

Identification Of Aquatic Weeds

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Introduction

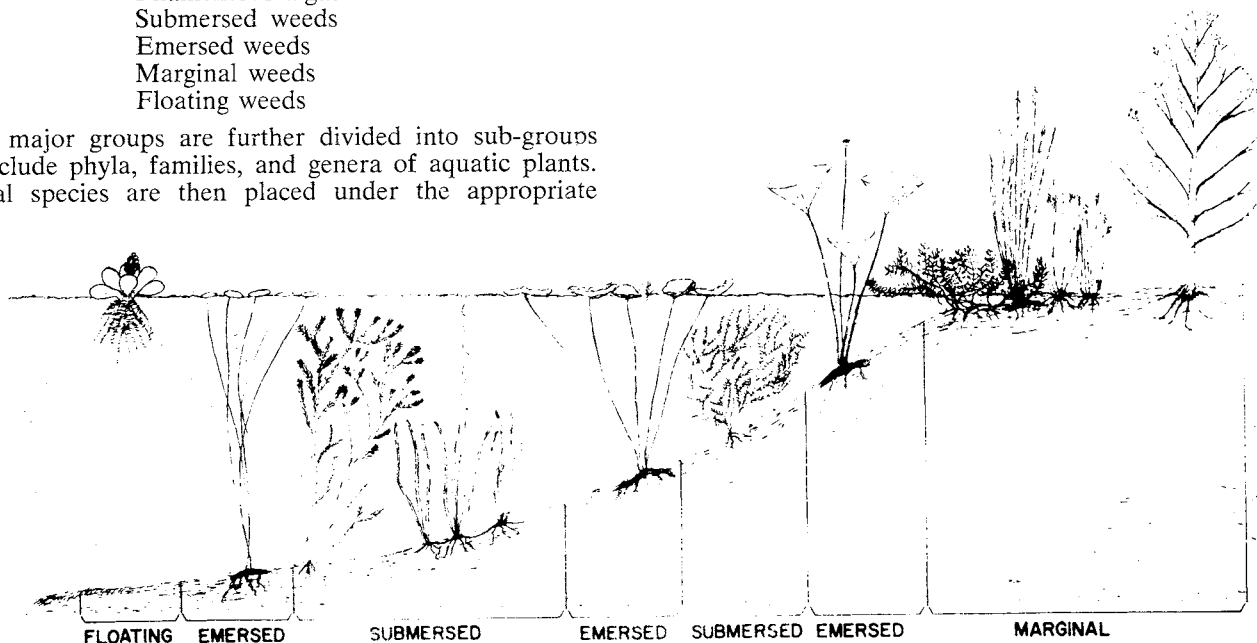
Aquatic plant growths in any body of water create problems involved with practically all water uses. A knowledge of the identity of over one-hundred species of aquatic plants which seriously affect water resources is necessary if effective and efficient control practices are to be employed. Since botanists may not be available to name every species of plant involved in a particular aquatic weed problem, the following simple outline of the major plant groups based upon their size, shape, and growth habits has been developed:

- Plankton algae
- Filamentous algae
- Submersed weeds
- Emersed weeds
- Marginal weeds
- Floating weeds

These major groups are further divided into sub-groups which include phyla, families, and genera of aquatic plants. Individual species are then placed under the appropriate genera.

Descriptions of these major groups, including a listing of the common and scientific name of many of the plant species in each group, and a descriptive illustration of some of the most important species are given in this paper.

The intent of this paper is not to present a taxonomic classification of aquatic plants. Rather, it is an attempt to set forth groupings of plants based upon morphological characteristics and occupancy of ecological niches that may be useful to a majority of persons involved in aquatic plant control at the present time.



SPATIAL RELATIONSHIPS OF ROOTED AQUATIC PLANTS

ALGAE

The freshwater algae are diverse in shape, color, size, and habitat. Some authorities have divided these algae into as many as nine phyla. A description of all species of algae would be as comprehensive as writing about all land plants, mosses, ferns, fungi, and seed plants.

For practical field work the algae are divided into two groups, plankton and filamentous algae, and are characterized by their growth form.

PLANKTON ALGAE

This group, sometimes called phytoplankton to separate them from the microscopic animal forms called zooplankton, include the truly aquatic, microscopic, single-cell, colonial, and simple filament forms of plants. They are the basic link in the conversion of inorganic constituents in water into

organic matter. The rate at which this conversion occurs depends upon the abundance of algae in a given area at a given time. When present in sufficient numbers these plants impart colors to the water varying from green to yellow to red to black. They may also congregate at or near the water surface and form so-called "water blooms", or "scums".

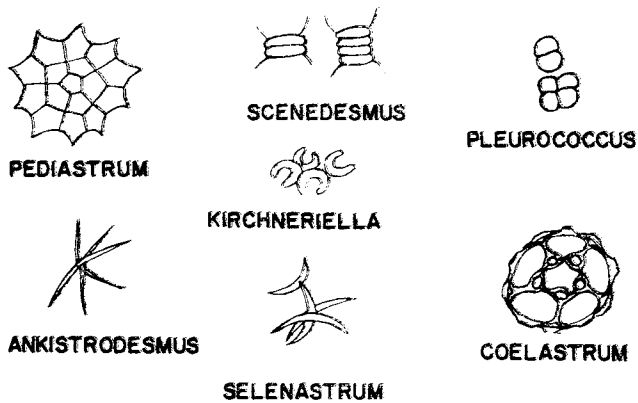
Based upon their taxonomic characters, the major plankton algae have been separated into the following phyla:

GREEN ALGAE

Chlorophyta (Green algae). Unicellular or colonial, cells contain plastids in which chlorophyll is predominant.

Chrysophyta (Yellow-green or Yellow-brown algae). Including diatoms and desmids. Unicellular or colonial. Pigment in chromatophores in which yellow or brown often predominates. Diatoms appear more abundant in colder waters.

Euglenophyta (Euglenoids). Cells solitary, swimming by one (1) or two (2) flagella. A gullet and eye spot (red) present at anterior end of many species.



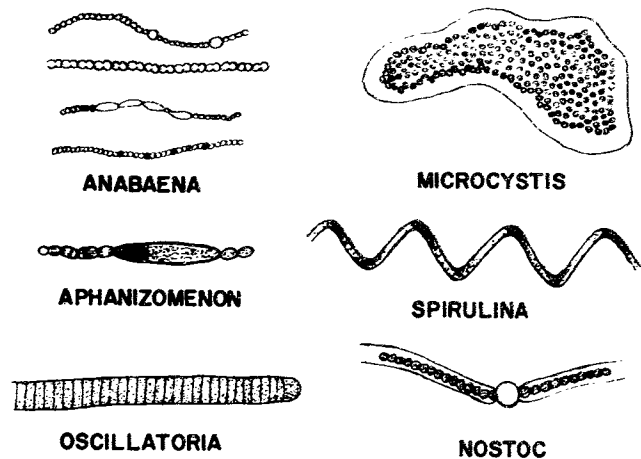
BLUE GREEN ALGAE

Cyanophyta (Blue-green algae). Unicellular or colonial, or simple filaments. Pigment in solution and coloring entire protoplast. Cell wall thin often covered with gelatinous sheath.

