

breeding seasons. Birds, butterflies, insects, and mammals will be attracted to specific seeds, nectar, or foliage. Predatory creatures will be attracted because of prey animals that feed and hide in the wetland.

Selection of plant species native to the area, instead of nonnatives or even invasive species, will help students recognize the natural ecosystem as it existed before human interference. This can lead to lessons in the historical use of plants by earlier occupants of the land. Native plants also require less care once established, and support animal species that are native to the area.

PROCEDURE

Warm-Up

Show students pictures of at least three local native wetland plant species from a local or regional magazine or a wetland poster. Have students identify the plants and suggest ways that these plants are used by wetland creatures.

Activity

Grades K-4

Explain the difference between a tree (single trunk, usually more than 20 feet tall), a shrub (many stems, less than 20 feet tall), an emergent plant (stands in water), and a submerged plant (usually under water, may have floating leaves). Locate examples on a wetland poster or picture.

On the *Wetlands Student Page*, students color and cut out the wetland plants, then attach them at an appropriate location on the wetland drawing. Several arrangements are possible, but the coontail must be underwater.

Grades 5-12

1. Using copies of the *Grading Plan*, outline the following zones on the appropriate *Planting Plan--Part I Student Page*:

<u>Zone</u>	<u>Water</u>	<u>Types of Plants</u>
Upland	None	Trees and shrubs
Transitional	Soggy soils	Herbaceous emergent plants and shrubs
Shallow wetland	0-6" water	Herbaceous emergent plants
Deep wetland	6-18" water	Herbaceous emergent plants
Pond	≥18" water	Floating leaved plants and submerged aquatic vegetation

2. Working in small groups, select three plant species and one substitute for each zone. (Each group may be assigned a different zone.) Each selected species should be adapted to (prefer) the hydrology, shade, salinity, and pH of that zone. For each plant species selected, also determine if the habitat and intended benefits match the goals and design for the planned wetland. (See Chapter 7, *Common Wetland Plants*.) If the plants selected are not suitable, choose other plants. Record selections on the *Planting Plan--Part II Student Page* as in **Figure 9.8**.

PLANTING PLAN--PART II

Plant Species	Water Tolerance	Shade Tolerance	Height Range	Flowering Time	Intended Benefits
A. Red osier dogwood	seasonal flooding	partial	6' to 12'	May to June	wildlife food and cover
B. Witch hazel	irregular flooding	full	20' to 30'	Sept. to Dec.	beauty
C. Black-eyed susan	seasonal flooding	partial	1' to 3'	Aug. to Oct.	beauty
D. New York aster	irregular flooding	none	1' to 3'	July to Oct.	beauty and cover
E. Switch grass	seasonal flooding	none	2' to 4'	July to Sept.	winter beauty, wildlife food
F. Black chokeberry	irregular flooding	partial	6' to 10'	May	songbird food
G. Little blue stem	seasonal flooding	none	2' to 3'		wildlife cover
H. Marsh hibiscus	0 to 3" water	none	4' to 7'	July to Sept.	hummingbird & wildlife food
I. Tussock sedge	0 to 6" water	none	2' to 4'	May to Aug.	wildlife food and cover
K. Swamp milkweed	seasonal flooding	none	3' to 6'	June to Aug.	butterfly nectar
L. Joe-Pye weed	seasonal flooding	partial	2' to 5'	July to Sept.	butterfly nectar
M. Cardinal flower	irregular flooding	none	2' to 5'	July to Oct.	hummingbird & butterfly
ALTERNATIVES:					
Blue flag	regular flooding	partial	1' to 3'	Late spring	beauty
Arrowwood	seasonal flooding	partial	6' to 12'	May to June	bird and mammal food

Figure 9.8 This is the *Planting Plan--Part II* created for Horsehead Wetlands Center.

