

**GLUE THIS
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NOTEBOOK**



ANSWER KEY

8.E.1.3

WATER QUALITY

guided notes

8TH GRADE SCIENCE



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
<ul style="list-style-type: none">• Temperature• Turbidity• Water Movement	<ul style="list-style-type: none">• Dissolved oxygen (+ other gases)• pH• Nitrates• Salinity	<ul style="list-style-type: none">• 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



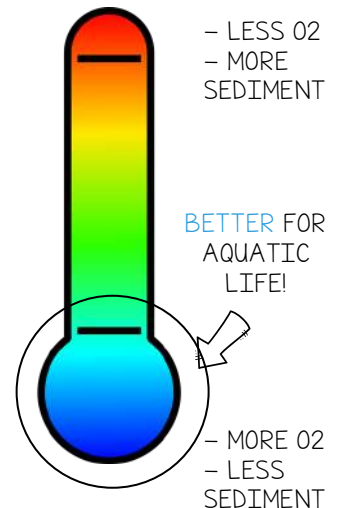
HEALTHY
ENOUGH TO
DRINK



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
 - o THINK ABOUT IT! We cannot thrive in an environment that is -50° , but some organisms can!
- As the temperature of the water **increases**:
 - o It is able to **dissolve** more **sediment** which can block the light and not allow **photosynthesis** to occur
 - o 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**
 - o Can lead to increased temperatures, **decreased** DO, and impairment of some aquatic organisms



CHEMICAL INDICATORS

DISSOLVED OXYGEN

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

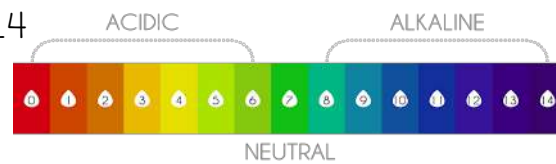
- The level of oxygen in surface water is important for many organisms such as **zooplankton** and fish to thrive.
- There are **two** ways oxygen gets into the water:
 1. From the **AIR** (being trapped by waves and moving currents)
 2. From **PLANTS** releasing O_2 during **photosynthesis**



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
 - o 0–6 = **ACIDIC**
 - o 7 = **NEUTRAL**
 - o 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.
 - o **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
<ul style="list-style-type: none">• Runoff contaminated with fertilizers• Septic tank leaks• Sewage• Natural deposit erosion	<ul style="list-style-type: none">• 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**

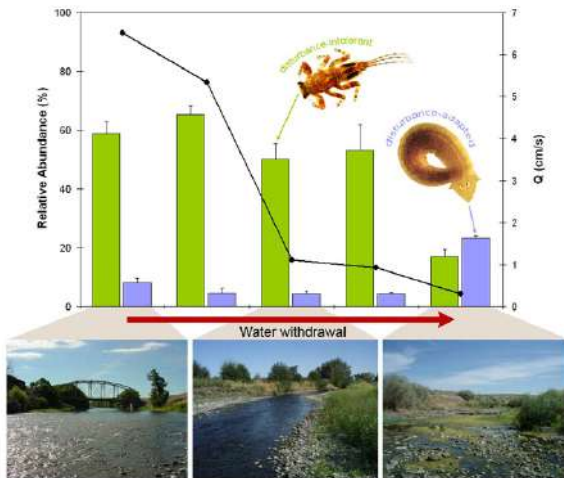


AMOUNT OF DIFFERENT
SPECIES LIVING IN AN AREA

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
 - o **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
 - o 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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8.E.1.3 – WATER QUALITY

guided notes

WATER SYSTEM HEALTH

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
<ul style="list-style-type: none">• Temperature• _____• Water Movement	<ul style="list-style-type: none">• Dissolved oxygen (+ other gases)• pH• _____• Salinity	<ul style="list-style-type: none">• 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



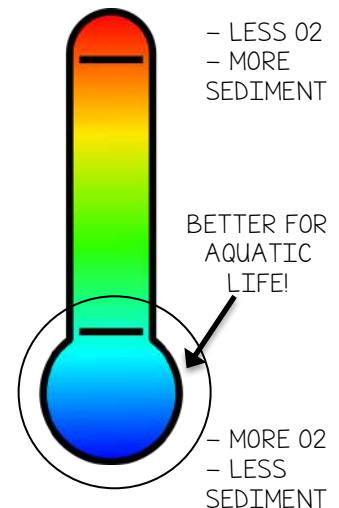
HEALTHY
ENOUGH TO



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
 - o THINK ABOUT IT! We cannot thrive in an environment that is -50° , but some organisms can!
- As the temperature of the water _____:
 - o It is able to _____ more _____ which can block the light and not allow _____ to occur
 - o 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 _____
 - o Can lead to increased temperatures, _____ DO, and impairment of some aquatic organisms



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.

- pH is measured on a scale from 0-14
 - o 0-6 = _____
 - o 7 = _____
 - o 8-14 = _____ (Alkaline)
- 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.
 - o 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
<ul style="list-style-type: none"> • Runoff contaminated with _____ • Septic tank leaks • _____ • Natural deposit erosion 	<ul style="list-style-type: none"> • 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 _____

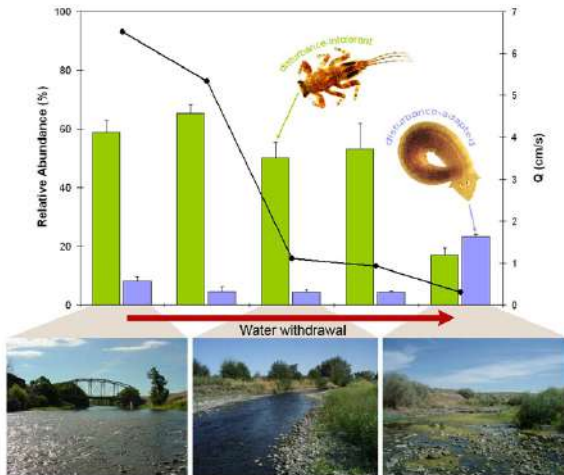


AMOUNT OF DIFFERENT
LIVING IN AN
AREA

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
 - o _____ 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

There has only been a growing _____ and concern for water pollution for the past _____ 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 _____ (EPA) in 1970
- In 1972, the _____ established the regulations on putting _____ into the water
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BEFORE THE EPA

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



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