Community science with Water Rangers!

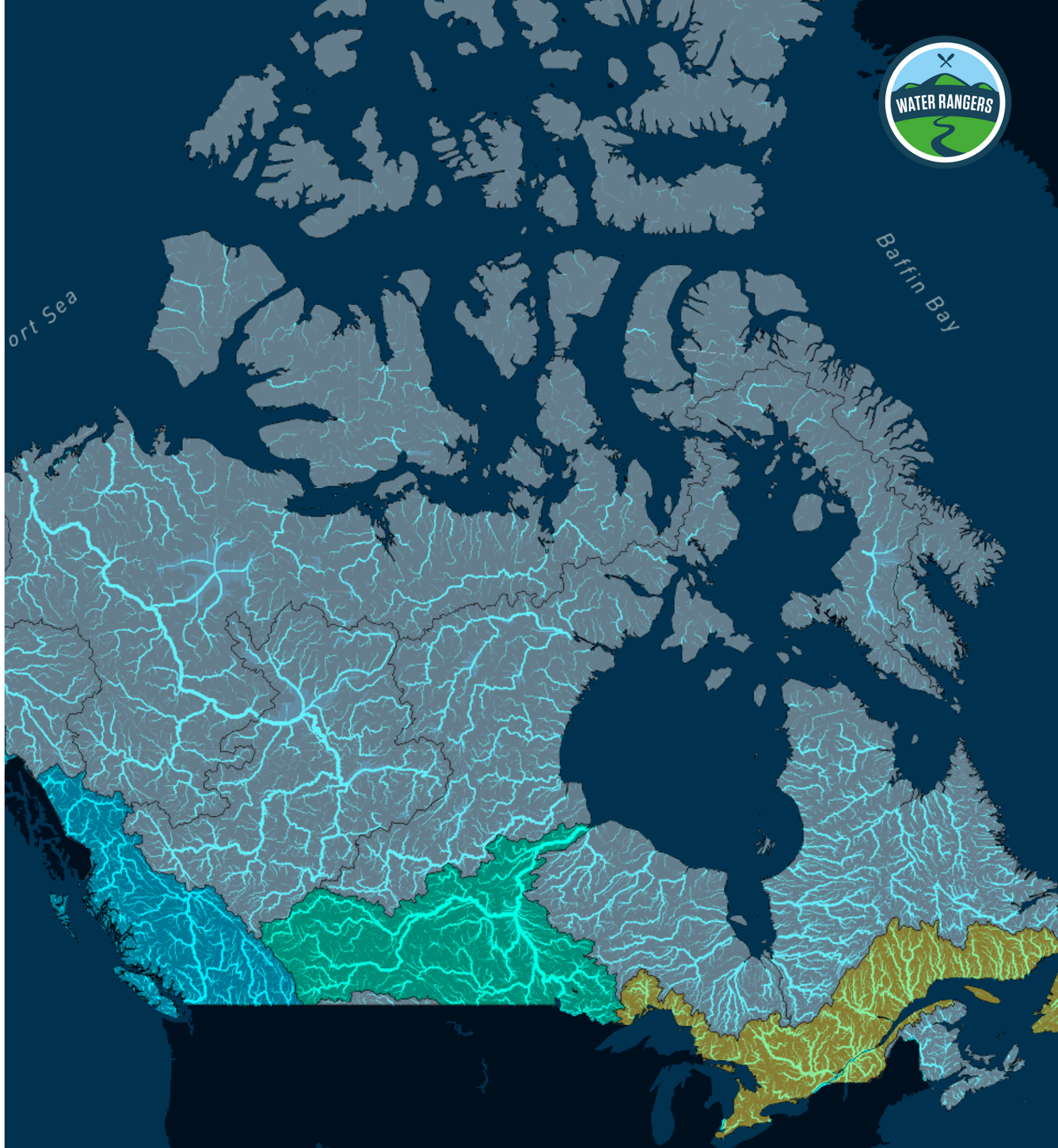
How many lakes, rivers, and streams are there in Canada?

Over **2 million!**

- Canada boasts the longest coastline in the world
- Canada is the 4th country in the world with the largest freshwater reserve; Brazil, Russia, US, Canada
- 75% of watersheds are data deficient

That's where **you** come in! And **community science.**

Source: 2025 Watershed Reports



Water Rangers builds easy to use tools to collect water quality data.