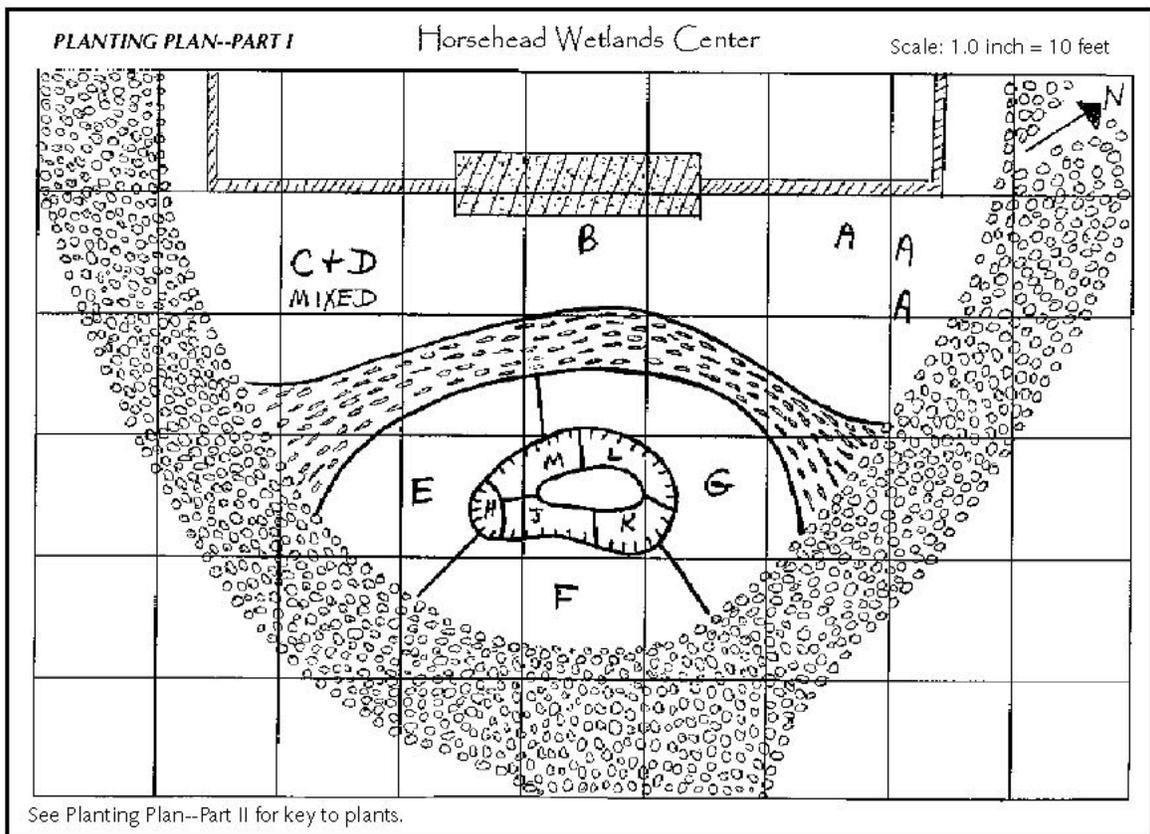


Figure 9.9 This is the completed *Planting Plan--Part I* for Horsehead Wetlands Center.

3. Each group should determine where the species selected will be placed within the planting zone and indicate the locations on the *Planting Plan--Part I* as in **Figure 9.9**. During design of the planting plan, use a key to mark plant species' locations. Hint: clustering the same species of plants together gives a more natural appearance to the planned wetland and makes it simpler to plant and monitor.
4. Using a local wetland nursery catalog, enter the following information on the *Order Form Student Page*:
 - a. the **Rate of Spread**: slow, medium, or fast;
 - b. the **Spacing** or distance apart that plants should be placed: one foot apart if slow spreading, two feet apart for medium rate of spread, three feet apart for those that spread rapidly, and five to twenty feet apart for trees and shrubs;
 - c. the **Planting Area** per species, which is determined using the same technique as on page 164;
 - d. the **Number** of plants needed to cover an area, which is calculated by dividing the **Planting Area** by the **Spacing** squared;
 - e. the **Form** in which the plant species is available: pots, bare roots, plugs;
 - f. the **Cost Per Plant**, which will vary by nursery and the form available;
 - g. the **Total Cost Per Species**, which is calculated by multiplying the **Number** times the **Cost per Plant**.

To determine the **Total price for plants** for the planned wetland, add the amounts in the **Total Cost Per Species** column, but do not include substitutes.

Wrap-Up

As a class compare planting plans based on the appropriateness of the species selected for each zone, the goals that will be met (i.e., plants to attract butterflies, nesting for birds), and overall cost. Select one planting plan to be implemented.