Cryptophyta. Cells solitary or colonial, swimming by means of 2 lateral or sub-apical flagella. Chromatophores large and brown.

Pyrrhophyta (Dino-flagellates). Cells solitary, swimming by means of 2 flagella, one commonly wound transversely around cell and the other extended posteriorly from point of flagella attachment.

Diatoms are most abundant in spring and fall (50°-60°F. optimum water temperature), the green algae are most abundant when water temperatures are 60°-80°F., and the blue-green algae are never abundant at water temperatures less than 70°F.



Biologist and engineers concerned with various management and utilization processes of waters often separate these algae into the following groups:

- Algae producing tastes and odors in water.
- Algae producing scum and slime growths in water areas.
- Algae causing coloration of waters.
- Algae causing corrosion of concrete and steel in contact with water.
- Algae causing interference in coagulation processes.

Algae producing substances toxic to animal life.

Algae that are parasitic to plant and animal life.

A major beneficial role of plankton algae is removal of carbon dioxide from the water in the process of photosynthesis during daylight, and the production of oxygen as a by-product of photosynthesis.

FILAMENTOUS ALGAE

Members of this group of algae belong primarily to the phylum Chlorophyta. These plants are filaments of single cells united end to end, and may appear as a single thread, as branched filaments, as a net, or as erect, stem-like, whorled branches with forked "leaves". These plants have no true roots, stems or leaves.

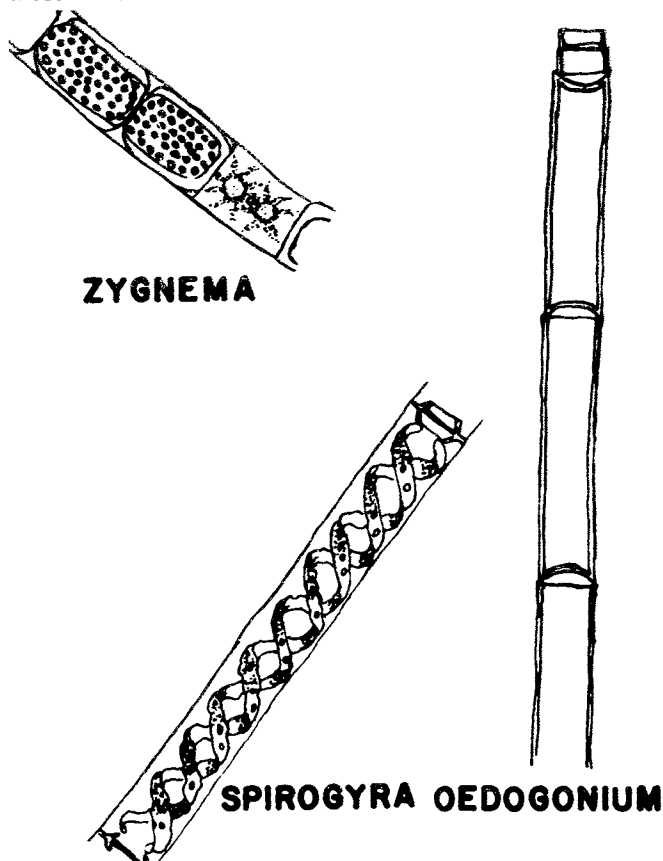
Certain of the attached or supported single filament forms which grow in cooler weather have been utilized as control measures for certain rooted submersed aquatic weeds in fish ponds. Since these algae die at onset of hot weather, their death seemingly triggers the death of the supporting higher plants.

Other species of single as well as branched filament forms grow in both cool and warm weather and are generally considered a nuisance in whatever body of water in which they occur. Distribution of species of the following genera of algae seemingly is rather general throughout the United States:

Zygnema—Single filament form of algae, each cell with two star-shaped chloroplasts. Some species with conspicuous gelatinous sheath.

Spirogyra—Single filament form of algae. Diameter cells very small to fairly large. Chloroplast in cells definitely spiraled. May form green clouds of cottony growths in still waters.

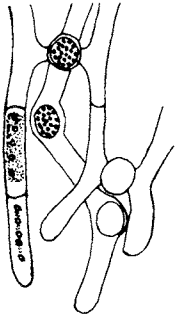
Oedogonium—Single filament form in which cells are not cylindrical, being slightly larger at anterior end. Always with one or more ring-like scars at anterior end just below cross wall.



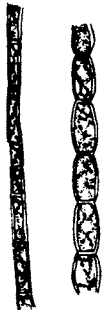
Mougeotia—Single filament form of algae with 1 band-like chloroplast per cell.

Rhizoclonium—Mainly single filament, coarse, wiry, form of algae. Cells slender usually three or more times as long as their diameter.

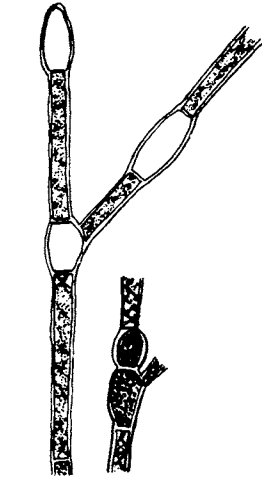
Pithophora—Irregularly branched filaments with barrel-shaped akinetes scattered throughout the filaments. Texture of filaments coarse, feeling like wet cotton to touch.



MOUGEOTIA



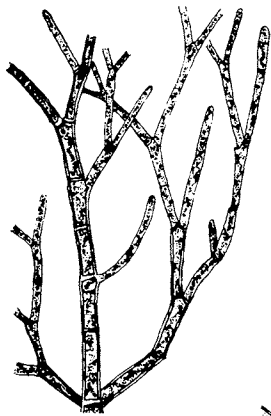
RHIZOCLONIUM



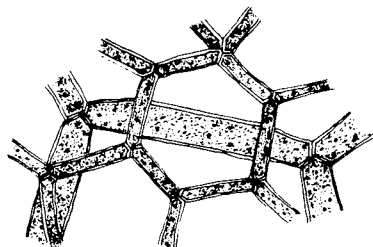
PITHOPHORA

Cladophora—Irregularly branched form of algae with cylindrical cells and without barrel-shaped akinetes. May form cladophora balls under northern conditions.

Hydrodictyon—Cells united at each end to form a network. Nets become extensive due to reproductive capacity of each cell to form a new net. Reported in ancient Chinese literature.



CLADOPHORA



HYDRODICTYON

Chara—Plants large, with erect stem-like whorled branches and forked leaves that are rough to the touch. Crushed plants produce musk-like odor.

