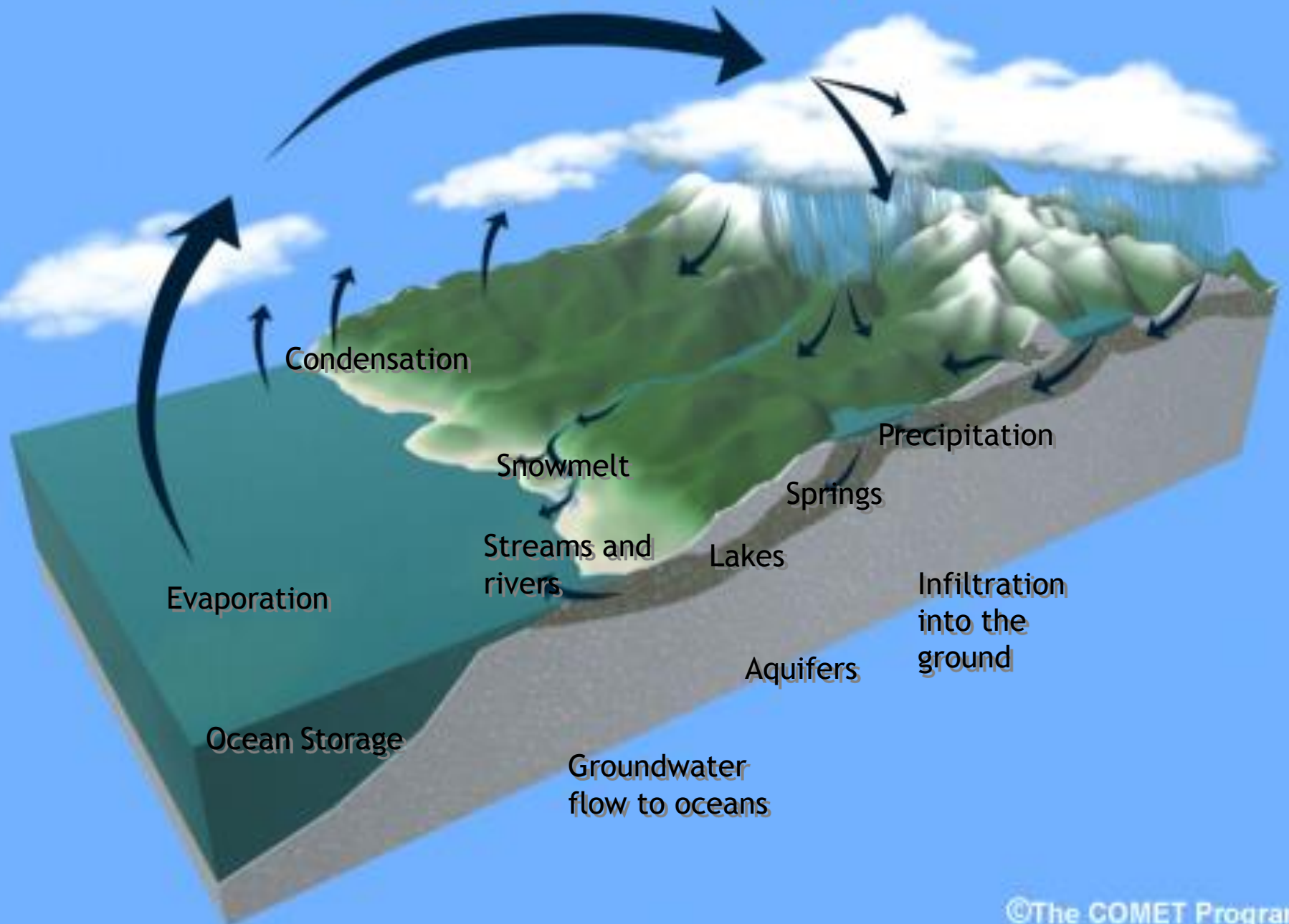


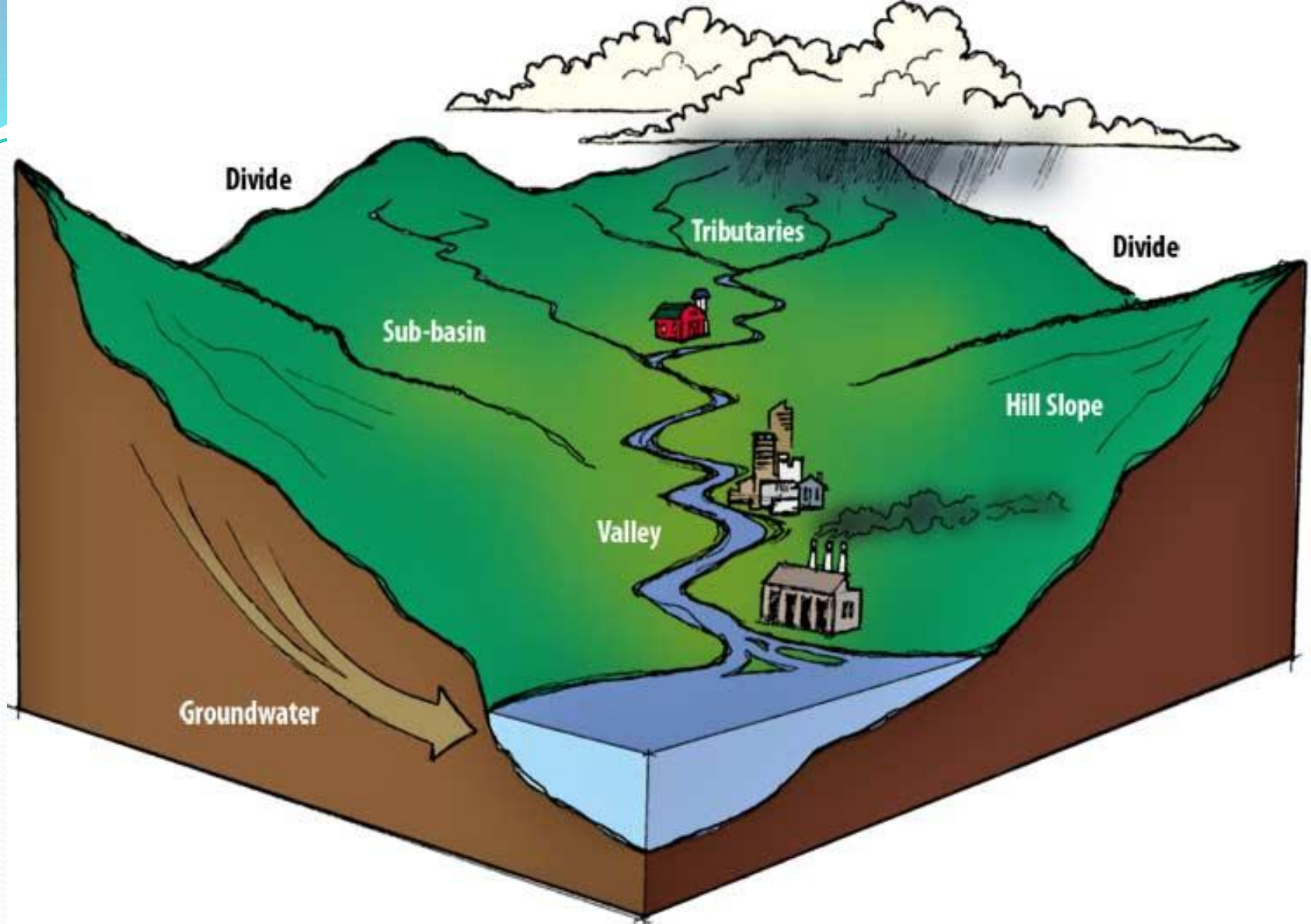


# How Leaves Become Trout

# Hydrologic Cycle Components







A watershed is an area of land from which all runoff drains, or '*sheds*' to the same river, lake, or other body of water.



