INVASIVE PLANTS AT UTAH LAKE
Phragmites and Tamarisk
(frag-mite-eese) (tam-a-risk)

TEACHER BACKGROUND:

Utah Lake has roughly 75 miles of shoreline, which could be used for sports, recreation, and the development of functional wetland habitats. Two plant species, which are not native to Utah, have slowly been taking over the shorelines of Utah Lake. They are phragmites (*Phragmites australis*) and salt cedar or tamarisk (*Tamarix.spp*)

Phragmites

Using aerial photos of Utah Lake, it is estimated that the shoreline and bed of Utah Lake contains over 5,800 acres of the invasive plant species, phragmites, which has created an invasive monoculture (an area of one plant species) of the Utah Lake shoreline.

Phragmites is difficult to eradicate without an aggressive vegetation management program. Phragmites is capable of surviving the harshest conditions including fire, frost, high pH and flood. It is tolerant of low water, storm water discharge, road salts, and pollution. This species spreads quickly by rhizomes, forming a dense mat that will out-compete or eliminate native vegetation and destroy needed wetlands. It was added to the Utah County list of noxious weeds by the Utah County Commission in 2008.

In addition to the damage to natural wetlands and recreational uses, the plants grow up to 14 feet tall and create an untreatable breeding habitat for mosquitoes, which have tested positive for the West Nile Virus within Utah County at various locations around Utah Lake.

Each year as the phragmites dies back and dries out, areas of new home development along with parks, bridges and other structures are at risk of extreme fire danger.

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Tamarisk

Tamarisk is another invasive plant species found on the shoreline of Utah Lake, though not as abundant as phragmites. Tamarisk is a deciduous shrub or small tree from Eurasia. Tamarisk can grow as high as 25 feet tall. The bark on saplings and young branches is purplish or reddish-brown. Leaves are scale-like, alternate, with salt-secreting glands. Flowers are small and the petals are reddish, pinkish, or white. Each plant can produce as many as 500,000 seeds annually. The seeds are dispersed by wind, water, and animals. Seeds are small with a tuft of hair attached to one end enabling them to float long distances by wind and water. Seeds are short-lived and can germinate within 24 hours after dispersal, sometimes while still floating on the water.

Tamarisk grows in dense, nearly impenetrable thickets. It also is well-adapted to alkaline (salty) soils. With the construction of dams and the alkaline soils of the southwest, rivers are no longer able to flush salt from the ecosystems and soils are even more alkaline, which deters general plant growth. Tamarisk creates even saltier soils by bringing up alkaline water, which is deposited on the leaf surface. The salt returns to the upper soils via leaf drop.

Tamarisk has additional negative effects on the surrounding environment by:

- narrowing and channelizing streams and rivers;
- displacing native vegetation such as cottonwoods and willows;
- providing poor habitat for livestock and wildlife;
- increasing wildfire hazard; and
- limiting human and animal use of the waterways.

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Tamarisk Leaf Beetles (*Diorhabda elongata*) are a new tool used to control and/or eradicate tamarisk. The beetles evolved in areas where tamarisk originated. After much study, the beetle was brought to the American Southwest to assist in control efforts. Beetles and their larva feed on the foliage of the tamarisk plant, thus reducing photosynthesis, which reduces the food (starches and sugars) made by the plant. Once the tamarisk has been defoliated, it can no longer photosynthesize and eventually this will kill the tree. Variables include the vigor of the tree and the duration of predation. Recent observations indicate that a tree can be killed within 3-5 years of beetle infestation. Once the tamarisk has been killed, the beetle dies off as its only food source has disappeared.

