Wetland Plants of Great Salt Lake
A guide to identification, communities, & bird habitat

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Karin Kettenring · Mark Larese-Casanova

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Preface

The wetlands of Great Salt Lake (GSL) are internationally important bird use areas, ecological wonders, and local treasures. I feel lucky to have spent each summer during 2012–2015 immersed in these wetlands, identifying plants as part of my dissertation work at Utah State University. Originally, the plant data I gathered was intended to be used in developing an index of the condition of GSL wetlands; however, it quickly became apparent that the data would also provide useful information for a wide range of organizations, agencies, and people.

Around this same time, Maureen Frank was working on a guide to GSL wetland vegetation and how to manage native plants as high-quality habitat for birds. This book is a combination of Maureen’s and my research and showcases a current, comprehensive list of GSL wetland plants. Native wetland plants are the first link in complex food webs, and they highlight the unique ecology of each wetland community and the diversity of wetland-dependent bird species.

From deep, submersgent wetlands at the heart of conservation areas, to the flat, salty playas where killdeer dart back and forth, my hope is that this guide provides you a window into the fascinating inner workings of GSL wetlands. Together, I believe our efforts in dedicating time, knowledge, and resources to understanding GSL wetland plants will benefit every species that depends on these wetlands, including ourselves.

Rebekah Downard

Acknowledgments

Funding for the development of this guide was generously provided by Utah State University Extension and a Wetland Program Development Grant from the Environmental Protection Agency through the Utah Geological Survey.

Rebekah would like to thank Diane Menuz with the Utah Geological Survey and Dr. Toby Hooker with the Utah Department of Water Quality for their help in assembling a comprehensive plant species list.

Maureen wishes to thank Howard Browers from the Bear River Migratory Bird Refuge for his help classifying birds and for providing an understanding of wetland systems.
About this guide

_Wetland Plants of Great Salt Lake: A Guide to Identification, Communities, and Bird Habitat_ is designed to assist researchers, land managers, birders, and wetland enthusiasts. Its color-coded chapters represent plant communities surrounding Great Salt Lake (GSL):

- **Chapter 1:** Submergent Wetlands (p. 9)
- **Chapter 2:** Emergent Wetlands (p. 29)
- **Chapter 3:** Meadow Wetlands (p. 69)
- **Chapter 4:** Playa Wetlands (p. 111)
- **Chapter 5:** Upland Plants (p. 135)

Each wetland community is classified by its topography, dominant plants, hydroperiod, and water chemistry (See Table 1.1, p. 3). The Upland Plants chapter lists species that occasionally disperse to and survive in wetlands but do not represent a wetland community. All chapters include a community description, a plants list, plant identification pages, and bird information and images. To view where wetland communities are located around GSL, use the *Wetland plant communities of Great Salt Lake* map (p. xii).

Plant species are listed in the wetland community where they are most commonly found. However, some species may be found in multiple communities (pp. x–xi). Each plant species is described in detail with four accompanying images, including the whole plant (big), its habitat (top left), its flowers, inflorescences, or seeds (top middle), and its leaves, stems, or both (top right). See the glossary for illustrations and definitions of plant anatomy (pp. 184–195). Each plant’s historical, medicinal, or distinguishing facts are included in the facts section when applicable.

Many state, regional, and national plant identification resources, or floras, were used to complete each plant identification page: *Vascular Plants of Northern Utah*, *A Utah Flora*, *Intermountain Flora*, *Manual of Grasses for North America*, and *Flora of North America*. Look to these sources for additional information.

Plant taxonomy—the classification of species into related groups—changes frequently as scientists use DNA research to find how species are related. The species names included in this guide represent
the current accepted names according to the U.S. Department of Agriculture PLANTS Database, as of December 2015. Older plant species’ names are included as synonyms when appropriate.

Bird species are pictured in their preferred wetland community based on nesting, foraging, and resting connections to plants within that community. They may be referred to by groups, such as waterfowl, shorebirds, waterbirds, and passerines.

Many bird species listed in this guide are highly dependent on GSL wetlands. This dependency qualifies them as species of special management concern or priority bird species (See Table 1.2, p. 7). Priority bird species represent the general habitat requirement of other bird species that may not be mentioned here.

The scientific and common names of bird species included in this guide correspond with the most recent scientific consensus as published in the American Ornithologists’ Union checklist, 57th Supplement, July 2016. Bird taxonomy is subject to change.
Using the general plant information key

A general plant information key is located on the bottom left of each identification page. It indicates a plant species’ typical wetland community (color), wetland indicator status, duration and growth form, nativity, and commonness. If a species is found in more than one wetland community, a colored line below the key will represent the other community. The example below shows that this species is typically found in submergent wetlands (blue) but may also be found in emergent wetlands (green).

<table>
<thead>
<tr>
<th>Wetland indicator:</th>
<th>Duration &amp; growth:</th>
<th>Nativity in lower 48:</th>
<th>Commonness:</th>
</tr>
</thead>
<tbody>
<tr>
<td>OBL</td>
<td>PF</td>
<td>N</td>
<td>C</td>
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One can also infer, using the categories below, that this species is an obligate wetland plant, a perennial forb, and a native plant in the United States that is common in Great Salt Lake submergent wetlands.

### Wetland Indicator Status

- **Obligate Wetland Species (OBL):** nearly always occur in wetlands
- **Facultative Wetland Species (FACW):** usually occur in wetlands
- **Facultative Species (FAC):** occur in both wetlands and uplands
- **Facultative Upland Species (FACU):** usually occur in uplands
- **Upland Species (UPL):** rarely occur in wetlands
- **No Indicator Status (NA):** no wetland indicator status

### Duration and Growth Form

- **Duration**
  - **Annual (A):** completes life cycle and dies in one growing season
  - **Perennial (P):** part of the plant persists year to year
  - **Biennial (B):** requires 2 years to complete life cycle
  - **Annual or perennial (AP):** depends on local conditions
  - **Annual, perennial, or biennial (APB):** depends on local conditions
Growth Form

**Graminoid (G):** grasses and grass-like plants, including species in the families Poaceae, Cyperaceae, and Juncaceae

**Forb (F):** a plant that is not a graminoid and not woody, also called an herb

**Shrub (S):** perennial, woody plant, usually < 5 meters (16 ft) tall, often multi-stemmed

**Vine (V):** a climbing or twining plant with long stems

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<th>G</th>
<th>F</th>
<th>S</th>
<th>V</th>
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<tbody>
<tr>
<td><strong>A</strong></td>
<td>AG</td>
<td>AF</td>
<td>AV</td>
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<td><strong>P</strong></td>
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<td><strong>B</strong></td>
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<td><strong>AP</strong></td>
<td>APF</td>
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<tr>
<td><strong>APB</strong></td>
<td>APBF</td>
<td></td>
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</tbody>
</table>

**Nativity in the Lower 48 States**

**Native (N):** naturally occurring in the contiguous United States

**Introduced (I):** accidentally or deliberately introduced from outside the United States

**Native and Introduced (NI):** introduced in part of the range

**Commonness in Wetland Community**

**Common (C):** found abundantly in the appropriate GSL wetland community

**Uncommon (U):** found less abundantly in the appropriate GSL wetland community

**Occasional (O):** found infrequently in GSL wetlands
Wetland plant communities of Great Salt Lake

Submergent Wetland
Emergent Wetland
Meadow Wetland
Playa Wetland

Wetland Management Areas

A. Public Shooting Grounds Waterfowl Management Area
B. Bear River Migratory Bird Refuge
C. Harold Crane Waterfowl Management Area
D. Ogden Bay Waterfowl Management Area
E. The Nature Conservancy Shorelands Preserve
F. Farmington Bay Waterfowl Management Area
G. Inland Sea Shorebird Reserve
Great Salt Lake wetlands: water, plants, birds, and management

Great Salt Lake (GSL) is renowned throughout North America for its size, salinity, and importance to migratory bird flyways. Located in the Great Basin, the lake encompasses approximately 4,400 km² (1,087,000 ac) of northern Utah and is the largest terminal lake in North America. Nearly 1,400 km² (351,000 ac) of wetlands surround GSL’s shorelines; these wetlands teem with life and are a flooded oasis in an otherwise arid region.

From submergent wetlands to playas, plant communities play a vital part in GSL wetland ecosystems. Wetland plants provide habitat for insects, amphibians, fish, reptiles, mammals, and birds that thrive in wetlands. In fact, Great Salt Lake was designated a Western Hemisphere Shorebird Reserve Network because over 250 bird species migrate to and rely on its wetlands for food, cover, and rest. Together, water, plants, and birds contribute to healthy, vibrant GSL wetland communities. Managing GSL’s wetland plant communities is a tremendous, yet necessary challenge that stands to benefit many stakeholders.

Water

Water is the defining feature of wetlands. From tiny microbes to hardy plants and towering great blue herons, all GSL wetland life is tied together by the presence of water. Water factors such as depth, flooding pattern, and chemistry differentiate the types of wetland communities.
Water levels at GSL and surrounding wetlands fluctuate with changes in snowpack, upstream irrigation demand, and evaporation. Fluctuations are cyclical, but irregular, and have a direct impact on how GSL wetlands function. For the past 15,000 years, water has only been able to leave GSL via evaporation. Meanwhile, salts and other minerals have been left behind and continue to accumulate as GSL’s three main tributaries—the Bear, Weber, and Jordan rivers—contribute more than 2 million tons of salt to the lake each year. Over time, the accumulation of salt has increased GSL’s salinity to 3–7 times the concentration of seawater.22

Wetlands are classified, in part, by the length of time and depth they are flooded. The pattern of flooding and drawdown is called the hydroperiod.36 Depending on the type of GSL wetland, flooding can vary from permanent, deep flooding to temporary saturation. Temporarily flooded wetlands, like playas, are only flooded for brief periods during the growing season, which runs from approximately April to October. Submergent and emergent wetlands are often semi-permanently flooded with standing water throughout most of the growing season. The hydroperiod and water source influence the salinity and alkalinity (pH) of a wetland, shaping the plant community. See Table 1.1 (p. 3) for specific hydroperiod depth and duration attributes of each wetland community.