Community science is when everyday people work together to collect data and solve problems in their environment.

We are going to be **community scientists and test a local water body!**

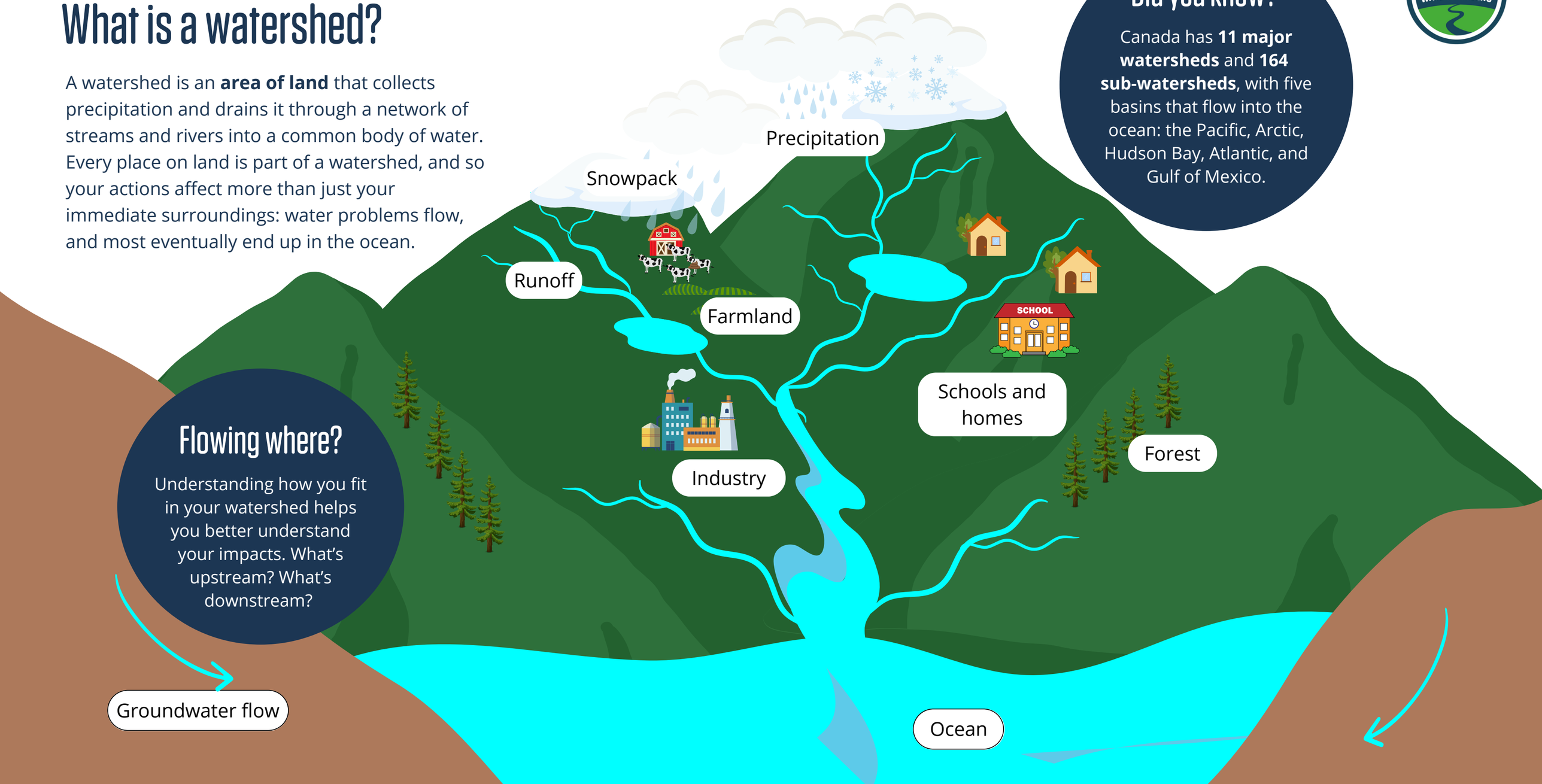
What do you know about the water in your community?