Nitella—Plants large with erect, stem-like, whorled branches and forked leaves that are delicate in appearance and not rough to touch. Crushed plants do not produce musk-like odor



CHARA



NITELLA

SUBMERSED WEEDS

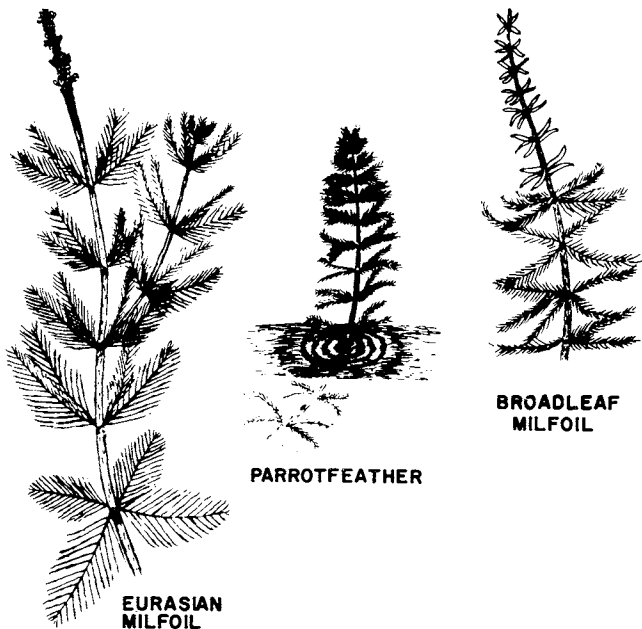
The plants included in this group are those rooted aquatics which produce all or most of their vegetative growth beneath the water surface. Most members of this group have true roots, stems, leaves, and produce seeds. In many instances these plants have an underwater leaf form, a totally different floating or emerged leaf form, and produce their flowers on an aerial stalk. Abundance of growth of these weeds is dependent upon depth and turbidity of water, and type of bottom. For most submersed plants a maximum depth of 8 to 10 feet in clear waters is the limit of their habitat.

Most of these submersed aquatic plants are capable of absorbing nutrients as well as herbicides through either their roots or vegetative growth.

Major obnoxious weeds in this group with a brief description of each family are as follows:

Watermilfoil Family—*Haloragidaceae*. Perennial aquatics, submersed with slender sparingly branched stems rooting freely at lower nodes. Leaves whorled, variable from pinnately dissected into filiform segments to those reduced to bracts, leaf dissection variable from submersed to emersed forms. Flowers very small, borne either in axils of emersed leaves or bracts. Members of this family fairly well distributed throughout the United States.

- Eurasian milfoil — *Myriophyllum spicatum*
- Parrotfeather — *Myriophyllum brasiliense*
- Broadleaf milfoil — *Myriophyllum heterophyllum*



Hornwort Family — *Ceratophyllaceae*. Submersed, rootless aquatic plants with slender main branch and scattered lateral branches. Lower end of stem frequently anchored in bottom mud. Leaves in whorls on stem, divided into slender, stiff, hooked, segments that are crowded toward apex by shortening of internodes to give shoots the “coontail” appearance. Only one genus but well distributed over the United States.

- Common Coontail — *Ceratophyllum demersum*

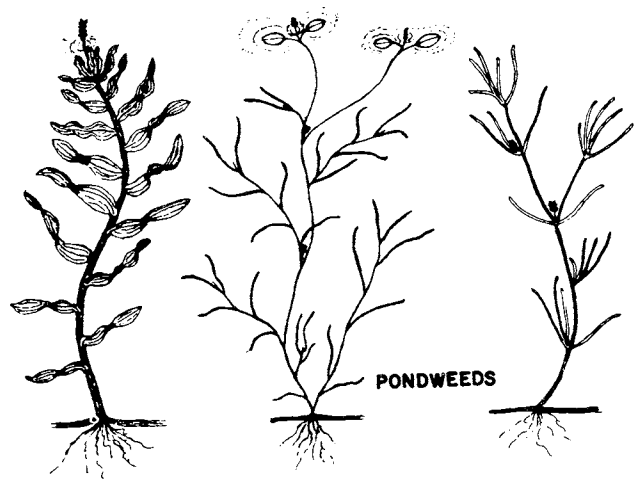
Waterlily Family — *Nymphaeaceae*. Submersed aquatic plant with slender, branched stem, opposite or whorled, finely dissected leaves and with upper leaves that are entire and oblong and floating on surface. Flowers small, solitary on axillary peduncle and generally emersed. One species, widespread over eastern half of United States.

- Cabomba — *Cabomba caroliniana*



Pondweed Family — *Potamogetonaceae*. Fresh or brackish water submersed aquatic plants with creeping rootstocks. Leaves mostly alternate, may be opposite, on erect jointed stems. Leaves all alike or may be 2 kinds, all submersed or some of them floating. Submersed leaves thin and linear or all broad, emersed leaves broad, more or less elliptical and petioled. Seed heads small and crowded into spikes. Spikes raised to surface on long peduncle and/or submersed on short peduncle. Winter buds produced in axils of leaves of some species, creeping rootstocks of other species may terminate in small tubers. The largest family of truly aquatic plants, widely distributed throughout the United States, and one of the most troublesome groups of submersed aquatic plants.

- Pondweeds — *Potamogeton* spp.
- Sago pondweed — *P. pectinatus*
- Waterthread pondweed — *P. diversifolius*
- Curlyleaf pond — *P. crispus*
- Widgeon grass — *Ruppia maritima*
- Horned pondweed — *Zannichellia palustris*



Frogbit Family — *Hydrocharitaceae*. Perennial, slender-stemmed, branching, submersed aquatic plants with whorled thin linear leaves and fibrous roots, or submersed plants with long, linear clustered leaves at nodes of rhizomes. Flowers borne on peduncle above surface of water.

- Brazilian waterweed — *Elodea densa*
- American waterweed — *E. canadensis*
- Eelgrass — *Vallisneria americana*



ELODEA



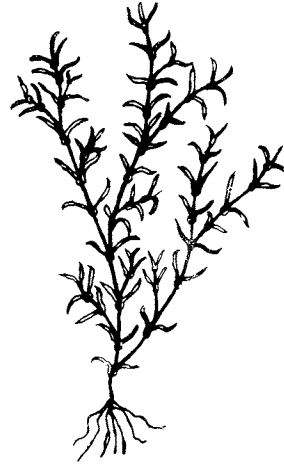
EELGRASS

Naiad Family — *Najadaceae*. Submersed aquatic plants with slender branches and fibrous roots. Leaves opposite or crowded into apparent whorls, finely toothed, dilated at base often with prominent stipules. About 35 species inhabiting fresh or brackish waters of temperate and tropical regions.

Naiads — *Najas* spp.
 Southern naiad — *N. guadalupensis*
 Slender naiad — *N. flexilis*

Pickerelweed Family — *Pontederiaceae*. Perennial or annual, floating or rooted aquatic plants with creeping rootstocks and fibrous roots. Leaves linear and thin on slender, branched, leafy stems. Flowers mostly solitary, appearing star-shaped, borne on spathe above water. Members of this family widely distributed throughout the United States.

