PLATTE BASIN TIMELAPSE

HANDOUT 1 - Herbarium Instruction Sheet (p.1)

Botany Specimen Preservation Instructions

Preserving specimens for future study is an important part of any science course. Plants must be harvested live and then "cured" to maintain optimum quality. A collection of preserved plants is called an herbarium. You will be responsible for creating the first TRUE, correctly identified, specimens in your school's herbarium.

There are specific tools and equipment needed to make a successful plant library, but some items can be substituted with various found or constructed objects.

You will NEED:

1. A pair of pruning shears, stout scissors, or a box knife with a retractable blade (this is not allowed in school and will be regulated by the teacher when collecting specimens while at school);
2. Thorn-proof gloves or a pair of old leather gloves for handling prickly plants;
3. Small hand spade or small shovel (miniature one for kids) used to dig up small plants in order to collect plants and roots;
4. Plastic bags—either Zip-lock-style or trash bags (trash bags and gallon size storage bags are the best for field collection, as they help to keep plants from drying out while collecting);
5. LOTS of blotting paper, construction paper, or newspaper about 12 X 18 inches in size to place plants on for drying and may be changed (like a wet diaper) while the plants are drying);
6. Several pieces of corrugated cardboard about 12 X 18 inches in size. This must be the same size as the plywood in # 7;
7. Two pieces of plywood or similar strength material 12 X 18 inches for the top and bottom of a plant press to provide stability and even pressure when weight is applied;
8. Heavy books, such as an old phone book or a couple of text books from the classroom;
9. Hand lens (10x magnification minimum) or medium to large magnifying glass to identify small plant parts in the field and in the lab;
10. Poison Ivy medication (It is almost a certainty that one student will pick the plant to identify it, thus coming in contact with oleoresin urushiol, the clear sticky substance on the plant which causes a rash. Not everyone gets a reaction, and many become sensitive to the plant later in life or after repeated exposure to the chemical. Know what the plant looks like so that you can avoid it).

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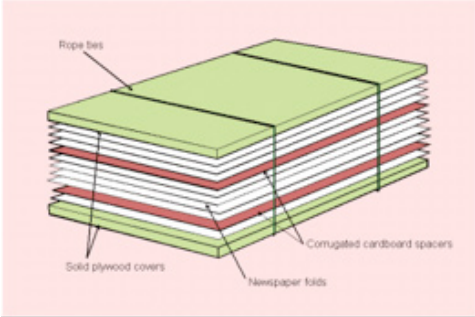
HANDOUT 1 - Herbarium Instruction Sheet (p.2)

How to Collect and Preserve Specimens for the Herbarium

1. Select only plants that are abundant and not known to be threatened or endangered and NOT on any local, state, or federal watch program.
2. When selecting an appropriate plant, make certain to collect the entire plant from the roots to the shoots (stems and leaves).
3. Use a trowel or small shovel to collect the plant and root system.
4. For larger plants, select only a small portion of the root and shoot systems (a stem section with leaves, fruits, and flowers) for preservation.
5. Collect all of the stages of reproduction, including flowers and fruits if present.
6. Store plant specimens in a plastic baggie while collecting. To keep plants sufficiently moist, you may want to include a few damp paper towels in the bag. Store plant specimens out of direct sunlight while in the field.
7. Once you have collected your plant specimens, take them back to the classroom to identify them and begin the drying process.
8. You will use a plant press (make one if needed) to preserve the plants. See illustration below.



9. Use books and cardboard from the classroom to create a plant press for drying your plant specimens.
10. Identify your specimen, create a label, and place both together on a sheet of newspaper. Make certain your identification is correct.
11. Once your plants have dried, attach each specimen with an accurate label to an herbarium sheet (acid-free white paper).
12. Now you are ready to catalogue your specimens.

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Specimen Label for Plant Collection

Scientific Name *(Genus, species):* _____

Plant Family: _____

Common Name: _____

Origin (native/exotic): _____ County & State Collected: _____

Date Collected: _____ Elevation Collected (if applicable): _____

Collected By: _____

Township: _____ Range: _____ Section Number: _____

Relative Abundance: _____

Notes (folklore, native use, etc.): _____

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PLATTE BASIN TIMELAPSE

PLATTE BASIN TIMELAPSE

HANDOUT 3 - Food Chain/Food Web Activity Questions (p.1)

Name: _____

1. What do food chains and food webs depict? Explain the relationship between food chains and food webs.

2. Why are there only a certain number of organisms in a food chain?

3. What does a beaver consume? What does an otter consume?

4. Identify one herbivore, one carnivore, one omnivore, and one detritivore.

5. The law of conservation of energy states that energy can neither be created nor destroyed and that the total energy of a closed system remains constant. Explain how this law applies to food chains and food webs. Be sure to emphasize how energy transfers from one organism to another and the role of the sun in an ecological system.