What is a watershed?

A watershed is an **area of land** that collects precipitation and drains it through a network of streams and rivers into a common body of water. Every place on land is part of a watershed, and so your actions affect more than just your immediate surroundings: water problems flow, and most eventually end up in the ocean.

Did you know?

Canada has **11 major watersheds** and **164 sub-watersheds**, with five basins that flow into the ocean: the Pacific, Arctic, Hudson Bay, Atlantic, and Gulf of Mexico.



Flowing where?

Understanding how you fit in your watershed helps you better understand your impacts. What's upstream? What's downstream?

With Water Rangers' tools, we can test for several parameters.

A **parameter** is a **measurable** factor that helps us figure out if the water that we test for is healthy or not.

Simple tools provide important information! Even our **senses** can tell us a lot. **Qualitative observations** helps us understand **quantitative observations.**

Weather, air and water temperature

Weather, air temperature and water temperature **influence other parameters** we test for. They help us observe seasonal changes!

Water temperature also impacts the bodily function of aquatic organisms.

Conductivity

What is it?

Water's ability to conduct electricity and measures its ionic content (e.g. chloride, nitrate, sodium, magnesium, calcium, or iron).

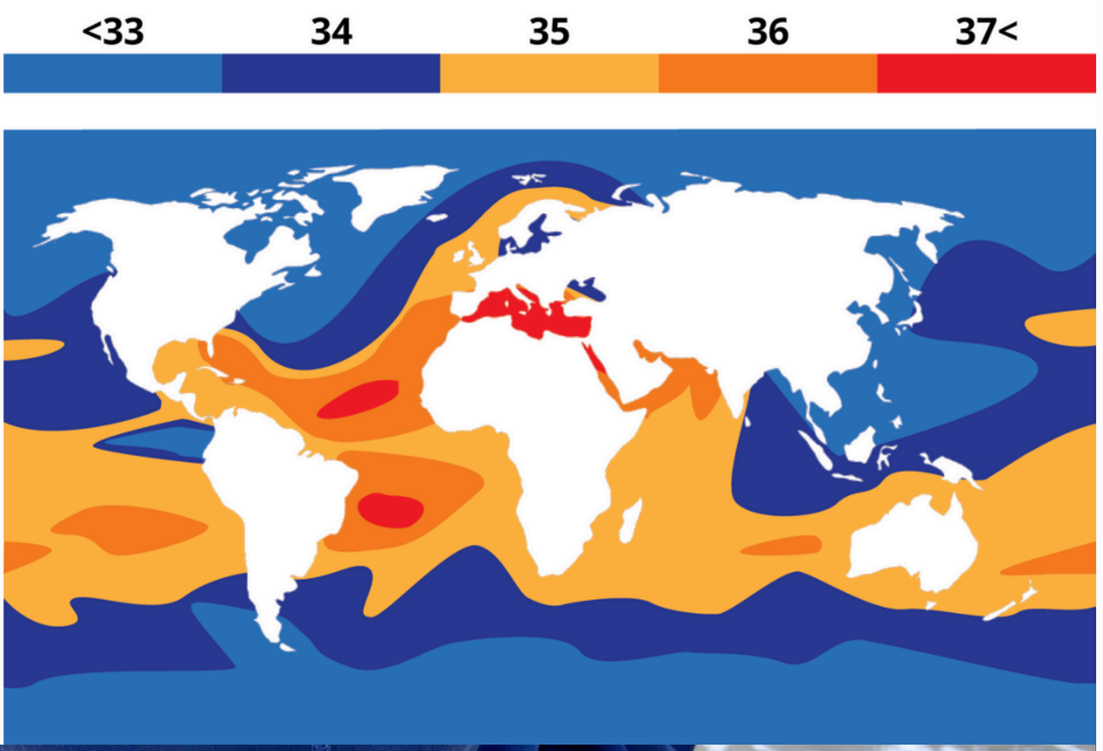
Why is it important?

Every body of water has its own unique conductivity level, based on its bedrock.

What do the measurements mean?

It's important to establish a baseline when water testing. We can use conductivity as an early warning system for potential problems that warrant further testing.

