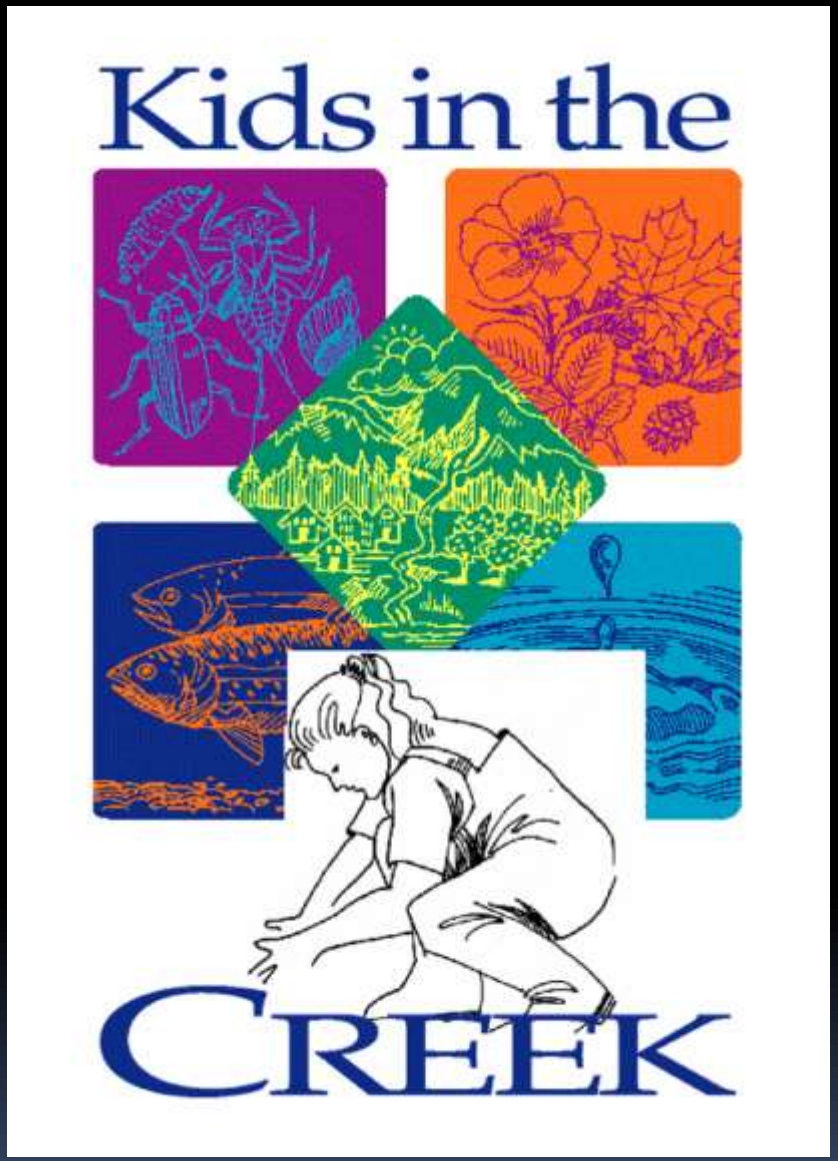
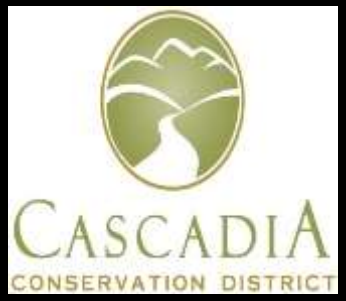



Prepare for an amazing day in the field…..

# Credits


CASCADIA
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State of Washington


City of
Wenatchee

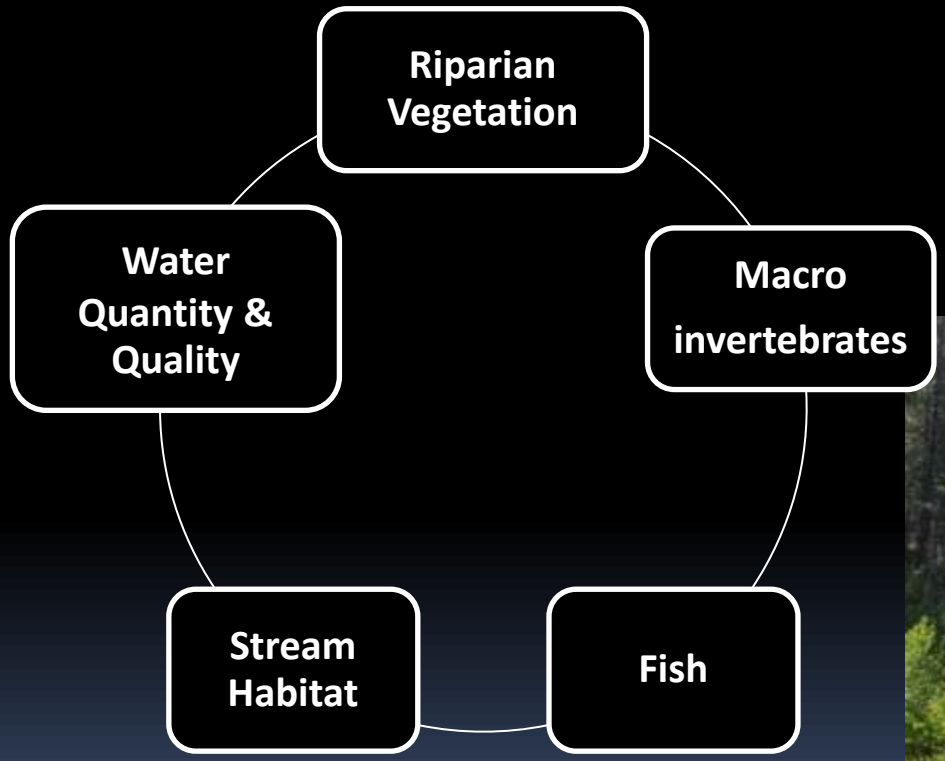

AMERICORPS
A


FOREST SERVICE
US
DEPARTMENT OF AGRICULTURE

# At Kids in the Creek you will learn about:

- Invert Investigator
- Riparian Rx
- Habitat Sense
- What's in the $H_2O$? (Quality)
- What's in the $H_2O$? (Quantity)
- Fish Health

# Water connects everything from the mountaintops to the streams




# Invert Investigator

- Key Terms:
  - Macroinvertebrate
  - Dichotomous Key
  - Functional Feeding Groups: Predator, Scraper, Shredder, and Collector
  - Indicator species
  - Intolerant
  - Tolerant
  - Metamorphosis
    - -Incomplete & Complete Metamorphosis
  - Instar
  - Entomologist

# Macroinvertebrate

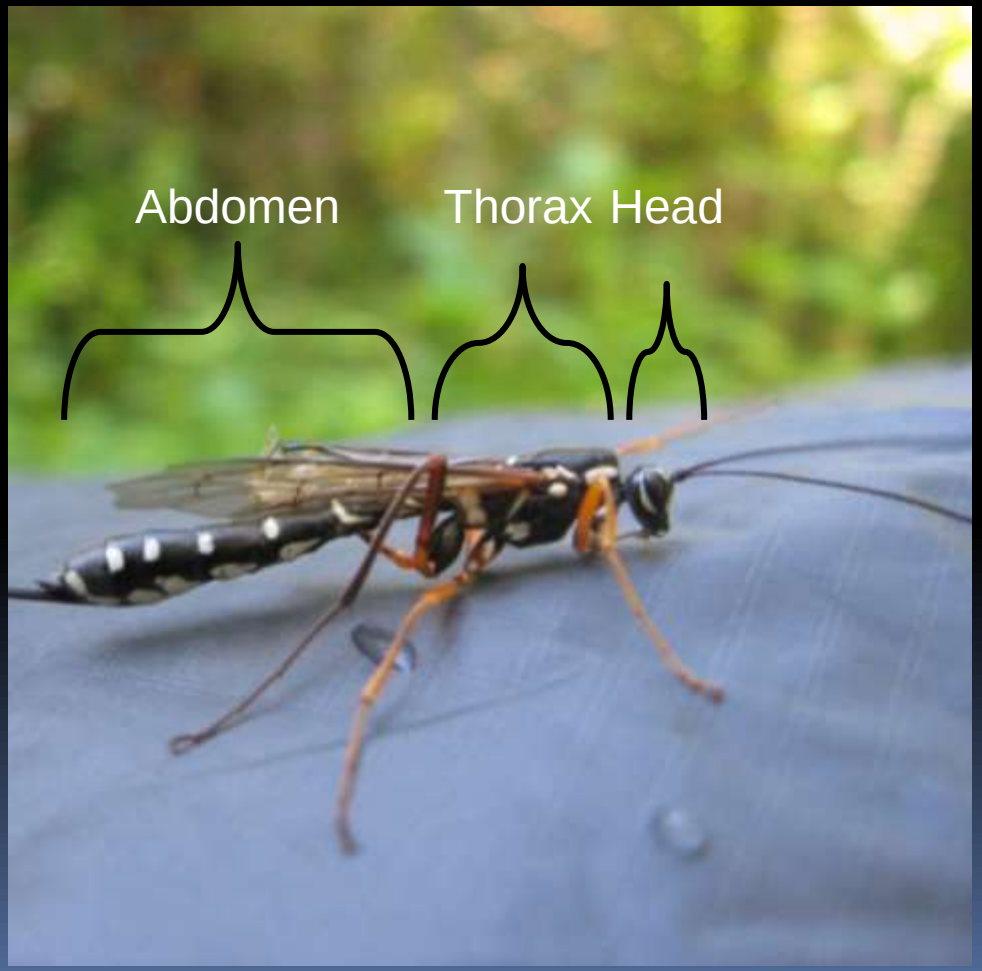
Caddisflies (Larvae)

Stoneflies (Plecoptera)

Organisms that lack an internal skeleton and are large enough to be seen with the naked eye.