Waterstargrass — *Heteranthera dubia*



NAIAD

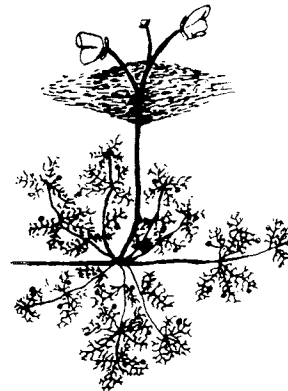


STARGRASS

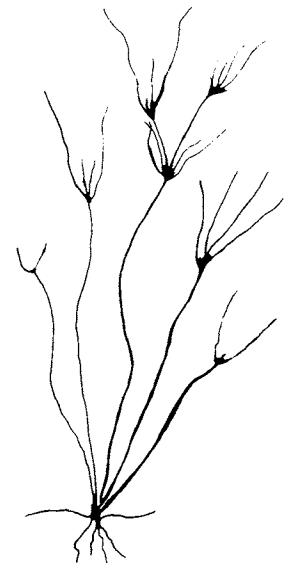
Bladderwort Family — *Lentibulariaceae*. Submersed or floating, rootless plants with flaccid, finely dissected or filiform simple leaves. Many of leaf segments with small bladders that have little trap doors. These bladders may trap small aquatic animals which are digested and may serve as partial nourishment for the plant. Solitary flowers appear above water on short, erect pedicel and are either yellow or purple in color.

Bladderworts — *Utricularia* spp.

Sedge Family — *Cyperaceae*. Perennial plants having general appearance of grasses, fibrous roots and solid stems, submersed stems may root at joints. Leaves linear, parallel-veined, basal or alternate on stem, and with closed sheath.



BLADDERWORT



NEEDLE RUSH

Flowers borne in axils of scales (glumes) in spikelets. Single species but with many varieties, distributed throughout the United States.

Slender Spikerush (Freshwater needle rush) —
Eleocharis acicularis

EMERSED WEEDS

This group includes those plants that are rooted in the bottom muds and produce a majority of their leaves and flowers at or above the water surface. Some species possess leaves that are flat and float entirely upon the water surface. Other species have leaves that are saucer-shaped or whose margins are irregular or fluted. These latter types of leaves do not float entirely upon the water surface. Rather, they offer sheltered water areas beneath the leaf that are suitable habitats for mosquitoes. Leaf size and point of attachment is also variable in this group. Size ranges from a diameter of 2 inches to as much as 18 inches. Point of stem attachment may be at the leaf margin or within the leaf margin. The presence of these floating-leaf species provides sufficient shade to eliminate a suitable habitat for submersed weeds. These plants occupy clear water areas to depths of 10 feet or more.

Since emersed weeds and submersed weeds prefer the same type habitat, the elimination of emersed weeds usually will permit submersed weeds to become established. The advisability of emersed weed control depends upon the proposed management of a water area. While it is cheaper to control emersed weeds, it is generally conceded that certain of the floating, flat-leaved weeds produce fewer problems with water management than do the partially floating-leaf species or the submersed weeds.

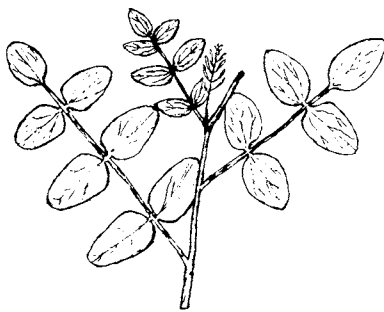
The major obnoxious weeds in the emersed group with a brief description of families are as follows:

Cress Family — *Crucifereae*. Perennial aquatic herb with creeping stems, rooting at nodes. Leaves alternate and pinnately compounded, with peppery flavor. Introduced from Europe, but distributed over most of United States.

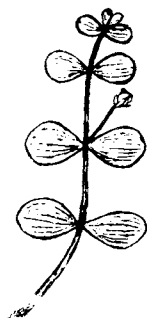
Watercress — *Nasturtium officinales*

Figwort Family — *Scrophulariaceae*. Creeping, fleshy herbs, rooting at nodes, leaves opposite, borne on stem and entire. Stems may be covered with crinkled hairs, flowers solitary, pale blue, purple, or white, borne on short stalk in axils of leaves.

Water Hyssop — *Bacopa caroliniana*



WATERCRESS



WATER HYSSOP

Waterlily Family — *Nymphaeaceae*. Perennial aquatic plants with large, creeping, often branched, rootstocks. Leaves may be large, elliptical or ovate in shape, sometimes emersed sometimes floating, submersed portions of stems and underside of floating elliptical leaves of one species covered with mucilaginous material. Flowers may be solitary and emersed or floating, or small and emersed.

Banana waterlily — *Nymphaea mexicana*

Fragrant waterlily — *N. tuberosa*

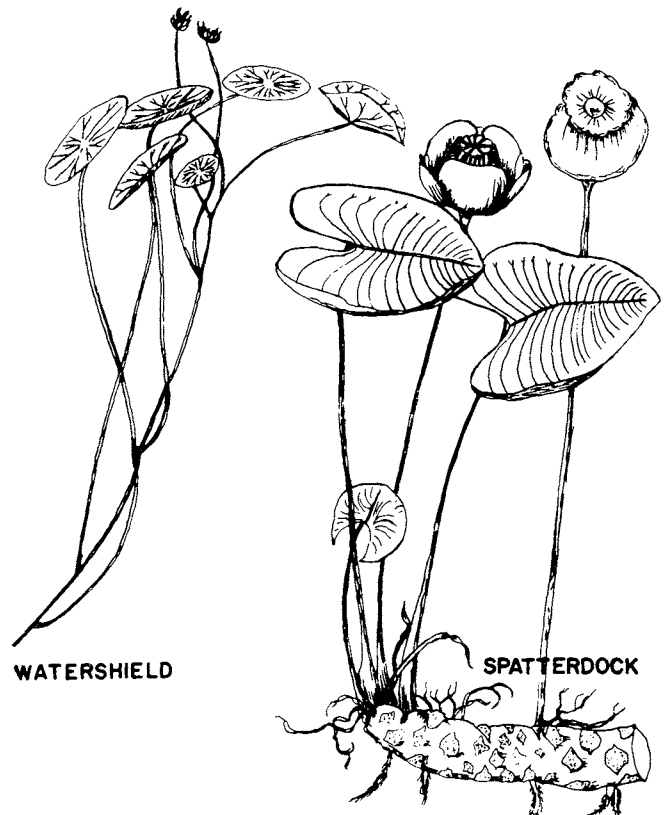
Spatterdock — *Nuphar advena*

American lotus — *Nelumbo lutea*

Watershield — *Brasenia schreberi*

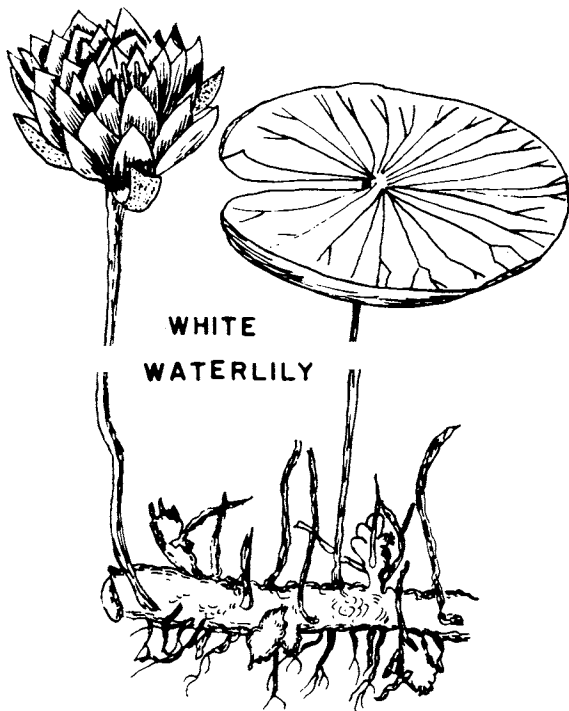
Watershield has elliptical, flat, floating leaves that have a mucilaginous covering on the underside of leaves and submersed stems. There are few mosquito problems connected with watershield growths since the leaves are flat on water surface.