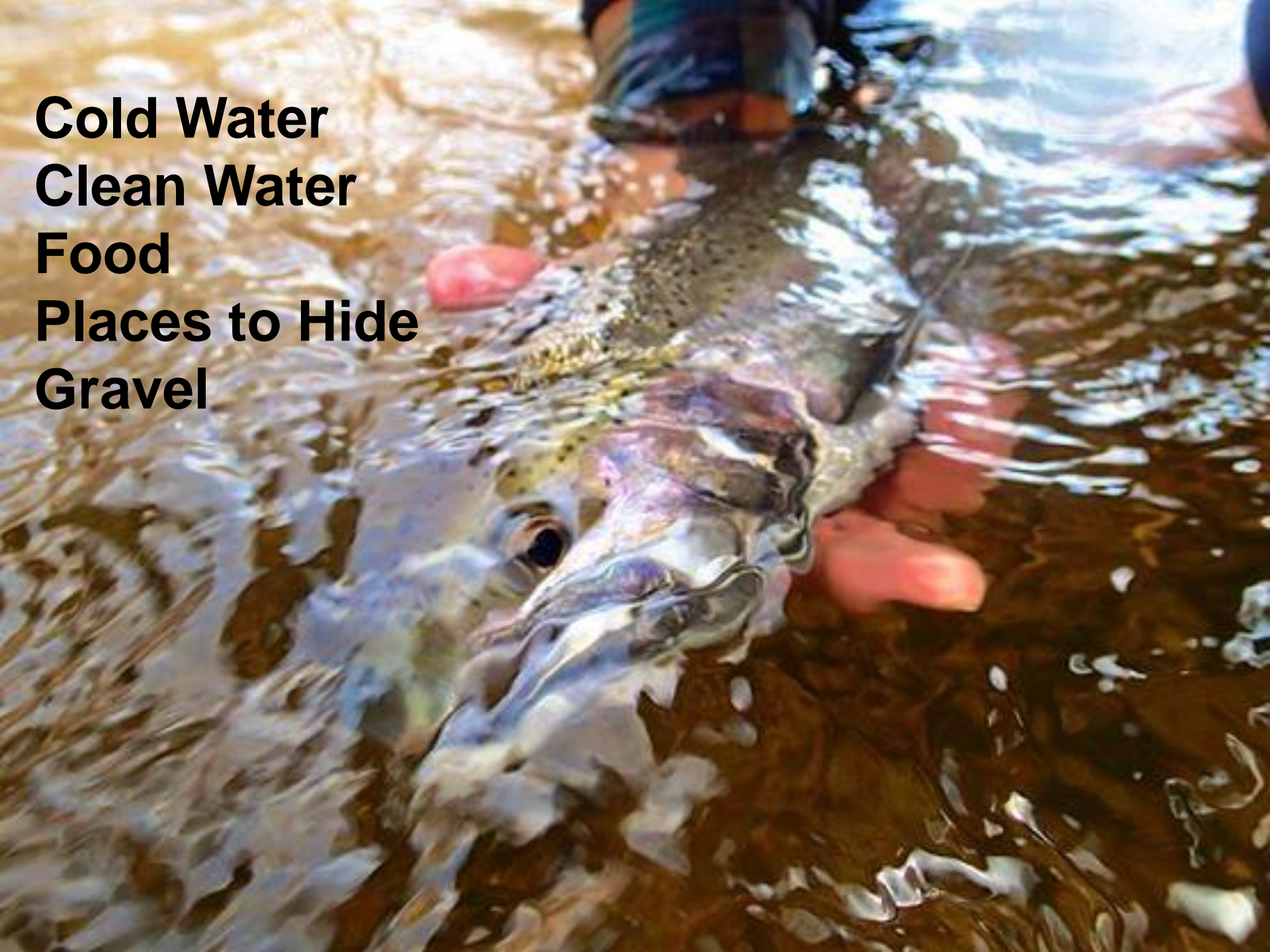


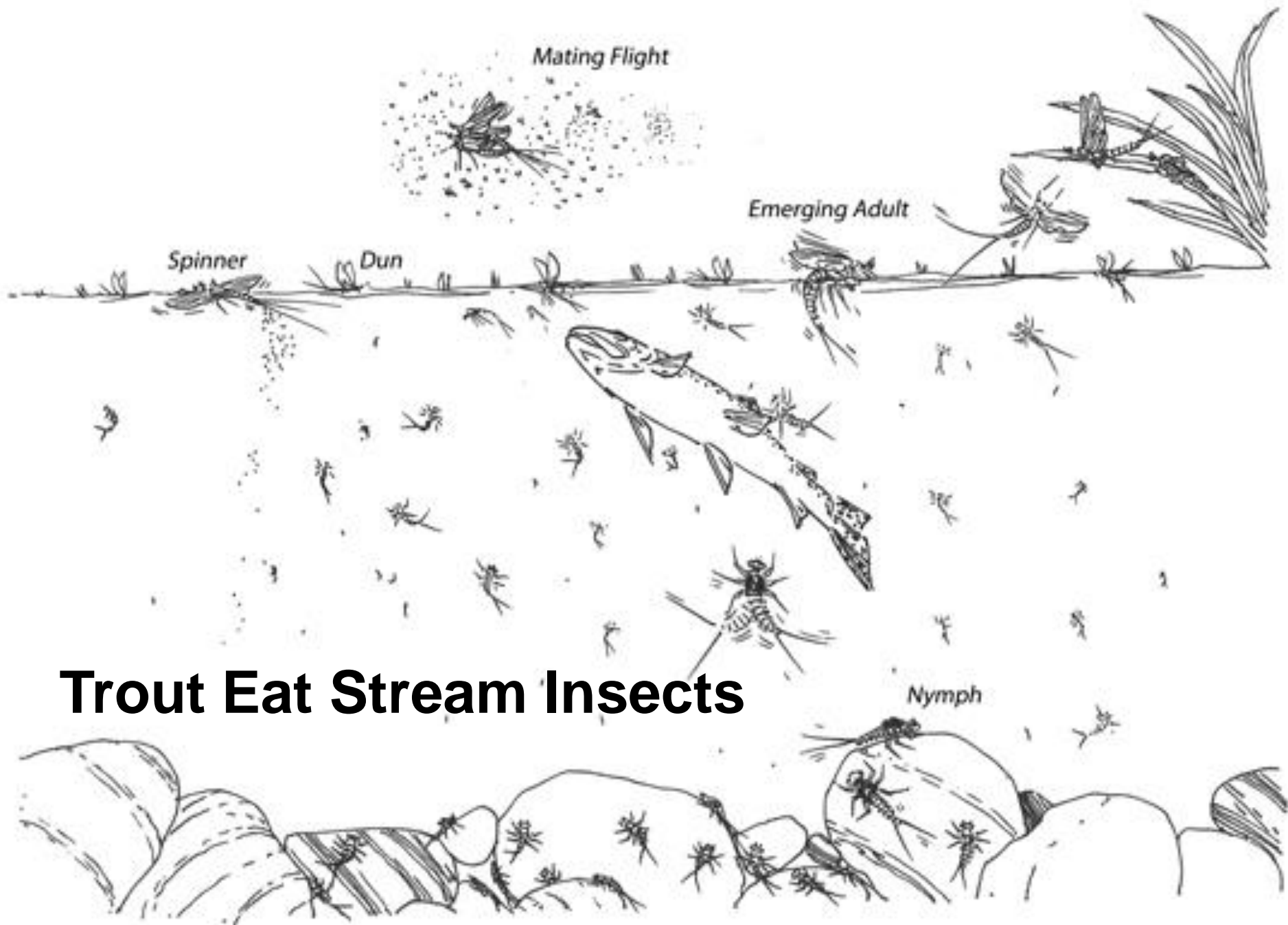
**Do you live in a watershed?**

**YES!