



### Tips for Unit Management

The use of older students as peer helpers, preferably from a class studying a similar subject, can greatly enhance the unit and help with managing the class on field trips and outdoor activities. Also, students working on this unit could assist with younger students.

Encourage parental involvement throughout the unit and especially on the field trips. Make the field trips a learning environment, and also a festive occasion. Have a picnic while you are there!

This project is a starting point. You are encouraged to take off from here and plan and conduct lessons as they best fit your class, school, and colleagues. However, please keep these suggestions in mind:

- **Articulation:** Communicate changes that influence other classes to the appropriate teachers and share ideas so that the program continues to be articulated and connected.
- **Vocabulary:** Don't insist on students learning a list of vocabulary words before doing the lesson. Vocabulary words are given so that the teacher will know the appropriate words to introduce when the time is right.
- **Integration:** 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> grade social studies units can integrate nicely with this project. Indians, colonial people, and pioneers had to use knowledge of edible and medicinal plants to survive.

## Teach Tahoe - Native Plants and Restoration

Students learn about the plants in their watershed and collect seeds, with the goal of growing native plants in the classroom and on the school site for a restoration project.

### Background

All Living Things must meet certain needs in order to survive and reproduce. Most living things must obtain nutrients, water, and oxygen. They also require an appropriate place to live. Adaptations allow organisms to succeed.

Native plants are plants that evolved naturally in a specific region. They are especially suited for the conditions and the ecological system in that location. They are often important in the food web. These plants grow wild with no assistance needed from people.

Most native plants do the majority of their growing during the spring and summer. The warm temperatures and abundant sunlight provide the optimum conditions for growth. Seeds are released at the end of the growing season. They will lie dormant until conditions are suitable for the embryonic plant to begin growing. The food supply for a seed is contained in the parts called seed leaves (cotyledons). These can often be observed as the first parts to emerge from a germinating seed.

Restoring native vegetation in a disturbed area is very important for many reasons. Native vegetation protects topsoil, slows down water runoff, and keeps sediment out of creeks.

This project spans a full year and matches many of the 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> grade California state standards and our state adopted Harcourt Brace science textbook. The project is a cycle that repeats itself and will continue to grow and be adapted over the years.

This project is divided into six sections. Because of the seasons in Tahoe and the length of the activities, it is advised to spread them out throughout the school year. Recommended months are given with each section.

This project includes one requisite field trip. The resource people listed at the end of the unit can help with field trip and restoration project planning. Be sure to secure permission and transportation in advance. **Schedule field trips as soon as possible!!!** Scheduling the trips early keeps the unit on track, keeps you focused on accomplishing those important activities, and generally gets the unit underway. Always schedule two dates for field trips so you have an alternate date if the first choice needs to be changed.

**Harcourt Science 3<sup>rd</sup> Grade**

Survival of Living Things

**Harcourt Science 4<sup>th</sup> Grade**Interactions of Living Things  
Chapter 2 – Plant Growth and Adaptations

*Plants have adaptations to help them meet their basic needs. These include important plant structures – roots, stems, and leaves.*

**Harcourt Science 5<sup>th</sup> Grade**

Systems of Living Things

**California Science Content Standards – Grade 3**

3. Adaptations in physical structure or behavior may improve an organism's chance for survival. As a basis for understanding this concept:

a. *Students know* plants and animals have structures that serve different functions in growth, survival, and reproduction.

d. *Students know* when the environment changes, some plants and animals survive and reproduce; others die or move to new locations.

**California Science Content Standards – Grade 4**

3. Living organisms depend on one another and on their environment for survival. As a basis for understanding this concept:

b. *Students know* that in any particular environment, some kinds of plants and animals survive well, some survive less well, and some cannot survive at all.

c. *Students know* many plants depend on animals for pollination and seed dispersal, and animals depend on plants for food and shelter.

