

# Aquatic Plant Management for Fish and Wildlife

Habitat Extension Bulletin

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*There are numerous species of aquatic plants in a wide diversity of shapes and sizes. Similarly, a range of opinion exists on what constitutes an aquatic plant.*

*Any puddle of water persisting for a month starts to turn green from microscopic algae. If a body of water remains for a year, higher forms of algae, submerged vascular plants, and emergent shore-line plants may appear. This procession is natural and beneficial to aquatic ecosystems. This bulletin provides information about the benefits of aquatic plants and ways to manage aquatic plants to achieve results that benefit the human user, fish, and wildlife alike.*

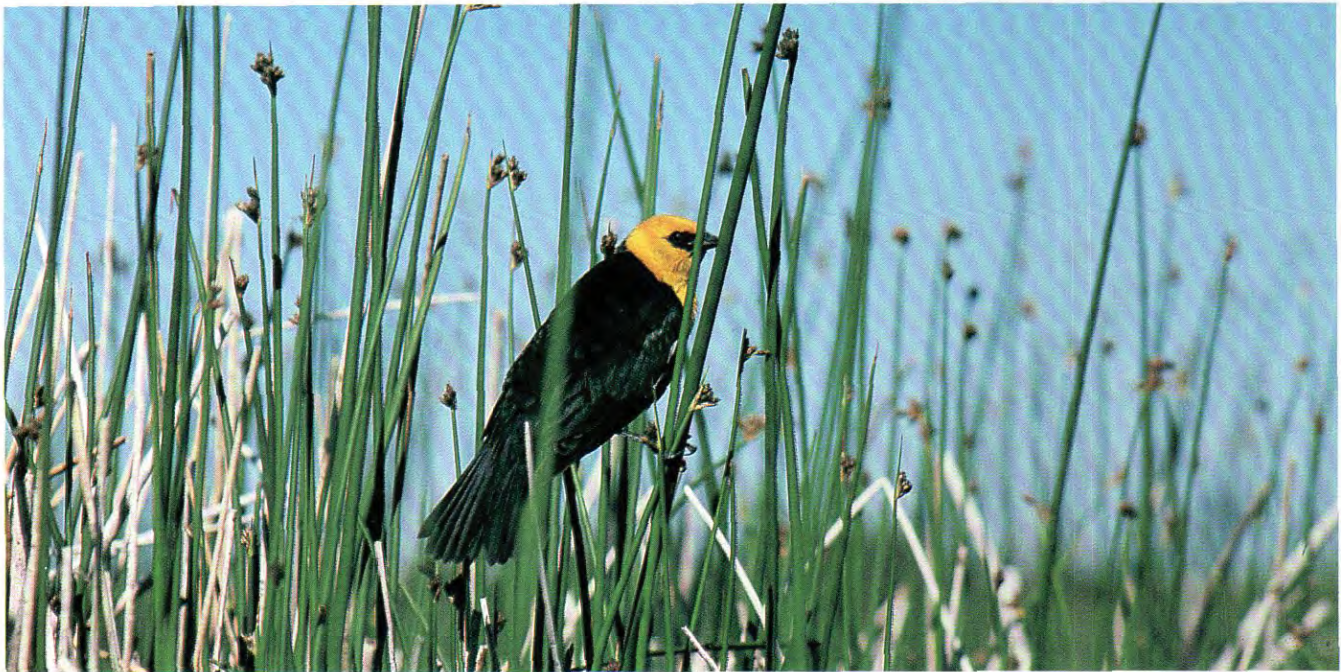
## **Benefits of Aquatic Plants**

Through photosynthesis, aquatic plants convert the sun's energy into oxygen and carbohydrates, a process called primary production. Many invertebrates and some vertebrates feed

directly on aquatic plants and are, therefore, known as primary consumers. Other animals eat primary consumers and are called secondary consumers. The progression proceeds through several more levels, each made possible originally by the nutrition and life-sustaining oxygen of aquatic vegetation.

Fish derive many benefits from the presence of aquatic vegetation. Some species feed on plants, but in North America, it is more common for fish, such as the fathead minnow and gizzard shad, to eat microscopic algae. Aquatic plants are used for shelter by many fish species. Experienced anglers know that "weed beds" are good places to catch fish. Also, insects and other invertebrates which fish feed upon use aquatic vegetation for attachment, shelter, and food. Some fish species, including northern pike and yellow perch, spawn on plants.

Waterbirds consume aquatic plants, though



*yellow-headed blackbird in marsh habitat*

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only the seeds contribute much energy. During periods of high protein need, such as for egg laying and molting, waterfowl rely heavily on small aquatic animals (insects and shrimp). Aquatic vegetation, which is so important for invertebrates, is indirectly related to waterfowl production at these critical times. Nesting and shelter of waterfowl are also enhanced by aquatic vegetation.