The salinity and alkalinity of the water in GSL and associated wetlands fluctuates throughout the year. These fluctuations occur when freshwater inflows peak during spring snowmelt conditions, and when evaporation increases with rising summer temperatures. When GSL’s water level is low, an additional 1,678 km² (414,688 ac) of saline mudflats and playas are exposed.55 The receding lake leaves behind high concentrations of salts and other elements, leading to high salinity and alkalinity in exposed wetland soils. Brackish wetlands, those with salinities in between fresh and saline conditions, are common where periodic freshwater inflows have flushed hypersaline soils. Freshwater wetlands are found close to freshwater sources like streams and springs. Generally, the longer and deeper wetlands are flooded, the lower the salinity will be. Many GSL wetlands are alkaline, which means the soil or water has a pH higher than 7.4. See Table 1.1 (p. 3) for water chemistry types specific to each wetland community.
## Great Salt Lake wetland communities

<table>
<thead>
<tr>
<th></th>
<th>Submergent Wetlands</th>
<th>Emergent Wetlands</th>
<th>Meadow Wetlands</th>
<th>Playa Wetlands</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Elevation, distance to freshwater</strong></td>
<td>Closest to freshwater where deep flooding is possible; farthest from GSL shoreline</td>
<td>Intermediate elevations in large, flat areas where flooding is shallow</td>
<td>Higher elevation between uplands and deeply flooded wetlands</td>
<td>At lowest elevations; expanding when shoreline recedes</td>
</tr>
<tr>
<td><strong>Dominant plants</strong></td>
<td>Submerged aquatic vegetation growing in the water column</td>
<td>Tall vegetation growing up through the water surface</td>
<td>Mid-height, dense grasses and forbs</td>
<td>Sparse growth of short, salt-loving plants</td>
</tr>
<tr>
<td><strong>Hydroperiod</strong></td>
<td>Permanently to semi-permanently flooded; deep: 40–90 cm (16–35 in) to shallow: 10–45 cm (4–18 in)</td>
<td>Seasonally to semi-permanently flooded with drawdown; deep: 20–30 cm (8–12 in) to shallow: 5–20 cm (2–8 in)</td>
<td>Seasonally flooded to saturated; very shallow: less than 5 cm (2 in), to saturated soils</td>
<td>Temporarily flooded; shallow: 0–5 cm (0–2 in), dry most of the season</td>
</tr>
<tr>
<td><strong>Water chemistry</strong></td>
<td>Fresh to brackish</td>
<td>Fresh to brackish</td>
<td>Fresh to brackish</td>
<td>Salty and alkaline</td>
</tr>
<tr>
<td><strong>Management tactics</strong></td>
<td>Maintain consistent flooding; low to moderate salinity; dredge nutrient-rich sediments; minimize physical disturbance</td>
<td>Ensure spring, fall flooding; drawdown to stimulate seed production; prevent undesirable species invasion</td>
<td>Manage for a diverse mosaic of plants</td>
<td>Protect ground-nesting birds from predators and flooding</td>
</tr>
</tbody>
</table>

Table 1.1
Plants

Plants, another defining feature of wetlands, determine what ecosystem functions a wetland might provide. Some plant species are effective at filtering pollutants out of the water, and others are beneficial because they prevent erosion, buffer nearby communities against flooding, or provide food and resting space for wildlife. See Table 1.1 (p. 3) that lists the dominant plant types in each community.

Wetland plants have a variety of adaptations that allow them to live and reproduce in flooded, low oxygen conditions and during periodic droughts or drawdown. General adaptations differ for each wetland plant community depending on the conditions plants must face in that habitat.

Submerged aquatic vegetation (SAV) have flexible, floating stems and leaves that are capable of photosynthesizing in low light.

Emergent plants have rigid stems that can grow exceptionally fast in order to keep leaves and flowers above the surface of the water.

Meadow plant species have a variety of underground adaptations that enable survival in variable conditions. These adaptations include dense root growth for soil stabilization and creeping or floating stems for rapid expansion.

Playa plants thrive in an especially harsh environment with a variety of adaptations such as very small leaves that reduce water loss during periods of drought and internal chambers that hold salts.

Wetland plants also vary in their reproductive adaptations in order to take advantage of dynamic water conditions. Many SAV and emergent plants have large, nutritious, floating seeds that must be eaten by ducks in order to germinate; this requirement ensures that such seeds will travel far before sprouting. Some meadow plant species have light, wind-dispersed seeds capable of floating to bare soil patches that are ideal for germination. When conditions are favorable—often the short period of the year when water is present—several playa species have short life cycles that allow them to reproduce quickly.
In addition to seed adaptations, many wetland plants are capable of reproducing without seeds, a strategy known as vegetative or asexual reproduction. When deep water or dry soil conditions exist and make seed germination and establishment difficult, some plants sprout new shoots from modified stem parts. These shoots are called rhizomes and stolons. Rhizomes are underground stems, and stolons are aboveground stems. Both rhizomes and stolons enable wetland plants to clone themselves and maintain or expand the area they cover.

**Birds**

Great Salt Lake wetlands provide habitat for many different kinds of wildlife, most notably, migratory birds. At times, over 6 million birds may be present on and around GSL, including priority species (See Table 1.2, p. 7). GSL wetlands are particularly important because they constitute more than 75% of Utah’s wetlands.

The amount of available food and the quality of cover that wetland plants provide determine the type and number of birds and wildlife that wetland communities support. The main groups of birds found in GSL wetlands are waterfowl, shorebirds, and waterbirds.

*Waterfowl* are relatively large birds that spend a considerable amount of time swimming or diving. Birds classified as waterfowl include ducks, geese, and swans.

*Shorebirds* are small-bodied, long-legged wading birds like plovers, stilts, and sandpipers. They are typically found next to water or in shallow water rather than swimming. Nine species of shorebirds regularly breed and nest at GSL wetlands. Another 14 species regularly occur in the ecosystem during some part of the year.

*Waterbirds* can be large or small and include pelicans, grebes, and herons. Sixteen species of waterbirds live on or near the water in GSL wetlands, often in colonies.

Two additional bird groups include songbirds and birds of prey. These two groups rely on wetlands less than waterfowl, shorebirds, and waterbirds, but they are often found in or near GSL wetland habitats.
Birds are attracted to GSL wetland habitats because of the abundance of foraging and cover resources that are otherwise unavailable or uncommon in the surrounding arid region. Numerous species of birds consume plant seeds, while stems and leaves provide structure and cover for aquatic macroinvertebrates, amphibians, fish, reptiles, and small mammals that birds will also consume. Nesting birds and their young rely on the cover that wetland plants provide in order to hide from predators. See Table 1.2 (p. 7) for a list of priority bird species and how those species use various preferred GSL wetlands.

Wetland managers have goals and plans that prioritize maintaining and improving bird populations via wise habitat management. Priority species receive special management because GSL and its surrounding wetlands are particularly important to those species. In fact, GSL wetlands host a large proportion of several bird species’ continental population. Many species use different wetland communities depending on when they visit GSL wetlands. During the fall migration, birds rely on more deeply flooded wetlands when foraging is critical. In spring, birds value wetlands with dense vegetation that is suitable for nesting habitat. Birds will also use different wetland communities based on their diet and adaptations to varying water depths. Management often focuses on maintaining a mosaic of wetland communities that support a diversity of migratory birds year round.
Great Salt Lake Priority Bird Species\textsuperscript{18, 39}

<table>
<thead>
<tr>
<th>Species</th>
<th>Group</th>
<th>*Foraging Habitat</th>
<th>*Breeding Habitat</th>
</tr>
</thead>
<tbody>
<tr>
<td>American avocet</td>
<td>Shorebird</td>
<td><img src="F18F19E000.png" alt="Submergent" /> <img src="F18F19F19.png" alt="Emergent" /> <img src="F18F19F1A.png" alt="Meadow" /> <img src="F18F19F1B.png" alt="Playa" /></td>
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<tr>
<td>American white pelican</td>
<td>Waterbird</td>
<td><img src="F18F19E000.png" alt="Submergent" /> <img src="F18F19F19.png" alt="Emergent" /> <img src="F18F19F1A.png" alt="Meadow" /> <img src="F18F19F1B.png" alt="Playa" /></td>
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<td>Black-necked stilt</td>
<td>Shorebird</td>
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<tr>
<td>Black tern</td>
<td>Waterbird</td>
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<tr>
<td>Cinnamon teal</td>
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<td>Forster’s tern</td>
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<td>Franklin’s gull</td>
<td>Waterbird</td>
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<td>Green-winged teal</td>
<td>Waterfowl</td>
<td><img src="F18F19E000.png" alt="Submergent" /> <img src="F18F19F19.png" alt="Emergent" /> <img src="F18F19F1A.png" alt="Meadow" /> <img src="F18F19F1B.png" alt="Playa" /></td>
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<td>Long-billed curlew</td>
<td>Shorebird</td>
<td><img src="F18F19E000.png" alt="Submergent" /> <img src="F18F19F19.png" alt="Emergent" /> <img src="F18F19F1A.png" alt="Meadow" /> <img src="F18F19F1B.png" alt="Playa" /></td>
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<tr>
<td>Long-billed dowitcher</td>
<td>Shorebird</td>
<td><img src="F18F19E000.png" alt="Submergent" /> <img src="F18F19F19.png" alt="Emergent" /> <img src="F18F19F1A.png" alt="Meadow" /> <img src="F18F19F1B.png" alt="Playa" /></td>
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<tr>
<td>Marbled godwit</td>
<td>Shorebird</td>
<td><img src="F18F19E000.png" alt="Submergent" /> <img src="F18F19F19.png" alt="Emergent" /> <img src="F18F19F1A.png" alt="Meadow" /> <img src="F18F19F1B.png" alt="Playa" /></td>
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</tr>
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*Organized by most to least preferred

Table 1.3
Management

Great Salt Lake wetland health is critical for resource managers, hunters, birders, conservationists, educators, photographers, and all who value wetland plants and birds. However, maintaining and managing wetland health is difficult. Drought, invasive species, and pollutants thwart many management efforts.

To produce as many wetland benefits and functions as possible, managers often seek to maintain a mosaic of wetland communities with heterogeneous vegetation structure. This is achieved by using the main principles of wetland management summarized below:

- Ensure an adequate supply of water, both in quantity and quality
- Provide favorable interspersion of open water and emergent vegetation for adequate foraging and nesting habitat
- Encourage vertical interspersion of vegetation in addition to horizontal

For wetlands that have water control structures, another principle can be applied:
- Ensure proper timing and duration of flooding

In unhealthy wetland communities, habitat management can be a foundation for rebuilding healthy ecosystem functioning. While the management recommendations above are generalizations, this book cites resources that managers can seek for specific guidance.

The first step in caring for GSL wetland communities—for researchers, land managers, birders, or wetland enthusiasts—is to learn about the plants and birds that inhabit these ecosystems. The following guide to wetland plants of GSL provides a good footing to that first step for anyone visiting these unique, beautiful wetlands.
Submergent Wetlands

Submergent wetlands are often referred to as ponds or open water wetlands. They are large, relatively deep, and flooded for most or all of the year. Approximately 260 km² (64,375 ac) of Great Salt Lake (GSL) wetland habitat is classified as submergent. Most of these submergent wetlands occur in large impoundments or wetland units where deep flooding can be accomplished through diking, diversion, and water level management. Submergent wetlands are characterized by an abundance of submerged aquatic vegetation (SAV) that grows while submerged within the water column or floating on the water’s surface. Most SAV are well adapted in constantly flooded environments because of tuberous roots and large, floating seeds.

Plants

Spiral ditchgrass (Ruppia cirrhosa, p. 24) and sago pondweed (Stuckenia pectinata, p. 23) are two of the most common and valuable GSL submergent species. Both tolerate elevated salinity and are high-quality food sources for migratory birds; however, sago pondweed is considered the cornerstone SAV species. Its presence in a submergent wetland indicates the wetland’s productivity for birds. The entire plant is edible and highly nutritious, including the leaves, tubers, and large seeds. Spiral ditchgrass is also highly nutritious but less productive; its importance to bird diets increases significantly during the winter months when other food sources are rare.
Wetland water level management is a key tool for maintaining the appropriate levels of salinity and depth necessary for SAV growth and reproduction. In GSL wetlands, a flush of freshwater in the spring is important for maintaining optimal water and salinity levels. Freshwater inflow varies throughout GSL wetlands, so managing SAV is easier in areas with a consistent supply of freshwater than in areas that experience frequent summertime drought. To stimulate the most plant production and therefore create the highest food availability for birds, 38–45 cm (15–18 in) of water with brackish salinity (9–15 ppt) is optimal for sago pondweed. Spiral ditchgrass thrives best in shallow wetlands where water depth is often less than 30 cm (12 in) and salinity is between 10–21 ppt.