PLATTE BASIN TIMELAPSE

HANDOUT 3 - Food Chain/Food Web Challenge (p.2)

Name: _____

1. What are the different trophic levels in a food chain? Why do organisms eat at different trophic levels?

2. Many consumers are omnivores, like humans, that feed at more than one trophic level. On which trophic level would you place an organism that can eat at multiple trophic levels?

3. It is a fact that not all energy available at each trophic level gets transferred to the next trophic level. Using your knowledge of the law of conservation of energy, explain how energy flows through the different trophic levels and why not all energy is transferred to the next trophic level, and how this energy is conserved in an ecosystem.

4. Decomposers are a group of consumers that are not always represented in food chains. Explain why these organisms are vitally important to the health of an ecosystem. **(HINT: Apply the law of conservation of energy and mass.)**

PLATTE BASIN TIMELAPSE

HANDOUT 3 - Food Chain/Food Web Challenge (p.3)

5. Because scientists know that not all energy is transferred from one trophic level to the next, they have developed an easy numerical way to represent the energy that is not transferred. It is called the 10% rule. Only 10% of the available energy at one level is transferred to the next level. For example, in a simple food chain with three organisms, the first organism may have 100 units of available energy; the next level or organism in the food chain would have only 10 units (10% of the previous number) of available energy; and the third organism would have 1 unit of available energy. With this information, practice your math skills by recording three food chains from the completed food web activity (Place your mouse curser over an organism and the chain will be highlighted.) Follow the steps below:
    - Record three separate food chains from the food web activity.
    - Label each food web, beginning trophic level (plants) with a different energy amount listed here: 100,000 units of energy, 10,000 units of energy, 1000 units of energy.
    - Using the 10% rule, calculate the amount of energy at each level in each of the three food chains that you have selected.
    - Did any of your food chains run out of energy?
    - Explain why true food chains are made up of only a few organisms.

Platte River Prairies

HANDOUT 4 - Food Chain/Food Web Energy Flow Activity

PLATTE BASIN TIMELAPSE

Name: _____ **Date:** _____

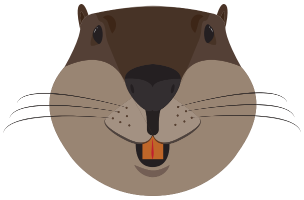
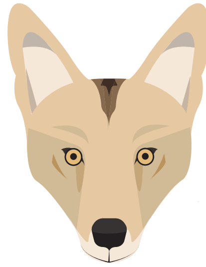
Materials Needed:

glue stick, plain 8 x 11 inch paper, scissors, pencil/pen, various pictures of orgasms both plant and animal

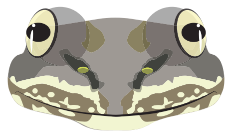
Procedure:

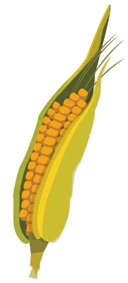
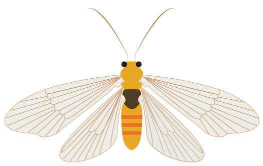
1. Create a FOOD CHAIN by printing out the PBT images (next page pdf), which you will cut out, arrange, and paste on a clean sheet of paper. You can draw the pictures too. *Remember that food chains have no more than 5 organisms.
   - Label the transfer of energy on the food chain by drawing arrows in the direction of energy flow.
   - Label the 1st trophic level with 100,000 units of energy and calculate the energy remaining at all other trophic levels.
   - Include all of the following labels on your food chain: heterotrophs, autotrophs, decomposers, all ordered consumers such as 1st, 2nd, 3rd, and 4th.

2. Create a FOOD WEB using the PBT images (pdf), which you will cut out, arrange, and paste on a clean sheet of paper. You can draw the pictures too.
   - Label the transfer of energy on the food web by drawing all appropriate arrows to indicate the direction of energy flow.
   - Note the trophic level(s) on which each consumer feeds in order to illustrate connections in your food web.
   - Label all of the herbivores, carnivores, omnivores, scavengers, detritivores, decomposers, and producers (autotrophs).

