

Lesson Plan

Getting Ready!

1. Read background information.
2. Check out a macroinvertebrate sampling kit from Klamath Basin OSU extension center and review the contents.
3. Select field sampling site and conduct a pre-visit before student field trip. *Forest Trails of Klamath County* publication and KBBT brochure can be used to identify safe and appropriate field sites.
4. Make copies of *Student Journal: Birds Eat Too!*
5. Ideally, students will be taken to a suitable (safe and wade-able) stream or lake where collection techniques will be demonstrated. If possible, students will be able to collect samples on their own in order to better learn collection techniques. If students cannot go to a water body, instructor can go before the demonstration and collect a large enough sample to divide evenly between groups. After sample collection is complete, students will pick through the debris to locate and then identify macroinvertebrates for local food web creation. Emphasis can be placed on experimental nature of project because leader usually does not know what the results will be. Even if sampling has been previously done on the same stream conditions could have changed between tests.

Discuss!

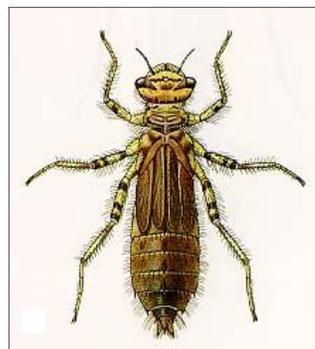
1. Discuss a food web with students in classroom before trip.
2. Review safety issues with students before heading into field.
3. Discuss what a macroinvertebrate is and what they can tell us about water quality.

Investigate!

1. Arrive at site and set out gear in small teams of 4-6 students.
2. Each station should have 1 D-frame net, 2-3 keys, 1 plastic dishpan, 1 ice cube tray, magnifiers and sorting tools as needed.
3. Use discretion as to how many students, if any will gather samples.
4. Collect samples for each group using D-frame net.
5. Invert net into plastic dishpan with a small amount of water in it and wash off net into the pan to collect all organisms in dishpan.
6. Have students sort through sample in dishpan placing individual organisms into ice cube tray for a better look.
7. In small groups, use dichotomous key (a key for the identification of organisms based on a series of choices between alternative characters) to identify as many organisms as possible.
8. Bring the whole group together to share results/findings and include in their Student Journal.

Site Comparison!

Take students on two field trips to aquatic sites where macroinvertebrates can be easily sampled. Compare the invertebrates and bird populations between sites and see if there is any evident relationships.



Dragonfly Nymph

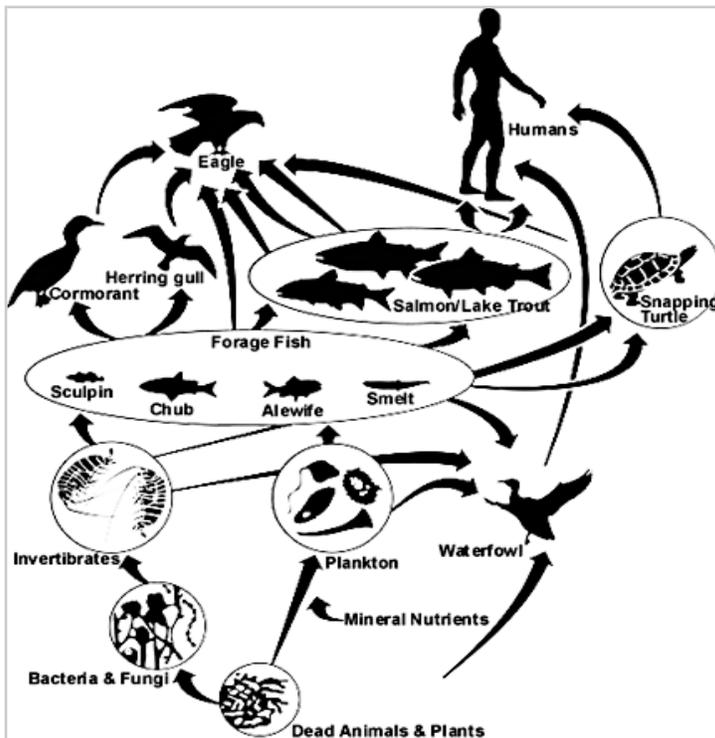
A **dichotomous key** is a tool that allows the user to determine the identity of items in the natural world, such as trees, wildflowers, mammals, reptiles, rocks, and fish. Keys consist of a series of choices that lead the user to the correct name of a given item. "Dichotomous" means "divided into two parts". Therefore, dichotomous keys always give two choices in each step.

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9. Release the macros back into the water safely and rinse out all equipment.
10. Have students observe birds with binoculars in the field. Have them specifically observe feeding behavior and see if students can note whether any are eating macroinvertebrates or fish in the water. Help them make the visual connection.

Follow Up!

1. Upon return to classroom have students illustrate a sample food web from the location sampled that includes at least five species. An example is provided here, but student images should be localized to field site visited.
2. You could also have them illustrate macroinvertebrates found in samples like the mayfly example in the right panel.



3. Ask students to share information they found about their samples, and what macroinvertebrates were missing or most common.
4. Help students make connections between macros, birds at site, and common fish that birds may also rely on.
5. Ask students 2-3 questions to recap the lesson (see right panel).

Helpful Hint!

While gathering macro samples don't forget to pick up rocks, gently roll logs, and look on aquatic vegetation to see macros living in their natural habitats.

What is a food web?

A food web is an illustration of how all living things are connected to each other through what they eat.



Mayfly Illustration

Suggested Questions

What is the most common macroinvertebrate found here?

What are the most common birds found here?

Do you think these birds rely on the macroinvertebrates we found? If so, how?

Do you see anything here that could help or harm the food/habitat that the birds rely on?

Can you explain how fish are a part of this food web?