Submergent vegetation provides habitat for macroinvertebrates and fish, but the physical disturbances from these species tend to alter SAV. Sago pondweed is especially intolerant of disturbances created by carp (Cyprinidae family). Carp are invasive bottom-feeding fish that uproot plants and increase water turbidity while searching for food in the mud. Managers can use pesticides or hydrologic drawdowns to control carp populations and decrease physical disturbances in submergent wetlands.

Native SAV need nutrients like nitrogen and phosphorus to grow, but when water nutrient levels are too high, SAV can be negatively impacted. High levels of nitrogen or phosphorous cause algal blooms that block sunlight and inhibit the growth of SAV. At their thickest, algal blooms prevent birds from accessing food in the water column. To deal with excess nutrients, managers can draw down their wetlands, allowing nutrients to bind to soil particles, then managers can dredge and remove the soil.
# Submerged aquatic plants by family

**Azollaceae (Azolla family)**
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**Ceratophyllaceae (Hornwort family)**
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**Characeae (Stonewort family)**
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- *Spirodela polyrrhiza* | Great duckweed | 18

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- *Potamogeton foliosus* | Leafy pondweed | 20
- *Potamogeton nodosus* | Longleaf pondweed | 21
- *Stuckenia filiformis* | Fineleaf pondweed | 22
- *Stuckenia pectinata* | Sago pondweed | 23

**Ruppiaceae (Ditchgrass family)**
- *Ruppia cirrhosa* | Spiral ditchgrass | 24

**Zannichelliaceae (Horned pondweed family)**
- *Zannichellia palustris* | Horned pondweed | 25
Azollaceae

*Azolla microphylla*

Mexican mosquitofern

**Habitat**
Permanently flooded wetlands, ponds, and slow-moving streams

**Stems and Roots**
Free-floating mats to 2 cm (0.8 in) across; small roots

**Leaves**
Pinnately compound branching, two-lobed leaves, green to red

**Flowers and Seeds**
No flowers; sporocarps located on underside of leaves

**Facts**
Synonym: *A. mexicana*

Mosquitofern is a fern, not a flowering plant.
**Ceratophyllaceae**

*Ceratophyllum demersum*

Coon’s tail

**Habitat**
Streams, ditches, ponds

**Stems and Roots**
Submerged, 1 m (3.2 ft) long stems, freely branched and tangled; rootless

**Leaves**
Whorls of 5–12 flat, linear leaves, toothed margins

**Flowers and Seeds**
Inconspicuous flowers in leaf axils; elliptical achene

**Facts**
Synonym: *C. apiculatum*

Coon’s tail can be distinguished from *Myriophyllum* species (p. 15) by its tiny, hidden flowers.
Characeae

Chara spp.

Chara

Habitat
Permanently flooded, alkaline wetlands

Stems and Roots
Multi-cellular algae attached to substrate via rhizoids

Leaves
No leaves; whorls of 6–16, light green, linear branches, gritty due to calcium carbonate deposits

Flowers and Seeds
No flowers; smells of hydrogen sulfide

Facts
Synonyms: stonewort, skunkweed, sandgrass

Chara is an algae often mistaken for a vascular plant.
Haloragaceae
Myriophyllum sibiricum
Shortspike watermilfoil

Habitat
Permanently flooded wetlands and ponds

Stems and Roots
Submerged, 30–80 cm (1–2 ft) long stems, slender with few branches

Leaves
Whorls of 4–5, thread-like, finely dissected leaves, 10 or fewer leaflets

Flowers and Seeds
Whorls of red flowers on short spikes held above water

Facts
Synonyms: *M. exalbescens*, *M. magdalenense*, *M. spicatum*

*M. spicatum*, an invasive milfoil, has longer leaves with more pairs of leaflets (16-21) than shortspike watermilfoil.
Lemnaceae
Lemna gibba
Swollen duckweed

Habitat
Permanently flooded wetlands, ponds, and slow-moving streams

Stems and Roots
Small floating plants, form colonies; single, small root per thallus

Leaves
Leafless; oval to round thallus, 5x4 mm (0.2x0.1 in); inflated air chambers below surface

Flowers and Seeds
Reproduction primarily by budding; flowers inconspicuous

Wetland indicator: OBL
Duration & growth: PF
Nativity in lower 48: N
Commonness: O
**Lemnaceae**

**Lemna minor**
Common duckweed

### Habitat
Permanently flooded wetlands, ponds, and slow-moving streams

### Stems and Roots
Small floating plants, form colonies; single, small root per thallus

### Leaves
Leafless, flat, oval, green or purple thallus, 3 faint veins; 4.5x3 mm (0.2x0.1 in)

### Flowers and Seeds
Reproduction primarily by budding; flowers inconspicuous

### Facts
- **Synonyms:** *L. cyclosta*, *L. minima*

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<th>Duration &amp; growth:</th>
<th>Nativity in lower 48:</th>
<th>Commonness:</th>
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<td>OBL</td>
<td>PF</td>
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</table>
**Lemnaceae**  
**Spirodela polyrrhiza**  
Great duckweed

**Habitat**  
Permanently flooded wetlands, ponds, and slow-moving streams

**Stems and Roots**  
Small floating plants; many roots per thallus

**Leaves**  
Leafless, 2–5 oval thalli connected by stalks, dark-green above, purple below, 5.5x3.5 mm (0.2x0.1 in)

**Flowers and Seeds**  
Reproduction primarily by budding, flowers inconspicuous

**Facts**  
Synonym: *Lemna polyrrhiza*

Great duckweed is distinguished from *Lemna* species (pp. 16–17) because it is larger and has many rootlets.
Potamogetonaceae

*Potamogeton crispus*
Curly-leaf pondweed

**Habitat**
Deeply flooded wetlands and slow-moving streams

**Stems and Roots**
Submerged, 40–80 cm (1.5–2 ft) long, freely branching stems, forming mats; slender, creeping rhizomes

**Leaves**
Alternate, flat, ribbon-like blades, 3–5 mm (0.1–0.2 in) wide, crisped margins

**Flowers and Seeds**
Stout, 3–5 cm (1–2 in) tall, pedunculate spikes of yellow flowers; ovate, beaked achenes

**Facts**
Synonyms: crisped pondweed, curly pondweed

Curly-leaf pondweed was first introduced to the Western United States by gun clubs.
Potamogetonaceae

Potamogeton foliosus
Leafy pondweed

Habitat
Shallowly flooded wetlands and slow-moving streams

Stems and Roots
Submerged, 20–100 cm (0.5–3 ft) long, slender, compressed stems, freely branching; matted, slender rhizomes

Leaves
Alternate, flat, ribbon-like blades, 1 mm (0.03 in) wide, entire margin

Flowers and Seeds
0.5–1.5 cm (0.2–0.6 in) tall, pedunculate spikes of crowded, globular, greenish flowers; achene with wavy keel

Narrow, flat leaves distinguish leafy pondweed from Stuckenia filiformis (p. 22) and S. pectinata (p.23), which have round leaves
Potamogetonaceae

**Potamogeton nodosus**
Longleaf pondweed

**Habitat**
Deeply flooded wetlands, ponds, and streams

**Stems and Roots**
Partially submerged, 40–150 cm (1–5 ft) long, round stems; stout rhizomes

**Leaves**
Submerged leaves lanceolate, 10–20 cm (4–8 in) long; floating leaves elliptical, 5–12 cm (2–5 in) long; all petiolate, alternate

**Flowers and Seeds**
Stout, pedunculate spikes of crowded, green-brown flowers; achene with 3 keels

**Facts**
Synonyms: *P. americanus*, *P. fluitans*, *P. oblongifolius*
Potamogetonaceae

Stuckenia filiformis
Fineleaf pondweed

Habitat
Shallowly flooded wetlands, slow-moving ditches

Stems and Roots
Submerged, 20–60 cm (0.5–2ft) long, slender stems; slender, creeping rhizomes, tubers

Leaves
Alternate, round, thread-like blades, 1–3 mm (.04–0.1 in) wide, blunt tip; sheaths fused into a tube

Flowers and Seeds
Slender, pedunculate, 3–10 cm (1–4 in) long spikes, 2–8 whorls of brown flowers; achene with rounded keel

Facts
Synonym: Potamogeton filiformis

Fineleaf pondweed is distinguished from S. pectinata (p. 23) by its wider leaves and fused leaf sheath.
Potamogetonaceae

Stuckenia pectinata
Sago pondweed

**Habitat**
Moderate to deeply flooded, fresh to brackish wetlands, and slow-moving ditches

**Stems and roots**
Submerged, 30–80 cm (1–2.5 ft) long, round stems, freely branched; slender, creeping rhizomes, tubers

**Leaves**
Alternate, round, thread-like blades, 1 mm (.04 in) thick, pointed tip; sheath open

**Flowers and Seeds**
Slender, 1–15 cm (0.4–6 in) long, pedunculate spikes with unequally spaced whorls of green-brown flowers, 0.5–1.1 mm (0.02–0.03 in) beak; achene with rounded keel

**Facts**
Synonyms: Coleogeton pectinatus, Potamogeton pectinatus

*See pp. 9–10 for additional information.*
**Ruppiaceae**  
*Ruppia cirrhosa*  
Spiral ditchgrass

**Habitat**  
Shallow to moderately deep flooded brackish or alkaline wetlands

**Stems and Roots**  
Submerged, 40–80 cm (1–2.5 ft) long, slender, freely-branched stems; creeping rhizomes

**Leaves**  
Alternate, round, slender, scattered or tufted blades, 1–10 cm (0.4–4 in) long, sheathing leaf-bases

**Flowers and Seeds**  
Flowers on spiraling peduncle; fruit a druplet

**Facts**  
Synonyms: *R. maritima*, *R. occidentalis*, *R. spiralis*, widgeongrass

Spiralling flower stalks are a unique feature of spiral ditchgrass.

*See p. 9 for additional information.*
Zannichellia palustris
Horned pondweed

Habitat
Deeply flooded, fresh to brackish wetlands and slow-moving ditches

Stems and Roots
Submerged, 30–50 cm (1–1.6 ft) long, slender stems, freely branched; slender, creeping rhizomes

Leaves
Opposite, linear, slender, light green blades, 2–8 cm (0.8–3 in) long

Flowers and Seeds
Axillary buds enclosing minute flowers; clusters of oblong achenes, toothed margins

Facts
Synonym: Z. major
Horned pondweed has opposite leaves, which distinguish it from other pondweeds.
Submergent Birds

Birds

When submergent wetlands are managed for a variety of water depths and wetland complexes, they maintain a high diversity of birds (pp. 27–28). Deep submergent wetlands provide ideal conditions for waterfowl that feed on lush SAV growth, while shallow submergent wetlands attract shorebirds that hunt for the large, complex populations of aquatic macroinvertebrates living on the plants.7; 39

A variety of waterfowl and other birds are attracted to high-quality submergent wetlands. Tundra swans (Cygnus columbianus) and many diving ducks, including canvasbacks (Aythya valisineria) and common mergansers (Mergus merganser), rest in submergent wetlands during their annual migrations. While resting, these species feed extensively on the leaves and tubers of sago pondweed.10 Dabbling ducks, including the northern pintail (Anas acuta) and American wigeon (Anas americana), consume the seeds of many SAV species, especially sago pondweed and spiral ditchgrass.3 Many of the waterfowl and shorebird species mentioned in subsequent chapters forage on vegetation and macroinvertebrates in submergent wetlands during their fall migration.7

Submergent wetlands, particularly deep submergent wetlands, provide habitat for piscivorous (fish-eating) birds that prey on fish hiding among SAV.39 Piscivorous bird species in GSL wetlands include the American white pelican (Pelecanus erythrorhynchos), double-crested cormorant (Phalacrocorax auritus), pied-billed grebe (Podilymbus podiceps), and the common merganser. Even birds of prey, including the bald eagle (Haliaeetus leucocephalus), fly over submergent wetlands in search of fish.