ASSESSMENT

Review the *Planting Plan--Part I*, the *Planting Plan--Part II*, and the *Order Form* prepared by each group of students.

- Are the selected plant species appropriate?
- Is a suitable key provided?
- Are the project goals likely to be met by the plants that were selected?
- Are calculations of plant quantities and costs accurate and within the budget limits?

EXTENSIONS

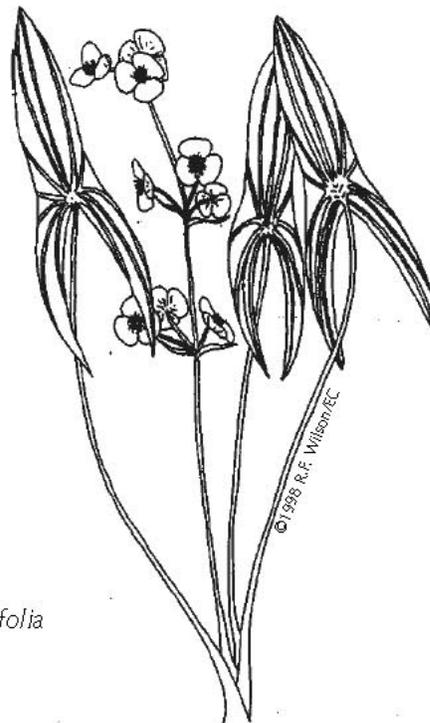
Choose one of the following situations. Suggest reasons for what has happened and design a second planting plan.

- a. All of the plants survive for two years after the planned wetland is planted.

- b. Throughout the wetland, half of the plants die during the first two years after the planned wetland is planted.
- c. All of the plants die in one area of the planned wetland.
- d. All of one species of plant die throughout the entire planned wetland.