Other wildlife would not live in and around ponds if aquatic plants were absent. Frogs, turtles, snakes, some songbirds and raptors, muskrats, mink, and many other animals all derive food, directly or indirectly, and shelter from aquatic plants.

Besides being a food source and place for shelter, aquatic vegetation can also save a pond from ruin caused by the siltation and turbidity of shoreline erosion. Stands of submergent and emergent vegetation in shallow water can subdue the erosive force of waves.

Despite these many benefits of aquatic plants to wildlife, pond owners commonly view aquatic plants as a nuisance. Instead of eliminating all aquatic plants, effective pond management involves determining and maintaining optimum amounts of vegetation.

### **Kinds of Aquatic Plants and Their Value to Fish and Wildlife**

#### **Algae**

Algae constitute a group of plants ranging from single-celled plankton to complex plants. Technically, they have no leaves or flowers. Three categories of algae are recognized: planktonic, filamentous, and macrophytic.

#### *Planktonic Algae*

The microscopic algae living in the water column are called phytoplankton. This group of plants, at

Figure 1. *Chara* (after Matsumura and Harrington 1955).



high density, gives water a green color, which is sometimes called a "bloom." Planktonic algae quickly find their way into an impoundment; there is no need to introduce them.

Because of the small size of planktonic algae, few fish species are able to feed upon them. Yet phytoplankton are critical to any aquatic system for a number of reasons. Phytoplankton produce most of the oxygen in an aquatic ecosystem.

Zooplankton (microscopic animals) feed on phytoplankton, and fish then consume zooplankton. Also, phytoplankton can be a useful tool for managing higher plants.

Properly timed applications of fertilizers have been used to increase phytoplankton numbers, thereby shading out unwanted, rooted plants. On the negative side, planktonic algae use oxygen for respiration at night, when no oxygen is being produced. This can deplete oxygen levels to a point where fish die. A specific group of planktonic algae known as blue-green algae can cause taste and odor problems in water and fish.

#### *Filamentous Algae*

Filamentous algae are long green threads, or filaments. These algae often form mats that look like slimy cotton. Filamentous algae are considered a nuisance more often than any other plant group. Fish have a hard time swimming through the filaments; in fact, one species, known as fish net algae, resembles a fish net that entangles small fish. Young waterbirds, such as coots and ducks, can drown after becoming entangled in filamentous algae. From a human viewpoint, pond aesthetics, swimming, boating, and fishing are compromised when too much filamentous algae is present. On the positive side, a few fish species, such as golden shiners, use filamen-

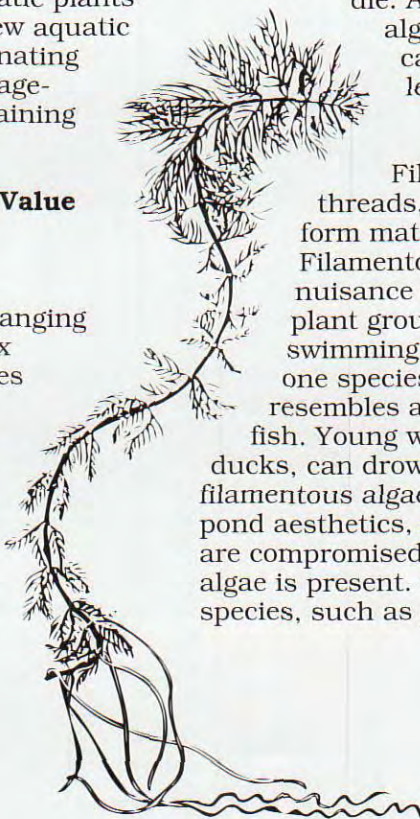


Figure 2. *Ceratophyllum* (after Matsumura and Harrington 1955).



tous algae as spawning substrate. Also, coots and gadwall ducks eat some species of filamentous algae. In general, this group of aquatic plants requires management to avoid user conflicts.

#### Macrophytic Algae

Macrophytic, or advanced, algae resemble rooted, vascular plants. However, these algae have no roots or vascular bundles. *Chara* is the most common plant in this group. It can be confused with the vascular plants called *Ceratophyllum* (coontail) and *Myriophyllum* (water milfoil), and it is important to accurately identify *Chara* if a herbicide is to be used because vascular plant herbicides are ineffective on algae. Unlike these other plants, *Chara* has no roots and flowers (Figure 1), and has a skunk-like odor from which its common name, musk-grass, is derived. Coontail and water milfoil may have a musty, pond odor but not a skunk odor. The leaves of coontail have a horned appearance (Figure 2), and the leaves of water milfoil are feather-like (Figure 3).