**  
**Everyone lives in a watershed.**



**Cold Water**  
**Clean Water**  
**Food**  
**Places to Hide**  
**Gravel**





## Trout Eat Stream Insects





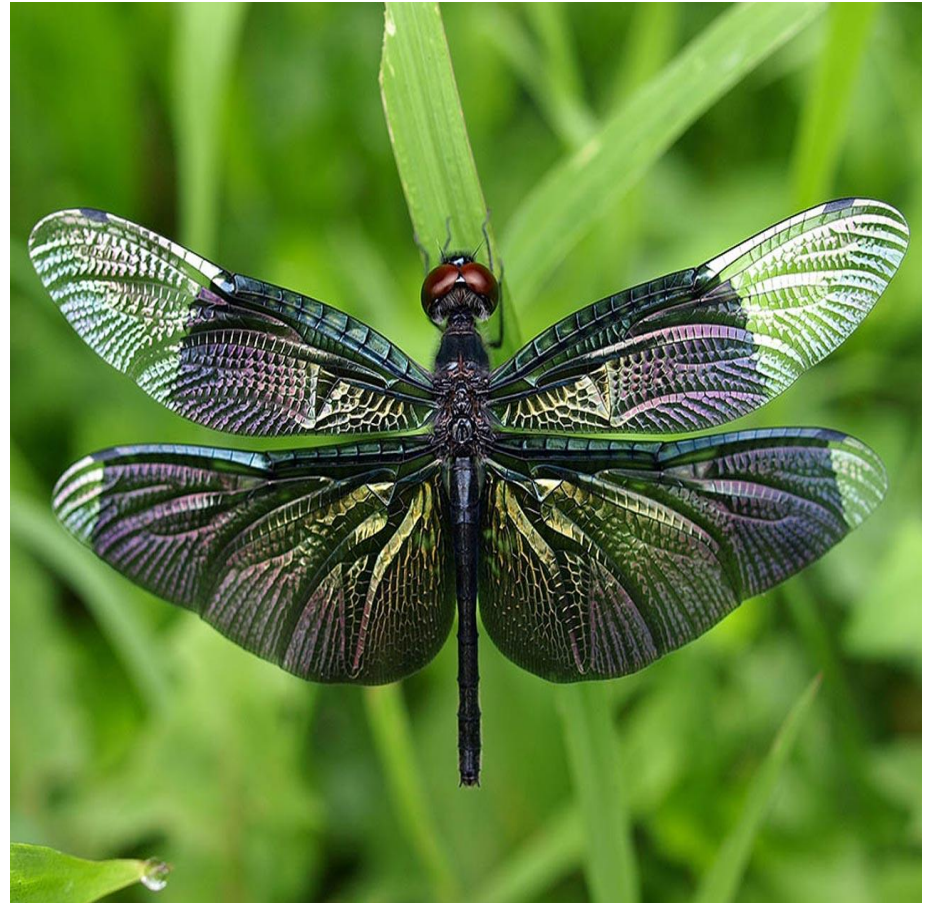
"M" pattern

## Stream Insects Eat Leaves

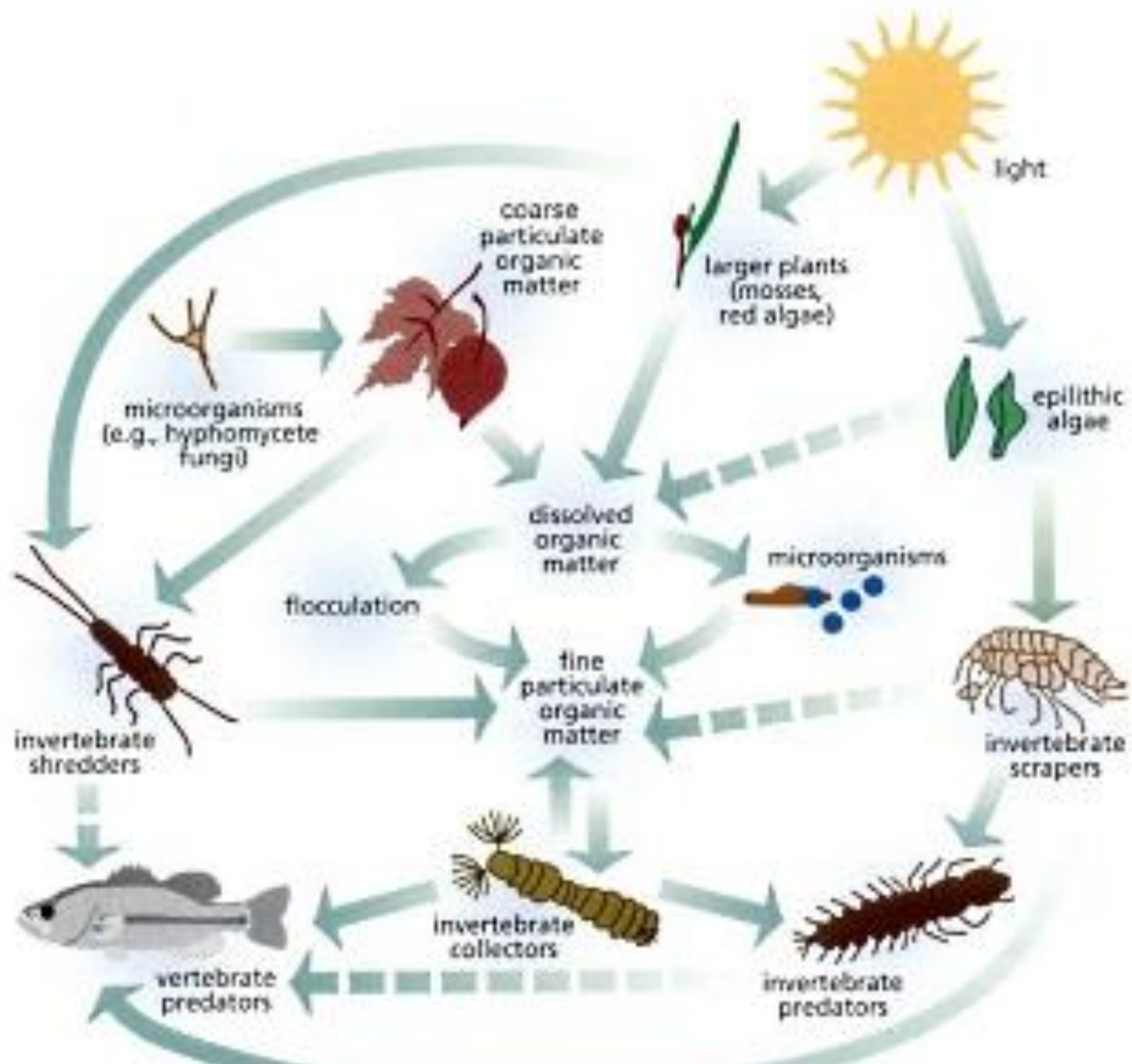