Spatterdock has similar habitat requirements to white water-lilies. The leaf is more heart-shaped and the flowers are almost oval with a distinctive seed case.

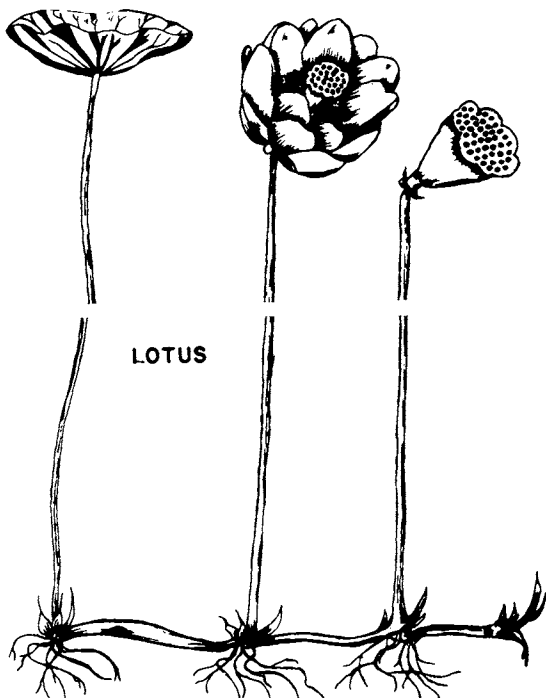


WATERSHIELD

SPATTERDOCK



American lotus is probably the largest of the aquatic plants. It has large, emersed, leaves that are inverted like a saucer. The flower is relatively large, borne on an emersed stalk. The seed head is unique-being used in the dry state as a decorative item.



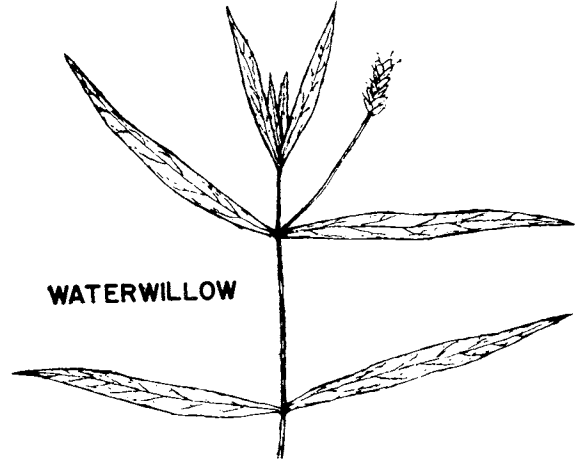
MARGINAL WEEDS

The species comprising this group are the most obvious and probably the most widely distributed of rooted aquatic plants. Members of this group are variable in size, shape, and preference of habitat. Many species are adapted to grow from moist shore-line soils into water up to 2 feet in depth. Others are limited to the moist soil habitat, while still others are confined almost entirely to a watery habitat.

The variations in composition of marginal species includes members of the broadleaf types, herbs, grasses, and trees. Major obnoxious species of marginal growth with brief description of families are as follows:

Acanthus Family — *Acanthaceae*. Perennial herbs with creeping rootstocks, and erect stems, leaves simple and opposite. Only one species limited to eastern United States.

Waterwillow — *Justicia americana*

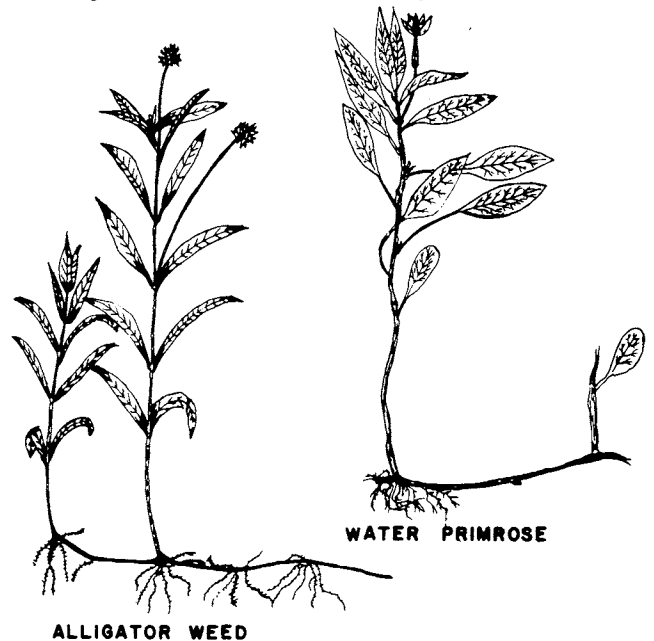


Evening Primrose Family — *Onagraceae*. Perennial herbs with opposite or alternate simple leaves. Seeds borne in a box shaped capsule. Plants may be erect and branched or stems may be creeping and branched, rooting may occur at nodes. Distribution of aquatic members of this family confined mainly to Southeastern United States.

Waterprimroses — *Jussiaea* spp.

Amaranth Family — *Amaranthaceae*. Herb-like plants with opposite, entire, oblong, lanceolate leaves. Stems prostrate and creeping, jointed, branched and often rooted at nodes. Flowers a cluster similar to white clover blossom. May grow on dry land, on wet land into water or may float on water surface. Confined mainly to South Atlantic and Gulf areas.

Alligatorweed — *Alternanthera philoxeroides*



Pickerelweed Family — *Pontederiaceae*. Stout, perennial, aquatic plant with thick, creeping rootstock and fibrous roots. Leaves in basal cluster and erect, with fleshy, sheathing petiole and heart-shaped to lance-shaped blades. Flowers a violet-blue cluster borne on stout erect stalk. Distribution confined to eastern half of United States.

Pickerelweed — *Pontederia cordata*

Water Plantain Family — *Alismaceae*. Mostly aquatic perennials with rosettes of sheathing basal leaves and scape-like stems from short, erect, rootstock, rhizomes or tubers, root system fibrous. Leaves variable, with long petioles, emersed or submersed types; submersed leaves subulate and elliptical. Emersed leaves elliptical to sagittate. Flowers on

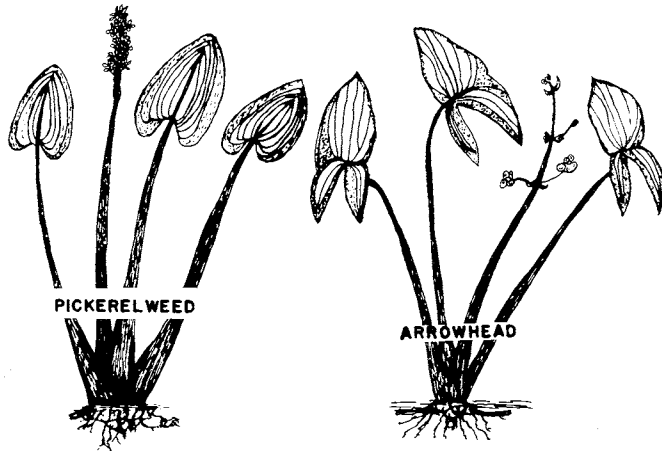
Cattail Family — *Typhaceae*. Tall, erect, perennial plants with simple jointless stems, linear sheathing leaves, and large, branching rootstocks. Flowers borne in dense, rigid, spike usually emerging from a spathe, these spikes dry and persist into late winter. Rootstocks are rich in starch. Distributed over entire United States.