# Three Main body parts of an Insect

- Head
- Thorax
- Abdomen

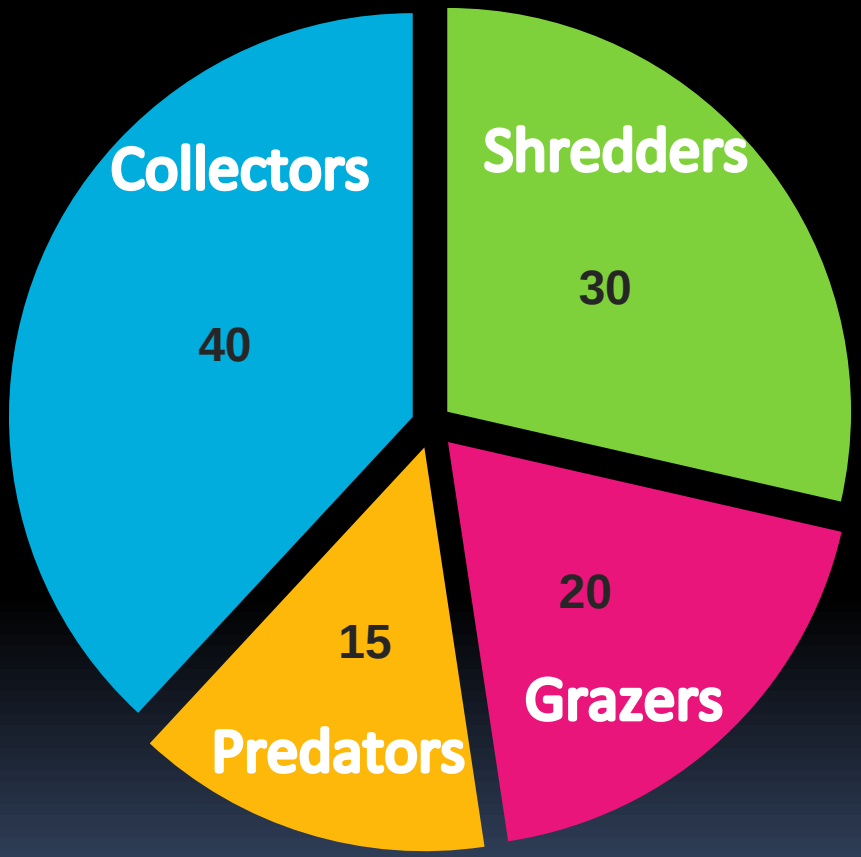


# Dichotomous Key

A key for the identification of organisms based on a series of choices between alternative characteristics.

Become familiar with the dichotomous key provided in your curriculum

# Functional Feeding Groups



# Predator


Eats living animals

# Scraper

Mouthparts scrape food, often diatoms

Mayflies (Ephemeroptera)

Snail

# Shredder

Caddisflies (Trichoptera)

Stoneflies (Plecoptera)

Tear away small pieces of leaves or other plant parts to eat

# Collector

Collects loose food particles of suitable size by filtering or gathering

Caddisflies (Trichoptera)

# Indicator Species

An organism whose presence indicates something about the quality of the environment

# Tolerant

True Fly (Diptera Larvae)

Macroinvertebrates that can survive in a variety of conditions including high sediment, low oxygen, and pollutants

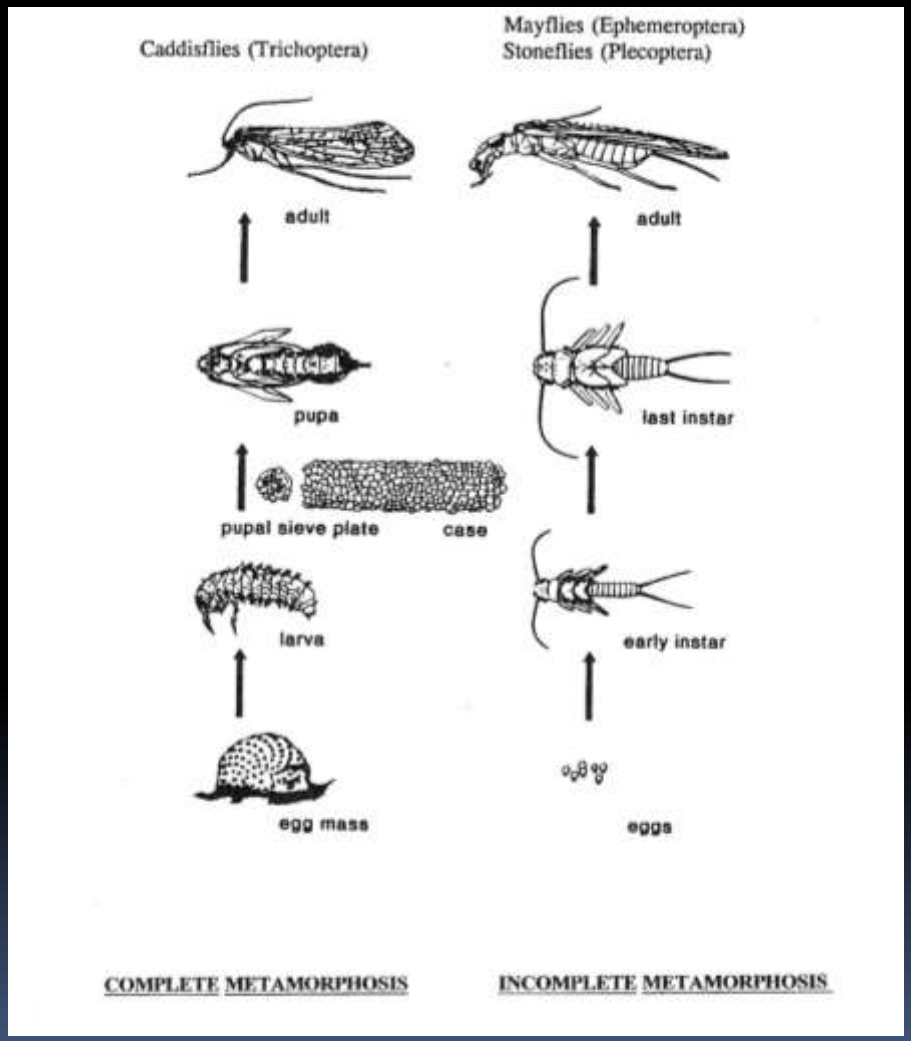
# Intolerant

Caddisfly (Trichoptera)

Macroinvertebrates that need high water quality including clean well oxygenated water

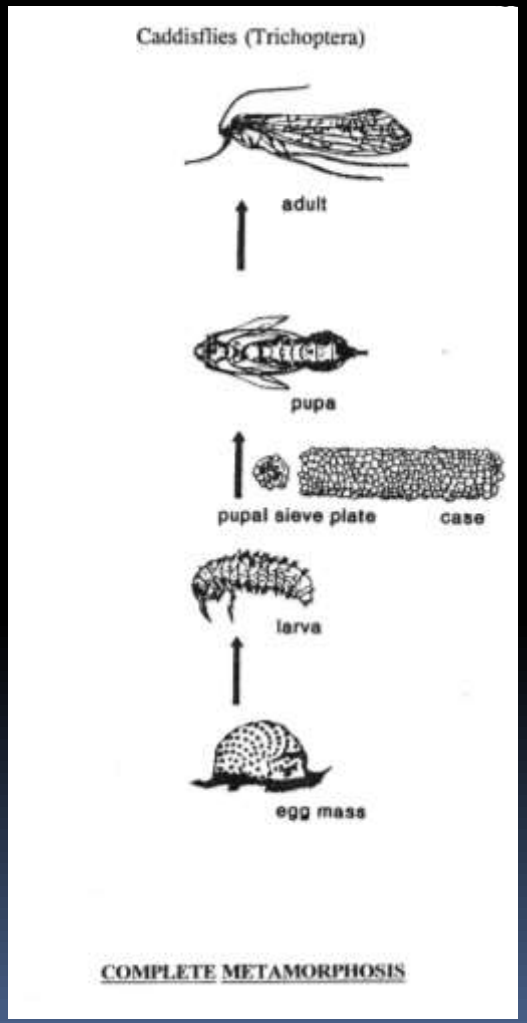
# Metamorphosis

The process by which larval animals transform to adults



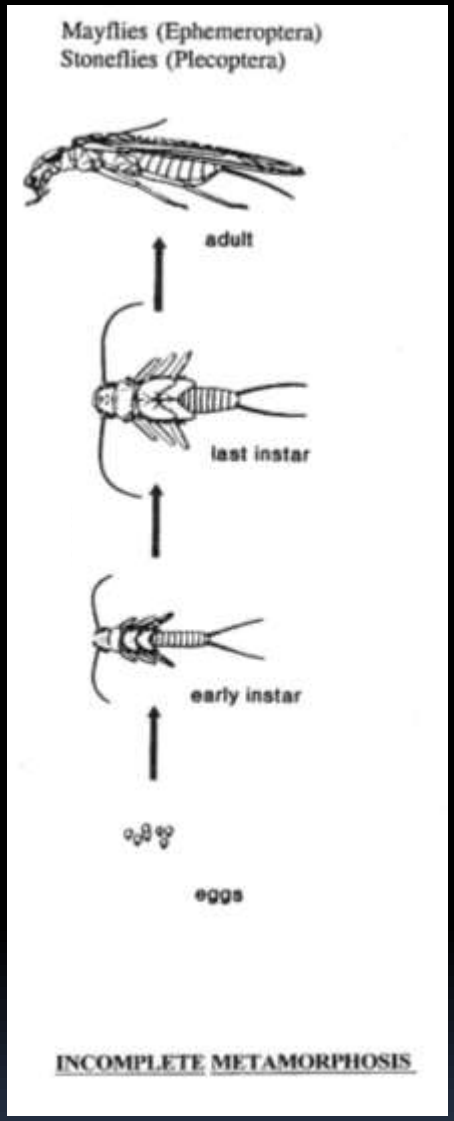
# Complete Metamorphosis

Life cycle includes egg, larva (immature) pupa, and adult stages



# Incomplete Metamorphosis

Life cycle includes egg, instars, and adult stages.