tergal banding



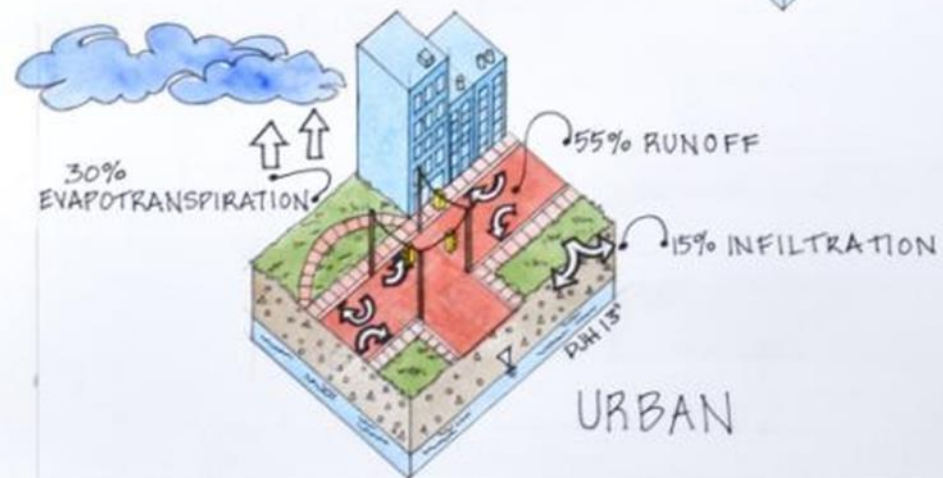
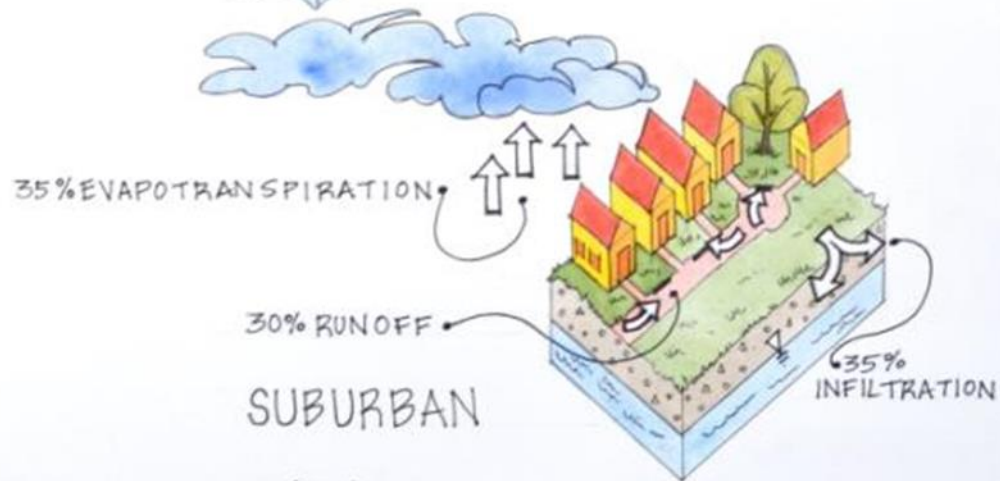
# Did you Know?





















