplankton and fish to thrive.
- There are two ways oxygen gets into the water:
  1. From the AIR (being trapped by waves and moving currents)
  2. From PLANTS releasing O_2 during photosynthesis

pH LEVEL

The pH of a body of water determines how acidic or how basic it is.

- pH is measured on a scale from 0–14
  - 0–6 = ACIDIC
  - 7 = NEUTRAL
  - 8–14 = BASIC (Alkaline)



- The pH of water is known to have a synergistic effect, which means that materials (iron, aluminum, ammonia, mercury) introduced into bodies of water can have more or less of an impact based on the pH of the water.
  - EXAMPLE: Metals in more acidic water can become more dangerous and more poisonous than they normally would be in neutral water.

NITRATES + PHOSPHATES

Nitrates and phosphates come from Nitrogen and Phosphorous, which are essential nutrients for healthy plant growth.

- Too many nitrates or phosphates in drinking water can make it unhealthy

SOURCES OF NITRATES	SOURCES OF PHOSPHATES
• Runoff contaminated with fertilizers • Septic tank leaks • Sewage • Natural deposit erosion	• Human and animal waste • Laundry • Cleaning and industrial waste

SALINITY

Salinity is the measure of salt in water and can be an indicator of how healthy a water system is.

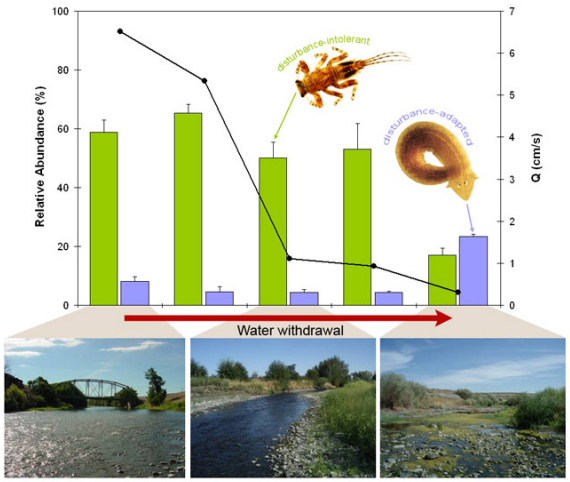
- Salinity can enter water systems through natural processes of weathering rocks from wind and rain
- High concentrations of salinity can cause vegetation to become unhealthy or die and can lead to a decrease in biodiversity

AMOUNT OF DIFFERENT SPECIES LIVING IN AN AREA

BIOLOGICAL INDICATORS

Biological indicators (Bioindicators) are macroinvertebrates that can give an indication of how healthy a water system is.

- The presence and numbers of the types of fish, insects, algae, plants and other aquatic organisms can tell us how healthy the water they live in is
- These organisms are usually easy to collect and identify
- These organisms are used to measure water health because many are very sensitive to pollution
    - Poor water quality is indicated by a few number of bioindicator organisms in one place



The species in the GREEN to the right is a bioindicator species because it is disturbance-intolerant (which means it does not handle a change in the water well).
– As the water withdrawal occurs, and the water system is less healthy for these organisms, their abundance numbers begin to drop.

WATER STEWARDSHIP

There has only been a growing awareness and concern for water pollution for the past 45-50 years. Before that, there was little concern about what was being put or dumped into our water systems.

- Part of this awareness came with the development of the Environmental Protection Agency (EPA) in 1970
- In 1972, the Clean Water Act established the regulations on putting pollutants into the water
    - This gave the EPA the authority to test for pollutants and chemicals in the water and set maximum amounts allowed to be found in the water

BEFORE THE EPA

The Cuyahoga River in Cleveland was so polluted with oils and chemicals that the water actually set fire!

AFTER THE EPA

Now you can swim in that same river!

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When it comes to the _____ of a water system, there are many factors that go into it. The balance between _____, chemical and _____ variables determine the health of a water system.

PHYSICAL	CHEMICAL	BIOLOGICAL
• Temperature • _____ • Water Movement	• Dissolved oxygen (+ other gases) • pH • _____ • Salinity	• Fish • Algae • Insects • Plants

These variables are subject to _____ from both natural and _____ forces

- Freshwater is a major _____ because it is the source of water for humans and animals
- Our freshwater that we use can be _____ or _____

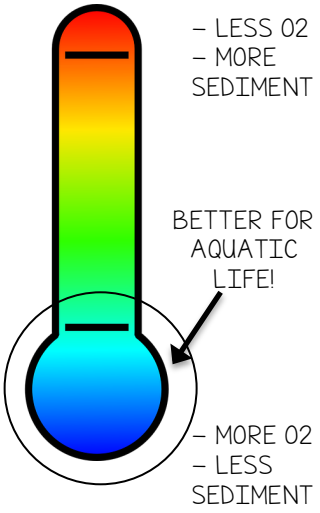
HEALTHY ENOUGH TO _____ IN AND CLEAN WITH