Distilled water	**0.5 – 3 µS**
Melted snow	**2 – 42 µS**
Can effect fish reproduction	**over 500 µS**
Tap water	**50 – 800 µS**
Potable water	**30 – 1500 µS**
Freshwater streams	**100 – 1,000 µS**
Industrial wastewater	**10,000 µS**
Sea water	**55,000 µS**



Salinity

What is it?

The amount of dissolved salt in water from natural sources like rocks and soil.

Why is it important?

Along with temperature, it influences water density, which drives currents, nutrient mixing, and the distribution of heat and oxygen.

What do the measurements mean?

Some quick ranges

Freshwater	0 - 0.5 ppt
Brackish water	0.5 - 0.31 ppt
Ocean	31 - 35 ppt

Salinity vs. Conductivity

Salinity	Conductivity
Total concentration of dissolved salts in water.	Total concentration of dissolved ions in water.
Measured in parts per thousand (ppt).	Measured in microseimens per cm (uS/cm).
A key factor in oceanography, influencing density, mixing, and ocean circulation.	Can indicate pollution or changes in water quality, and hint at the water's source based on its natural conductivity level.
Can come from eroded rocks on land, openings in the seafloor, and runoff. Often lower than the 35ppm ocean average due to mixing with rivers and streams.	Can come from minerals in bedrock, soil and sediment erosion, runoff, as well as human activities such as agriculture, industry, and wastewater discharge.

Nitrates

A specific **form of nitrogen** that is formed after nitrites have been exposed to nitrifying bacteria. Nitrates (NO_3) are bioavailable, meaning they are an important source of nutrients for plants.

Why is it important? Algae and other aquatic plants use nitrates as a vital source of food. However, excess levels of nitrates in water can make it difficult for aquatic insects or fish to survive.

How to interpret:

- Strips usually read 0 since they aren't sensitive enough for small amounts
- Natural levels are under 1 ppm
- Above 10 ppm can harm aquatic life
- 10 ppm is the legal limit for drinking water
- Sensitive fish prefer under 0.06 ppm

Nitrites

A compound that **forms naturally when nitrogen combines with oxygen.** It consists of one nitrogen atom and two oxygen atoms. Nitrite can be oxidized into nitrate, becoming less toxic.

Why is it important? Algae and other aquatic plants use nitrates as a vital source of food. However, excess levels of nitrates in water can make it difficult for aquatic insects or fish to survive.

How to interpret:

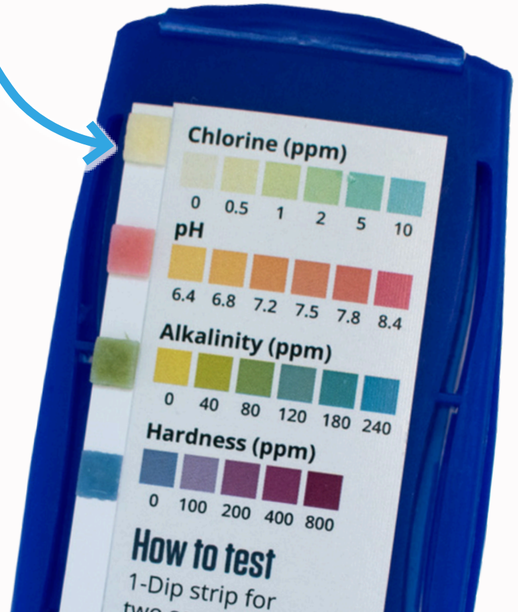
- Strips usually read 0 since they aren’t sensitive enough for small amounts
- It is natural to have some in water
- Over 1 ppm is considered dangerous
- Too much causes plant growth that lowers oxygen and harms fish

Chlorine

A reactive gas **not found freely in nature** that is used to disinfect water. Testing helps detect unexpected pollution sources into a water body, like pool discharge or nearby treatment plants.

How to interpret:

0-0.5 ppm: Great
1 ppm: Worrying
2+ ppm: Is this a pool?



pH

What is it?