# Macroinvertebrates can tell us the quality of the water.

- Every species of animal has a range of physical and chemical conditions in which it can survive.
- Some invertebrates are sensitive and will not survive in polluted waters, others will tolerate a little to a lot of pollution.





# Macroinvertebrates can tell us the quality of the water.

- In the cleanest ponds, lakes, and rivers, you'll find the greatest diversity of aquatic invertebrates.
- In polluted waters, only a few species can survive.





# Sensitive Macroinvertebrates

- Some can survive ONLY in clean water





# Somewhat-Sensitive Macroinvertebrates

- Some can survive in medium clean water





# Tolerant Macroinvertebrates

- Some can survive in both clean and polluted water





# Creepy Critter Game





# Leaf Pack Network





# The Leaf Pack Network

- Network of citizens, teachers, and students investigating their local stream ecosystems.
- Create an artificial leaf pack and place it in a stream.
- Collect and examine the packs in the classroom.
- Discover aquatic insects that indicate stream health, showing the connection between trees and streams.
- Share data through the network.





## Resources

### QUICK LINKS

- [Leaf Pack Network® Home](#)
- [Participant Log In](#)
- [View Data](#)
- [Learning Center](#)
- [Resources](#)
  - [LPN Manual](#)
  - [Goals & Objectives](#)
  - [Education Standards](#)
  - [Equipment](#)
  - [Additional Readings](#)
  - [Groups & Agencies](#)
  - [Recursos en Español](#)
- [News](#)
- [FAQ](#)
- [Get Involved!](#)
- [Contact Us](#)
- [LPN Site Map](#)

### Subscribe to E-News



Leaf Pack Network® was supported in part by grants from the William Penn Foundation and the New York State Department of Environmental Conservation.

## Leaf Pack Experiment Equipment

### Free Downloads

- [Leaf Pack Network Manual](#) contains complete instructions for the Leaf Pack Experiment. Individual chapters are available as separate PDF files in English and Spanish.
- [LaMotte's Insect Checklist](#) lists habitat, pollution sensitivity, and behaviors for 20 of the most common aquatic macroinvertebrates.

## Leaf Pack Experiment Stream Ecology Kit



Students will learn to design, implement, and analyze a scientific investigation while discovering the value of aquatic macroinvertebrates as living indicators of water quality.

The kit is reusable and flexible, adaptable to varying time constraints, number of students and grade levels, and it is geographically friendly, and complete.

All the apparatus and guides necessary for collecting, sorting, and identifying macroinvertebrates are included.

The Leaf Pack Experiment Kit also includes a comprehensive instructor's manual – a valuable reference guide that includes background material on stream ecology, a glossary, diagrammed instructions, experiment ideas, and field and lab data sheets. [Watch this video to see the kit in action!](#)

**Around \$199.00 each, depending on supplier.** Call LaMotte at 800-344-3100 to order ([Order Code: 5882](#)) or [check their list of distributors](#).

## Aquatic Bug Kit



A creepy, crawly, wet investigation of the health of streams, ponds, and other freshwater environments.

Following the easy-to-read BUGKIT manual, one to two students learn to collect, observe, sort, and identify aquatic insects as a tool for measuring water quality.

Students can complete the activity at home after collection or spend an afternoon outdoors beside a stream.

The BUGKIT includes mesh leaf bags for collection, trays and plastic dishes for sorting, a magnifying lens, BUG GUIDE, and a

BUG BOARD identification chart. Ideal for bug-hunters, age 8 and up.

**Around \$24.99 each, depending on supplier.** Call LaMotte at 800-344-3100 to order ([Order Code: 5950](#)) or [check their list of distributors](#).

