TAKE CARE OF TEXAS: EDUCATOR MATERIALS

LESSON PLAN

Testing Water: Invasive Species

Objectives

Students will learn about the types of aquatic plants, what invasive species are, and why invasive species can harm aquatic environments. They will examine aquatic plants and discover if certain invasive species (commonly found in Texas) are in their survey area.

Prerequisites

Teachers should determine the number of supervisors needed and ensure that those supervisors understand their responsibilities before starting this lesson.

Duration

40 minutes

Materials

- Student Worksheets
- Take Care of Texas Virtual Field Trip- Texas River Biodiversity (https://takecareoftexas.org/education/virtual-field-trips#1)
- Texas River Biodiversity Turn and Talk handout
- www.texasinvasives.org
- Student Observation worksheet
- Rubber Gloves
- Soap and Water
- Paper Towels
- Waders (if treading into the water)
- Trash Bags

Introduction

1. In this lesson, we will identify aquatic plants in a selected survey area and determine whether they are invasive. Watch the **Take Care of Texas Virtual Field Trip – Texas River Biodiversity** and have students

complete the ***Texas River Biodiversity Turn and Talk handout*** with partners or a small group.

2. Afterwards, show and review *the* ***List of Aquatic Plants*** *resource* attached to students and identify the four types of plants they might find in a stream.
3. Explain that some of the aquatic plants are considered invasive species—nonnative species whose introduction harms (or is likely to harm) the economy, the environment, or human health. Along with aquatic plants, there are terrestrial plants (and even aquatic and terrestrial animals) that are considered invasive.
4. Have students find local invasive plants using the website **TexasInvasives.org**, which contains information about invasive species and their ecological threat. Search for an invasive plant in your area and record it below:
    a. Example—the floating aquatic plant called giant salvinia. Why is this nonnative plant an invasive species? It can harm the environment when it covers the water's surface and blocks the light entering the water; this leads to a reduction in photosynthesis, causing dissolved-oxygen levels to decrease (that could lead to changes in the aquatic life). In addition, giant salvinia can also harm the economy by clogging intake pipes (for irrigation, etc.) and reducing recreational activities (swimming, fishing, boating, etc.).

Procedure

1. Split into groups of 2-3 students and review the following safety procedures for students to follow.
    a. Since you may encounter local aquatic environments, stay only in shallow waters and wash your hands after the end of the lesson.
    b. Have team members wear rubber gloves and waders to identify any submerged plants in the water, they can take turns or assign the job to one student.
2. Pass out the ***Student Observation worksheet*** to students and explain they will record their observations as they survey the research area. Explain that students can talk to each other to help with observations.
3. After completing the survey, clean off the waders and rubber gloves near the survey area so you don't transport invasive species to another area.
4. Once back in the classroom, small groups share their observations and write down similarities and differences on a large sticky notepaper to explain to the rest of the class.

Glossary

- **Algae** – small plants or plant-like organisms found floating in the water, attached to rocks or logs, on the substrate, or in large quantities floating on the surface (filamentous algae). Most algae are microscopic.
- **Emergent Plants** – rooted to the substrate and growing above the water. Found along shorelines and shallow areas.
- **Floating Plants** – floating freely on the surface. You can also have plants that are rooted to the substrate with their leaves floating on the surface.
- **Invasive Species** – nonnative species whose introduction harms (or is likely to harm) the economy, the environment, or human health.
- **Submerged Plants** – generally rooted to the substrate and completely underwater.

Applicable TEKS

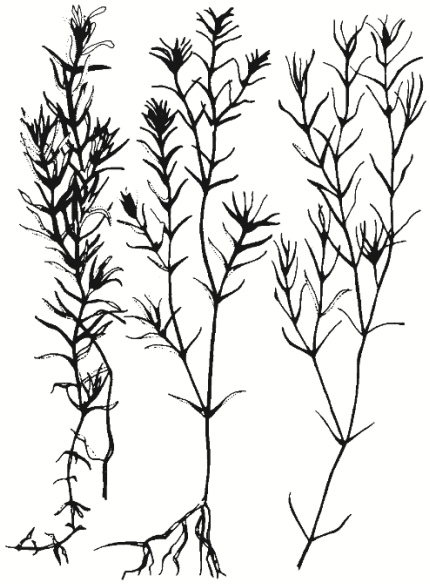
Science TEKS

- **6th Grade** – §112.26.b. 1A-H; 5A-G; 11A-B; 12A-C.
- **7th Grade** – §112.27.b. 1A-H; 5A-G; 11A-B; 12A-B.
- **8th Grade** – §112.28.b. 1A-H; 5A-G; 12A-C.