HEALTHY ENOUGH TO _____

PHYSICAL INDICATORS

TEMPERATURE

- The _____ of a body of water determines the _____ that can live there
- Many organisms have a _____ temperature range where they will thrive
  - THINK ABOUT IT! We cannot thrive in an environment that is −50°, but some organisms can!
- As the temperature of the water _____:
  - It is able to _____ more _____ which can block the light and not allow _____ to occur
  - It dissolves ____ _____ (because particles are moving too fast and O_2 can escape into the air) and may not contain enough for organisms to survive



TURBIDITY

_____ is how clear/_____ a body of water is.

- _____ is due to the amount of _____ dissolved in the water
- A _____ turbidity = not _____
  - Can lead to increased temperatures, _____ DO, and impairment of some aquatic organisms

HIGH TURBIDITY (CLOUDY)

LOW TURBIDITY (CLEAR)

CHEMICAL INDICATORS

DISSOLVED OXYGEN

Dissolved _____ is the amount of oxygen in water that is _____ for aquatic organisms to use.

- The level of oxygen in surface water is important for many organisms such as _____ and fish to thrive.
- There are _____ ways oxygen gets into the water:
  3. From the _____ (being trapped by waves and moving currents)
  4. From _____ releasing O_2 during _____

pH LEVEL

The ____ of a body of water determines how _____ or how _____ it is.

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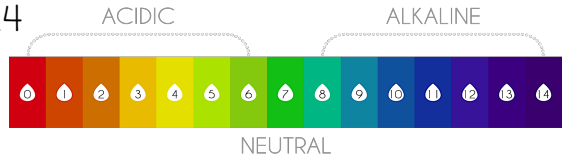


- The pH of water is known to have a _____ effect, which means that materials (iron, aluminum, ammonia, mercury) introduced into bodies of water can have _____ or _____ of an impact based on the pH of the water.
  - EXAMPLE: _____ in more acidic water can become more dangerous and more _____ than they normally would be in neutral water.

NITRATES + PHOSPHATES

_____ and _____ come from Nitrogen and Phosphorous, which are _____ nutrients for healthy plant growth.

- Too many nitrates or phosphates in drinking water can make it _____

SOURCES OF NITRATES	SOURCES OF PHOSPHATES
• Runoff contaminated with _____ • Septic tank leaks • _____ • Natural deposit erosion	• Human and animal _____ • _____ • Cleaning and industrial waste

SALINITY

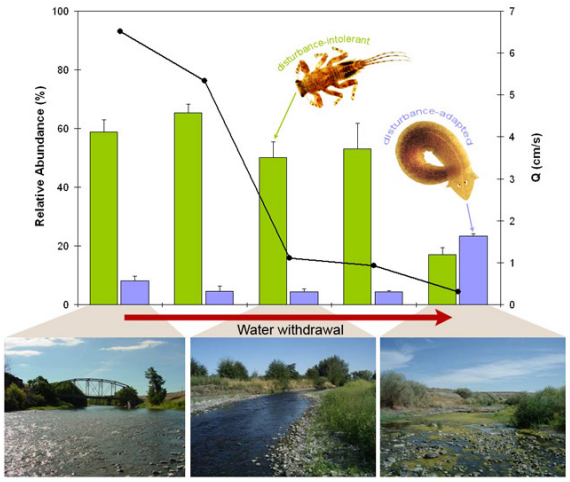
_____ is the measure of _____ in water and can be an indicator of how healthy a water system is.

- Salinity can enter water systems through natural processes of _____ rocks from wind and rain
- _____ concentrations of salinity can cause vegetation to become unhealthy or die and can lead to a _____ in _____ _____ LIVING IN AN AREA

BIOLOGICAL INDICATORS

Biological indicators (_____) are _____ that can give an indication of how healthy a water system is.

- The _____ and _____ of the types of fish, insects, algae, plants and other aquatic organisms can tell us how healthy the water they live in is
- These organisms are usually easy to _____ and identify
- These organisms are used to measure water health because many are very _____ to pollution
    - _____ water quality is indicated by a _____ number of bioindicator organisms in ____ place



The species in the _____ to the right is a bioindicator species because it is _____-_____ (which means it does not handle a change in the water well).
– As the water withdrawal occurs, and the water system is _____ healthy for these organisms, their _____ numbers begin to _____.

WATER STEWARDSHIP

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- In 1972, the _____ _____ _____ established the regulations on putting _____ into the water
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The Cuyahoga River in Cleveland was so _____ with oils and chemicals that the water actually set _____!

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