**California Science Content Standards – Grade 5**

2. Plants and animals have structures for respiration, digestion, waste disposal, and transport of materials. As a basis for understanding this concept:

a. *Students know* many

**Activity 1****Unit Introduction – What's the Problem**

*Note: this activity should be completed as close to the beginning of the school year as possible, in order to make arrangements for guest speakers and field trips.*

**Materials**

Chart paper or butcher paper

Marking pens

Native plant identification book

Notebook or journal for each student

**Procedures****Part 1**

1. On one sheet of chart paper write the heading "What Living Things Need." On another sheet write the heading "What Living Things Do." Pin up the papers where the students can see them. Assign one student to stand next to each chart to record student responses.
2. Allow students about five minutes to volunteer words or phrases to list on the chart paper. They should include food, water, air, shelter, and living space among the needs of living things. They should include eating, breathing, and reproducing among the things that living things do. You may have to prompt the students to ensure that these items are listed.
3. Tell students to picture the watershed in their minds. Have them name all the plants that are found in the area. If they don't know the plant names, accept a description. Record their responses on the board. List as many plants as the students can think of.
4. Explain to the students that they will be studying plants in this unit. They will be learning how plants live. Select a few sample species and ask students to describe the adaptations they have to survive in their habitats. Pose this question for the students to think about overnight: "Do plants have special adaptations to get all the things they need to survive?" *Note: Depending on the student's level of background information, you may want to refer to **Harcourt Science** or other curriculum, to help students find the information they need to answer this question.*

**Part 2**

1. Allow time for students to respond to the question from step 4 above. After several students have given responses, ask for examples they have seen that could support the responses.
2. Distribute the notebooks to the students. Explain to them that these notebooks will be used to record their progress through the unit. Teachers and parents at the end of the unit will read these notebooks. Students will use the notebooks together with teachers to assess their achievement for the entire unit.
3. An entry should be made in the notebook for every day on which the students work on this unit. Notebook entries may be in a variety of forms: Sentences, poems, diagrams, or cartoons could all be appropriate. Some additional materials such as worksheets,

multicellular organisms have specialized structures to support the transport of materials.  
e. *Students know* how sugar, water, and minerals are transported in a vascular plant.  
f. *Students know* plants use carbon dioxide (CO<sub>2</sub>) and energy from sunlight to build molecules of sugar and release oxygen.

**California Language Arts  
Content Standards Grade 3, 4,  
5**

**1.0 Listening Strategies**

Students listen critically and respond appropriately to oral communication.

**Comprehension**

1.1 Retell, paraphrase, and explain what has been said by a speaker.

1.2 Connect and relate prior experiences, insights, and ideas to those of a speaker.

1.3 Respond to questions with appropriate elaboration.

**1.0 Writing Strategies**

Students write clear, coherent sentences and paragraphs that develop a central idea. Their writing shows they consider the audience and purpose. Students progress through the stages of the writing process (e.g., prewriting, drafting, revising, editing successive versions).

will be included. Some entries will be only one or two sentences long and take only a few minutes to write, while others will be full compositions, worksheets, or assignments given out by the teacher.

4. Have students number the pages of the notebook as they make entries. The reason for the numbering is to help students keep their work organized and to quickly identify missing pieces. You may want students to build a Table of Contents for their notebooks.
5. Assign students to write their first entry in their notebooks. Have them tell about the problems of survival faced by one type of plant in the watershed. Have them guess how the plant might solve the problem.

**Wrap-up**

1. Briefly check the notebook entries. Make recommendations for improvement, where appropriate.
2. Have students put the notebooks away in a designated storage area. Notebooks should be removed from the classroom only to use for field work.

**Activity 2**

**Guest Speaker**

*Note: This activity should take place in the fall, prior to seed collection. If possible arrange for the same guest speaker to accompany your class on the field trip.*

**Focus:** Students learn about native, and nonnative, flora in their watershed from a professional botanist.

**Background Info:** Native plants are plants that evolved naturally in a specific region. They are especially suited for the conditions and the ecological system in that location. They are often important in the food web. These plants grow wild with no assistance needed from people. Introduced wild plants (nonnative plants) are plants that grow wild but are not native. They were brought to the area intentionally for some purpose or accidentally on horse hooves, in people's clothing, etc. Many annual grasses arrived here in the hooves and manure of the horses and cattle of the Spaniards. Many times these plants have no natural predators or local diseases to keep their numbers under control and they often out compete the native plants. Star thistle is a good example of this.