In addition to feeding in submergent wetlands, a few priority bird species will also use submergent plant species for breeding and nesting. Black terns (Chlidonias niger) breed in shallow submergent wetlands, and Clark’s and western grebes (Aechmophorus clarkii; A. occidentalis) will use sago pondweed to build floating nests on the water of these deep wetlands.33 Because they support so many different types of birds throughout the year, maintaining healthy, flooded submergent wetlands is a critical wetland management goal at GSL.
Submergent Birds

Tundra swan
*Cygnus columbianus*

Canvasback
*Aythya valisineria*

Common merganser
*Mergus merganser*

Northern pintail
*Anas acuta*

American wigeon
*Anas americana*

American white pelican
*Pelecanus erythrorhynchos*
Double-crested cormorant  
*Phalacrocorax auritus*

Western grebe  
*Aechmophorus occidentalis*

Bald eagle  
*Haliaeetus leucocephalus*

Black tern  
*Chlidonias niger*

Pied-billed grebe  
*Podilymbus podiceps*

Clark’s grebe  
*Aechmophorus clarkii*
Emergent wetlands are what many people imagine when they think of marshes that fringe lakes and ponds. They are characterized by a mix of open water and vegetation that grows in, but emerges from, the surface of the water. Over the course of a year, emergent wetland water levels can fluctuate considerably between deeply flooded and dry. The emergent wetlands surrounding Great Salt Lake (GSL) are often located near large submergent wetlands and encompass approximately 520 km² (129,693 ac). Emergent wetlands are dominated by stout, fast-growing bulrushes, cattails, and large grasses.

Plants
Alkali bulrush (*Bolboschoenus maritimus*, p. 39), hardstem bulrush (*Schoenoplectus acutus*, p. 40), and Olney’s threesquare (*Schoenoplectus americanus*, p. 41) are three species of bulrushes that provide essential migratory bird habitat. Each thrives under slightly different flooding and water chemistry conditions, but all reproduce by rhizomes as well as by seeds. Rhizomes allow stands of bulrushes to persist under stressful drought or flooding conditions that are characteristic of emergent wetlands.

Alkali bulrush, the shortest and most valuable bulrush species, grows in expansive, loose stands. While it grows best in 5–15 cm (2–6 in) of water, it also benefits from seasonally fluctuating water levels and is capable of withstanding both temporary, deep flooding and
short-term drought. This hardy species can tolerate highly alkaline soils up to 9.0 pH, and while it grows most robustly when salinity is below 6 ppt, it can tolerate extended periods of time at salinities near 10 ppt with no increase in plant mortality.

Hardstem, the tallest bulrush, grows in dense stands of deeply flooded wetlands (up to 30 cm or 12 in deep); however, it has lower drought and salinity tolerances than alkali bulrush. Adult plants can tolerate salinities near 6 ppt with very little reduction in growth, but mortality increases at salinities above that level. During periods of drawdown, the soil must remain saturated for long-term maintenance of hardstem bulrush.

Olney’s threesquare, another dense, stand-forming bulrush, gets its name from its concave, triangular stem. Thriving best in shallow water of at least 10 cm (4 in), Olney’s threesquare can tolerate water depths up to 30 cm (12 in). Olney’s threesquare can also tolerate brackish conditions, around 6 ppt for up to 2 months, but will grow shorter as salinity approaches 12 ppt.

In addition to bulrushes, cattails (Typha spp., pp. 64–65) are common in GSL emergent wetlands. Although native, cattails are often viewed as undesirable species because they can colonize wetlands after a disturbance or when water stagnates, forming dense monocultures that outcompete habitat-forming plants like bulrushes. Without proper management of water flow, salinity, and nutrients, cattails will form dense, monotypic stands that waterfowl and other large birds cannot use. Water management, herbicide application, mowing, disking, grazing, burning, or a combination of those techniques can be useful in preventing cattails from growing too densely.
## Emergent Plants by Family

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<th>Genus</th>
<th>Species</th>
<th>Common Name</th>
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<tr>
<td>Alismataceae (Water plantain family)</td>
<td><em>Sagittaria cuneata</em></td>
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<td>Arrowhead</td>
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<td>Apiaceae (Carrot family)</td>
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<td>Poison hemlock</td>
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<td>Asclepiadaceae (Milkweed family)</td>
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<td>Swamp milkweed</td>
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<td>Asteraceae (Aster family)</td>
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<td>Western goldentop</td>
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<td>Brassicaceae (Mustard family)</td>
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<td><em>Rorippa palustris</em></td>
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<td>Marsh yellowcress</td>
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<td>Cyperaceae (Sedge family)</td>
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<td>Alkali bulrush</td>
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<td>Hardstem bulrush</td>
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<td><em>Schoenoplectus americanus</em></td>
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<td>Olney’s threesquare</td>
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<td></td>
<td><em>Schoenoplectus pungens</em></td>
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<td>Common threesquare</td>
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<td>Grossulariaceae (Currant family)</td>
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<td>Hippuridaceae (Mare’s-tail family)</td>
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<td>Common mare’s-tail</td>
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<td><em>Mentha arvensis</em></td>
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<td>Wild mint</td>
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**Alismataceae**

*Sagittaria cuneata*

Arrowhead

**Habitat**
Shallow to moderately deep ponds, slow-moving streams

**Stems and Roots**
10–50 cm (4–6 in) tall, emergent stem; rhizomes, tubers

**Leaves**
Basal, hastate blades, long petioles; ribbon-like submerged blades

**Flowers and Seeds**
2–8 whorls of large, white, 3-petal flowers, deciduous; globular fruiting bodies

**Facts**
Synonyms: wapato, duck potato, *S. arifolia*
Apiaceae

Conium maculatum
Poison hemlock

Habitat
Saturated soils, ditchbanks

Stems and Roots
30–60 cm (1–2 ft) tall, hollow stems with purple spots, branching above; taproots

Leaves
Opposite, pinnately dissected blades, petiolate; lower leaves sessile

Flowers and Seeds
Compound umbels of numerous, small, white, 5-petal flowers; seeds oblong, ribbed

Facts
Ingesting poison hemlock can be fatal.
Conium is the poison that is believed to have killed Socrates.
Asclepiadaceae

**Asclepias incarnata**
Swamp milkweed

**Habitat**
Shallowly flooded wetlands, streams, and ditchbanks

**Stems and Roots**
40–150 cm (1–5 ft) tall, stout stems with milky latex; short rhizomes

**Leaves**
Opposite or whorled, linear-lanceolate blades, pointed tips

**Flowers and Seeds**
Pink, 5-petal flowers in umbelliform cymes, petals with corona; seed comas

**Facts**
Swamp milkweed provides habitat for butterflies, and its seed comas have been used as pillow and life jacket stuffing.
**Asteraceae**

*Euthamia occidentalis*

Western goldentop

**Habitat**
Temporarily to permanently saturated soils

**Stems and Roots**
50–200 cm (0.6–6 ft) tall, stout stems, branched above; creeping rhizomes

**Leaves**
Many alternate, sessile, lanceolate blades; smooth surface, scabrous margins

**Flowers and Seeds**
Flat-topped corymbs of many small yellow flowers, involucres pale yellow, pappus of capillary bristles

**Facts**
Synonyms: false goldenrod, *Solidago occidentalis*

Western goldentop is taller than *Symphiotrichum ciliatum* (p. 79); its similar aster and flower heads are globular prior to blooming.
**Habitat**
Shallow, slow-flowing streams and wetlands

**Stems and Roots**
10–60 cm (4 in–2 ft) tall, hollow stems, decumbent to ascending, forming dense colonies; fibrous roots

**Leaves**
Alternate, pinnately compound blades with pairs of elliptical leaflets, auriculate petiole

**Flowers and Seeds**
Terminal and axillary racemes of white, 4-petal flowers; silique

**Facts**
Synonym: *Sisymbrium nasrutium-aquaticum*

Watercress is used as a popular salad herb because of its spicy, peppery flavor.
Brassicaceae

*Rorippa palustris*
Marsh yellowcress

**Habitat**
Shallowly flooded wetlands and streambanks

**Stems and Roots**
20–100 cm (8 in–3.3 ft) tall, stout stems, branched above; taproots

**Leaves**
Alternate, cauline and basal, oblong and deeply lobed blades, margins irregularly toothed, clasping petiole

**Flowers and Seeds**
Terminal and axillary racemes of small, yellow, 4-petal flowers; silicle or siliqua
Cyperaceae

*Bolboschoenus maritimus*
Alkali bulrush

**Habitat**
Temporarily to permanently shallow-flooded, alkaline or saline wetlands

**Stems and Roots**
20–150 cm (8 in–5 ft) tall, stout, triangular culms; rhizomes, firm tubers

**Leaves**
Several long, flat, cauline blades

**Flowers and Seeds**
Compact cluster of 3–25 spikelets, scales tan or light brown, 2+ leaf-like involucre bracts; brown, lenticular achene

**Facts**
Synonyms: cosmopolitan bulrush, *Schoenoplectus maritimus*, *Scirpus maritimus*

*See pp. 29–30 for additional information.*
**Cyperaceae**

*Schoenoplectus acutus*

Hardstem bulrush

**Habitat**
Shallow to deeply flooded wetlands and shorelines

**Stems and Roots**
1–3 m (3–10 ft) tall, round, firm culms, >1 cm (0.4 in) across; rhizomatous

**Leaves**
Few, short blades near bottom of stem or bladeless sheaths

**Flowers and Seeds**
Open, branched inflorescence of 20+ spikelets, scales gray-brown with red spots; erect, stem-like involucre bract; small, dark brown, lenticular achene

**Facts**
Synonym: *Scirpus acutus*

*S. tabernaemontani* is similar in appearance to hardstem bulrush but is not found near GSL.