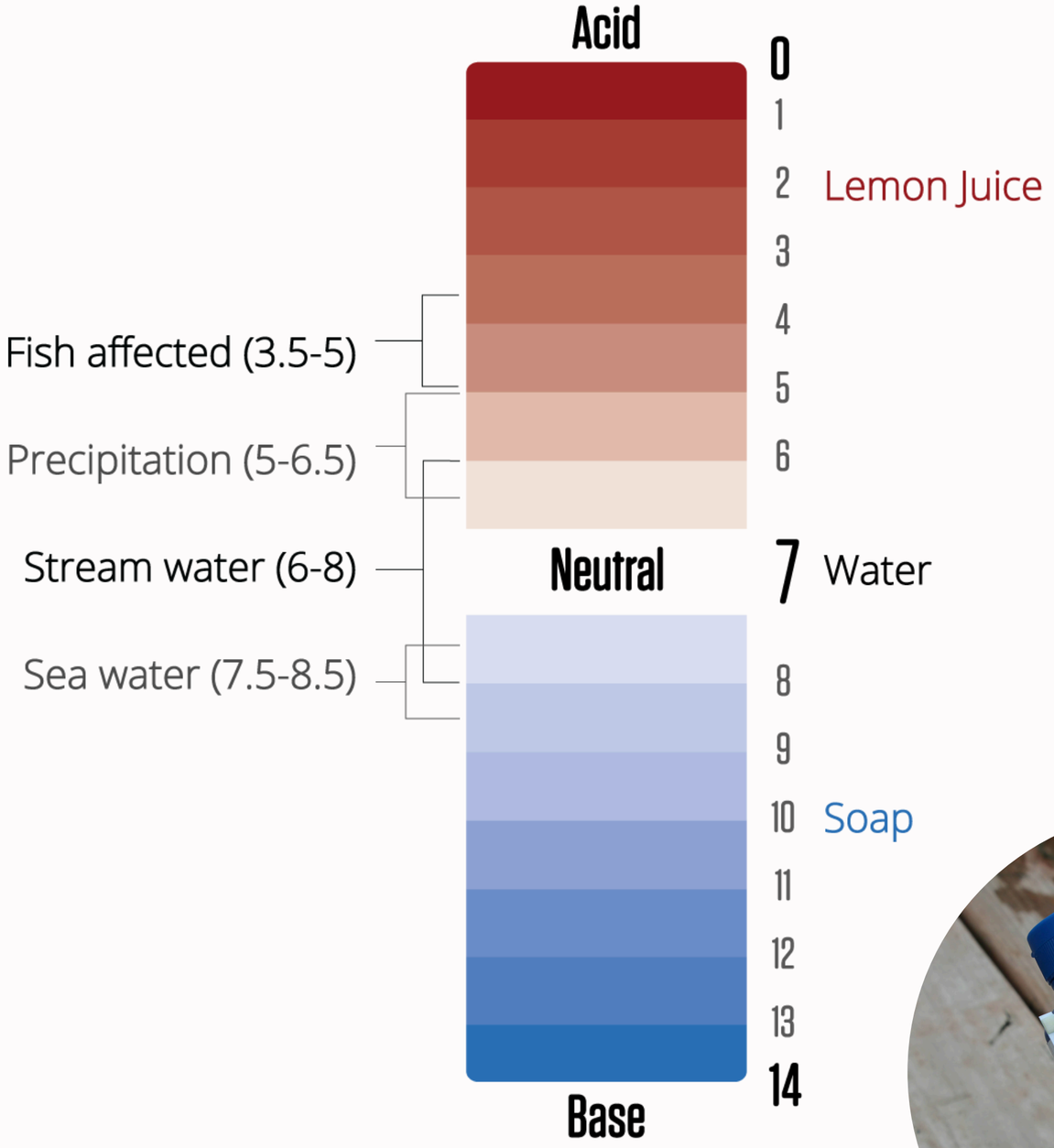
pH, short for “potential of hydrogen”, is the measure of the acidity or alkalinity of water.

Why is it important?

pH influences how easily nutrients are available and how easily pollutants dissolve in water. Aquatic life is sensitive to pH changes.

What do the measurements mean?

Low pH levels can harm fish gills and reproduction, and dissolve the shells of animals like sea urchins, coral, and sea snails.



Alkalinity

Water's **ability to neutralize acid** and **resist pH changes**, influenced by soil, bedrock, plants, and industrial waste. High levels are NOT a sign of bad water quality. Alkalinity (and hardness) helps determine which guidelines apply when testing for heavy metals.