## Aquatic Macroinvertebrate Life Cycle & Habitat Flashcards

<http://www.leafpacknetwork.org>









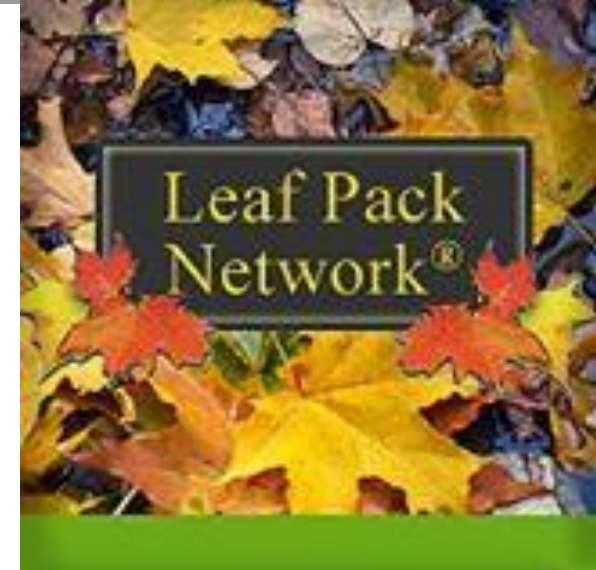
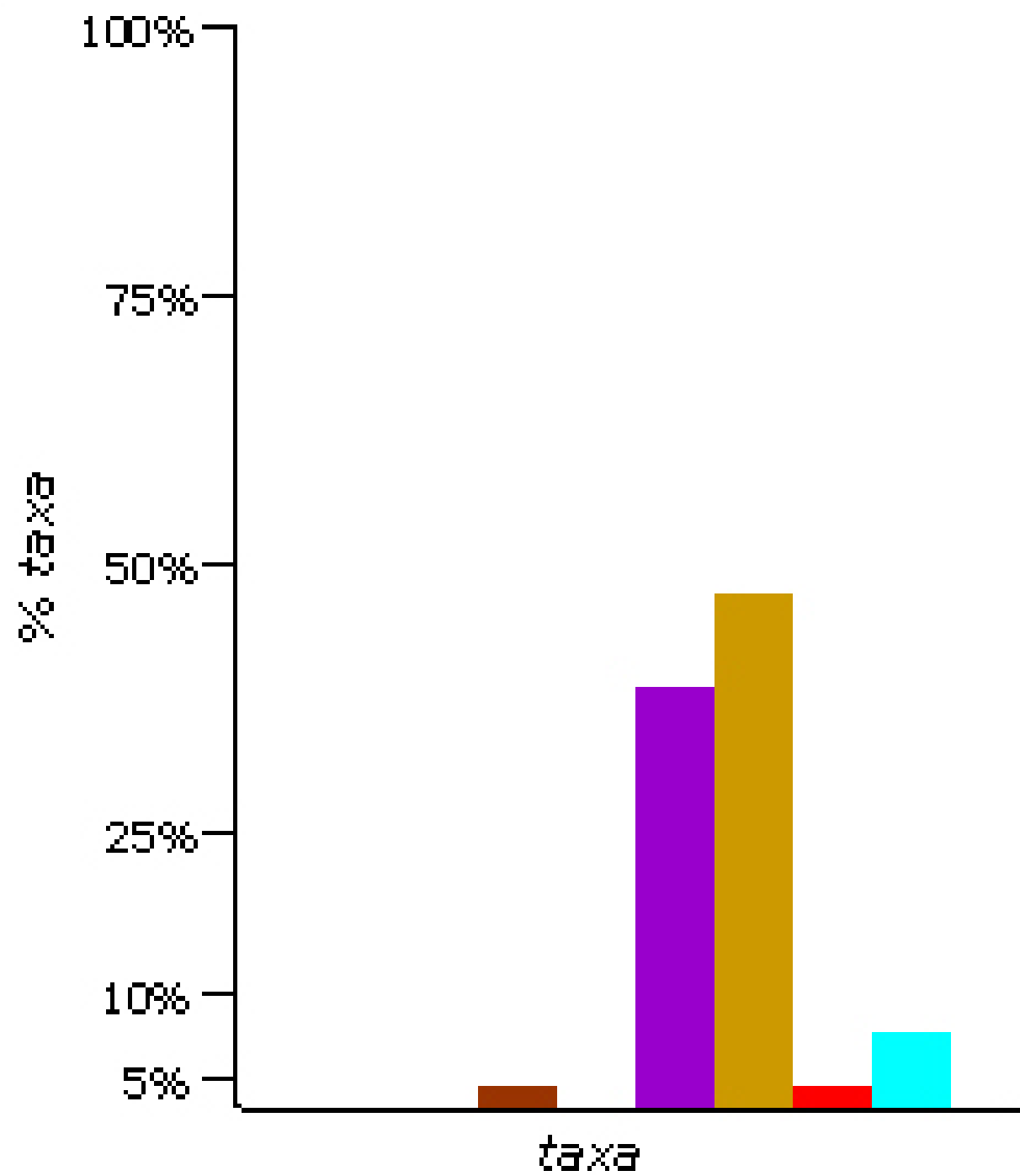














# What will you be doing?

- Plan our Experiment – TODAY
- Prepare Leaf Packs and put them in Creek- TOMORROW
- Collect Leaf Packs from Creek – NEXT MONTH
- Identify Insects – NEXT MONTH
- Interpret Data – NEXT MONTH
- What is the Water Quality of Our Site? – NEXT MONTH



# Scientific Method

The scientific method is a way to ask and answer scientific questions by making observations and doing experiments.