List of Aquatic Plants

Submerged

Plants generally rooted to the substrate and completely underwater

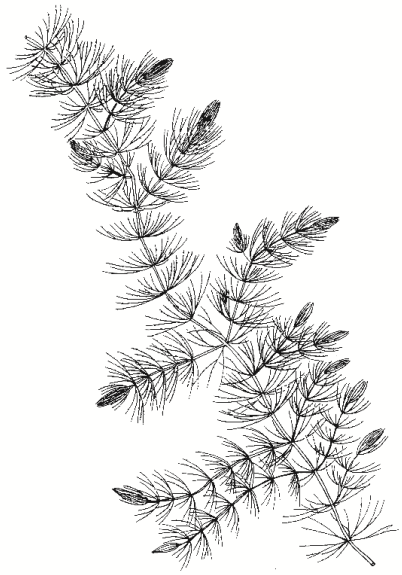


BUSHY PONDWEED (SOUTHERN NAIAD)

Scientific Name: *Najas guadalupensis*

Description: Slender plant possessing linear, deep-green or greenish-purple leaves (13 to 19 millimeters long). Bushy pondweed inhabits a variety of water habitats.

Invasive: No



COONTAIL

Scientific Name: *Ceratophyllum demersum*

Description: Olive to dark-green plant with many branched stems and no roots. When submerged, the leaves look much like the tail of a raccoon. Coontail inhabits standing water and often forms dense colonies.

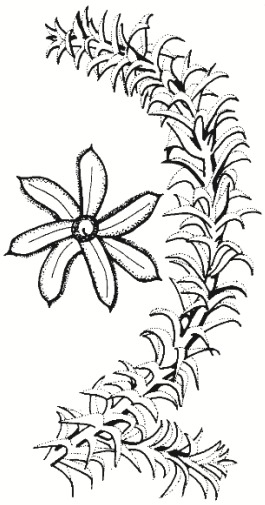
Invasive: No

ELODEA

Scientific Name: *Elodea canadensis*

Description: Heavily rooted plant with densely packed green leaves (each whorl contains three leaves). The leaf surface and its margin are smooth with no prominent midrib. Elodea is found in many habitats—from fast-moving streams to still waters up to 3 meters deep.

Invasive: No



HYDRILLA

Scientific Name: *Hydrilla verticillata*

Description: Dark-green plant with long branching stems. Unlike elodea, hydrilla leaves have toothed margins and midrib spines. Flowers are inconspicuous and white on long stalks. Hydrilla is found in most water habitats.

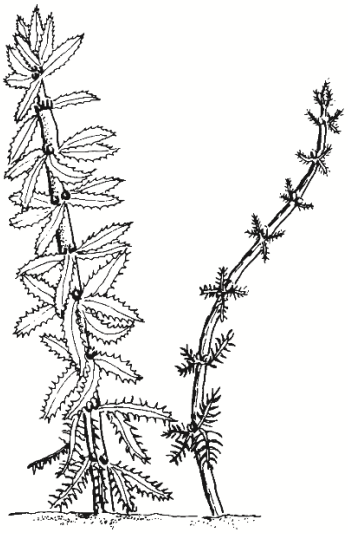
Invasive: Yes

PARROTFEATHER MILFOIL

Scientific Name: *Myriophyllum aquaticum*

Description: Plant with reddish-brown stems and olive-green leaves divided into feather-like segments. It often extends above the water surface approximately 10 centimeters. Parrotfeather milfoil is found in a variety of water habitats.

Invasive: Yes



Emergent

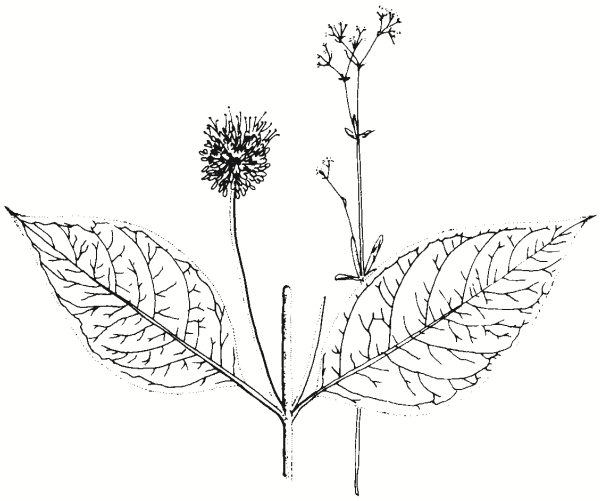
Plants (along shorelines and shallow areas) rooted to the substrate and growing above the water

ALLIGATOR WEED

Scientific Name: *Alternanthera philoxeroides*

Description: Perennial plant with leaves approximately 10 cm long. Leaves are long, narrow, and elliptical. White, clover-like flowers appear near the tip of the plant. Alligator weed can be found in any freshwater habitat.