Blue cattail — *Typha glauca*

Common cattail — *T. latifolia*

Narrowleaf cattail — *T. angustifolia*

Southern cattail — *T. domingensis*



fruiting stalk and usually white in color. Each underground stem ends in edible tuber.

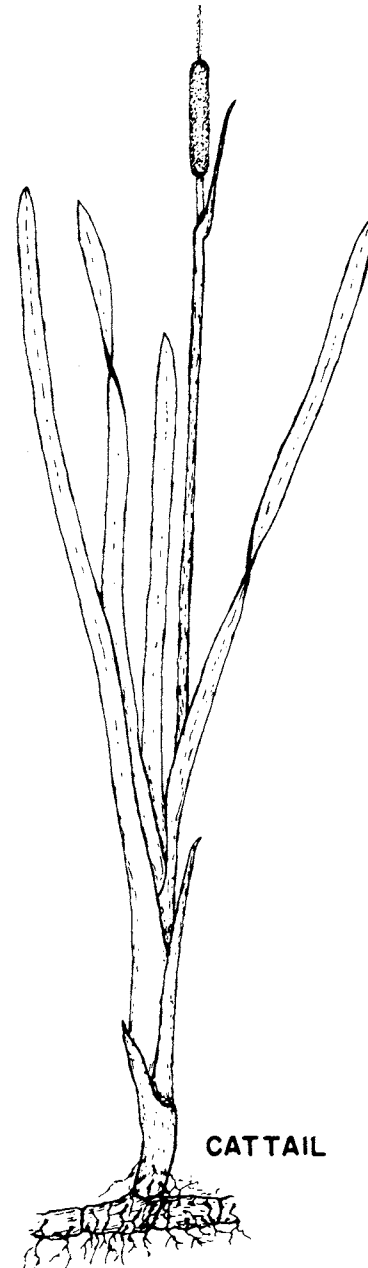
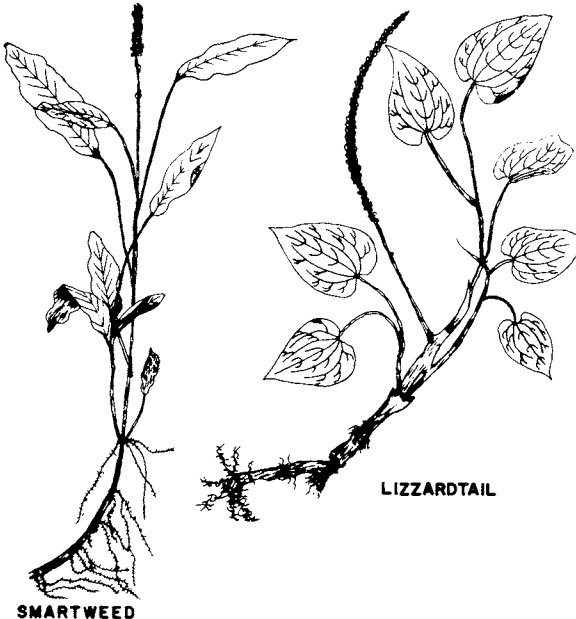
Arrowhead — *Sagittaria* spp.

Buckwheat Family — *Polygonaceae*. Moist soil perennial or annual plants with jointed stems with swollen nodes and creeping rootstocks, alternate simple entire leaves. Flowers in spikes. A few species of a single genus are aquatic and are distributed over United States.

Smartweeds — *Polygonum* spp.

Pepper Family — *Piperaceae*. Tall aquatic plant from slender rootstock, leaves scattered and heart-shaped, flowers white. Confined to eastern half of United States.

Lizzardtail — *Saururus cernuus*

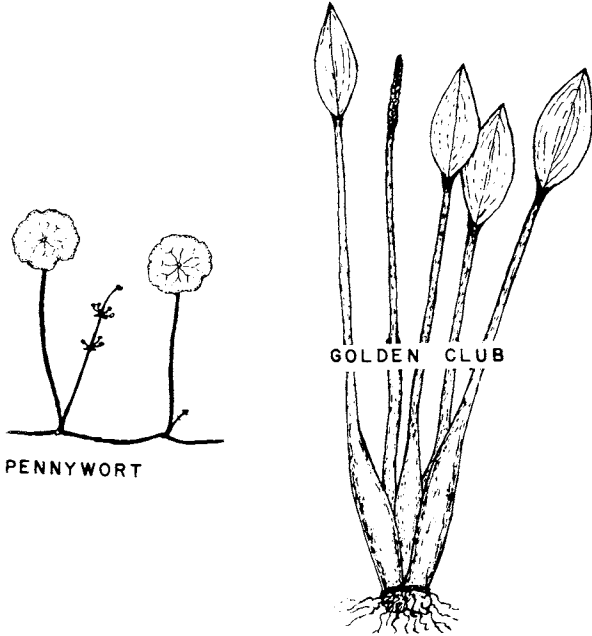


Parsley Family — *Umbelliferae*. Low perennial herbs with creeping, stem-like rootstock often bearing small tubers. Leaves round and peltate on erect petioles from rootstock, may be floating or emersed. Flowers small and white on erect petiole. Grows over both North and South America.

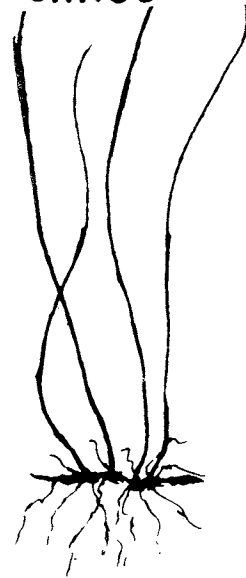
Pennywort — *Hydrocotyle* spp.

Arum Family — *Araceae*. Stout aquatic plants with alternate, fleshy, clustered leaves, rootstock short, erect, with fibrous roots. Leaves lanceolate in shape and either erect or floating. Flowers borne in clusters at apex of stout stalk.

Golden club — *Oronthium aquaticum*



SOUTHERN WATER GRASS



Grass Family — *Gramineae*. Plants with fibrous roots, nodose stems usually with hollow internodes and narrow, parallel-veined, 2 ranked leaves composed of a sheath and blade. Seed heads are variable.