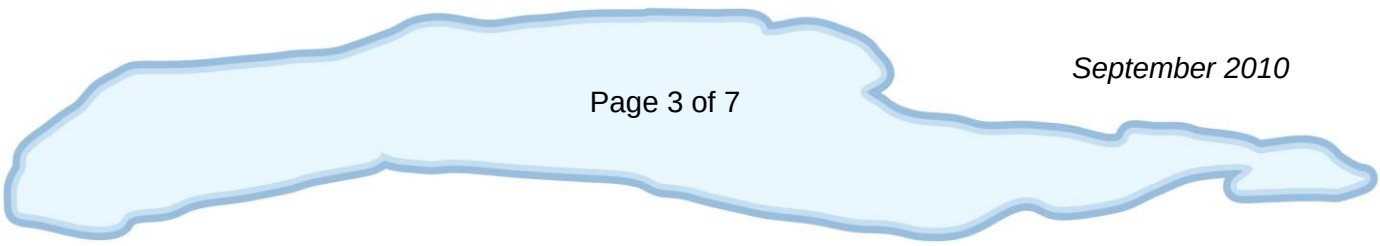
Native Plants Displaced by Phragmites and Tamarisk.

Cattail

There are two species of cattail found around the shores of Utah Lake. *Typha latifolia* is the common species of cattail found in Utah. *Typha domingensis* is the minor species of cattail found in Utah. Cattails provide important habitat for many species of waterfowl, birds, and small mammals.

Bulrush

There are six species of bulrush found around the shores of Utah Lake. *Scirpus acutus, Scirpus americanus, Scirpus maritimus, Scirpus pallidus, Scirpuspungens,* and *Scirpus validus.*



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OBJECTIVE:

Students will be introduced to several invasive species that are in and around Utah Lake and compare these species with native species. This lesson will focus on Phragmites (Frag-mite-ees), a very aggressive plant species, which has already invaded the shorelines of Utah Lake. Students will understand how this species is changing the environment affecting the native plant and animal communities.

TEACHER MATERIALS:

- Mason Jar
- Ping Pong Balls
- Dry Beans
- Scissors
- Magnifying Glasses
- Figure describing morphology of a cattail (pg. 8)
- Pictures of phragmites, cattails, bulrush, and tamarisk (find on the internet)
- Specimen of cattail, pulled up by its roots
- Specimen of phragmites- cut off a stalk, if you can, try to get some roots.

PROCEDURE:

Dissecting Cattails .....not a real cat

Discussion: Use the following information as a way to discuss how a plant survives in a wetland. Focus on the differences between the invasive species of Utah Lake (phragmites and tamarisk) and the native species (cattails and bulrush). You may choose to make comparisons using the roots/rhizomes and their spacing and how it affects the environments. Some other ideas include how their multiplication or leaf adaptations (shading the environment or depositing salt/minerals).

1. Obtain cattails. Cattails in the fall that are dried work best. If possible, pull it up by its roots. You might need a shovel.

2. Have students cut the scape (stalk) with a pair of scissors. Examine them with magnifying glasses. Look to see the holes in the darker green outside phloem. The phloem takes nutrients from the water to the plants. The air holes (that you can see) in the phloem take air to the underground\underwater parts of the plants. This feature is how the plant adapts to live in the water. Without this adaptation, the plant would suffocate. In fact, if you cut a cattail plant (that is growing in the water) below the surface of the water, it will likely die of suffocation.

3. Break the brown part of the cattail (its flower). This is made up of seeds. Put a few seeds in a cup of water and check them each day to see if the seeds are floating or sinking. You may also chose to send a few seeds home with each student. Instruct the students to put the seeds in a cup of water and see what happens the next morning. Nothing will happen. Tell students to check them again each day. After a few days, the seeds will sink. Explain that this adaptation helps the seeds to select a true wetland where it can thrive instead of germinating in a puddle where it will die.

4. Notice the roots. The thicker shoot (rhizome) serves the purpose of starting new plants. Because these are thick, a natural space is placed between plants. In the wetland, this allows animals space to build nests and space for other plants to grow. The smaller roots hold the plant in place and suck up nutrients through the water to nourish the plant.

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Adaptations of Phragmites that make it so aggressive.