How to interpret:

10 ppm: Very low
11-50 ppm: Low
51-150 ppm: Moderate
151-300 ppm: High
> 300 ppm: Very high

Hardness

Related to alkalinity (they often change together) as both involve **calcium carbonate**, but hardness also measures **other dissolved minerals** like calcium and magnesium that don't necessarily neutralize acid.

How to interpret:

0-20 ppm: Soft
21-60 ppm: Moderately soft
61-120 ppm: Moderately hard
121-180 ppm: Hard
>180 ppm: Very hard

Dissolved oxygen

What is it?

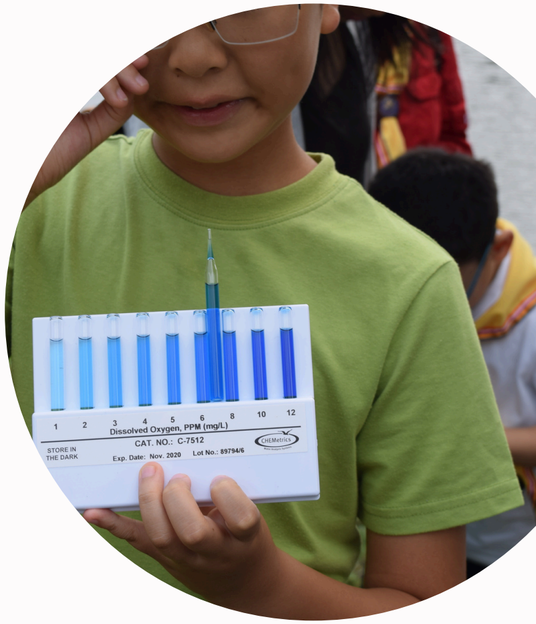
The amount of gaseous oxygen dissolved in the water.

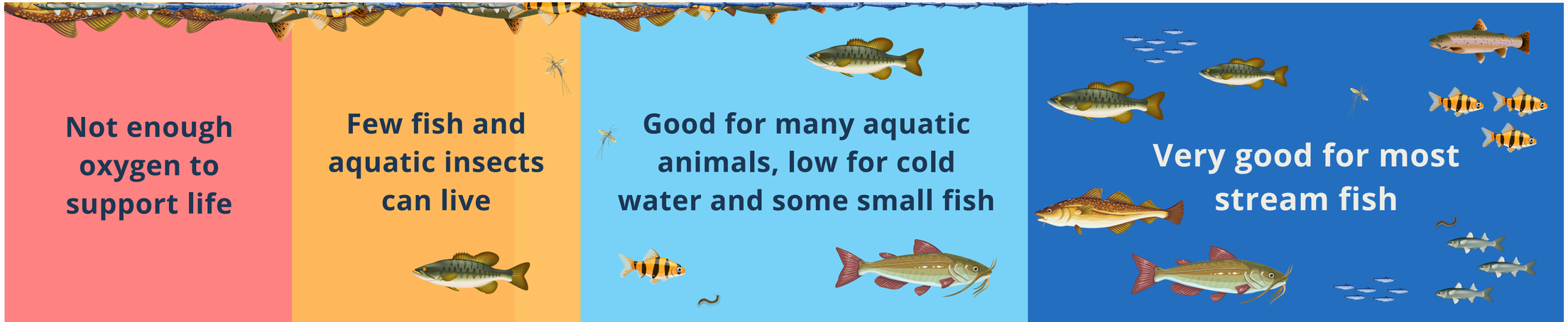
Why is it important?

Oxygen is what gives the water life! All living things in an aquatic ecosystem need oxygen to survive.

What do the measurements mean?

Affected by flow, temperature, and depth. Cold, shallow, and moving water holds more oxygen. Plants add oxygen, but too much plant or algal growth can lead to organic decay, which uses up oxygen.





You're part of the team now!

Water Rangers are:

Wide-eyed & optimistic: Open and positive about the work ahead.

Boundlessly curious: Lifelong learners with inquiring minds.

Better together: Working with each other to reach our goals.

Head & heart strong: Stepping up to do what needs to be done.

Forward thinkers: Imagining a better world together.

Let's head to the field and get testing!

Find out more ways you can join the movement at *waterrangers.com/join-the-wave*

Thanks for being a part of our community!

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