Invasive: Yes



BUTTON BUSH

Scientific Name: *Cephalanthus occidentalis*

Description: Low-growing shrub bush often approaching the size of a small tree. Leaves are long and round or elliptical. It is best identified by the white flowers that resemble buttons. Button bush inhabits the shorelines of lakes and ponds or in water up to 1.2 meters deep.

Invasive: No

CATTAIL

Scientific Name: *Typha spp.*

Description: Tall, erect, and jointless plant. At the end of each is a spike followed by a long and dense seed cylinder. Cattails inhabit shallow banks, shorelines, ditches, and canals.

Invasive: No

SMARTWEED

Scientific Name: *Polygonum spp.*

Description: Plant with hairy stems and often swollen at the nodes. It produces small pinkish-white flowers commonly over 5 cm long. The plant inhabits irrigation ditches and marshes, and lives along the banks of streams and lakes.

Invasive: No

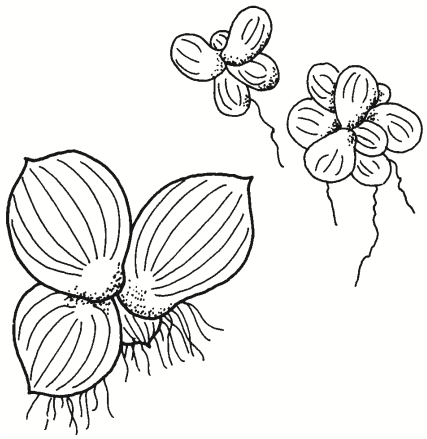
WATER PRIMROSE

Scientific Name: *Ludwigia spp.*

Description: Medium-size tree-bush. It has many side branches with leaves approximately 5 cm long and lanceshaped. Each leaf has tiny soft hairs on both sides. Flowers are yellow with four petals. Water primrose inhabits the banks of ditches, canals, and streams.

Invasive: No

Floating

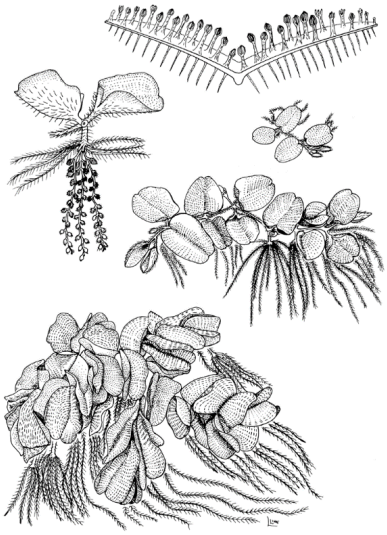


DUCKWEED

Scientific Name: *Lemna minor*

Description: Small free-floating green frond (leaf) with one root per frond. Fronds may occur singly or in groups. The fronds are usually ridged and range from two to four millimeters in diameter. Duckweed inhabits fertile waters with little current.

Invasive: No



Source: University of Florida
Center for Aquatic and Invasive Plants

GIANT SALVINIA

Scientific Name: *Salvinia molesta*

Description: Green aquatic fern with a chain-like appearance that can form dense floating mats. Each leaf (frond) is approximately 13 millimeters wide and 25 mm long. The upper surface of the leaf contains coarse, white hairs. Underwater are brown, thread-like leaves that resemble roots. Giant salvinia inhabits warm, slow-moving waters.

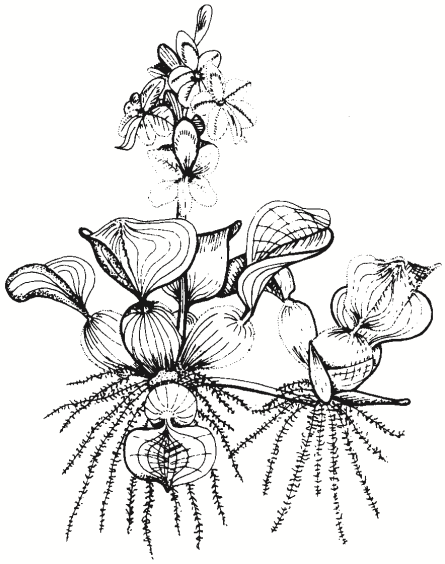
Invasive: Yes

SPATTERDOCK (COW LILY)

Scientific Name: *Nuphar luteum*

Description: Plant with heart-shaped leaves that float on the surface or stand above the water. A yellow flower (about 5 cm in diameter) may also appear above the surface. Each of the leathery, dark green leaves is approximately 20 to 25 cm wide. The stem is stout, tough, and fibrous, and is connected to a large, spongy rootstock that sends roots down into the substrate. Spatterdock inhabits calm, shallow waters with a muddy substrate.