- Roots: The roots of phragmites form a very thick mat. This mat prevents other plants from being able to grow in between the established roots of phragmites.
- Leaves/Stalk: The leaves of phragmites and stalks grow so close together that they block sunlight from reaching the soil. The lack of sunlight prevents others plants from being able to germinate. The stalks grow so close together that species of animals that normally nest or feed near the shoreline (the habitat for phragmites) cannot build their nest or feed.
- Seeds: Phragmites produces a large amount of seeds, however the plant usually multiplies by underground rhizomes (underground stems). Seeds of the plants are a source of food for many animal species.

Adaptations of Tamarisk

- Roots: The roots of tamarisk grow extremely deep. These deep roots access groundwater, a limited natural resource. The roots, like all plants, take up nutrients. Salt is a mineral that tamarisk will take up inside the plant with the large amount of water it uses. The plant will then deposit the salt in its leaves. When the leaves fall off the plant and decompose a large amount of salt is left behind. This salt prevents many plant species from growing with a few exceptions, one of which is tamarisk seedlings.

- Stems: The stems of the tamarisk plant can grow roots when the stem is submerged into water. If a tamarisk stem breaks off the plant, is carried downstream by water, it may establish a new colony. The stems that are submerged in water and have formed roots help increase the large amount of water, which is absorbed by the plant, another adaptation that depletes our water resources.
- Plant Multiplication: This plant can multiply by underground roots, stems that are in water, and by seeds. This plant can multiply in many ways, making it harder for native species to grow and thrive.

Adaptations of Cattail and Bulrush

- Roots: The roots of both cattail and bulrush support the plant in the soil.
- Rhizomes: A rhizome is an underground stem. Cattails and bulrush both send out underground stems that can reach several feet away from the original plant. When the stem reaches through the soil surface, it will produce a new plant. The distance between the plants is large enough to allow other plant and animal species a chance to live. This is important habitat for many wetland animals. The spacing between the plants is critical to the habitat.
- Seeds: Cattails produce seeds that are easily distributed by wind. They have the ability to float on top of water for several days before they germinate, and adaptation to prevent the seed from germinating in an area without enough water. The seeds are used by many species of animals as food.

Phragmites/Cattail Demonstration: (Use this activity to show how an invasive species begins to replace native species)

Fill a mason jar with ping pong balls. These represent native Utah wetland plants. Notice the space between the ping pong balls. This is a representation to the space between cattail or bulrush plants. This space allows for other species of plants to grow and nesting for birds. Next, pour dry beans in the jar. Initially, they just fill in the empty spaces. Add a few more beans while shaking the jar gently. The beans will push up the ping pong balls much like phragmites pushes out native plants.

ASSESSMENT:

Find other invasive species and compare them to native species. Some examples of invasive species include Johnsongrass (*Sorghum halepense*), Leafy Spurge (*Euphorbia esula*), and Bermuda Grass (*Cynodon dactylon*). All of these can currently be found near Utah Lake and the surrounding area.

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ADDITIONAL REFERENCES

A plant field guide about noxious Utah plants

Information on Tamarisk

STANDARDS ADDRESSED:

Science

Benchmark:

Utah has diverse plant and animal life that is adapted to and interacts in areas that can be described as wetlands, forests, and deserts. The characteristics of the wetlands, forests, and deserts influence which plants and animals survive best there. Living and nonliving things in these areas are classified based on physical features.

Standard 5: Students will understand the physical characteristics of Utah's wetlands, forests, and deserts and identify common organisms for each environment.

Objective 1: Describe the physical characteristics of Utah's Wetlands.

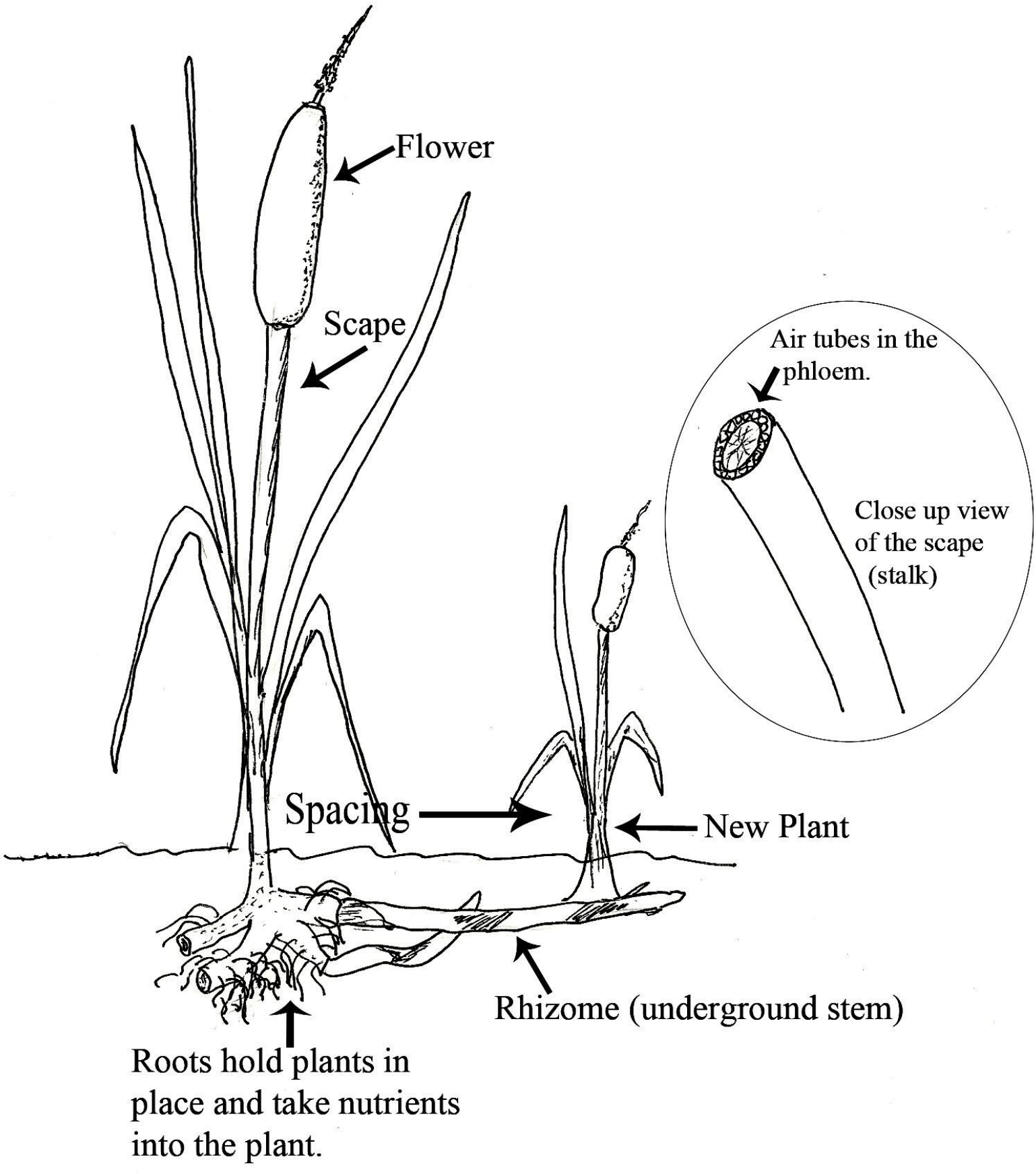
Indicators:

a. Compare the physical characteristics (e.g., precipitation, temperature, and surface terrain) of Utah's wetlands, forests, and deserts.
b. Describe Utah's wetlands.
c. Locate examples of areas that have characteristics of wetlands.

Objective 2: Describe the common plants and animals found in Utah environments and how these organisms have adapted to the environment in which they live.

Indicators:

a. Identify common plants and animals that inhabit Utah's forests, wetlands, and deserts.
b. Cite examples of physical features that allow particular plants and animals to live in specific environments (i.e., duck has webbed feet; cactus has waxy coating).
c. Describe some of the interactions between animals and plants of a given environment


Flower
Scape
Air tubes in the phloem.
Close up view of the scape (stalk)
Spacing
New Plant
Rhizome (underground stem)
Roots hold plants in place and take nutrients into the plant.