**Procedures:**

1. Invite a local botanist from a natural resource agency or a member of the Native Plant Society to come into the classroom. They can assist with what plants or seeds to collect and how to collect them, and how to grow them.
2. Assign students to write in their notebooks about the guest speaker

**California Language Arts  
Content Standards Grade 3, 4,  
5 1.0 Writing Strategies**

**Research**

- 1.5 Quote or paraphrase information sources, citing them appropriately.  
1.6 Locate information in reference texts by using organizational features (e.g., prefaces, appendixes).  
1.7 Use various reference materials (e.g., dictionary, thesaurus, card catalog, encyclopedia, online information) as an aid to writing.  
1.8 Understand the organization of almanacs, newspapers, and periodicals and how to use those print materials.

**2.0 Writing Applications (Genres and Their Characteristics)**

Students write compositions that describe and explain familiar objects, events, and experiences. Student writing demonstrates a command of standard American English and the drafting, research, and organizational strategies outlined in Writing Standard 1.0.

**3<sup>rd</sup> Grade Standard**

2.2 Write descriptions that use concrete sensory details to present and support unified impressions of people, places, things, or experiences.

**4<sup>th</sup> & 5<sup>th</sup> Grade Standard**

**2.3 Write information reports:**

- Frame a central question about an issue or situation.
- Include facts and details for focus.
- Draw from more than one source of information (e.g., speakers, books, newspapers, other media sources).

and what they learned. This entry could be in any format including drawings of plants.

Possible contacts:

- Barry Babba, Biologist, Habitat Specialist, Teichert Aggregates – Martis Valley, 587-3811

**Activity 3  
Native Plant Research**

*Note: This activity should begin after the students have heard from the guest speaker and continue throughout the year. The first time your students participate in the restoration project, they will be learning about the native plants. This information will be used as part of their research. The following year, your students will be the experts teaching the new students about the native plants.*

**Focus:** Students do research on the native plants that they will be collecting seeds from and propagating in the classroom for the restoration project. Drawings, research on the natural history of the plant, and recommendations for planting and care.

**Procedures:**

- Form a list of the native plants you will be using to revegetate the restoration site with.
- If there is enough, allow each student to choose their own, if not, allow the students to form groups based on which plant they want to research. *Note: This will take more than one period of work, so prepare for a period in the library (research), several in class (write-up/drawing), and some in the computer lab (typing info/scanning pictures).*
- Students should begin their research by finding information about seed collection. This will be the focus of the next activity.
- Discuss the write-up and research procedures. Pass out the research worksheets and make reference books available. The write-up on the native plant should include the following:
  - The plant's common name
  - Its scientific name
  - Type of flower (if applicable)
  - Description of the leaf, where the plant grows, and what season it flowers
  - If it is an annual, biennial, or perennial
  - Size of plant and size of flower
  - Any special things about the plant, i.e. medicinal value, edible parts, Native American uses, history, if known
- Use the writing process to have students edit and bring their write-ups to finished form.
- Entries in the notebook should take the form of notes and drawings as the student obtain information about their native plant.

7. Do a directed art lesson. Using color photographs, the students should create artwork showing what their plants look like. (Art medium options: pen and ink with watercolor wash, crayons, crayon etching, pastels, cut and paste tissue or construction paper, prints, watercolor, tempera paints)
8. Prepare a display with the art work and write-up mounted on poster board with nice lettering.

#### **Activity 4**

##### **Seed Collection and Germination**

*Note: Outside trip, walking or bus, 1 – 3 hours. This activity is weather and area dependent. The goal of the activity is to collect seeds that will be germinated in the classroom at a later date for the restoration project, so the seeds collected should come from the proposed restoration site. If weather or bussing makes this impossible, then this activity may be altered to a simple discovery and collection activity for artwork right at the school site. If the collection for the revegetation project can occur, get tips from your guest speaker from Activity 2. Invite your guest speaker or another expert along if so desired. Find out which plants fit your restoration site best, and be sure to obtain permission from landowners to collect native plants and seeds for propagation.*

**Focus:** Students observe wild plants at the end of the life cycle and collect seeds for the restoration project.

**Background Information:** Most native plants do the majority of their growing during the spring and summer. The warm temperatures and abundant sunlight provide the optimum conditions for growth. Through photosynthesis, plants use energy from sunlight to produce sugar. Some of the sugar is converted into cellulose (plant fiber) as the plant grows. Some of the sugar is converted into starch to store energy for later use. Starch may accumulate in various parts of the plant such as stalks, roots, or tubers. Many plants deposit large amounts of starch in the seeds. Seeds are the plants' investment in the future.

Seeds are released at the end of the growing season. They will lie dormant until conditions are suitable for the embryonic plant to begin growing. The large amounts of starch, which can be produced and stored during the summer, will serve as food for the developing young plant until it grows enough to produce its own food.

Plants have a variety of mechanisms to disperse seeds away from the parent plant. Wind, animals, and even humans can carry seeds away. These mechanisms provide an advantage in the propagation of the species, since the offspring are less likely to have to compete with each other and with the parent for sunlight, water, and other needs. They also allow for the spread of the offspring into previously unpopulated areas.

##### **Materials**

*Materials needed for collection of native plants and seeds, will depend upon plants chosen for propagation, but you will most likely need the*

*following items:*

Small paper bag (1 per student)

Roll of scotch tape (1 per group)

Gardening shears or stout scissors

Hand lenses (2-3 per group)

Egg carton for sorting and storing seeds (1 per group)

Index cards (3 per group)

Pencil (1 per group)

Planting pots for transplanting plants (collect soil from the site where plant is collected)

Shovel (1 per group)

Trowel (2 per group)

Gloves for students

### **Jeffrey Pine Seeds**

#### **Collection**

Collect Jeffrey Pine Cones in the Fall. You are competing with squirrels and chipmunks for viable seeds. If you climb a tree or knock the cones down from the tree you will have a better chance of collecting viable seeds. Look for evidence of recent dining by the animals. The cones that just fell from the tree and have yet to open up will most likely contain viable seeds. With cones that have already opened, peak between the scales and see if the wings are still in the cone. Can you see seeds?

#### **Procedures**

1. Let students use **gloves and a rock** to break open the cone. (*The scales are quite prickly and gloves are a must!*)
2. Use a tarp or a surface that will allow students to find the seeds as they fall out. This activity is really meant to connect students to where seeds come from; to see how many seeds a cone holds; to discover how they are dispersed (wings); and how much competition there is for seeds.

#### **Seed Germination**

The likelihood of finding viable seeds during the collection of Jeffrey Pine Cones is not very good. It is recommended that you purchase viable seeds for germination.

#### **Comstock Seeds**

(775)265-0090

917 Highway 88

Gardnerville, NV 89410

Explain that the seeds need to winter over and experience very cold temperatures in order to germinate.

#### **Procedures**

1. Place some seeds in moist paper towel and put them in a zip-lock storage baggie. Note the date and number of seeds on the baggie.
2. Place the baggie in a refrigerator for two to three months. (If you want to plant in the Spring, place in the refrigerator in mid

February)

3. Put some of your seeds in a small container of 50/50 native soil and potting soil.
4. Place these containers in a protected area in the snow. Animals will try to get the seeds if they are not well protected. This will simulate a more realistic seed germination process. The success of these seeds is not as good as the seeds that will be in the refrigerator.
5. Check to see if the seeds have started to sprout in two to three months.

### **Activity 5**

#### **Plant Propagation**

*Note: Time will vary depending on plants to be propagated. Plan at least 5 to 10 1-hour class sessions and long-term care for some plants. Seeds will be collected in the appropriate season.*

#### **Advance Preparation Materials:**

, 1, bags, and jars for seed collecting, , bucket, potting soil, appropriate plant food

*Taken from Adopt-A-Watershed "Plants Solve Problems of Survival"  
Intermediate Unit*