*See pp. 29–30 for additional information.*

---

Wetland indicator: **OBL**
Duration & growth: **PG**
Nativity in lower 48: **N**
Commonness: **C**

40
Cyperaceae

Schoenoplectus americanus
Olney’s threesquare

Habitat
Semi-permanent, shallowly flooded wetlands

Stems and Roots
50–150 cm (1.5 ft–5 ft) tall, clustered, sharply 3-sided, concave culms; rhizomatous

Leaves
Few, short blades on lower part of stem

Flowers and Seeds
Small, compact cluster of 2–15 spikelets, scales yellow-brown to red-brown, 1 stem-like involucre bract; small, dark-brown, lenticular achene

Facts
Synonyms: Scirpus americanus, S. olneyi, S. chilensis, S. conglomeratus

*See pp. 29–30 for additional information.
Cyperaceae

*Schoenoplectus pungens*
Common threesquare

**Habitat**
Saturated to shallowly flooded, alkaline wetlands

**Stems and Roots**
15–100 cm (0.5–3.3 ft) tall, triangular culms; rhizomatous

**Leaves**
Several flat or folded blades near base of stem

**Flowers and Seeds**
Compact cluster of 1–6 spikelets, scales yellow-brown with notched apex; lenticular achene

**Facts**
Synonym: *Scirpus pungens*

Common threesquare is distinguished from Olney’s threesquare by its shorter height and slightly, not sharply, concave culms.
Grossulariaceae

**Ribes aureum**
Golden current

**Habitat**
Shallowly flooded wetlands, shorelines

**Stems and Roots**
1–3 m (3-9 ft) tall shrubs, gray or tan bark

**Leaves**
Alternate, 3-lobed blades, petiolate

**Flowers and Seeds**
Racemes of 5–18 yellow, 5-petal flowers with cylindrical hypanthium, fragrant, turns red with age; orange-red berries

**Facts**
Golden current flowers and berries are edible.
**Habitat**
Shallow ponds and slow-moving streams

**Stems and Roots**
10–40 cm (0.4–1 ft) tall, erect, partially submerged stems; rhizomes

**Leaves**
Whorls of 6+ thick, linear blades

**Flowers and Seeds**
Inconspicuous flowers in leaf axils, no petals
Iridaceae

*Iris pseudacorus*

Yellow flag

Habitat
Shallowly flooded wetlands, ditchbanks, and shorelines

Stems and Roots
40–150 cm (1–5 ft) tall stems, forming large clumps; rhizomatous

Leaves
Overlapping, broad (25 mm or 1 in), smooth, sword-shaped blades

Flowers and Seeds
Spathes with 2–3 large, yellow flowers with 3 spreading petals

Facts
Synonym: paleyellow iris

---

Wetland indicator: OBL  Duration & growth: PF  Nativity in lower 48: I  Commonness: O
Lamiaceae

*Lycopus asper*

Rough bugleweed

**Habitat**
Shallow, semi-permanent to permanently flooded wetlands

**Stems and Roots**
20–80 cm (0.5–2.5 ft) tall, square stems with spreading hairs; rhizomes, tubers

**Leaves**
Opposite, sessile, oblong to lanceolate blades, serrated margins

**Flowers and Seeds**
Whorls of small, white, 4-lobed flowers in leaf axils, 2 exserted stamens

**Facts**
Synonym: *L. lucidus*
Lamiaceae

*Mentha arvensis*
Wild mint

**Habitat**
Saturated to shallowly flooded wetlands

**Stems and Roots**
20–80 cm (0.5–2.5 ft) tall, erect, hairy, square stems; creeping rhizomes

**Leaves**
Opposite, ovate to elliptical blades, toothed margins, petiolate

**Flowers and Seeds**
Whorls of small, white to light purple flowers with 4 fused petals in upper leaf axils and 4 exserted stamens

**Facts**
Synonyms: *M. canadensis, M. gentilis, M. glabrior, M. penardii*

Wild mint can be easily identified by its strong, minty fragrance.
Onagraceae

*Epilobium ciliatum*

Fringed willowherb

**Habitat**
Saturated to shallow, permanently flooded wetlands

**Stems and Roots**
1–2 m (3–6.5 ft) tall, erect stems; fibrous roots, turions

**Leaves**
Opposite, lanceolate to ovate blades, minutely toothed margins; upper leaves with short, fine hairs

**Flowers and Seeds**
Racemes of white or pink, 4-petal flowers on 2–15 mm (0.08–0.6 in) long pedicels; seeds with tuft of hairs
Poaceae

*Phalaris arundinacea*

Reed canarygrass

**Habitat**
Saturated to shallowly flooded streams and ditchbanks

**Stems and Roots**
40–230 cm (1–7.5 ft) tall culms; rhizomatous

**Leaves**
Scabrous blades, open sheaths, short auricles, membranous ligule

**Flowers and Seeds**
Contracted panicle with dense, spike-like branches, 3 florets (1 fertile and 2 scale-like) per spikelet; glumes with scabrous keel

**Facts**
Synonym: *Phalaroides arundinacea*

Wetland indicator: FACW
Duration & growth: PG
Nativity in lower 48: NI
Common-ness: U
Poaceae

**Phragmites australis subsp. australis**

**Common reed**

**Habitat**
Shallow to moderately deep flooded, fresh to saline wetlands

**Stems and Roots**
1–4 m (3–13 ft) tall, stout, hollow, ribbed culms, forming dense stands; stout rhizomes

**Leaves**
Long, flat, green-blue blades, persistent open sheaths; <1 mm short (0.04 in), ciliate ligule

**Flowers and Seeds**
Large, 15–35 cm (6–13 in) long, open panicle, purple when young; 3–10 florets per spikelet; upper glume longer than lower glume; palea shorter than lemma

**Facts**
Synonyms: *P. communis*, *P. phragmites*

*See pp. 112 and 181 for additional information.*
Poaceae

*Phragmites australis* subsp. *americanus*
American common reed

**Habitat**
Saturated soils to shallow-flooded wetlands, streams, ditchbanks, and seeps

**Stems and Roots**
1–2 m (3–6 ft) tall, hollow, shiny culms in loose colonies; stout rhizomes

**Leaves**
Long, flat, green-yellow blades; loose, deciduous, sheath; >1 mm (0.04 in) long, ciliate ligule

**Flowers and Seeds**
Straw-colored panicle, smaller than introduced variety, 3–10 florets per spikelet; long, unequal glumes; palea shorter than lemma

**Facts**
Shiny or glossy culms and deciduous leaf sheaths are the most reliable distinguishing features of American common reed.

*See p. 181 for additional information.*
Poaceae

*Polypogon monspeliensis*

Rabbitsfoot grass

**Habitat**
Saturated to shallowly flooded saline or alkaline wetlands

**Stems and Roots**
5–65 cm (2 in–2 ft) tall, hollow culms; caespitose

**Leaves**
Flat blades, open sheaths; pointed, membranous ligule

**Flowers and Seeds**
Dense, contracted, spike-like panicle, 1 floret per spikelet, glumes with long, narrow awn

**Fact**
Synonym: *Alopecurus monspeliensis*
**Poaceae**

*Puccinellia nuttalliana*

Nuttall’s alkaligrass

**Habitat**
Saturated to temporarily shallow-flooded, alkaline wetlands

**Stems and Roots**
35–70 cm (1–3.3 ft) long, erect culms; caespitose

**Leaves**
Blades often rolled inward, sheaths open, membranous ligule

**Flowers and Seeds**
Pyramidal, open panicle with spreading branches, slender spikelets with 3–7 florets

**Facts**
Synonyms: *P. airoides, P. cusickii*

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Wetland indicator: FACW
Duration & growth: PG
Nativity in lower 48: N
Commonness: C

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**Polygonum lapathifolium**  
Pale smartweed

**Habitat**  
Shallowly flooded wetlands; often near a disturbance

**Stems and Roots**  
10–200 cm (4 in–6.6 ft) tall, ascending or erect stems, swollen nodes; taproots, rhizomes when submerged

**Leaves**  
Alternate, lanceolate blades, pitted surface, faint to dark spot near center; petiolate; membranous, cylindrical ocrea, tears with age

**Flowers and Seeds**  
Long (3–8 cm or 1–3 in), arching racemes with bundles of 4–15 white flowers with 4–5 tepals; disc-shaped, brown achenes

**Facts**  
Synonyms: *P. nodosum*, *P. tomentosum*, *Persicaria incarnata*, *P. lapathifolia*

The taxonomic treatment of *Polygonum* species is currently undergoing debate and change.
Habitat
Shallowly flooded wetlands and ditchbanks

Stems and Roots
10–70 cm (4 in–2.3 ft) tall, decumbent or erect stems, swollen nodes, branching near base; taproots

Leaves
Alternate, lanceolate blades, dark red spot in center; membranous ocrea with bristles on upper margin, tears with age

Flowers and Seeds
Nodding racemes with bundles of pink to purple flowers with 4–5 tepals; dark brown, disc-shaped achenes

Facts
Synonyms: *P. dubium*, *P. fusiforme*, *P. puritanorum*, *Persicaria maculata*, *P. maculosa*, *P. persicaria*
Polygonaceae
*Rumex maritimus*
Golden dock

**Habitat**
Saturated to shallowly flooded wetlands

**Stems and Roots**
15–60 cm (6 in–2 ft) tall, erect stems; vertical rhizome

**Leaves**
Linear to lanceolate blades, smooth margins, petiolate

**Flowers and Seeds**
Panicles along half stem length, dense whorls of 15–30 green to yellow, pedicellate, valvate flowers; valves with irregularly toothed margins

**Facts**
Synonyms: *R. fueginus*, *R. persicarioides*. Plant taxonomists are investigating if *R. maritimus* and *R. fueginus* are distinct species from different continents.
Polygonaceae

_Rumex stenophyllus_

Narrowleaf dock

**Habitat**
Temporarily flooded wetlands, and ditchbanks

**Stems and Roots**
40–80 cm (1.3–2.6 ft) tall, erect stems, branched above; vertical rhizome

**Leaves**
Lanceolate blades, margins strongly crisped or wavy, petiolate

**Flowers and Seeds**
Panicles along half stem length, whorls of 20+ green to brown, pedicellate, valvate flowers, valves with 4–10 narrow projections or teeth on margins
Habitat
Saturated to shallowly flooded, saline wetlands, streambanks, and shorelines

Stems and Roots
3–18 cm (3–7 in) tall, solid stems, erect or ascending; stoloniferous

Leaves
Basal, orbicular or cymbal-shaped blades with small lobes, petiolate

Flowers and Seeds
Cymes of 1–5 small, yellow, 5-petal flowers, deciduous; fruits a cluster of 25-200 achenes

Facts
Synonyms: alkali buttercup, Cytorhyncha cymbalaria, Halerpestes cymbalaria
Habitat
Shallowly flooded wetlands, streambanks, and shorelines

Stems and Roots
10-40 cm (4in–1.3 ft) tall, hollow, smooth, erect, branched stems; fibrous roots

Leaves
Blades semi-circular in outline, deeply lobed into 3 parts, long petioles

Flowers and Seeds
Terminal, small, yellow 3–5 petal flowers, 3–5 green sepals, 10–25 stamen; fruit an ovoid cluster of 90+ achenes with beak

Facts
Synonym: cursed buttercup
Blister buttercup’s juice is toxic and can cause blistering of the skin, tongue, and lips.
Scrophulariaceae
*Mimulus guttatus*
Seep monkeyflower

**Habitat**
Stream and ditchbanks, shorelines, and slow-moving streams

**Stems and Roots**
5–50 cm (2 in–1.6 ft) tall, erect to ascending stems; occasionally stoloniferous or rhizomatous; growth forms highly variable

**Leaves**
Opposite, obovate to orbicular blades, irregularly toothed margins, lower leaves petiolate, surface variable

**Flowers and Seeds**
Racemes of yellow, bilaterally symmetrical flowers with distinct upper and lower lips, red spots near throat
Scrophulariaceae

**Veronica anagallis-aquatica**

Water speedwell

**Habitat**
Shallow, permanently flooded wetlands, and slow-moving streams

**Stems and Roots**
10–60 cm (4 in–2 ft) tall, erect or ascending stems, often branched; rhizomatous

**Leaves**
Opposite, clasping, elliptical blades, smooth surface, toothed margins

**Flowers and Seeds**
Racemes of white to pale blue or purple flowers with 4 fused petals, flowers fall off easily

**Facts**
Synonyms: V. anagallis, V. catenata, V. glandifera
Solanaceae
Solanum dulcamara
Climbing nightshade

Habitat
Saturated to shallowly flooded wetlands, often disturbed

Stems and Roots
1–3 m (3–9 ft) long, climbing, hairy stem; a vine, herb, or subshrub; rhizomatous

Leaves
Alternate, ovate blades, shallow to deeply cleft at base, petiolate

Flowers and Seeds
Cymes of purple, downward-facing flowers with united anthers; red berries

Facts
Climbing nightshade berries are poisonous, and the plant does not always grow upright.
Habitat
Moderately deep, flooded wetlands and shorelines

Stems and Roots
50–200 cm (1.6–6.5 ft) tall, stout stems; fibrous roots with creeping rhizomes

Leaves
Alternate, linear, flat or keeled blades

Flowers and Seeds
Branches with globular flowers, 5–12 staminate flowers above, 1–2 larger, pistillate flowers below; burr-like fruits, beaked achenes

Facts
Synonym: *S. californicum*
Typhaceae

*Typha domingensis*

Southern cattail

Habitat
Moderate to deeply flooded wetlands

Stems and Roots
2–4 m (6–13 ft) tall, stout, cylindrical, pithy stems; rhizomes

Leaves
Alternate, wide, flat blades, bottom side concave, sheaths open

Flowers and Seeds
Cylindrical, spike-like flowers; yellow (staminate) and light-brown (pistillate) sections separated by length of green axil

Facts
Synonym: *T. angustata*

The rhizomes, young flower spikes, stem, leaf base, and pollen of southern cattail are edible.