Instar:
As the insect grows larger, it molts. The wingless instar continues to get larger and each molt results in a different size of instar

# Entomologist

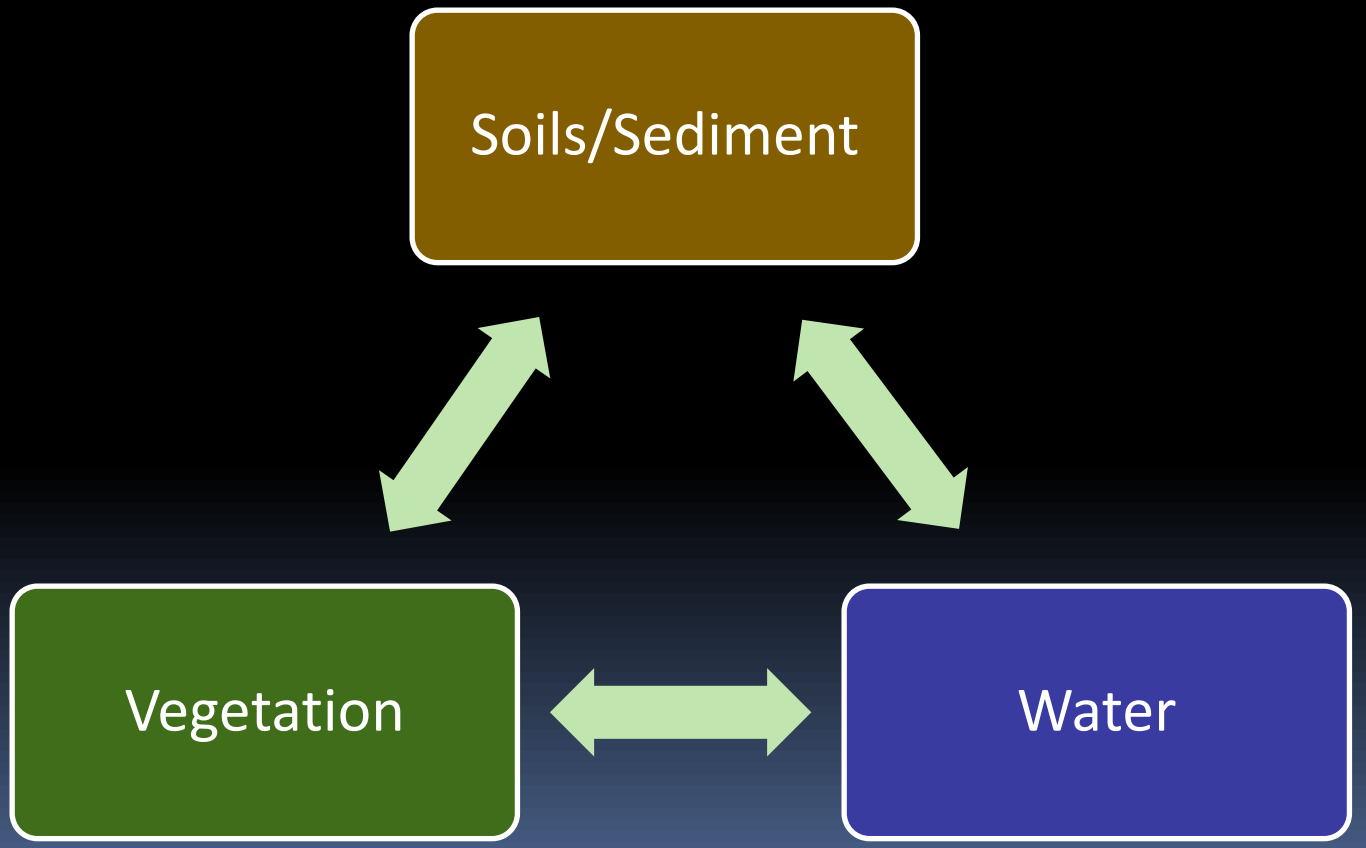
Someone who studies insects

What affects the types of macroinvertebrates you will find at a stream site?

# Riparian Rx

- Key Terms:
  - Riparian
  - Flora
  - Herb
  - Canopy (tree)
  - Succession
  - Transect

# Three Critical Elements of a riparian zone



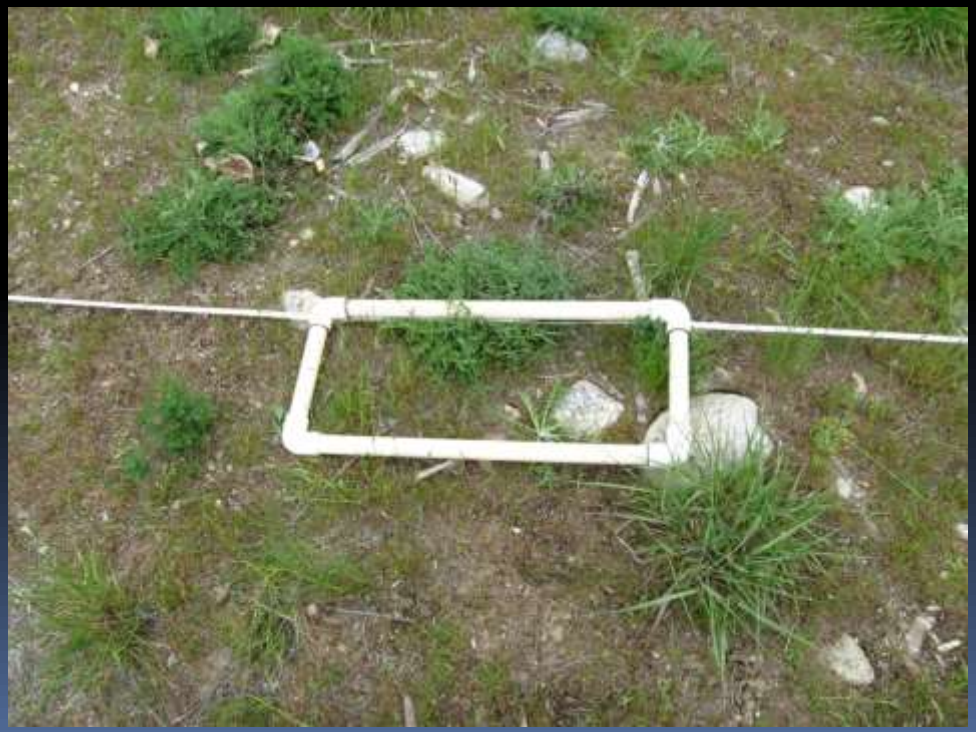
# Riparian

The vegetated area along a stream or other body of water that uses soil moisture provided by the stream.

# Transect

A way to randomly sample vegetation

The vegetation within a transect is described and assigned a value based on the space it occupies



# Succession

The gradual replacement of one community by another

# Canopy

# Tree Types

Coniferous / Conifer

Deciduous

# Flora

Plant life in an area or time period, especially the native plants.

All of the plants around the Columbia River are considered the flora for the area.

# Herb

Includes forbs and grasses, have a fleshy stem instead of woody, and die back each year.

# Ethnobotany

The scientific study of the relationships between people and plants.

For example: Indigenous tribes sometimes used Horsetails to scrub pots.

What is the importance of the riparian zone to the stream?

Entiat National Fish Hatchery - 2003


Riparian
Rx

# Habitat Sense

- Key Terms
  - Stream Reach
  - Habitat Type:
  - Pool
  - Riffle
  - Glide
  - Side Channel
  - Substrate
  - Interstitial space
  - Streambank erosion
  - Embeddedness
  - Woody Debris
  - Fish Cover

# Stream Reach

A section of river or creek

# Stream Habitat Type

Streams can be divided into slow and fast water habitat types

Streams can be also be divided into pools, riffles, and glides

# Pool

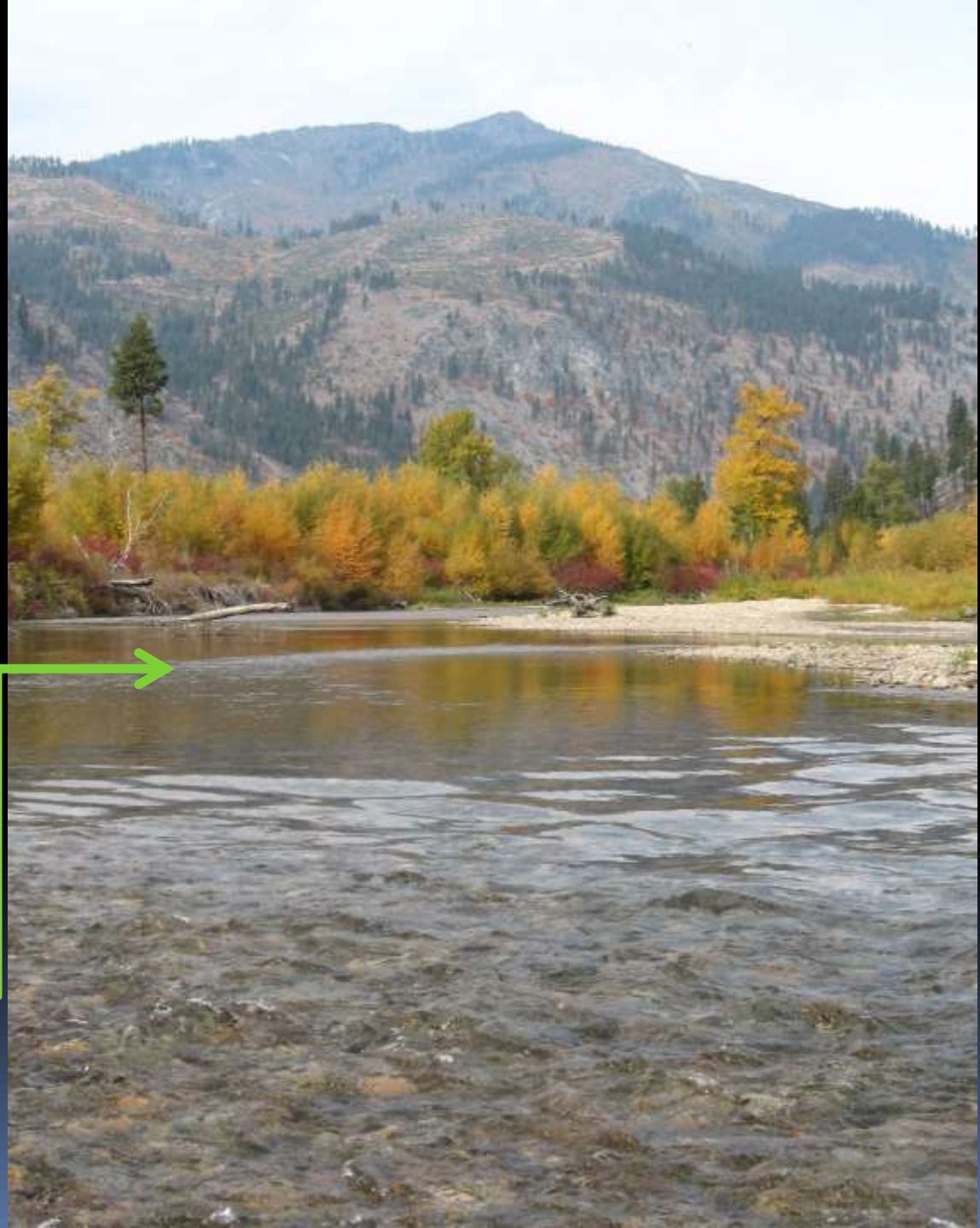
Deeper area with water held in at the lower end by the tail pool crest, maintains water depth.