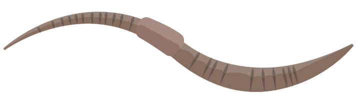





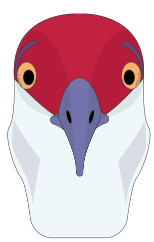


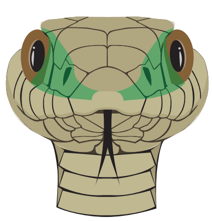


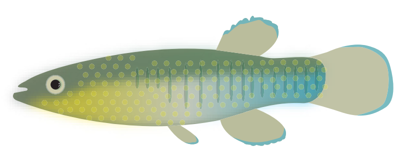










PLATTE BASIN TIMELAPSE

HANDOUT 5 - Prairie Reflection Essay

Name: _____ **Date:** _____

You will have a full 30 minutes to write your answers to the following four questions. Tomorrow you will have 30 minutes to re-read, re-organize, and revise your ideas into a coherent essay. Please answer all four questions to the best of your ability. Make sure to give examples whenever possible.

Once you start writing, you may use dictionaries and other writing aides, but YOU MAY NOT DISCUSS YOUR WRITING WITH ANYONE.

1. Describe how the Platte Basin Timelapse project that you created made a difference in your understanding of ecology and specifically prairie food chains and food webs.

2. What long-term benefits could the Platte River Prairies project provide to you?

3. How did you apply what you had already learned in school to the project?

4. What skills have you gained from the project that may help you to become a more responsible citizen when using Nebraska's water resources?

PLATTE BASIN TIMELAPSE

HANDOUT 6 - Outdoor Classroom Tour (p.1)

Name: _____ **Date:** _____

Purpose:

Provide an electronic self-guided tour of a natural area for the surrounding community, weekenders, and school groups.

Objective:

Create a self-guided tour of a natural area such as prairie, woodland, wetland, and pond. Product should include images, text, and a video link with QR codes posted outside in a designated area. You may work individually OR in pairs (2 students only).

Assignment:

1. Begin by researching either terrestrial or aquatic organisms found in the natural area OR specific area such as a wetland, woodland, pond, prairie, rotting log, etc. You should have experience with this if you have already gone outside to document the many different organisms in your habitat.
2. Locate one specific organism on which to focus your research, such as a specific type of shrub, a prairie wildflower, an invasive species of plant, poisonous plant, edible plant, tree, a wolf spider burrow, burrowing wasps, monarch butterflies, bird, or, bird's nest, amphibian, reptile, etc. Focusing on one specific habitat (such as a riparian area) will help guide your tour project and cut down on the amount of work you will need to do. Example title and topic: "Striped Chorus Frog: A Closer Look at a Wetland," OR "Redwing Blackbirds: The Noisy Stewards of the Cattails," OR "Pond Mud: The Secret Is in the Smell." You may also wish to illustrate the relationship between two organisms, such as milkweed and monarch butterflies. But in most cases, you will highlight ONE specific organism from your chosen habitat.
3. Investigate a resource within the local community to assist with your research. Examples of resources include: university professors, city arborist, the local city parks and recreation department, local zoo, weed control technicians, game and parks officials, natural resource districts, USGS wetland restoration team, professional online websites, university extension pages, etc. You may want to contact resources during class time using your own cell phone, school phone, or email.
4. Gather all information and plan what part (habitat or organism) of the tour you will provide. If you plan to use a video you will be using your own camera or a computer's built-in camera. You will be travelling outside in order for you to photograph locations and various organisms at designated times.

continued on next page...

HANDOUT 6 - Outdoor Classroom Tour (p.2)

5. Your QR codes should include the following information:
    - Photo of organisms of interest or habitat of interest.
    - Common AND scientific name of organisms. If a habitat is your focus, then you must include common organisms found there, as well as names that help to describe the habitat, such as wetland, bog, or marsh. Be specific with the terminology.
    - Identifying characteristics of the organisms or habitat in order to help people identify it when outside. Try to avoid using taxonomic terms unless they are explained or labeled. Use common language when appropriate but be accurate.
    - Distribution and population of the organisms or habitat. This needs to be a written description with a small map showing shaded areas where the organism or habitat can be found.
    - Identify the biotic and abiotic factors that limit a population or populations.
    - Ecological role of the organism(s) must be explained. Include the following: predator-prey interactions, temperature tolerance, circadian rhythms, hibernation, migration, or year round resident, impact on humans such as a food source, pest, etc.
    - Important or interesting fact(s) that you want the public to know about your organisms or habitat.
    - Environmental Awareness: provide visitors with information that makes them more environmentally aware of the habitat and your organism(s). Explain human impacts, solutions to impacts, and ways to lessen impacts to your habitat or organism. (Local resources should be included when available.) For example: “Wetlands are easily damaged by foot traffic, so take the shortest route into the area and follow the exact route out, or follow a trail when available.”
6. The QR codes will be placed outside for the public to use. Do your best work, as it will be on public display.