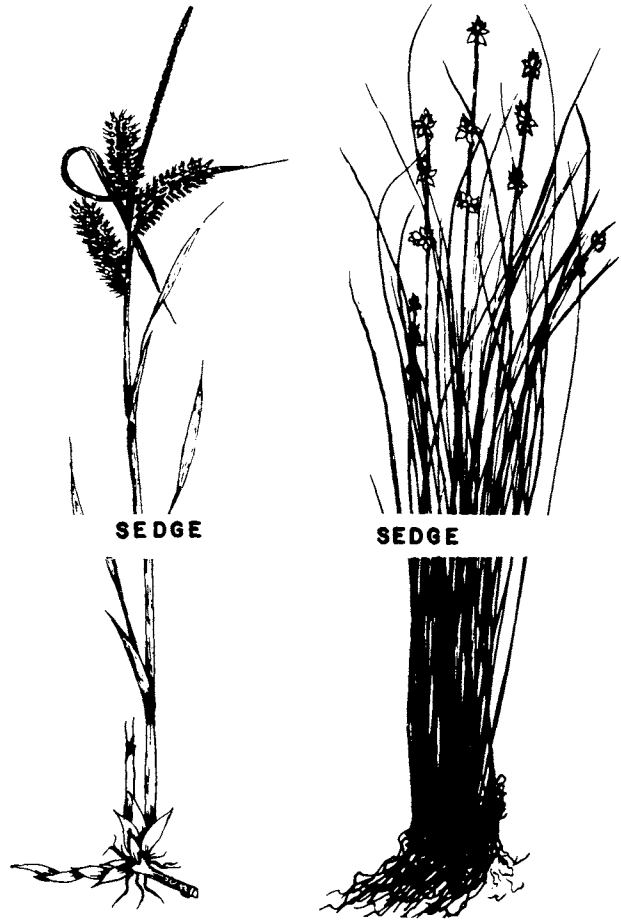
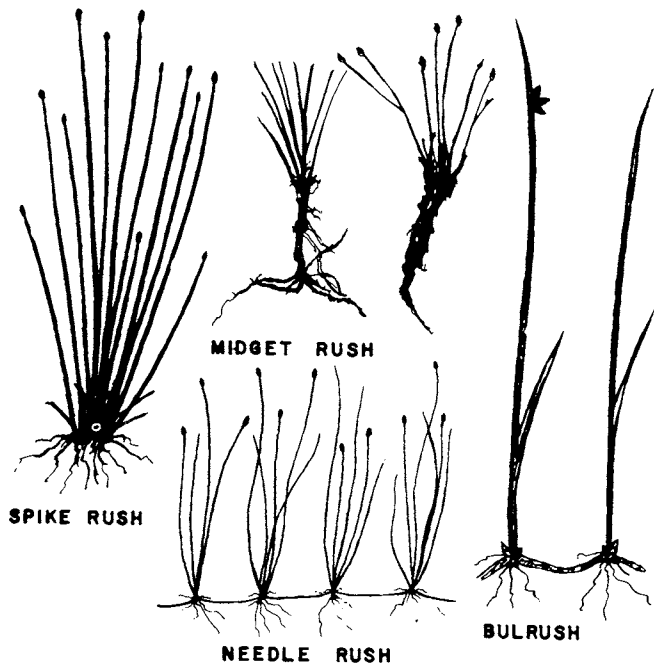
- Giant cutgrass — *Zizaniopsis miliaceae*
- Rice cutgrass — *Leersia oryzoides*
- Southern cutgrass — *Leersia hexandra*
- Giant reed — *Phragmites communis*
- Cordgrass — *Spartina* spp.
- Southern watergrass — *Hydrochloa caroliniensis*
- Knotgrass — *Paspalum distichum*
- Water paspalm — *Paspalum fluitans*
- Paspalm — *Paspalum repens*
- Maidencane — *Panicum hemitomon*
- Paragrass — *Panicum purpurascens*
- Torpedo grass — *Panicum repens*
- Water managrass — *Glyceria fluitans*
- Sawgrass — *Cladium jamaicense*

Southern watergrass grows from the moist shoreline into waters up to 8 feet deep. The submersed portion of the plants are a mass of leafless stems with frequent rooting at the nodes. The emersed stems have tufts of leaf growths floating on or extending above the water surface for 4 to 6 inches. Occurrence rather infrequent, but it is potentially one of the more noxious plants.

Knotgrass grows from the moist shoreline into waters up to 2 feet deep. Its growth characteristics are very similar to Bermuda grass.



KNOT GRASS



Sedge Family — *Cyperaceae*. Perennial plants having general appearance of grasses or rushes with fibrous roots and usually solid stems, often having creeping rootstocks. Leaves linear, parallel-veined, basal or alternate on stem, and with closed sheath. *Carex* has 3-sided stems, 3-ranked leaves that are often finely serrated on margin and lower midrib. Flowers borne in axils of scales (glumes) in spikelets.

- Sedges — *Carex* spp.
- Spikerushes — *Eleocharis* spp.
- Flatsedges — *Cyperus* spp.
- Bulrushes — *Scirpus* spp.

Sedges (*Carex* spp.) cause varying degrees of marginal infestation of all water areas throughout the United States. In certain situations their presence and abundance are such as to present serious problems in water movement, water loss through evaporation, and public health hazards. The two forms shown represent the varied forms in this genus.

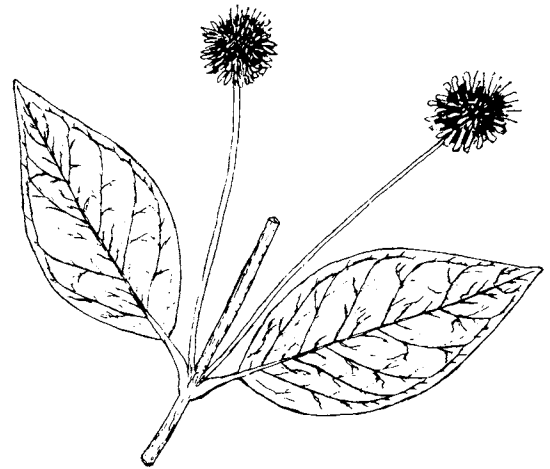
Rush Family — *Juncaceae*. Perennial plants with appearance of grasses, leaves flattened somewhat, sheathing at base, lower bladeless and reduced to mere sheaths. Creeping rootstock, stems simple, pithy and hollow, often with partitions. Leaves often hollow. Flowers in terminal cluster. About 200 species grow in marshes and bogs, a few grow in water.

Rush — *Juncus* spp.



Madder Family — *Rubiaceae*. Large shrubs with leaves opposite or in 3's. Flowers in spherical heads on long bare stalks in axils of upper leaves. Mature fruits small brown balls. Grows on moist bank and into water a few inches in depth. Spread over eastern portion of United States.

Buttonbush — *Cephalanthus occidentalis*

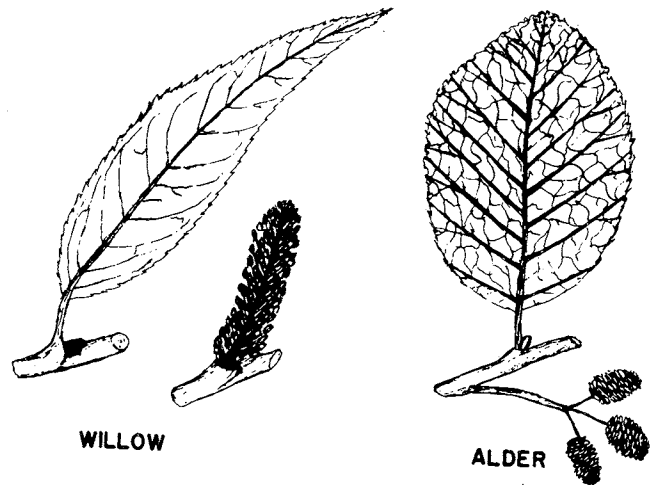


Willow Family — *Salicaceae*. Large shrubs or trees with simple alternate leaves that are several times as long as wide, usually toothed. Flowers in catkins that generally appear in spring before leaves. Distributed all over United States.