# Riffle

Faster water with surface broken by water flowing over substrate.

Slower water, relatively shallow, no surface turbulence

# Glide

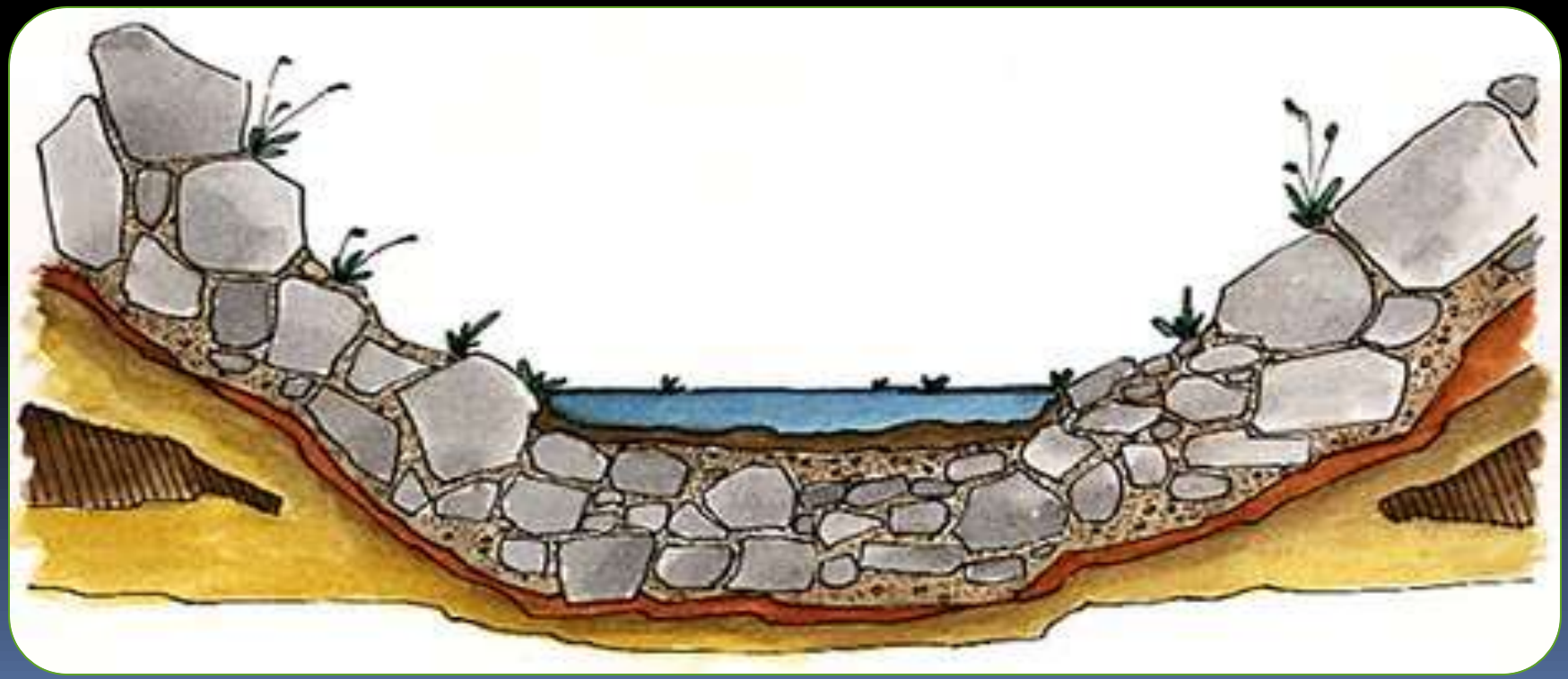


# Side Channel

Adjacent to main channel, smaller in size, and generally slower water

# Substrate

The sand, silt, clay, gravel, cobble, boulders, and bedrock that form the stream bed



# Interstitial Space

Spaces or openings in substrate.

What organisms might use them?

# Streambank Erosion

The wearing away of the streambank soils and substrate by high flows, or land use practices.

# Embeddedness

The degree that gravel, cobbles, or boulders are surrounded by sand and silt.

# Woody Material

Wood material in the stream channel.

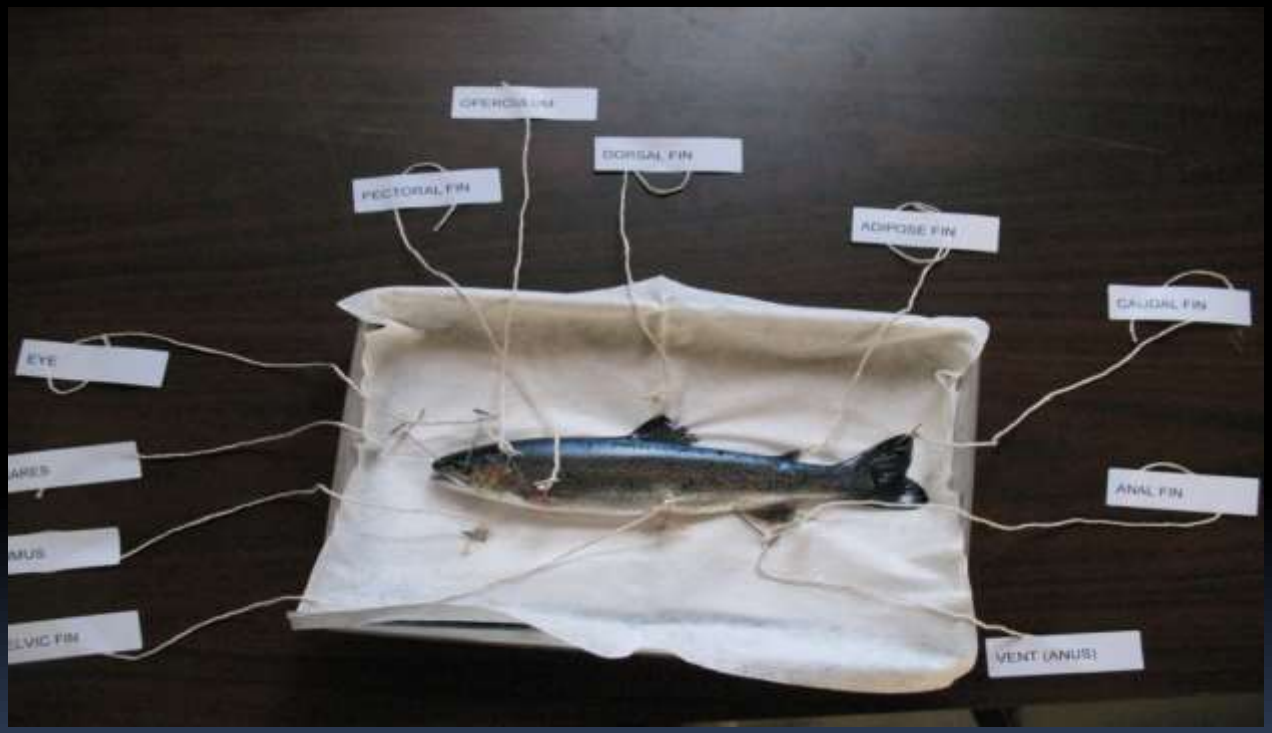
What does it do for the stream channel? for fish?

# Fish Cover

Provides cover for the fish from predators and other dangers.

How can we measure stream habitat to see what it provides for fish and to monitor change?

# Fish Health




- Key Terms:
  - Anadromous
  - Acclimation
  - Adaptation
  - Lateral Line
  - Disease
  - Viruses, bacteria, parasites

# Anadromous

Fish that migrate from saltwater to fresh water for spawning

# Acclimation

adjustment to environmental conditions: within minutes, days, weeks.

# Adaptation

adjustment to environmental conditions: over time scales covering multiple generations of a population

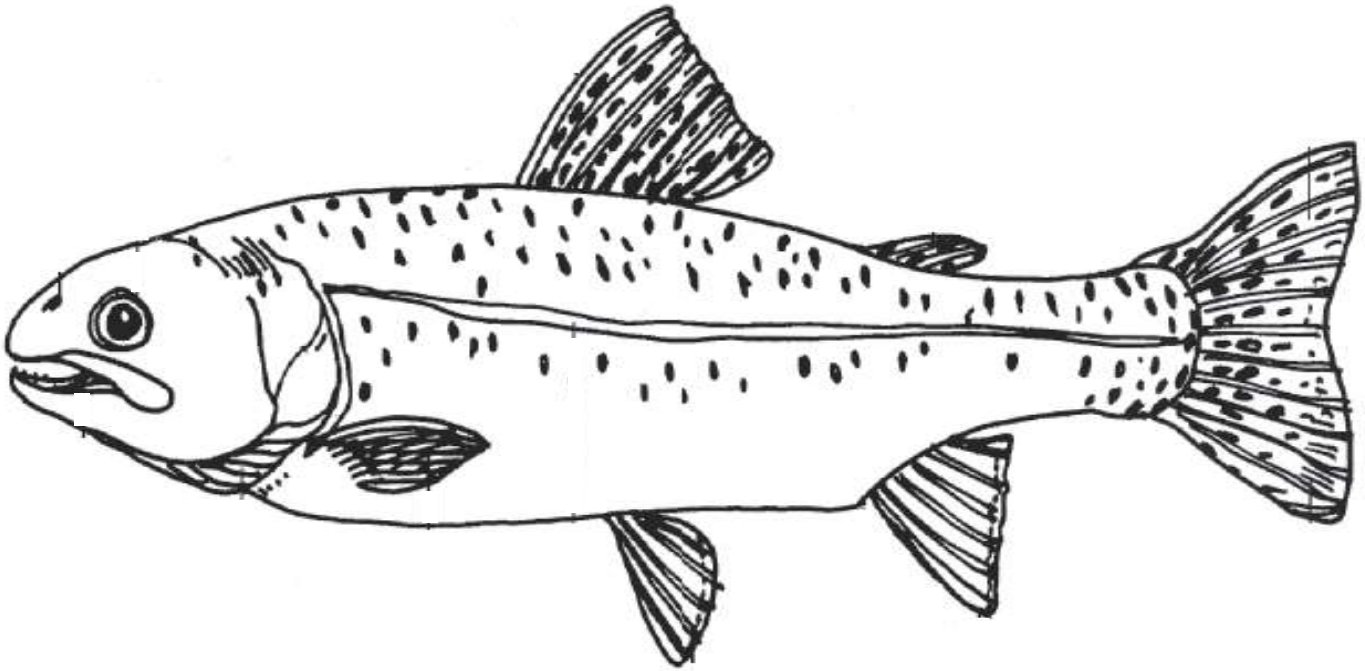
Praying mantis: Camouflage, turn head 180°, and see up to 60 ’ away