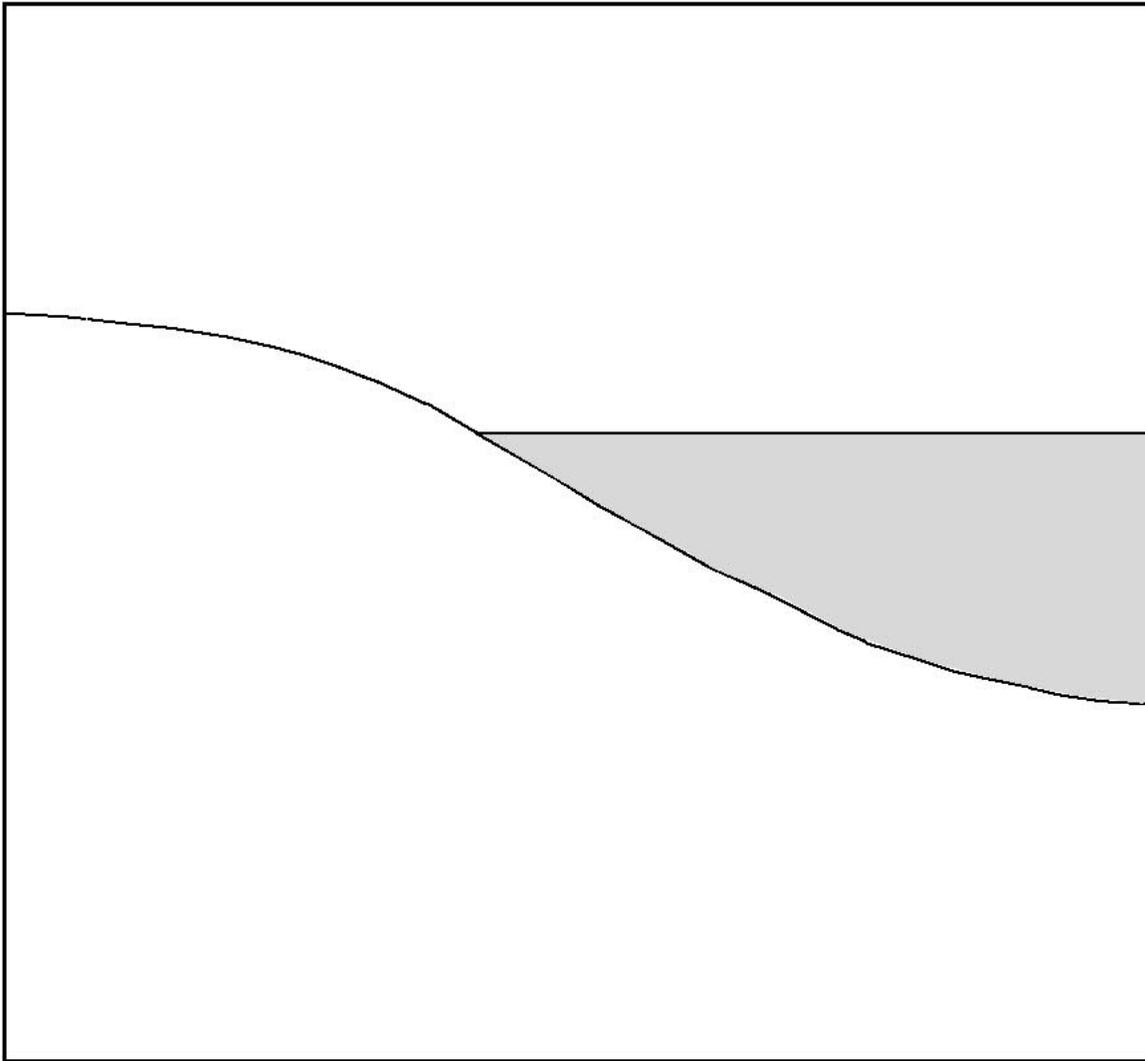
RESOURCES

Cox, J. 1991. *Landscaping with Nature*. Rodale Press, Emmaus, PA.
Druse, K. 1994. *The Natural Habitat Garden*. Clarkson Potter Publishers, New York, NY.
Ottesen, C. 1995. *The Native Plant Primer*. Harmony Books, New York, NY.
Perry, F. 1981. *The Water Garden*. Van Nostrand Reinhold Company, New York, NY.
Seidenberg, C. 1995. *The Wildlife Garden*. University Press of Mississippi, Jackson, MS.
Stevenson, V. 1985. *The Wild Garden*. Penguin Handbooks, New York, NY.
Tufts, C. and P. Loewer. 1995. *Gardening for Wildlife*. Rodale Press, Emmaus, PA.
USEPA. 1994. *A Citizen's Guide to Wetland Restoration*. U.S. Environmental Protection Agency, Region 10, Seattle, WA. EPA 910/R-94006.

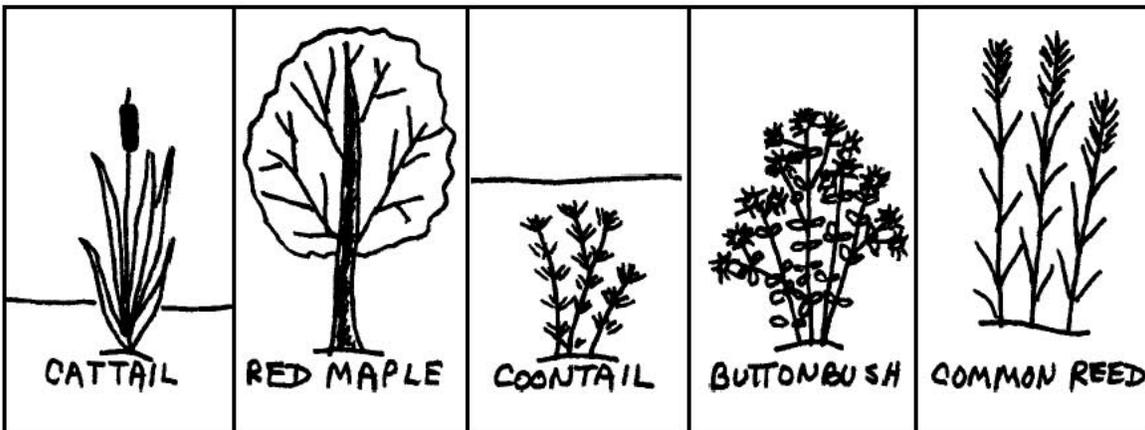


Duck potato,
Sagittaria latifolia

WETLANDS (for grades K-4)



Cut out the plant squares and place them where they belong in the wetland.





PLANTING PLAN--PART I (for areas smaller than 90' x 60')

Scale: 1.0 inch = _____ feet

PLANTING PLAN--PART I (for large areas)

Scale: 0.5 inch _____ feet