Willows — *Salix* spp.

Birch Family — *Betulaceae*. Large shrubs or small trees, leaves scattered, entire, heavily veined, toothed. Seed heads are small burs in clusters, similar to pine cones.

Alders — *Alnus* spp.

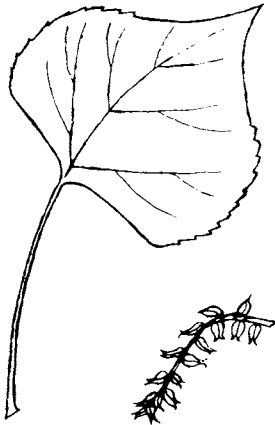


Plains Cottonwood — *Populus sargentii*

Large tree with gray bark, deeply furrowed. Leaves broadly oval, often wider than long, 3 to 4 inches long and wide, long-pointed, coarsely toothed with curved teeth, smooth, light green, shiny. Great Plains and Rocky Mountains.

Salt Cedar — *Tamarix pentandra*

A large shrub or small tree to 30 feet. Stems support slender, contorted branches with small scale-like leaves on the young branches. Flowers are borne in dense panicles developing from base to apex in individual racemes. Seeds are very small with slender hairs at the apex. Located in Southwest United States.



POPULUS SARGENTII



TAMARIX PENTANDRA

FLOATING PLANTS

This group has some species which are limited to their distribution while others are widespread throughout the world. Plants in this group have true roots and leaves, but instead of being anchored in soil they float about on the water surface. Bouancy of the plants is accomplished through modification of the leaf (including covering of leaf surface) and leaf petiole. Most species have extensive root systems which collect nutrients from the water medium. Most species are capable of reproducing at a rapid rate under favorable conditions, and are considered among the most obnoxious aquatics.

Major species are as follows:

Waterfern Family — *Salviniaceae*. Delicate, mosslike floating plants with small scalelike 2-lobed leaves; upper lobe aerial and lower lobe submersed. Reproduction by spores and by plant fragmentation. Plants green when young, turning pink, red, or brown with age. Plants confined to temperate and subtropical regions of United States.

Salvinia — *Salvinia rotundifolia*

Azolla — *Azolla caroliniana*



SALVINIA



AZOLLA

Pickerelweed Family — *Pontederiaceae*. Perennial or annual floating plants, with creeping rootstocks and large fibrous roots. Leaves in basal cluster, fleshy, ovate, and modified for boupancy. Flowers, a cluster borne on stalk above water. Seeds are produced, and they are viable under favorable conditions. Plants propagate vegetatively by sending out daughter plants on creeping rootstock. Confined to subtropical regions of the United States.

Waterhyacinth — *Eichhornia crassipes*

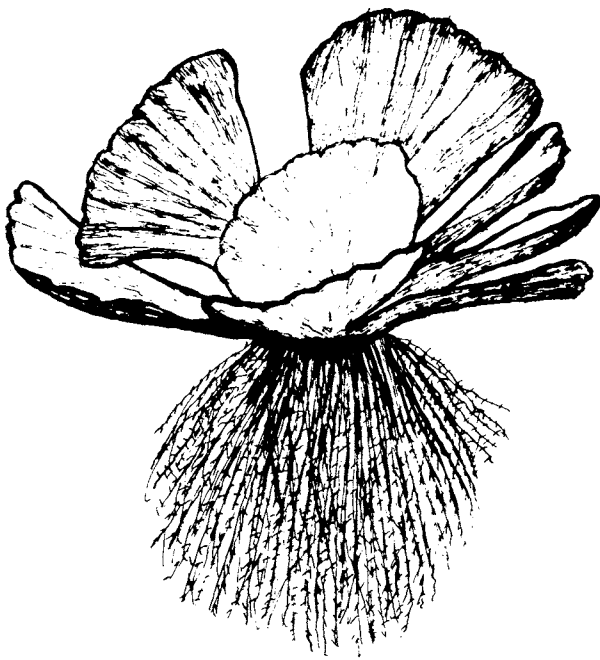
Waterhyacinth — A serious pest plant in water areas of subtropical and tropical areas throughout the world. Size of plants apparently determined by fertility of water environment and length of growing season. Causes problems in navigation, flood control and public health.



WATER HYACINTH

Arum Family — *Araceae*. Stout plants, mostly floating; leaves, hairy, fleshy and pliated, borne in rosettes from short stem bearing numerous adventitious branching roots. Propagation mainly vegetative by buds. Confined to subtropical areas of United States.

Waterlettuce — *Pistia stratiotes*



WATERLETTUCE

Water Chestnut Family — *Hydrocaryaceae*. Annual aquatic herbs with long, cordlike, sparsely branching, submersed stems which arise from a nut. Leaves are of 3 kinds: linear, mostly alternate; submersed, finely dissected and 2 at each node; emersed rosette clustered with inflated rhombic blades. Seeds a 2 or 4 pronged nut borne on short stalk. If seeds are air dried they die. Native of Europe, Africa, and Asia, limited distribution in northeastern United States.

Water chestnut — *Trapa natans*



WATER CHESTNUT

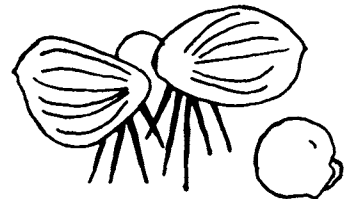
Duckweed Family — *Lemnaceae*. Plants free floating, minute, with undifferentiated flattened or globular plant body (frond) and without definite stems or leaves. Fronds in colonies with or without roots. Reproduction is mainly vegetative by simple frond division.

Common duckweed — *Lemna minor*
 Giant duckweed — *Spirodela polyrhiza*
 Watermeal — *Wolffia columbiana*

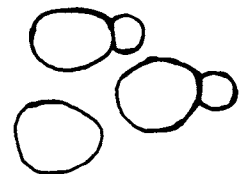
Duckweeds and watermeal usually occur as mixtures of several species. The growth of these plants in fresh waters is most abundant in areas protected from wind-wave action either by taller vegetation or shoreline configuration. Plants present serious problems by forming layer several inches thick on water surface. Such thick layers of plants are also very resistant to chemical control simply by physical inability to get chemicals on plants.



DUCKWEED



LARGE DUCKWEED



WATERMEAL

The following texts were used freely throughout the article to obtain good, simple descriptions as aids in identification: Eyles, Don E., J. Lynne Robertson, Jr., and Garnet W. Jax. A Guide and Key to the Aquatic Plants of the Southeastern United States. 1944. Public Health Bulletin No. 286. 151 pp.

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