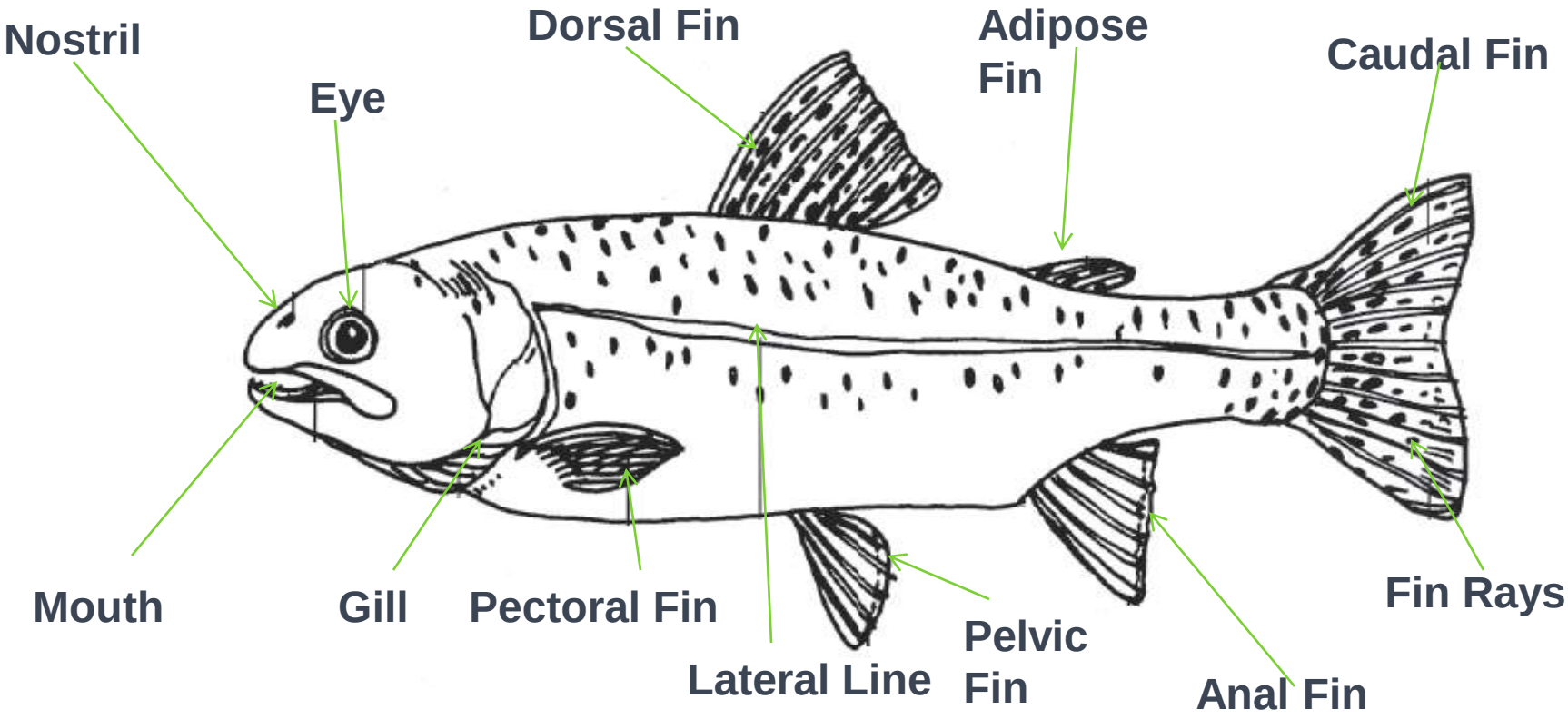
Lynx: Relatively large feet adapted to walk on snow

Fingerling salmon: Countershading; dark on top/light on bottom; camouflage

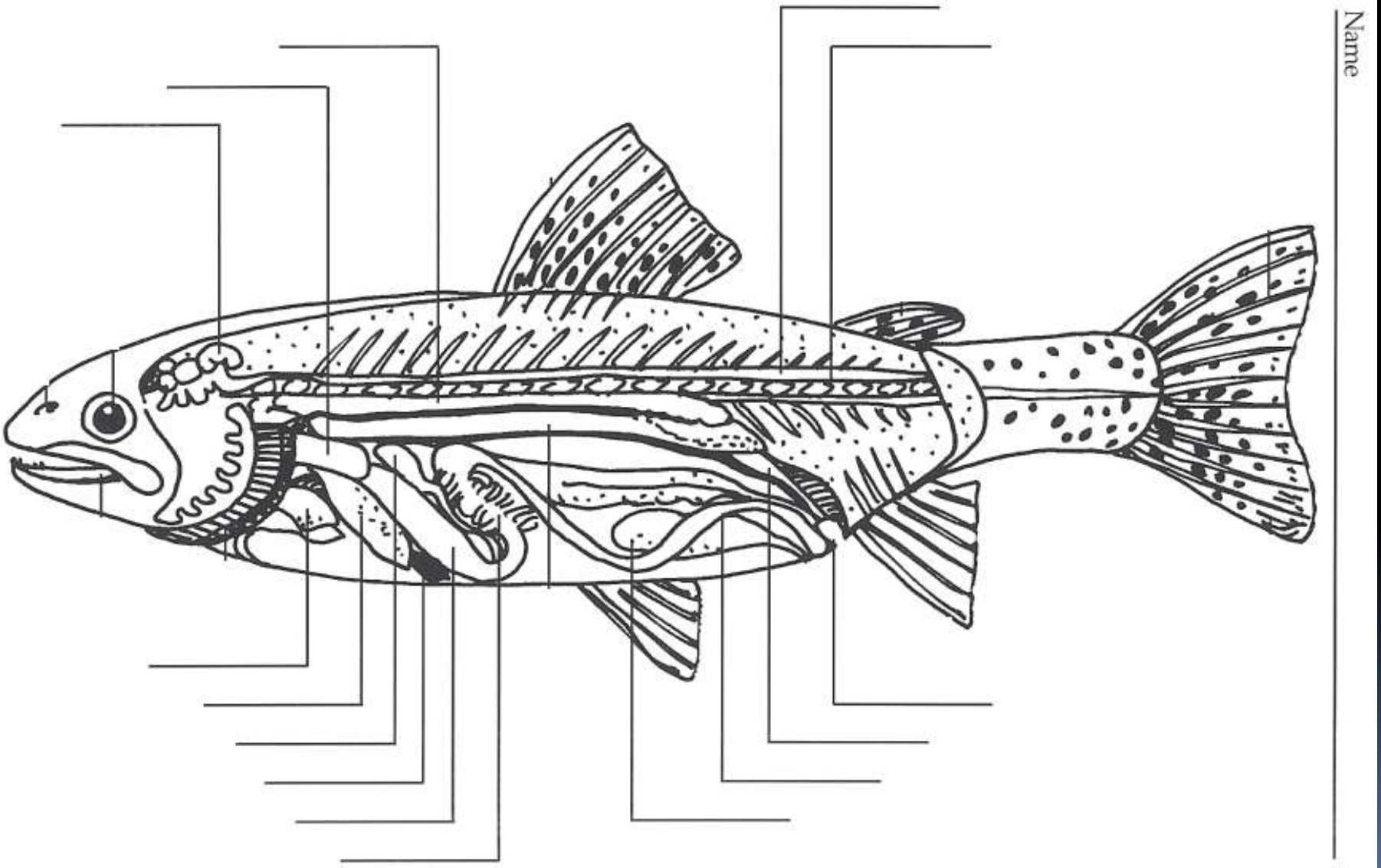
Fern: Small leaves with large groupings to capture sunlight through the canopy

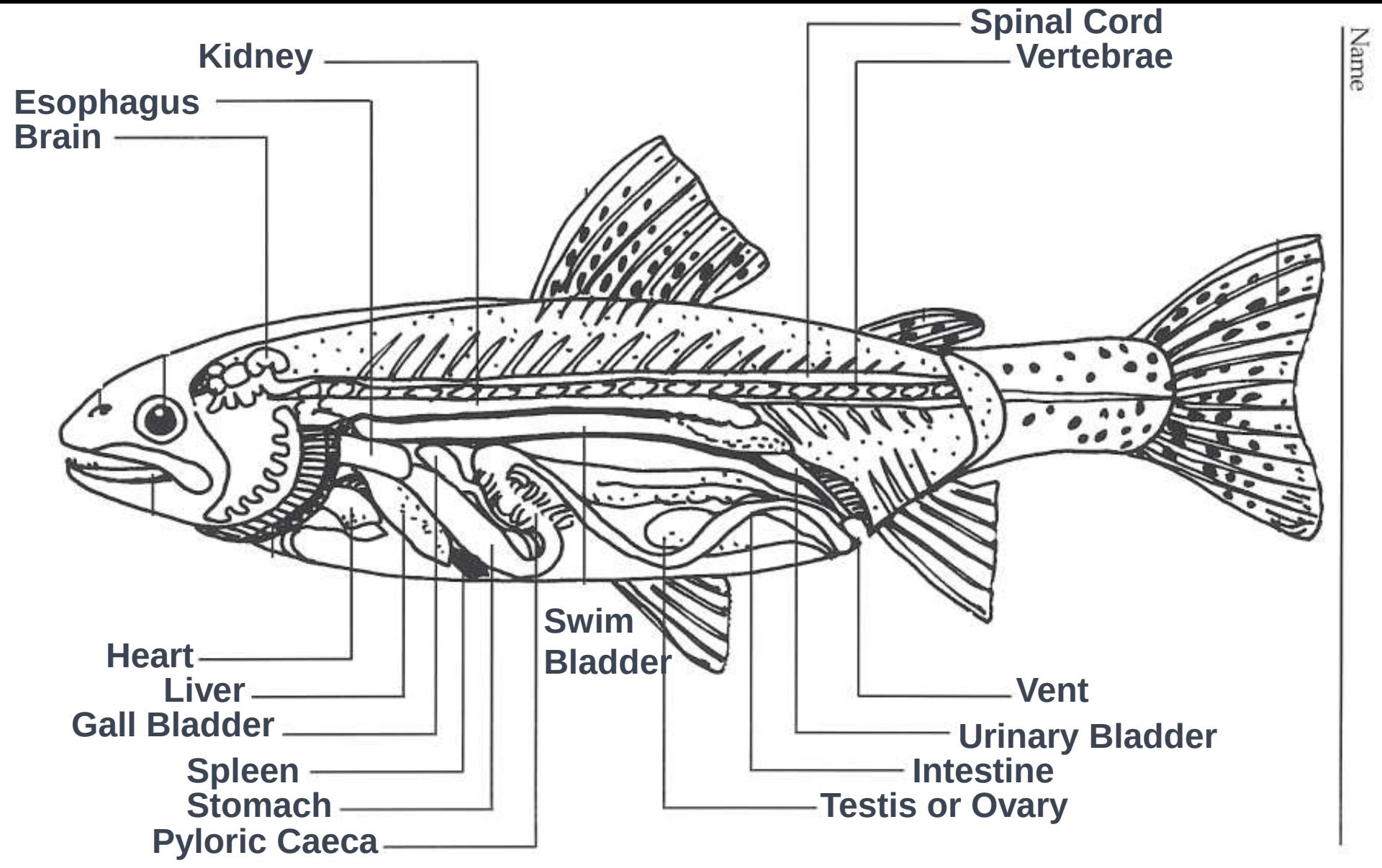
# Can you name the external parts of a fish?