The major wildlife benefit of macrophytic algae is shelter. Fish and many invertebrates live in and around plants of this group. Some species of fish spawn on macrophytic algae, and this group of plants is particularly important as a food source for waterfowl. Muskrats and 22 species of ducks are known to feed on macrophytic algae. Macrophytic algae seldom grow more than three feet tall, impacting water sports only in shallow water.

#### Macrophytes

Macrophytes have flowers, true leaves, and roots. It is useful to split macrophytes into three groups: free-floating, submergent, and emergent.

##### Free-Floating Macrophytes

Free-floating plants in North America are represented by tiny plants known collectively as

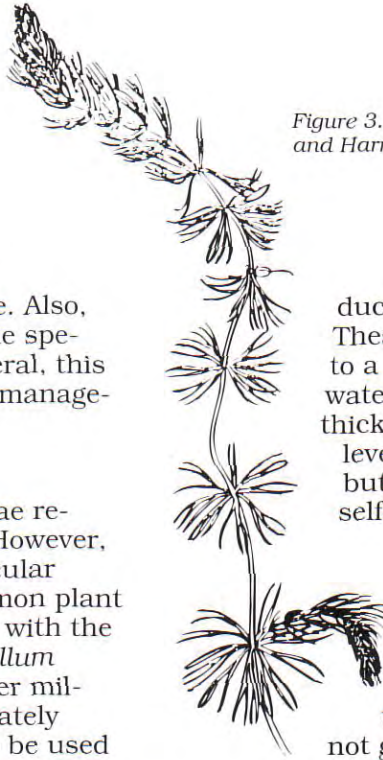


Figure 3. *Myriophyllum* (after Matsumura and Harrington 1955).

duckweeds, or sometimes, watermeal. These plants range in size from a pin head to a match head. They grow only in still water, and dense growths (several inches thick) often indicate high phosphorous levels in water. These plants can flower, but most of their propagation is through self-replication.

These free-floating macrophytes are important to a number of wildlife species. Fish derive shelter from duckweeds, and waterfowl and muskrats eat them. Sometimes duckweeds become so abundant on the surface that submerged plants can not get enough sunlight to grow.

##### Submergent Macrophytes

Plants in this group grow from the bottom to the surface, and consequently some of the leaves may float (e.g., water lilies). However, because of their attachment to the pond bottom, submergent plants should not be confused with free-floating plants.

Fish, insects, and other invertebrates use submergent vegetation for shelter.

Dense growths of these plants are referred to as "weed beds" by anglers. Submergent plants are also extremely

important to waterfowl. Most produce seeds above water, and some produce edible tubers. The true pondweeds (*Potamogeton*), wildcelery (*Vallisneria*), and coontail are examples of submergent plants valuable to waterfowl. Some submergent plant species, such as water lilies

water lilies







arrowhead

(*Nymphaea*), spatterdock (*Nuphar*), water buttercup (*Ranunculus*), and American elodea (*Elodea*), are used as ornamentals in aquariums and backyard ponds.

Most submergent plants grow densely in shallow water. They reduce wave action, thereby slowing bank erosion. However, because of their dense growth, submergent plants sometimes hinder swimming, boating, and fishing.

#### *Emergent Macrophytes*

Emergent plants grow from the shallow bottom of a pond up through the water to a considerable distance into the air. If the water level recedes, plants in this category usually survive. Common emergent plants are cattails (*Typha*), arrowhead (*Sagittaria*), rushes (*Scirpus*), spikerushes (*Eleocharis*), sedges (*Carex*), and smartweed (*Polygonum*). Two grasses are commonly found in the wet conditions adjacent to ponds in the inter-mountain region: saltgrass (*Distichlis*) and wild millet (*Echinochloa*).

cattails



Only very young fish utilize emergent vegetation for shelter due to shallow water conditions. However,

ing them are visible, emergent plants add considerably to pond aesthetics. Emergents grow along shorelines, thus reducing bank erosion. Without some management of emergent plants, they can grow too dense and become nearly impenetrable.

#### **Manipulation of Aquatic Plants**

Natural ponds and wetlands have gradually established plant and animal life over thousands of years. However, modern land use practices, such as grazing, tilling the surrounding land, drainage, and fire suppression, can impact natural processes. Constructed ponds and wetlands have not been shaped by the forces of time but are also subject to the effects of land use practices. Thoughtful management is essential if these relatively fragile ecosystems are to be supported and preserved.

There are several key concepts to keep in mind when trying to manipulate aquatic plants. Moderation should be a guiding principle. Too little vegetation can be as detrimental to a system as too much. Also interspersion, or "edge effect," adds greatly to the wildlife value of the habitat as does species diversity.

#### *Water Depth*

Farm pond construction guides generally suggest digging one-fourth to one-third of the pond area at least 10 feet deep to insure winter survival of fish. For human safety, pond bank slope should be no steeper than 2:1 until the