- Ask a Question
- Do Background Research
- Construct a Hypothesis
- Test Your Hypothesis by Doing an Experiment
- Analyze Your Data and Draw a Conclusion
- Communicate Your Results



# Question 1

- Group One: A local stream has a lot of stormwater pipes entering it and we want to know if it is affecting water quality.
- How would this be tested using the leaf packs?
- Hypothesis?



## Question 2

- Group Two: A landowner cut down trees along a stream and we want to know if it is affecting water quality.
- How would this be tested using the leaf packs?
- Hypothesis?



## Question 3

- Group Three: A company is constructing a building next to a stream causing soil to run into it. We are curious if it is affecting water quality.
- How would this be tested using the leaf packs?
- Hypothesis?



# Preparing Leaf Packs

- Collect leaves that are common around Creek and place them in the mesh bag.
- Use the scale to weigh 30 grams of dry leaves in each leaf pack.
- Complete the tag for each mesh bag and place tag in leaf pack bag.
- Tie bag closed.
- Loop a long length of string through leaf pack so it can be tied to a rock (or log or roots).

# Placing Leaf Packs in Stream

- Tie leaf pack directly in to stream to rock (log or root).
- Position leaf pack facing upstream so that as much of the surface area of the bag is facing the current as possible. Make sure all leaf pack are submerged and securely tied.
- Have students record where they put them
- Keep leaf packs in stream 3-4 weeks.



A photograph showing two individuals, a man and a woman, wading in a shallow stream. The man, on the left, is wearing a light blue long-sleeved shirt and dark waders, and is holding a small object in his hands. The woman, on the right, is wearing a black t-shirt and dark waders, and is reaching into the water near some rocks. The stream is surrounded by dense vegetation, including tall grasses and reeds on the left bank and various shrubs and trees on the right bank. The water is dark and reflects the surrounding greenery. The text "Collect Leaf Packs" is overlaid in the bottom left corner.

**Collect Leaf Packs**





**Collecting Insects**



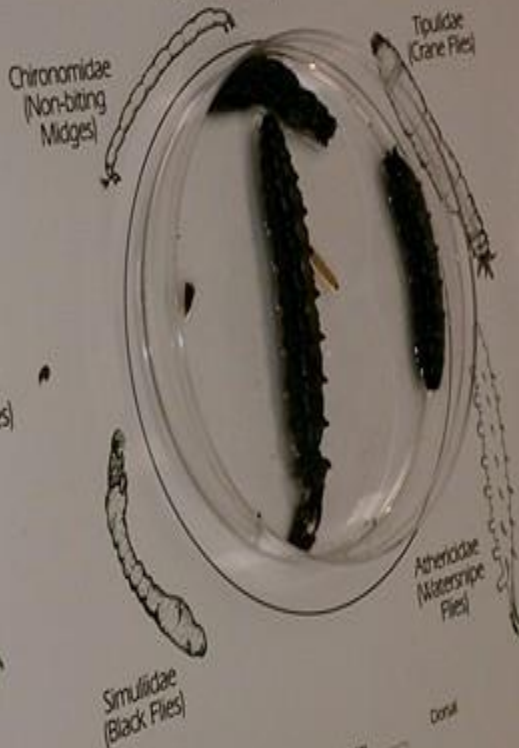
# Water Beetles

Order Coleoptera



## True Flies

Order Diptera



## True Bugs

Order Hemiptera



## Dobsonflies & Alderflies

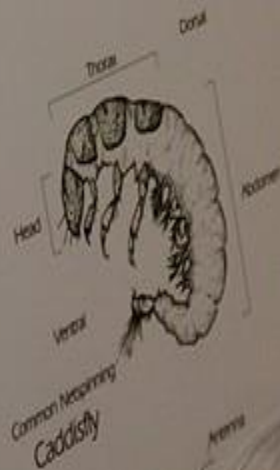
Order Megaloptera



# Identifying Insects

Proleg.

Unsegmented, leg-like structure, usually located on the back of some Diptera larvae and on the abdomen (usually ventrally or laterally) in many other insects.



# Interpret Data

- Classroom Presentations
- Uploading Data on Network

Interpret Data



# Additional Tools

- Leaf Pack Network Resource Manual
  - Leaf Pack Data Sheets
  - Habitat Assessment
  - Insect ID sheet
- Learning Activities
  - Tree ID
  - Leaf Pack Crossword

# Field Work Today

- Prepare One Leaf Pack Per Group
- Tie Leaf Packs in Stream
- Habitat Assessment



# Questions?