Nostril
Eye
Dorsal Fin
Adipose Fin
Caudal Fin
Mouth
Gill
Pectoral Fin
Lateral Line
Pelvic Fin
Anal Fin
Fin Rays

# Can you name the internal parts of a fish?




Spinal Cord
Vertebrae
Kidney
Esophagus
Brain
Swim
Bladder
Heart
Liver
Gall Bladder
Spleen
Stomach
Pyloric Caeca
Vent
Urinary Bladder
Intestine
Testis or Ovary

Name

# How do fish and humans differ externally?

- Humans have appendages
  - Arms
  - Legs
- Humans have skin with hair.
- Fish have fins
  - Pectoral
  - Pelvic
- Fish have skin with scales and slime.

# How do humans and fish breath?

Lungs to get oxygen out of air

Gills to get oxygen out of water

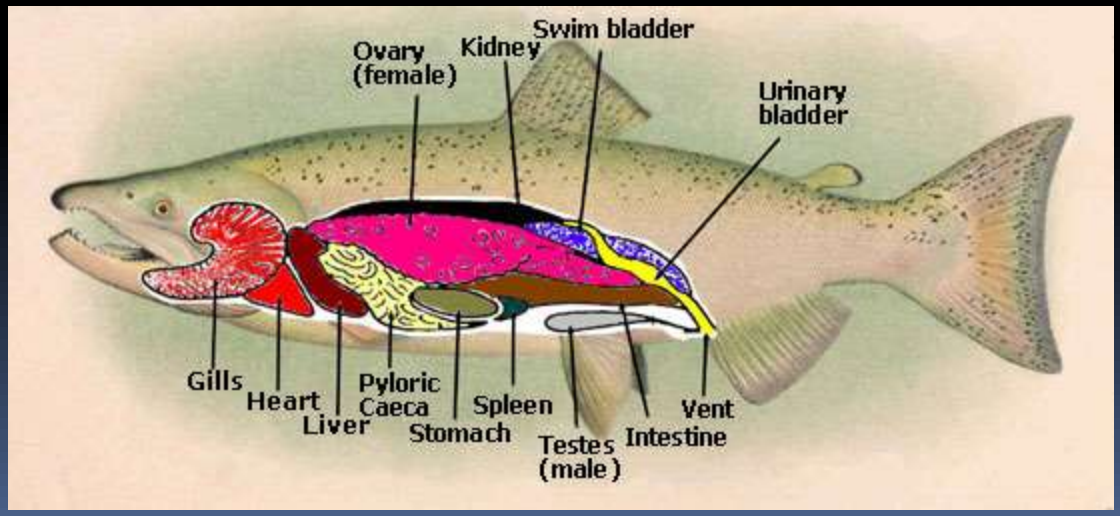
What are the 2 internal structures in a fish that humans do not have?

# Pyloric caeca

Pyloric caeca are on the intestine of most bony fish. They are blind sacs that help with digestion and absorption.

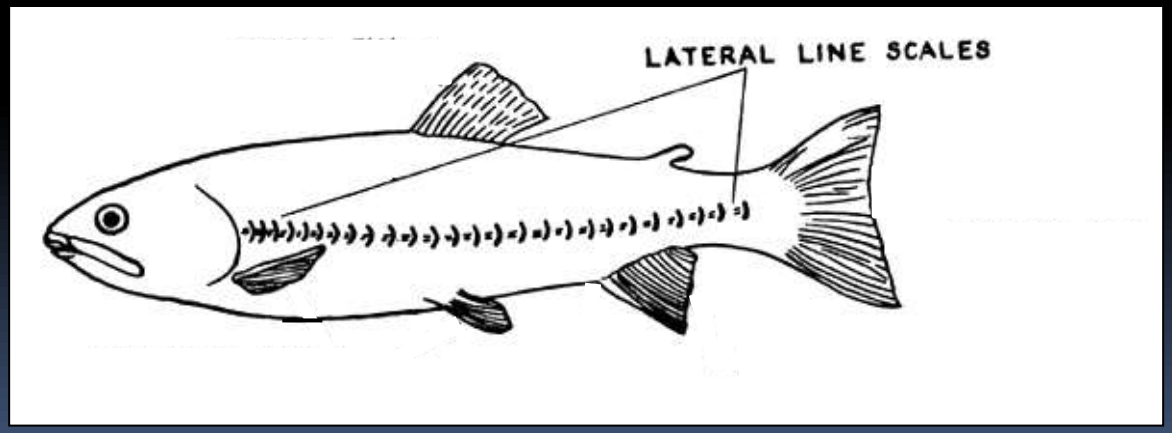
# Swim Bladder

Organ of a fish that is responsible for a fish's buoyancy.



# How do fish sense sound and movement?

## Lateral line

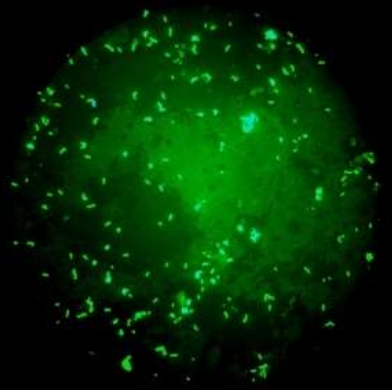



A series of pores that run along the sides of fishes body

# Fish can get sick from diseases, viruses, bacteria, and parasites

Unhealthy Chinook salmon

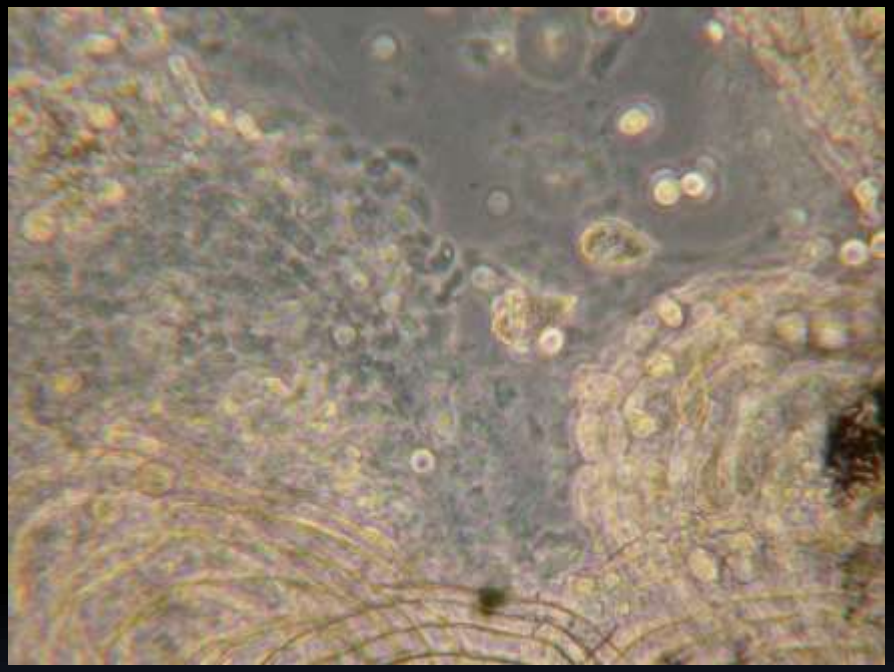
Juvenile Chinook with lordosis



Fluourescent antibody test for bacteria

Fish health biologist

# Can you find the parasite on the gills and in skin scrape?



# How can we keep our streams healthy for fish?

- Healthy Riparian Areas
- Keep water in the streams
- Cool water temperatures
- High water quality
- Hatchery fish with low levels of pathogens
- Keep antibiotics and other medicines out of streams


SCALE

# What's in that H2O (Quality)

- Key Terms:
  - Hydrologic cycle
  - Infiltration
  - Runoff
  - Point Source pollution
  - Non-point Source pollution
  - Dissolved Oxygen
  - pH
  - -Acidic & Basic
  - Turbidity
  - Silt and Sediment

# Hydrologic Cycle

The continuous circulation of water in systems throughout the planet, involving precipitation, condensation, runoff, evaporation and transpiration