Invasive: No



WATER HYACINTH

Scientific Name: *Eichhoria crassipes*

Description: Free-floating plant with spongy stems and light-blue (or even violet) flowers. Beneath the plant are numerous dark fibrous roots. The plant is dark green and ranges from seed plants (10 to 15 cm across and 10 cm high) to large plants (measuring 61 cm across and almost 1 meter high). Water hyacinth can inhabit almost any moist environment.

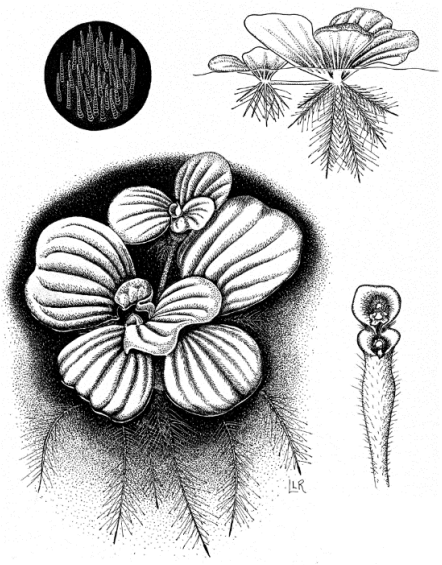
Invasive: Yes

WATER LETTUCE

Scientific Name: *Pistia stratiotes*

Description: Plant with floating leaves that are thick, hairy, ridged, and light green. It resembles an open head of lettuce. Water lettuce inhabits lakes, ponds, and slow-moving streams in regions that remain relatively warm throughout the year.

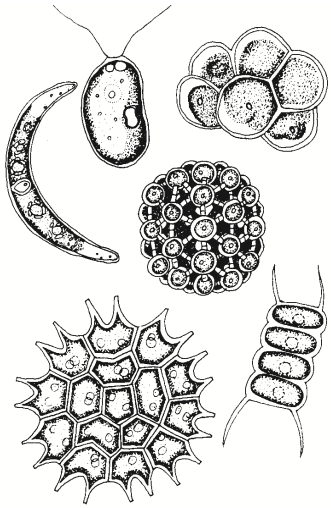
Invasive: Yes



Source: University of Florida Center for Aquatic and Invasive Plants

Algae

Algae are small plants or plant-like organisms that live primarily in water. Algae falls into four basic physical structures: single-celled; colonial (groups of single algae cells); filamentous (algae made up of single cells arranged end to end, either in a straight line or branched); and plant-like (large algae that resemble vascular plants). Free-floating algae that are single-cell or colonial are commonly referred to as phytoplankton.



Student Observations

Name: _____ Date: _____

SUBMERGED		
HYDRILLA *Hydrilla verticillata*	• Dark-green plant with long branching stems. • Leaves have toothed margins and midrib spines. • Flowers are inconspicuous and white on long stalks.	Observations:
PARROTFEATHER MILFOIL *Myriophyllum aquaticum*	• Reddish-brown stems and olive-green leaves divided into feather-like segments. • Often extends above the water surface approximately 10 centimeters.	Observations:
EMERGENT		
ALLIGATOR WEED *Alternanthera philoxeroides*	• Perennial plant with leaves approximately 10 cm long. • Each leaf is long, narrow, and elliptical. • White, clover-like flowers appear near the tip of the plant.	Observations:
FLOATING		
GIANT SALVINIA *Salvinia molesta*	• Green aquatic fern with a chain-like appearance that can form dense floating mats. • Each leaf (frond) is approximately 13 millimeters wide and 25 mm long. • The upper surface of the leaf contains coarse, white hairs. • Underwater are brown, thread-like leaves that resemble roots.	Observations:
WATER HYACINTH *Eichhoria crassipes*	• Free-floating plant with spongy stems and light-blue flowers. • Beneath the plant are numerous dark, fibrous roots. • The plant is dark green and ranges from 10 cm to almost 1 meter high.	Observations:
WATER LETTUCE *Pistia stratiotes*	• Plant with floating leaves that are thick, hairy, ridged, and light green. • Resembles an open head of lettuce	Observations: