Plants of the Lake Waco Wetlands

Grasses
Blue Bluestem (*Andropogon gerardii*)
Buffalograss (*Buchloe dactyloides*)
Eastern Gamagrass (*Tripsacum dactyloides*)
Sideoats Grama (*Bouteloua curtipendula*)
Switchgrass (*Panicum virgatum*)
Canada Wild Rye (*Elymus canadensis*)
Green Sprangletop (*Leptochloa dubia*)

Wildflowers
Butterfly Milkweed (*Asclepias tuberosa*)
American Basketflower (*Centaurea americana*)
Clasping Coneflower (*Dracopis amplexicaulis*)
Purple Coneflower (*Echinacea purpurea*)
Golden-wave Coreopsis (*Coreopsis basalis*)
Lanceleaf Coreopsis (*Coreopsis lanceolata*)
Plains Coreopsis (*Coreopsis tinctoria*)
Illinois Bundleflower (*Desmanthus illinoensis*)
Lemon Mint (*Mondarda citriodora*)
Mealy Blue Sage (*Salvia facinacea*)
Scarlet Sage (*Salvia coccinea*)
White Gaura (*Gaura lindheimeri*)
Indian Paintbruch (*Castilleja indivisa*)
Indian Blanket (*Gaillardia pulchella*)
Texas Bluebonnet (*Lupinus texensis*)
Aquatic Plants

Bulrush (*Schoenoplectus californicus*)

Stems grow up to 10 feet tall and are thicker on the bottom than on the top. Leaves appear as sheaths on the base of the stem and inflorescence of several drooping spikelets appear on the top of the stem. The seeds from the bulrush serve as a food source for ducks and the young shoots from the plant serve as food for snow geese. [City of Waco Water Utility Services Department]

*Schoeneoplectus californicus* is a species of sedge known by the common names California bulrush and giant bulrush. It is also sometimes called “tule”, but the closely related *Schoenoplectus acutus* is the more correct owner of that name.

*Schoenoplectus californicus* is a rhizomed water plant found in marshy areas from southern and western North America to South America and on Pacific islands including some of those in the Hawaiian and Cook chains. It has tall, thin, dark green stems which are usually triangular in cross-section and woolly, bristly tan or brown flowers in panicle inflorescences. [Wikipedia]

Soft Rushes (*Juncus* sp.)

Juncaceae, the rush family, are a monocotyledonous family of flowering plants of eight genera and about 400 species. Members of the Juncaceae are slow-growing, rhizomatous, herbaceous plants, and they may superficially resemble grasses. They often grow on infertile soils in a wide range of moisture conditions. The most well-known and largest genus is *Juncus*. Most of the *Juncus* species grow exclusively in wetland habitats. A few rushes are annuals, but most are perennials.

The leaves are evergreen and well-developed in a basal aggregation on an erect stem. They are alternate and tristichous (i.e., with three rows of leaves up the stem, each row of leaves arising one-third of the way around the stem from the previous leaf). Only in the genus *Distichia* are the leaves distichous. The rushes of the genus *Juncus* have flat, hairless leaves or cylindrical leaves. The leaves of the wood-rushes of the genus *Luzula* are always flat and bear long white hairs.

The plants are hermaphroditic or, rarely, dioecious. The small and insignificant flowers are arranged in inflorescences of loose cymes, but also in rather dense heads or corymbs at the top of the stem or at its side. This family typically has reduced perianth segments called tepals. These are usually arranged in two whorls, each containing three thin, papery tepals. They are not bright or flashy in appearance, and their color can vary from greenish to whitish, brown, purple, black, or hyaline. The three stigmas are in the center of the flowers. As is characteristic of monocots, all of the flower parts appear in multiples of three.

The fruit is usually a nonfleshy, three-sectioned dehiscent capsule containing many seeds. [Wikipedia]
Cattails (*Typha* sp.)

Leaves grow out long and straight, twisting at the top. The cylindrical flower spike is packed with tiny flowers and can grow up to one foot long. Smaller bird and mammal species depend on this plant for habitat and food sources. Cattails are one of the most common aquatic plants at the Lake Waco Wetlands. [City of Waco Water Utility Services Department]

*Typha* is a genus of about eleven species of monocotyledonous flowering plants in the family Typhaceae. The genus has a largely Northern Hemisphere distribution, but is essentially cosmopolitan, being found in a variety of wetland habitats.

These plants are conspicuous and hence have many common names. They may be known in British English as bulrush, or reedmace, in American English as cattail, catninetail, punks, or corn dog grass, in Australia as cumbungi or bulrush, and in New Zealand as raupo. *Typha* should not be confused with other plants known as bulrush, such as some sedges (mostly in *Scirpus* and related genera).

Their rhizomes are edible. Evidence of preserved starch grains on grinding stones suggests they were eaten in Europe 30,000 years ago.

*Typha* leaves are alternate and mostly basal to a simple, jointless stem that eventually bears the flowering spikes. Typha plants are monoecious and bear unisexual, wind-pollinated flowers, developing in dense spikes. The numerous male flowers form a narrow spike at the top of the vertical stem. Each male (staminate) flower is reduced to a pair of stamens and hairs, and withers once the pollen is shed. The very large numbers of tiny female flowers form a dense, sausage-shaped spike on the stem below the male spike — in larger species this can be up to 30 centimetres (12 in) long and 1 to 4 centimetres (0.39 to 1.6 in) thick. Seeds are minute, 0.2 millimetres (0.0079 in) long, and attached to a fine hair. When ripe the heads disintegrate into dense cottony fluff, from which the seeds disperse by wind.

Typha is often among the first wetland plants to colonize areas of newly exposed wet mud, with its abundant wind dispersed seeds. It can also survive in the soil for long periods with buried seeds. It germinates best with sunlight and fluctuating temperatures, which is typical of many wetland plants that regenerate on mud flats. It also spreads by rhizomes, forming large interconnected stands. Hence, it has three interlocking reproductive strategies: dominance of local habitats by clonal growth, survival of long inhospitable periods with buried seeds, and dispersal to new sites with wind-dispersed seeds. This may explain in part why the species is so widespread.

It is considered to be a dominant competitor in wetlands, and often excludes other plants with its dense canopy. In large fertile bays along the Great Lakes, for example, may be by far the most abundant wetland plant. Different species of cattails, are, however, adapted to different water depths.

Owing to the well-developed aerenchyma, it is quite resistant to flooding. Even the dead stalks are capable of transmitting oxygen to the rooting zone.
Although this is a natural species of wetlands, there is growing concern about the degree to which it is replacing other native species. This problem is known in habitats ranging from the Great Lakes to the Everglades. Native sedges are being displaced, and wet meadows are shrinking. This is likely a response to altered hydrology of these wetlands, and to increased nutrient levels. However, an introduced or hybrid species may be contributing to the problem as well.

Control is difficult. The most successful strategy appears to be mowing or burning (to remove the aerenchymous stalks) followed by prolonged flooding. However, it may be more important to be preemptive by maintaining wide water level fluctuations (including periods of drought) along with infertile conditions to prevent invasion in the first place.

It is frequently eaten by wetland mammals such as muskrats which may also use it to construct feeding platforms and dens. [Wikipedia]

Spike Rushes (*Eleocharis* sp.)

*Eleocharis* is a genus of 250 or more species of flowering plants in the sedge family, *Cyperaceae*. The name is derived from the Greek words ἕλειος (heleios), meaning “marsh dweller,” and χάρις (charis), meaning “grace.” Members of the genus are known commonly as spikerushes, although spikesedges is a more technically appropriate name and most scientists who study them in earnest refer to them as such. The genus has a geographically cosmopolitan distribution, with centers of diversity in the Amazon Rainforest and adjacent eastern slopes of the South American Andes, northern Australia, eastern North America, California, Southern Africa, and subtropical Asia. The vast majority of *Eleocharis* species grow in aquatic or mesic habitats from sea level to higher than 5,000 meters in elevation (in the tropical Andes).

The genus itself is relatively easy to recognize; all *Eleocharis* species have photosynthetic stems and lack leaves (the leaves have been reduced to sheaths surrounding the base of the stems). Many species are robust, rhizomatously-spaying plants of lowland tropical wetlands, while many others are small caespitose annual or perennial herbs growing near streams, and still others are intermediate. There are also a number of species that are obligate aquatic species, which usually have submerged, branching stems and often exhibit interesting photosynthetic adaptations, such as the ability to switch between C3 and C4 carbon fixation in response to different environmental stimuli. In all *Eleocharis* species, the flowers are borne on unbranched terminal spikelets at the apices of stems.

In spite of the diversity of the genus itself, taxonomic characters useful for delimiting species within it are few, and many species are very difficult to tell apart. Many currently recognized species with very wide geographic ranges are highly polymorphic. Some of these species probably contain multiple independently-evolving lineages. Because of their difficult nature, many botanists avoid collecting these plants and so many species are under-represented in the botanical record.
One of the best known species is the Chinese water chestnut, *Eleocharis dulcis*. These plants bear tubers on their rhizomes which may be peeled and eaten raw or boiled. In Australia, magpie geese rely almost exclusively on these tubers for sustenance for a significant portion of the year. [Wikipedia]

Arrowhead (aka, Duck Potato) (*Sagittaria latifolia*)

Leaves are large, up to 4 inches wide and lance-shaped. The white flowers have 3 petals. Duck potato gets its common name from the potato-like corms that sometimes form in their root systems and serve as a food source for many species of ducks. [City of Waco Water Utility Services Department]

*Sagittaria* is a genus of about 30 species of aquatic plants whose members go by a variety of common names, including arrowhead, duck potato, iz-ze-kn, katniss, kuwai, swan potato, tule potato, and wapato (or wapatoo). Most are native to South, Central, and North America, but there are also some from Europe and Asia. The generic name means “belonging to an arrow” in Latin and refers to the shape of the leaves. The genus lies within the water plantain family, the Alismataceae.

*Sagittaria* plant stock (the perennial rhizome) is a horizontal creeper (stoloniferous) and obliquely obovate, the margins winged, with apical or ventral beak; in other words, they are a small, dry, one-seeded fruit that do not open to release the seed, set on a slant, narrower at the base, with winged edges, and having a “beaked” aperture (one side longer than the other) for sprouting, set above or below the fruit body.

One of the names for this plant is derived from the edible underwater tuber that the plant produces. In late fall or early spring, disturbing the aquatic mud in which the plant grows will cause its small tubers to float to the surface where they can be harvested, and then boiled. [Wikipedia]

Pickerelweed (*Pontederia cordata*)

Leaves are large, up to 5 inches wide and lance-shaped. Flower heads are spikes of violet - blue colored flowers. The small fruits that the plant produces are eaten by many species of puddle ducks. A common and prolific plant out at the Lake Waco Wetlands. [City of Waco Water Utility Services Department]

*Pontederia* is a genus of tristylos aquatic plants, members of which are commonly known as pickerel weeds. Pontederia is endemic to the Americas, distributed from Canada to Argentina, where it is found in shallow water or on mud. The genus was named by Linnaeus in honour of the Italian botanist Giulio Pontedera.

*Pontederia* plants have large waxy leaves, succulent stems and a thick pad of fibrous roots. The roots give rise to rhizomes that allow rapid colonization by vegetative reproduction. Species are perennial, and produce a large spike of flowers in the summer. There is a species of bee (*Dufourea novaeangliae*) that exclusively visits *Pontederia cordata*; waterfowl also eat the fruit of the plant.

*Pontederia cordata*, and another member of the family, *Eichhornia crassipes*, have become invasive in many tropical and temperate parts of the globe, but
are, on the other hand, efficient biological filters of polluted water in constructed wetlands. [Wikipedia]

**American Waterwillow (Justicia americana)**

American Water-Willow (*Justicia americana*) is a herbaceous, aquatic flowering plant in the Acanthus family native to North America. It is the hardiest species in the genus *Justicia*, the other members of which being largely tropical and subtropical, and it is able to survive as far north as USDA zone 4. It is common throughout its range.

The plant grows partially submerged in still or flowing water, reaching up to 40 cm (1 ft. 4 in.) tall from a creeping rhizome. The leaves are 10 cm (4 in.), opposite, sessile, linear or lanceolate, and slightly crenulated. The flowers are bicolored, born in opposite arrangement on spikes 3 cm (1 in.) long coming off a peduncle 10 cm (4 in.) long. Color ranges from white to pale lavender with the upper corolla lip pale violet or white, arching over the lower lip mottled in dark purple. The lateral lobes are unadorned or slightly blushed. The anthers are purplish-red rather than the usual yellow. Flowering is from May to October. The fruit of this plant is a small brown capsule.

The creeping rhizome allows *J. americana* to form large colonies on or near the shorelines of still or slow waters in lakes and rivers, and on rocky riffles and shoals in faster flowing rivers. Its rhizomes and roots provide important spawning sites for many fish species and habitat for invertebrates. [Wikipedia]

**White Water Lily (Nymphaea odorata)**

**Yellow Water Lily (Nymphaea mexicana)**

Leaves are nearly circular in shape and notched to the center, and float on top of the water. Flowers are showy and fragrant, usually white in color but with numerous hybrids and varieties, colors may vary. Although ducks occasionally eat seeds and roots, it does not serve as a major food source. [City of Waco Water Utility Services Department]

*Nymphaea* (water lily) is a genus of hardy and tender aquatic plants in the family Nymphaeaceae. There are about 50 species in the genus, which has a cosmopolitan distribution. White-flowered waterlilies (of several species) are the national flower of Bangladesh.

The name *Nymphaea* comes from the Greek term “Νυμφαία”, possibly related to “Νύμφη” meaning “nymph”. The nymphae in Greek mythology were supernatural feminine beings associated with springs, so the application of the name to delicately flowered aquatic plants is understandable. Despite its common name “water lily” (water-lily, waterlily), *Nymphaea* is not related to the true lily, *Lilium*.

The main plant is submerged, with large floating, plate-like leaves and showy flowers in many different colours produced in spring. Blue flowers are only produced by the tender species, e.g. *N. caerulea*. The fruits, containing many seeds, are produced in the autumn, and are also submerged. The leaves have a
radial notch from the circumference to the petiole (leaf stem) in the center. [Wikipedia]

American (aka, Long-leaf) Pondweed (*Potamogeton nodosus*)

*Potamogeton nodosus* is a species of aquatic plant known by the common name longleaf pondweed. It is native to Eurasia and the Americas, where it is widespread and can be found in water bodies such as ponds, lakes, ditches, and streams. This is a perennial herb producing a thin, branching stem easily exceeding a meter in maximum length. The leaves are linear to widely lance-shaped and up to 15 centimeters long by 4 wide. Both floating leaves and submerged leaves are borne on long petioles, a distinguishing characteristic. The inflorescence is a spike of many small flowers arising from the water on a peduncle. [Wikipedia]

Duckweed (*Lemna minor*)

Duckweeds, or water lens, are flowering aquatic plants which float on or just beneath the surface of still or slow-moving bodies of fresh water and wetlands. Also known as “bayroot”, they arose from within the arum or aroid family (Araceae), and therefore, often are classified as the subfamily Lemnoideae within the Araceae. Classifications created prior to the end of the twentieth century classify them as a separate family, Lemnaceae.

These plants are very simple, lacking an obvious stem or leaves. The greater part of each plant is a small organized “thallus” or “frond” structure only a few cells thick, often with air pockets (aerenchyma) that allow it to float on or just under the water surface. Depending on the species each plant may have no root or may have one or more simple rootlets.

Reproduction is mostly by asexual budding, which occurs from a meristem enclosed at the base of the frond. Occasionally three tiny “flowers” consisting of two stamens and a pistil are produced, by which sexual reproduction occurs. Some view this “flower” as a pseudanthium, or reduced inflorescence, with three flowers that are distinctly either female or male and which are derived from the spadix in Araceae. Evolution of the duckweed inflorescence remains ambiguous due to the considerable evolutionary reduction of these plants from their earlier relatives.

The flower of the duckweed genus Wolffia is the smallest known, measuring merely 0.3 mm long. The fruit produced through this occasional sexual reproduction is a utricle, and a seed is produced in a sac containing air that facilitates flotation. [Wikipedia]

Southern Naiad (*Najas guadalupensis*)

*Najas guadalupensis* (aka, najas grass, guppy grass) is a species of aquatic plant known by the common name common water nymph. It is native to the Americas, where it is widespread. It is also known on other continents as an introduced species and sometimes a noxious weed. This annual plant grows submerged in aquatic habitat types such as ponds, ditches, and streams. It produces a slender, branching stem up to 60 to 90 centimeters in maximum
length. The thin, somewhat transparent, flexible leaves are up to 3 centimeters long and just 1 or 2 millimeters wide. They are edged with minute, unicellular teeth. Tiny flowers occur in the leaf axils; staminate flowers grow toward the end of the plant and pistillate closer to the base. [Wikipedia]

Muskgrass (aka, Skunkweed) (Chara sp.)

*Chara* is a genus of green algae in the family Characeae. They are multicellular and superficially resemble land plants because of stem-like and leaf-like structures. They are found in fresh water, particularly in limestone areas throughout the northern temperate zone, where they grow submerged, attached to the muddy bottom. They prefer less oxygenated and hard water and are not found in waters where mosquito larvae are present. They are covered with calcium carbonate deposits.

The branching system of *Chara* species is complex with branches derived from apical cells which cut off segments at the base to form nodal and internodal cells alternately. They are typically anchored to the littoral substrate by means of branching underground rhizoids. *Chara* plants are rough to the touch because of deposited calcium salts on the cell wall. The metabolic processes associated with this deposition often give *Chara* plants a distinctive and unpleasant smell of hydrogen sulfide.

The plant body is a gametophyte. It consists of a main axis (differentiated into nodes and internodes), dimorphic branches (long brach of unlimited growth and short branches of limited growth), rhizoids (multicellular with oblique septa) and stipulodes (needle shaped structures at the base of secondary laterals).

*Chara* reproduces vegetatively and sexually. Vegetative reproduction takes place by tubers, amyllum stars and secondary protonema. The fructifications for sexual reproduction are globle or antheridium (male) and nucule or archegonium (female). [Wikipedia]

Hydrilla (Hydrilla verticillata)

*Hydrilla* (Esthwaite Waterweed or Hydrilla) is an aquatic plant genus, usually treated as containing just one species, *Hydrilla verticillata*, though some botanists divide it into several species. Synonyms include *H. asiatica*, *H. japonica*, *H. lithuanica*, and *H. ovalifolia*. It is native to the cool and warm waters of the Old World in Asia, Europe, Africa and Australia, with a sparse, scattered distribution; in Europe, it is reported from Ireland, Great Britain, Germany, and the Baltic States, and in Australia from Northern Territory, Queensland, and New South Wales. The stems grow up to 1–2 m long. The leaves are arranged in whorls of two to eight around the stem, each leaf 5–20 mm long and 0.7–2 mm broad, with serrations or small spines along the leaf margins; the leaf midrib is often reddish when fresh. It is monoecious (sometimes dioecious), with male and female flowers produced separately on a single plant; the flowers are small, with three sepals and three petals, the petals 3–5 mm long, transparent with red streaks. It reproduces primarily
vegetatively by fragmentation and by rhizomes and turions (overwintering), and flowers are rarely seen.

Hydrilla has a high resistance to salinity (> 1-100000 ppt) compared to many other freshwater associated aquatic plants.

The name Esthwaite Waterweed comes from its occurrence in Esthwaite Water in northwestern England, the only English site where it is native, but now presumed extinct, having not been seen since 1941. *Hydrilla* closely resembles some other related aquatic plants, including *Egeria* and *Elodea*. [Wikipedia]