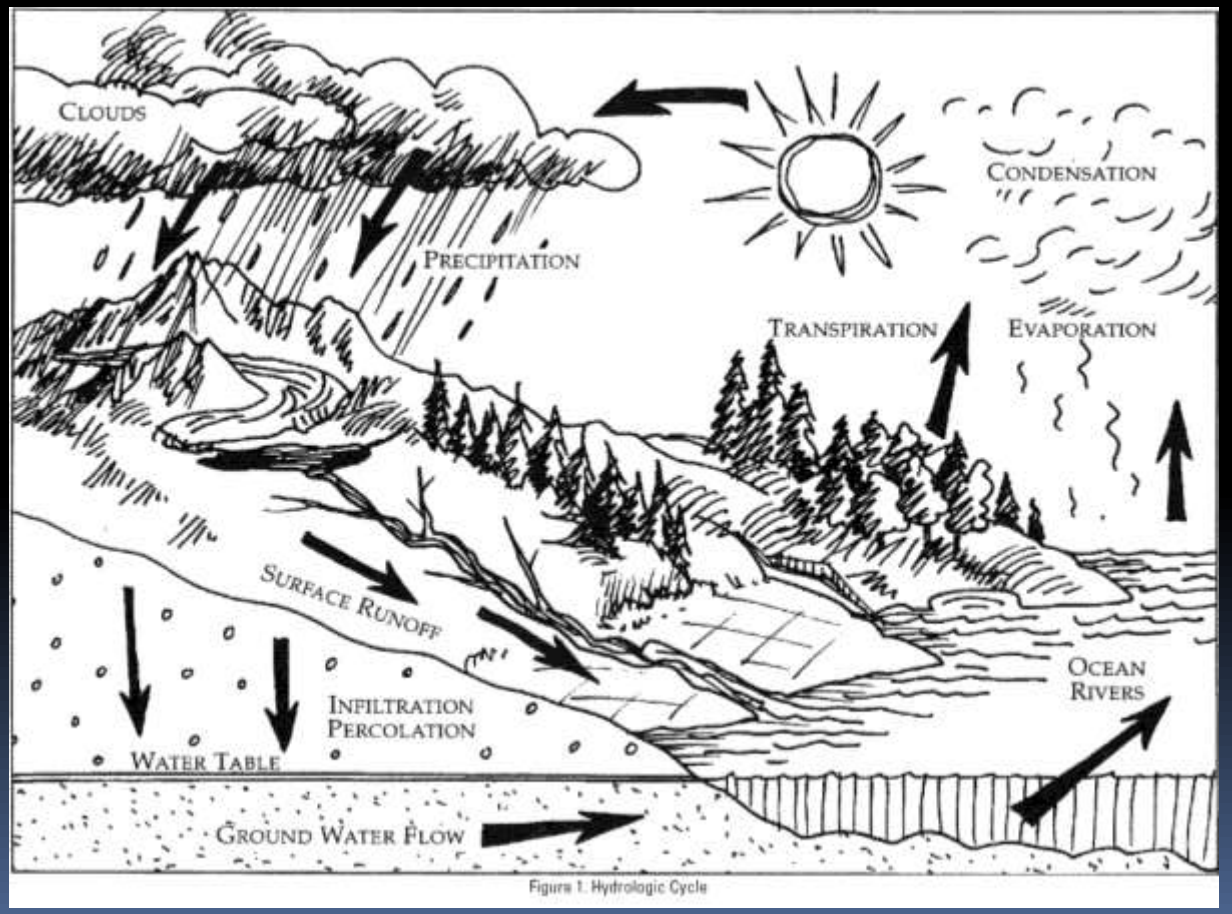
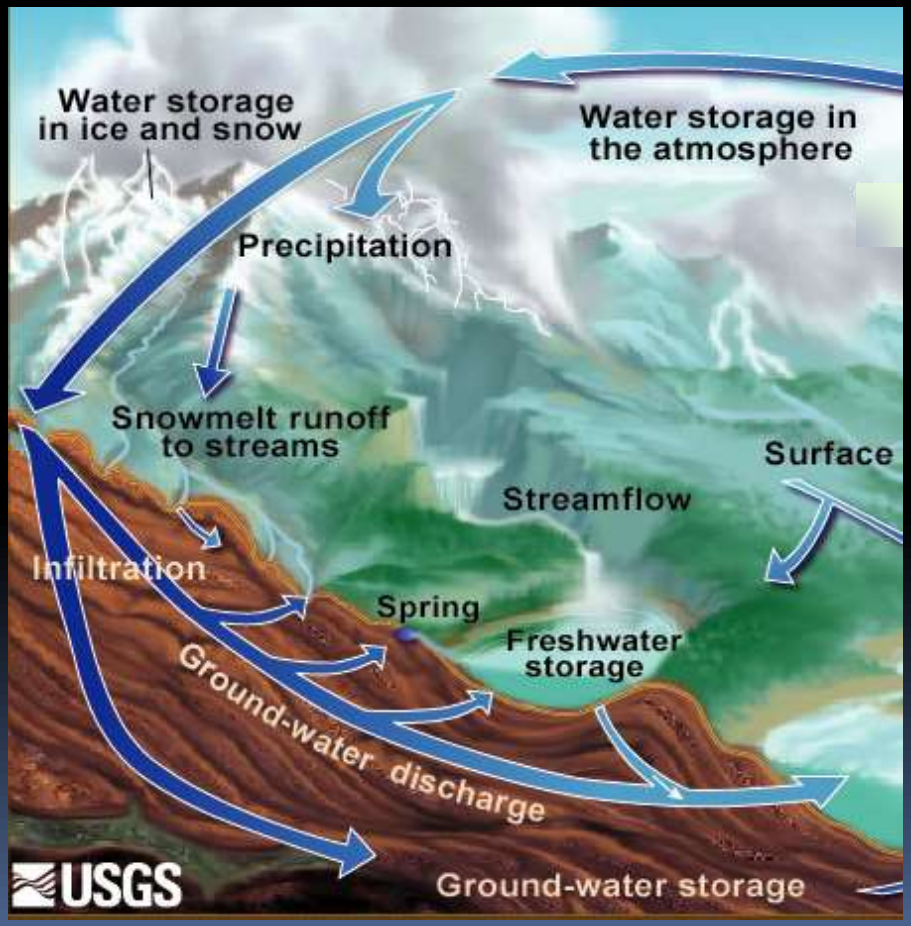


Figure 1. Hydrologic Cycle

# Infiltration




Process by which water moves from the earth or surface water into the groundwater system

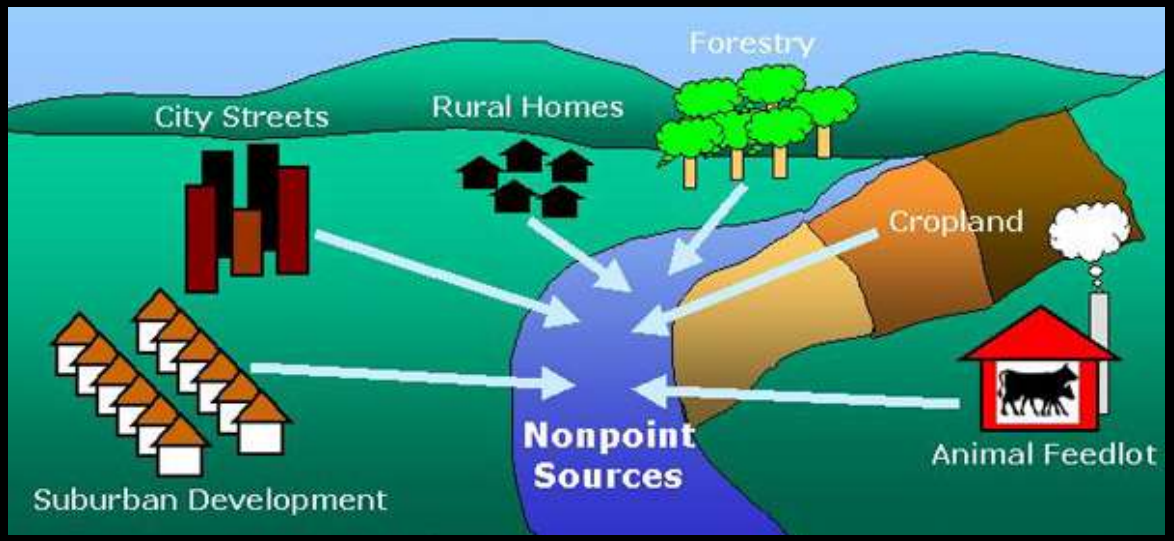
# Runoff

Water that drains or flows off the surface of the land

# Point Source Pollution

Pollution from a specific location that can be controlled (can point to it)

# Non point source pollution



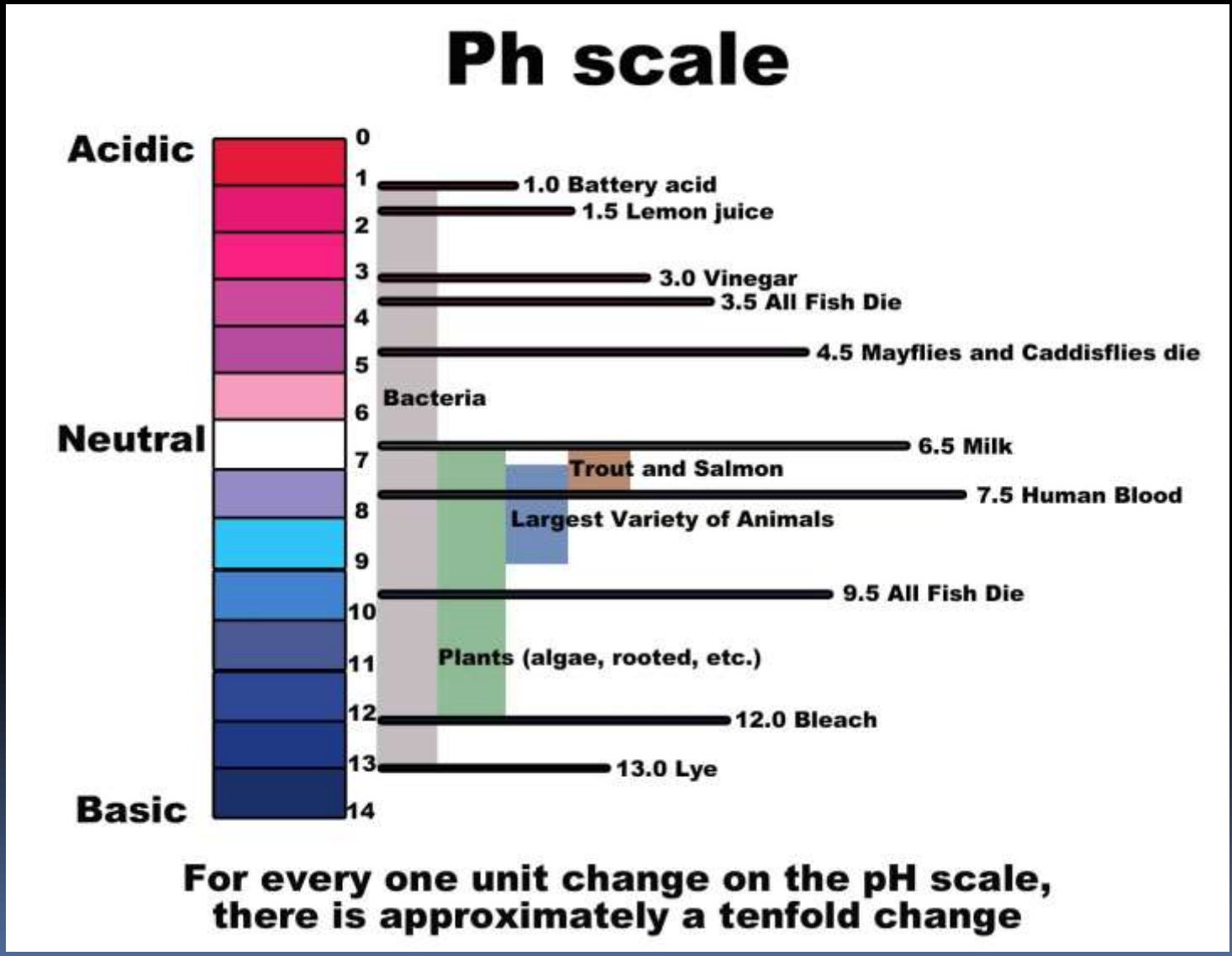

Pollution deriving from many unidentified sources includes runoff from urban and agricultural areas.

# Dissolved Oxygen

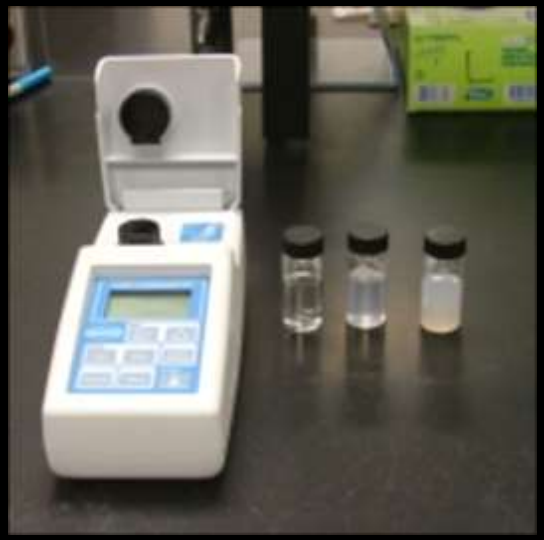
The amount of oxygen dissolved in the water.

# pH

The scale ranges from 0 (most acid) to 14 ( most basic)



# Turbidity



Nephelometer

Degree to which light penetration is blocked because water is muddy or cloudy.

# Sediment

Fine substrate that settles to the bottom the stream

# Parts per million

Parts Per Million or ppm is a measure of concentration

Example:

4 drops of ink in one 55-gallon barrel of water would produce an ink concentration of 1 ppm

# How do riparian plants affect water quality?

# What's in that H2O (Quantity)

- Key Terms:
  - Gradient
  - Velocity
  - Stream Flow
  - Cubic Feet per Second(CFS)

# Stream Flow

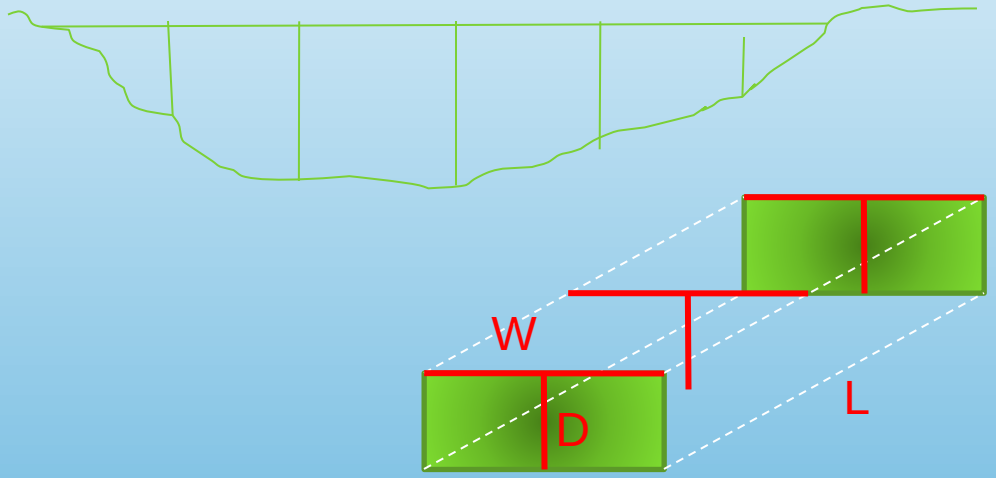
A volume of water moving past a given point per unit time (CFS).

1. Measure stream velocity:

Velocity = Distance / Time (feet/second)

2. Measure the cross sectional area of the stream:

Area = Average width * Average depth, (feet$^2$)




3. Velocity * Area = Flow
(feet/second)* (feet$^2$) = feet$^3$/second = CFS

*How would you make these measurements?*

*Is water velocity always the same within a stream reach?*

# Gradient

Vertical drop of the stream over a distance and it affects stream velocity, size of substrate, geomorphology, etc.

How does watershed health depend on stream flow? (fish habitat, water quality, types of macroinvertebrates, and vegetation)

How do floods change the streams?

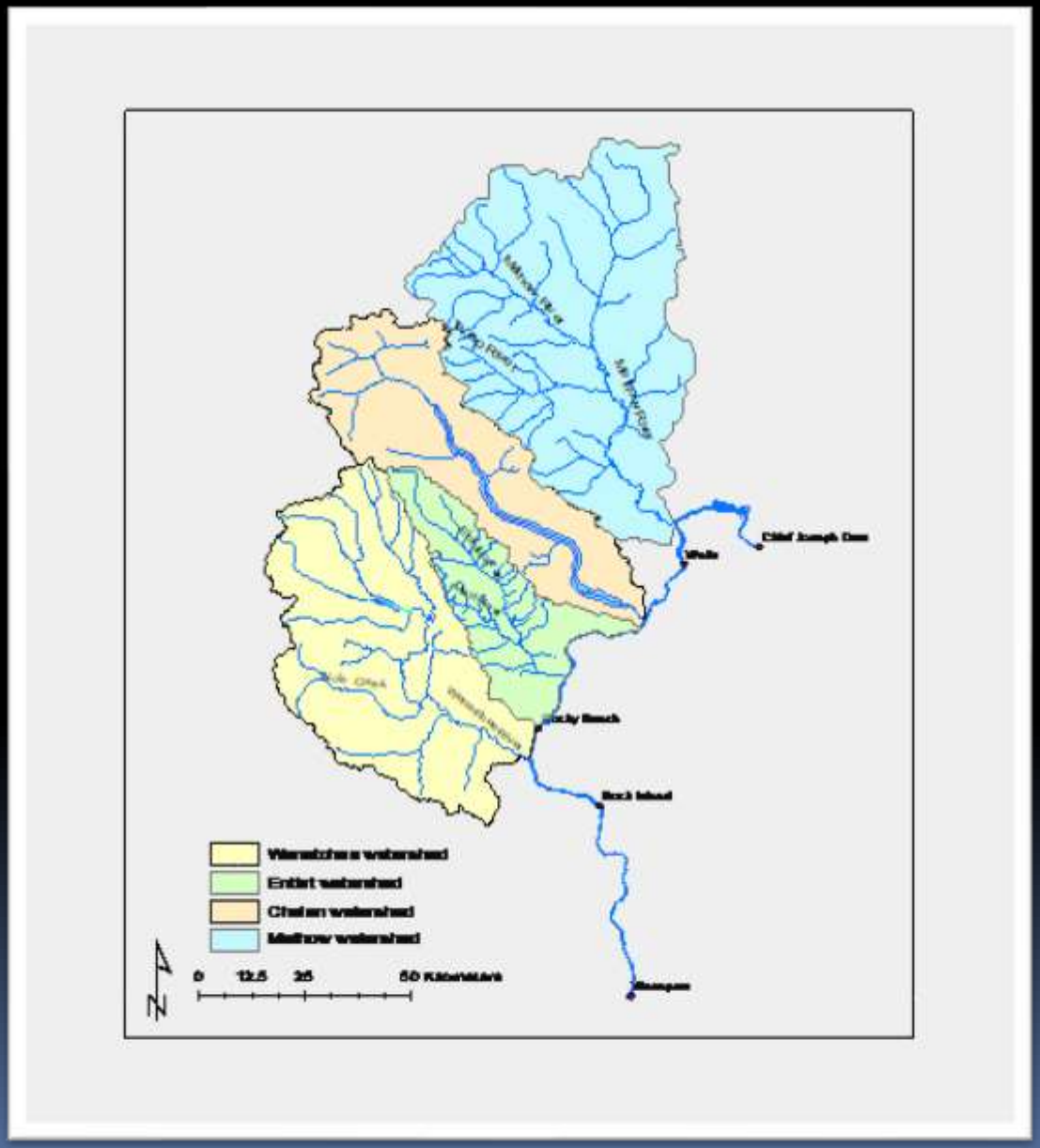
# Watershed Wonders

- Key Terms:
  - Watershed
  - Best Management Practices
  - Mitigation

## Watershed:

all of the land area with a common drainage

# What is your watershed address?




- Example:
- river mile 6 Mad River
- Entiat River
- Columbia River
- Pacific Ocean

# Best Management Practices

Sustainable methods used to best reduce or mitigate harm to the environment

Fencing in livestock, is one type of management practice

# Mitigation

To lessen the effects of potentially harmful activities

Construction of fish passage structure at water diversion dam in Peshastin Creek

Stream restoration structures on the Entiat River

# Can you name some activities that might affect your watershed?


# STUDENTS: Preparing for the field day…

- ✓ Become familiar with the essential vocabulary (KITC powerpoint)
- ✓ Wear a name tag
- ✓ Bring a clipboard, Packet of student worksheets , and a pencil
- ✓ A sack lunch
- ✓ Water bottle (optional)
- ✓ Check the weather
- ✓ Wear appropriate clothes and warm socks
- ✓ Bring raingear (optional)
- ✓ Wear warm socks
- ✓ Pack extra socks
- ✓ Wear a hat, sunglasses, or bring sunscreen (optional)