*See p. 30 for additional information.*
Typhaceae
*Typha latifolia*
Broadleaf cattail

**Habitat**
Moderate to deeply flooded wetlands

**Stems and Roots**
1–3 m (3–9 ft) tall, stout, cylindrical, pithy stems; fleshy rhizomes

**Leaves**
Alternate, wide, flat leaves, sheaths open

**Flowers and Seeds**
Cylindrical, spike-like flowers; yellow (staminate) and dark-brown (pistillate) flower sections contiguous

*See p. 30 for additional information.*
Emergent marshes provide critical nesting and resting cover for a wide array of migratory birds (pp. 67–68). Both diving and dabbling ducks primarily nest in bulrushes, as do Franklin’s gulls (*Leucophaeus pipixcan*), black terns, Forster’s terns (*Sterna forsteri*), and large waterbirds. Large emergent plants provide materials for nests and a safe hiding place for hens and chicks. Many passerines, including red-winged blackbirds (*Agelaius phoeniceus*) and marsh wrens (*Cistothorus palustris*), also build and hide their nests in emergent vegetation. Marsh wrens are especially industrious, with males building several globe-shaped nests suspended from emergent wetland plants.

In addition to nesting habitat, the dense growth of GSL’s emergent bulrushes provide a year-round protective resting space for birds. In the spring, marbled godwits (*Limosa fedoa*) will use emergent wetlands to stage. Redheads (*Aythya americana*) and other waterfowl loaf in emergent wetlands because of the proximity to open water, where they can remain safe from predation but close to food.

Emergent plants are quite valuable to foraging birds. Wintering waterfowl seek Alkali bulrush seeds because they are a high-energy food source. Dabbling ducks, including the mallards (*Anas platyrhynchos*) and northern shovelers (*A. clypeata*) commonly forage for seeds on the water’s surface. American coots (*Fulica americana*) can be found grazing on the vegetative parts of bulrushes and grasses. In warmer months, emergent wetland plant species provide important habitat for insects and mollusks that are consumed by goldeneyes (*Bucephala spp.*) and other diving ducks. Even shorebirds, which are typically found in playa wetlands, will visit shallow emergent wetlands for feeding. Lone great blue herons (*Ardea herodias*) are often seen stalking through emergent wetlands or perched in trees. Great blue herons usually eat fish and small mammals but will forage opportunistically on a variety of wetland wildlife, including snakes.
Emergent Birds

Franklin’s gull
Leucophaeus pipixcan

Forster’s tern
Sterna forsteri

Red-winged blackbird
Agelaius phoeniceus

Marsh wren
Cistothorus palustris

Marbled godwit
Limosa fedoa

Redhead
Aythya americana
Mallard
*Anas platyrhynchos*

Northern shoveler
*Anas clypeata*

American coot
*Fulica americana*

Goldeneye
*Bucephala spp.*

Great blue heron
*Ardea herodias*
Meadow Wetlands

Meadow wetlands, typically referred to as meadows, are defined by temporary or seasonal shallow flooding or saturated soils. Meadows comprise nearly 390 km² (97,225 ac) around Great Salt Lake (GSL) and are divided into wet and salt meadows based on differences in typical salinity ranges and dominant plant species. Across these ranges, meadow plant communities are characterized by shorter grasses and sedges that are well-adapted to fluctuating water levels. Most meadows are either located on low-angled slopes at slightly higher elevation than submergent and emergent wetlands, or they are on the outside edges of depressions and streams. Due to frequent proximity to agricultural land, many GSL meadows are grazed by cattle.

Plants

A number of plant species are important to wet and salt meadow, although specific species are representative of either wet or salt meadows because of salinity. While a wet meadow is an especially species-rich habitat because of low soil salinity, a salt meadow is unique because of its salinity tolerant plants.

Common spikerush (Eleocharis palustris, p. 83) is one important wet meadow species. It is often the first plant to grow in disturbed areas and can quickly colonize bare areas following a drawdown. However, common spikerush is intolerant of elevated salinity and stunts at salinities above 6 ppt.

Wet meadows often contain grasses and forbs. Slimstem reedgrass (Calamagrostis stricta, p. 96) and timothy (Phleum pratense, p. 102) are two characteristic wet meadow grasses, although they are found
infrequently. An abundance of common forbs, such as nodding beggartick (*Bidens cernua*, p. 74), are also present in wet meadows.

Saltgrass (*Distichlis spicata*, p. 97) is the most important habitat species in salt meadows because it provides nesting cover for a number of waterfowl species. As a drought-tolerant, salt-tolerant species that grows in dense mats and expands via rhizomes, saltgrass can grow in wetland soils with salinity greater than 30 ppt without any impacts to growth or seed production. Periodic wetland burning can stimulate saltgrass growth because it creates bare ground that can be colonized by new growth from both seeds and rhizomes.

Nebraska sedge (*Carex nebrascensis*, p. 81) and clustered field sedge (*Carex praegracilis*, p. 82) are common sedges in GSL salt meadows. Both species often grow in the same habitat—saturated to shallowly flooded meadows—and support the same bird species, but Nebraska sedge is taller, has larger seeds, and is more tolerant of alkaline conditions (pH of 7.5 or more). Seasonally fluctuating water levels are beneficial to sedges, and dry periods are especially important after inundation. As a stable wetland species, Nebraska sedge can be used to treat wastewater and is often a key species in determining the severity of cattle grazing pressure. If grazing is impairing a meadow, the rhizomatous structure of Nebraska sedge, which typically protects soil from erosion, will become weakened and more tolerant species will replace it.

Like sedges, arctic rush (*Juncus arcticus*, p. 89) is a salt meadow plant that benefits from fluctuating water levels. Arctic rush can tolerate brackish and alkaline soil, seasonal drought, shade, and frequent disturbance. Arctic rushes’ broad range of tolerance, combined with its dense, rhizomatous growth, makes it a particularly valuable native salt meadow species because it can prevent the spread of invasive vegetation.
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Urticaceae (Nettle family)

Urtica dioica  Stinging nettle  107
Habitat
Saturated to shallow-flooded wetlands

Stems and Roots
20–110 cm (7 in–3.6 ft) tall, branching stems; fibrous roots, stoloniferous

Leaves
Opposite, pinnate blades with 5–15 pairs of leaflets, toothed margins, petiolate

Flowers and Seeds
Compound umbels of small, white, 5-petal flowers; flattened seeds

Facts
Synonyms: B. incisa, B. pusilla, Siella erecta

Cutleaf waterparsnip is highly toxic and easily misidentified as watercress (p. 37).
**Bidens cernua**
Nodding beggartick

**Habitat**
Saturated to shallow-flooded wetlands

**Stems and Roots**
10–110 cm (4 in–3.6 ft) tall, smooth stems; fibrous roots

**Leaves**
Opposite, sessile, lanceolate blades, serrated margins

**Flowers and Seeds**
Many large heads with yellow disk and ray flowers present; nodding with age; trident-shaped seeds

**Facts**

Synonym: *B. glaucescens*

Nodding beggartick has been used as a honey plant.

*See p. 69 for additional information.*
Asteraceae

*Erigeron glabellus*

Streamside fleabane

**Habitat**
Saturated to shallow-flooded wetlands

**Stems and Roots**
10–60 cm (4 in–2 ft) tall erect stems; caudex, fibrous roots

**Leaves**
Alternate, oblanceolate blades, sessile, with stiff hairs; lower leaves larger

**Flowers and Seeds**
Many heads, rays purple to white, numerous; hairy involucre bract, brown midvein

**Facts**
Synonym: Smooth daisy

Wetland indicator: FAC
Duration & growth: PF
Nativity in lower 48: N
Commonness: U
**Asteraceae**

**Senecio hydrophilus**

*Water ragwort*

**Habitat**
Saturated, alkaline wetlands

**Stems and Roots**
40–200 cm (1.5–6.5 ft) tall, hollow, clustered stems; fibrous roots

**Leaves**
Alternate, elliptical blades, smooth, slightly succulent; lower leaves larger, petiolate

**Flowers and Seeds**
15+ clustered, erect heads of yellow disk and ray flowers

**Facts**
Synonyms: alkali-marsh butterweed, water grounsel, *S. sandvicensis*
Habitat
Saturated, saline wetlands and shorelines

Stems and Roots
10–70 cm (4 in–2.2 ft) tall, branching, red-tinged stems; taproots

Leaves
Alternate, linear blades, smooth with few hairs; lower leaves withering

Flowers and Seeds
Panicles of fluffy, white flowers; pappus bristles longer than ray flowers; blooming late summer

Facts
Synonyms: Aster brachyactis, Brachyactis angusta, B. ciliata, Tripolium angustum
Brassicaceae

Chorispora tenella
Musk mustard

**Habitat**
Temporarily saturated wetlands; disturbed areas

**Stems and Roots**
10–45 cm (4 in–1.5 ft) tall, stipitate-glandular stems; taproots

**Leaves**
Alternate blades; shape varies from oblong to pinnatifid, sessile, or petiolate

**Flowers and Seeds**
Racemes of pink to lavender, 4-petal flowers; long siliques

**Facts**
Synonyms: blue mustard, crossflower
Caryophyllaceae

Spergularia maritima
Salt sandspurry

Habitat
Saturated, alkaline wetlands

Stems and Roots
7–20 cm (2.7–8 in) long, prostrate to ascending, branched stems; taproots

Leaves
Opposite, linear blades, succulent, with stipules

Flowers and Seeds
Solitary, 5-petal, white to pink flowers, pedicellate; seed capsules

Facts
Synonyms: S. marginata, S. media
Habitat
Saturated, alkaline wetlands; disturbed areas

Stems and Roots
10–100 cm (4 in–3.2 ft) tall, ribbed stems, branching, erect to prostrate; taproots

Leaves
Opposite (lower 2/3) to alternate (upper 1/3), petiolate, thin, triangular to hastate or ovate blades; farinose, becoming smooth

Flowers and Seeds
Branched spikes of glomerules; bracteoles triangular with toothed margins, smooth-face, pointed apex; black or brown seeds

Facts
Cyperaceae

*Carex nebrascensis*

Nebraska sedge

**Habitat**
Semi-permanently saturated to shallow-flooded wetlands

**Stems and Roots**
20–100 cm (8 in–3.2 ft) tall, stout, triangular culms; long, scaly rhizomes

**Leaves**
Firm, flat blades, bluish-waxy surface

**Flowers and Seeds**
3–6 sessile, erect, cylindrical spikes, brown-black scales with green midrib; inflated elliptical perigynia, light brown

*See p. 70 for additional information.*
Cyperaceae

*Carex praegracilis*
Clustered field sedge

**Habitat**
Temporarily saturated to shallow-flooded wetlands

**Stems and Roots**
30–70 cm (1–2.3 ft) tall culms, solitary or clustered; stout, dark rhizomes

**Leaves**
Long, flat blades on bottom quarter of stem; lowest leaves reduced to sheaths

**Flowers and Seeds**
6–25 spikes aggregated in ovoid head, sessile; scales light brown; perigynia light brown, ovate, convex

**Facts**
Synonym: *C. camporum*

*See p. 70 for additional information.*
**Cyperaceae**

**Eleocharis palustris**

Common spikerush

**Habitat**
Saturated to shallow-flooded wetlands; exposed soils

**Stems and Roots**
10–100 cm (4 in–3.2 ft) tall, smooth, round culms; rhizomatous

**Leaves**
Bladeless leaf sheaths near stem base

**Flowers and Seeds**
Terminal, brown, lanceolate spikelet; lens-shaped, brown achenes with white tubercle constrained at the base

*See p. 69 for additional information.*
Cyperaceae

Eleocharis parishii
Parish spikerush

Habitat
Saturated, fresh to brackish wetlands

Stems and Roots
10–30 cm (4 in–1 ft) tall, slender, round, ribbed culms; slender rhizomes

Leaves
Bladeless leaf sheaths near stem base

Flowers and Seeds
Terminal, brown, narrow, lanceolate spikelet; scales purple with translucent midrib; 3-sided achenes with sessile tubercle

Facts
Synonym: E. disciformis
Parish spikerush has thinner stems and smaller, darker spikelets than common spikerush.
Fabaceae
*Glycyrrhiza lepidota*
Wild licorice

**Habitat**
Saturated wetlands; disturbed areas

**Stems and Roots**
40–120 cm (1.2–3.9 ft) tall, punctate stems; sweet-flavored, deep roots

**Leaves**
Alternate, odd-pinnate blades, leaflets lanceolate to oblong with pointed tip

**Flowers and Seeds**
Racemes of white to cream, 5-petal flowers; burr-like, oblong or elliptical pods with hooks

**Facts**
Synonym: *G. glutinosa*
Roots of wild licorice have a licorice flavor.
Fabaceae

**Lotus corniculatus**
Birdfoot trefoil

**Habitat**
Streams and ditchbanks near agriculture

**Stems and Roots**
20–60 cm (8 in–2 ft) tall, slender stems; taproot, caudex

**Leaves**
Alternate, pinnate blades with 3 lanceolate or elliptical leaflets, petiolate

**Flowers and Seeds**
Pedunculate yellow, bilaterally symmetrical flowers, sometimes red-tinged; pods

---

Wetland indicator: FAC
Duration & growth: PF
Nativity in lower 48: I
Common-ness: O
Fabaceae

*Trifolium fragiferum*

Strawberry clover

**Habitat**
Saturated, alkaline or saline wetlands

**Stems and Roots**
5–30 cm (2 in–1 ft) long, creeping, mat-forming stems, rooting at nodes; initial taproot, rhizomes or stolons

**Leaves**
Alternate, palmate blades with 3 leaflets obovate with pointed tips, surface with soft hairs, petiolate

**Flowers and Seeds**
Compact, spherical heads of pink to purple flowers, become papery and veined with age

**Facts**
Stolons of strawberry clover can float, allowing survival during flooding.

Wetland indicator: FACU
Duration & growth: PF
Nativity in lower 48: I
Commonness: O
**Centaurium exaltatum**
Desert centaury

**Habitat**
Saturated to flooded, alkaline wetlands

**Stems and Roots**
10–40 cm (4 in–1.3 ft) tall, erect, branched, 4-angled stems

**Leaves**
Opposite, sessile, linear to lanceolate blades

**Flowers and Seeds**
Cymose panicles of white or pink flowers, 4–5 petals and corolla tube, pedicellate

**Facts**
Synonyms: *C. nuttallii*, *Cicendia exaltata*, *Zeltnera exaltata*
Juncaceae

**Juncus arcticus**

Arctic rush

**Habitat**
Temporary to permanently saturated, alkaline wetlands

**Stems and Roots**
30–90 cm (1–3 ft) tall, firm, round culms; creeping, sod-forming rhizomes

**Leaves**
Blade-less, basal, brown leaf sheaths remaining

**Flowers and Seeds**
Lateral inflorescences of 10–50 flowers, approximately 6 cm (2.4 in) long, brown-black scales; erect, stem-like involucre

**Facts**
Synonym: *J. balticus*

*See p. 70 for additional information.*
Juncaceae

**Juncus torreyi**
Torrey’s rush

### Habitat
Saturated, alkaline wetlands and streambanks

### Stems and Roots
40–100 cm (1.3–3.2 ft) tall, round culms; cord-like rhizomes

### Leaves
Round, hollow blades, cauline, auriculate

### Flowers and Seeds
2–10 dense, spherical inflorescences of 12+ flowers, brown scales

---

**Wetland indicator:** FACW

**Duration & growth:** PG

**Nativity in lower 48:** N

**Commonness:** O

---

90
Juncaginaceae

*Triglochin maritima*
Seaside arrowgrass

**Habitat**
Temporary to permanently saturated, alkaline wetlands

**Stems and Roots**
30–120 cm (1–3.9 ft) tall, erect, round culms; stout rhizome

**Leaves**
Basal, short, linear blades

**Flowers and Seeds**
Scapes with dense racemes, elliptical tepals; follicular fruit

**Facts**
Synonym: *T. elatum*
Lythraceae

*Lythrum salicaria*

Purple loosestrife

**Habitat**
Stream and ditchbanks; shallow-flooded wetlands

**Stems and Roots**
50–150 cm (1.6–4.9 ft) tall, stout, square stems, clustered; rhizomes; wide variation in growth

**Leaves**
Opposite, sessile, lanceolate blades with hairy surface

**Flowers and Seeds**
Showy spikes with clusters of 4–6 petals, purple flowers, forming cylinder at base

**Facts**
Purple loosestrife is a noxious weed in Utah.
Plantaginaceae

Plantago lanceolata
Narrowleaf plantain

Habitat
Saturated, disturbed wetlands

Stems and Roots
15–60 cm (0.5–2 ft) tall scapes; fibrous roots

Leaves
Basal, long, narrowly elliptical to lanceolate blades

Flowers and Seeds
Scapes with dense, cylindrical spike, flowers with exserted stamens; capsules

Facts
Synonym: P. altissima
Plantaginaceae

*Plantago major*

Common plantain

**Habitat**
Dry to saturated, disturbed wetlands

**Stems and Roots**
5–25 cm (2–10 in) tall scapes; fibrous roots

**Leaves**
Basal, cordate to ovate blades, petiolate

**Flowers and Seeds**
Scapes with dense, narrow spikes; flowers with reflexed corolla lobes, exserted stamens

**Facts**
Synonyms: *P. asiatica*, *P. halophila*, *P. intermedia*
Poaceae

*Alopecurus arundinaceus*
Meadow foxtail

**Habitat**
Temporarily saturated to shallow-flooded wetlands

**Stems and Roots**
30–110 cm (1–3.6 ft) tall culms; rhizomatous

**Leaves**
Flat leaf blades on lower half of culm, open sheath, membranous ligule

**Flowers and Seeds**
Dense, spike-like inflorescence; 1 floret per spikelet, flattened; glume with hairs along keel; bent lemma awn

**Facts**
Meadow foxtail has been cultivated as meadow hay.
Poaceae

*Calamagrostis stricta*

Slimstem reedgrass

**Habitat**
Saturated to shallow-flooded wetlands

**Stems and Roots**
35–90 cm (1.1–2.3 ft) tall, hollow culms; rhizomatous

**Leaves**
Flat blades ribbed on upper surface; open sheaths, membranous ligule

**Flowers and Seeds**
Inflorescences a contracted panicle, pale green to yellow; 1 floret per spikelet, laterally compressed, glumes keeled, lemma with awn and ring of hairs around base

*See p. 69 for additional information.*
Poaceae  
*Distichlis spicata*  
Saltgrass

**Habitat**  
Temporarily saturated to shallow-flooded wetlands and shorelines

**Stems and Roots**  
10–45 cm (4 in–1.5 ft) tall culms, decumbent at bases; rhizomes or stolons

**Leaves**  
Overlapping, rigid blades along entire culm, open sheaths, membranous ligule

**Flowers and Seeds**  
Large, laterally compressed spikelets in green to yellow-green, contracted panicle over-topped by uppermost leaf blades; glumes keeled

**Facts**  
Synonyms: *D. stricta*, *Uniola spicata*

*See pp. 70 and 112 for additional information.*
Poaceae

Echinochloa crus-galli

Barnyardgrass

Habitat
Stream and ditchbanks

Stems and Roots
30–100 cm (1–3.2 ft) tall culms, rooting at nodes; caespitose

Leaves
Broad, flat blades with scabrous margins, open sheaths, no ligule

Flowers and Seeds
Branching, nodding panicles; 2 florets per spikelet, dorsally compressed; glumes with long awn; fertile lemma 3-sided, shiny

Facts
Synonyms: Japanese millet, Panicum crus-galli

Barnyardgrass has been planted as a waterfowl habitat species in some state management areas.
Poaceae

*Hordeum jubatum*

Foxtail barley

**Habitat**
Temporarily saturated or flooded, alkaline wetlands

**Stems and Roots**
20–80 cm (8 in–2.5 ft) tall, hollow culms; caespitose, appearing annual

**Leaves**
Flat, lax, scabrous blade, open sheaths, membranous ligule

**Flowers and Seeds**
Inflorescence nodding spike, turning purple with age; 3 spikelets per node (1 fertile, 2 infertile), 1 floret per spikelet; glumes awn-like, lemma with long, 1–6 cm (0.35–2.5 in) awn
Poaceae

Leymus cinereus
Great Basin wildrye

Habitat
Temporarily saturated meadows, ditchbanks, and roadsides

Stems and Roots
1–2.5 m (3.2–8.2 ft) tall culms, caespitose with short rhizomes

Leaves
Flat blades with blueish waxy coating, 4–15 mm (0.15–0.59 in) wide, visible veins; open sheath, auricles present, membranous ligule

Flowers and Seeds
Inflorescence long, 10–29 cm (3.93–7.90 in) spike; spikelets on opposite sides with 3–7 florets each; keeled glumes, awned lemmas

Facts
Synonym: Elymus cinereus
Poaceae
*Muhlenbergia asperifolia*
scratchgrass

**Habitat**
Permanently saturated to shallowly flooded, alkaline wetlands

**Stems and Roots**
10–60 cm (4 in–2 ft) tall, slender culms; long, scaly rhizomes

**Leaves**
Flat or folding cauline blades with open, overlapping sheaths; membranous ligule

**Flowers and Seeds**
Inflorescence an open panicle, almost as wide as long, breaking away at maturity; small, 1.5 mm (0.06 in), purple, laterally compressed spikelets; membranous glumes

**Facts**
Synonym: *Sporobolus asperifolius*

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<tr>
<th>Wetland indicator:</th>
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Poaceae

**Phleum pratense**

Timothy

**Habitat**
Saturated soils in a variety of habitats

**Stems and Roots**
50–100 cm (1.6–3.2 ft) tall, hollow, tufted culms

**Leaves**
Flat leaf blades, scabrous margins, open sheath; membranous ligule

**Flowers and Seeds**
Contracted, dense, spike-like inflorescence, 1 floret per spikelet; distinct, flat-topped glumes with comb-like hairs on keel and awn

**Facts**
Timothy has awned glumes and spreading spikelets while *Alopecurus arundinaceus* (p. 97) has awned lemmas and ascending spikelets.

*See p. 69 for additional information.*
Poaceae

**Poa palustris**
Fowl bluegrass

**Habitat**
Saturated to shallow-flooded wetlands

**Stems and Roots**
25–120 cm (10 in–3.9 ft) long, decumbent culms, rooting at nodes; tufted to stoloniferous

**Leaves**
Ascending, flat blades with rolled tip, sheaths open to base, membranous ligule pointed at top

**Flowers and Seeds**
Pyramidal panicles, open or contracted, nodding with age; 25–100 spikelets per node; glumes keeled; lemmas with tuft of hair at base

**Facts**
Synonyms: *P. crocata*, *P. eyerdamii*, *P. trilora*

Fowl bluegrass is distinguished from *Poa pratensis* (p. 174) by its pointed (not flat) ligule.
Polygonaceaee

*Polygonum ramosissimum*

Bushy knotweed

**Habitat**
Temporarily to permanently saturated wetlands; disturbed areas

**Stems and Roots**
10–100 cm (4 in–3.2 ft) tall, profusely branched, ribbed stems

**Leaves**
Small, alternate, lanceolate to elliptical, yellow to blue-green blades; ocrea disintegrating into brown fibers

**Flowers and Seeds**
Small, axillary and terminal, 5-parted flowers, white to yellow to yellow-green tepals, hypanthium present

Wetland indicator: FAC
Duration & growth: AF
Nativity in lower 48: N
Commonness: C
Scrophulariaceae

*Castilleja minor*

Lesser Indian paintbrush

**Habitat**
Saturated to shallow-flooded wetlands

**Stems and Roots**
20–80 cm (8 in–2.6 ft) long, simple stems, hairy; short taproots

**Leaves**
Many alternate, sessile, linear to lanceolate blades

**Flowers and Seeds**
Narrow racemes of tubular, bilaterally symmetrical, red flowers, bracts leafy, red-tipped
Scrophulariaceae

*Cordylanthus maritimus*
Saltmarsh birds beak

**Habitat**
Saturated to shallow-flooded, alkaline wetlands

**Stems and Roots**
10–30 cm (4 in–2 ft) tall, branched stems, sticky-haired surface

**Leaves**
Alternate, lanceolate blades, often with powdery salt crystals

**Flowers and Seeds**
Spikes of light yellow or white, bilaterally symmetrical flowers, long leafy bracts; hairs on bracts and petals

**Facts**
Synonym: *C. maritimum*

---

**Wetland indicator:** OBL
**Duration & growth:** AF
**Nativity in lower 48:** N
**Commonness:** O
Habitat
Streambanks and shorelines

Stems and Roots
0.5–3 m (1.6–10 ft) tall, erect, 4-sided stems, covered in stinging hairs; rhizomatous

Leaves
Opposite, elliptical to lanceolate, dark green blades, toothed margins, petiolate, with stinging hairs

Flowers and Seeds
Long, pedunculate panicles of 4-lobed staminate and pistillate flowers

Facts
Avoid handling stinging nettle; contact with skin causes painful stinging.
Meadow Birds

Birds

Meadow grasses are primary nesting habitat for ducks and shorebirds (pp. 109–10) seeking shorter nesting cover than other birds. Cinnamon, blue-winged, and green-winged teal (Anas cyanoptera, A. discors, and A. crecca) depend specifically on meadows for nesting cover. Ducks require saltgrass for nesting habitat, and large dabbling and diving ducks may occasionally use sedges for nesting cover. The largest concentration of staging Wilson’s phalaropes (Phalaropus tricolor) is found around GSL, though only a small population of this concentration nests here. When nesting, Wilson’s phalaropes prefer the salt-tolerant grasslands of meadows.

While meadow plant species tend to be shorter and have smaller seeds, they provide a valuable source of nutrition for some migratory birds. Teal, dabbling ducks, and geese will eat the vegetative parts and seeds of sedges and grasses. Meadow plants also provide habitat for terrestrial invertebrates that loggerhead shrikes (Lanius ludovicianus) and other passerines seek as prey. In flooded meadows, tall shorebirds such as white-faced ibis (Plegadis chihi) and snowy egrets (Egretta thula) will forage for aquatic invertebrates among sedges. Birds of prey such as rough-legged hawks (Buteo lagopus), American kestrels (Falco sparverius), and northern harriers (Circus cyaneus) fly over a variety of wetland habitats, but will use meadows more frequently to prey on plentiful insects, small birds, and mammals living within meadows or nearby emergent wetlands.
Meadow Birds

Cinnamon teal
*Anas cyanoptera*

Blue-winged teal
*Anas discors*

Green-winged teal
*Anas crecca*

Wilson’s phalarope
*Phalaropus tricolor*

White-faced ibis
*Plegadis chihi*

Snowy egret
*Egretta thula*
Loggerhead shrike
*Lanius ludovicianus*

Rough-legged hawk
*Buteo lagopus*

Northern harrier
*Circus cyaneus*

American kestrel
*Falco sparverius*
Playa Wetlands

**Playa** means “beach” or “seashore” in Spanish and refers to an arid or semiarid wetland with distinct wet and dry seasons. Playas comprise approximately 240 km² (60,317 ac) around Great Salt Lake (GSL); in fact, the lake itself is located in a playa depression, which is why it is relatively shallow. GSL playas typically collect water during the spring. When water evaporates, the mineral deposits left behind create highly saline and alkaline soil conditions. Playas are sparsely vegetated and occur on poorly drained depressions that typically have no outlet. Because playas are a harsh environment, plants that do occur in playas have physiological adaptations to survive drought, salinity, and high pH.

Mudflats are areas that have become exposed when flooded submergent or emergent wetlands have been drawn down. GSL mudflats cover approximately 1,680 km² (414,689 ac) and are considered critical habitat for millions of migratory shorebirds. During periods of drought, large portions of the bed of GSL itself are also exposed and classified as mudflats. Because plant species found in playas also occur on mudflats, this section combines facts about playas with facts about mudflats.

**Plants**

Despite their simple vegetation structure, playas and mudflats are difficult to manage and tend to be maintained passively. Playa vegetation requires both brief, seasonal flooding and extended drought. Plants that grow in playas, such as pickleweed (*Salicornia rubra*, p. 124) and Pursh seepweed
(Suaeda calceoliformis, p. 125), are typically short and sparse. Pickleweed is a halophyte (salt-loving plant) capable of growing in soils with a salinity of 35 ppt or greater. The leaves of pickleweed have been reduced to scales, while the stems are succulent and include vacuoles or chambers that sequester salts from the rest of the plant. The seeds of pickleweed are dehiscent, which means they are forcefully expelled from plants as they dry out during the late fall, attracting large flocks of waterfowl. Pursh seepweed, another succulent halophyte, is taller than pickleweed and grows in both saline and brackish wetlands. Like pickleweed, Pursh seepweed produces more seeds when exposed to saline and alkaline conditions. In GSL playas, Pursh seepweed is important because it provides cover for nesting shorebirds.

Other plants, such as phragmites (Phragmites australis, p. 50) and saltgrass (Distichlis spicata, p. 97) grow well in playas. Phragmites, an aggressive wetland invader, can quickly colonize playa ecosystems through seeds and by sending out stolons and rhizomes. Dense, invasive phragmites that grows on previously unvegetated ground completely alters the habitat, preventing birds that need open foraging areas from accessing their prey. Although saltgrass is primarily a salt meadow species, it is prevalent in playas as well.
Playa Plants by Family

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Saltcedar 131
Aizoaceae

*Sesuvium verrucosum*
Verrucose seapurslane

**Habitat**
Temporarily saturated, saline, and alkaline wetlands

**Stems and Roots**
30–100 cm (1–3.2 ft) long, prostrate, short-branched stems, forming mats; taproots

**Leaves**
Opposite, oblanceolate to obovate, succulent blades, salt crystals on surface

**Flowers and Seeds**
Solitary, dark pink, 5-petal flowers in leaf axils

**Facts**
Synonym: *S. erectum*

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<th>Nativity in lower 48:</th>
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</table>
Asteraceae
*Iva axillaris*
Povertyweed

**Habitat**
Temporarily saturated, alkaline and saline wetlands; disturbed areas

**Stems and Roots**
10–60 cm (4 in–2 ft) tall stems; deep, creeping roots

**Leaves**
Opposite below and alternate above, oblong blades, sparsely hairy

**Flowers and Seeds**
Solitary, nodding flower heads, pedunculate; black achenes

**Facts**
Native Americans have used povertyweed to treat indigestion and colds.

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Native Americans have used povertyweed to treat indigestion and colds.
Asteraceae
*Xanthium strumarium*
Rough cocklebur

**Habitat**
Exposed mudflats

**Stems and Roots**
20–200 cm (8 in–6.5 ft) tall, hairy stems; taproots

**Leaves**
Alternate, broad, shallowly lobed blades with rough surface; petiolate

**Flowers and Seeds**
Brown, ovate burrs with rigid, hooked spines

**Facts**
Cocklebur seedlings are poisonous to livestock and humans.
Boraginaceae

**Plagiobothrys leptocladus**
Finebranched popcornflower

**Habitat**
Temporarily saturated wetlands

**Stems and Roots**
10–30 cm (4 in–1 ft) long, slender, prostrate stems, branching at base

**Leaves**
Opposite, narrowly linear blades, smooth above, stiff hairs below

**Flowers and Seeds**
Loose racemes of small, white flowers with 5 spreading petals; nutlet

**Facts**
Synonyms: *P. orthocarpus*, *Allocarya leptoclada*

---

Wetland indicator: OBL  
Duration & growth: AF  
Nativity in lower 48: N  
Commonness: O
**Chenopodiaceae**

**Allenrolfea occidentalis**

Iodine bush

**Habitat**
Saturated, alkaline wetlands

**Stems and Roots**
30–150 cm (1–4.9 ft) tall, alternate branching, fleshy, jointed stems, woody at base; large taproots

**Leaves**
Alternate, dark green, succulent, scale-like, triangular leaves

**Flowers and Seeds**
Cylindrical spikes of inconspicuous flowers, 3–5 per stem joint, 1–2 exserted stamens; seeds enclosed in bracts

**Facts**
Synonym: *Halostachys occidentalis*
Iodine bush tastes salty because of concentrated salt in its stems.
Chenopodiaceae

*Atriplex* spp.

Saltbush

**Habitat**

Variety of saturated to dry, alkaline or saline wetlands

**Stems and Roots**

30–150 cm (1–4.8 ft) tall, prostrate to erect, stems often gray-green

**Leaves**

Alternate or opposite, deltoid, triangular or hastate leaves often farinose, especially when young

**Flowers and Seeds**

Clusters or panicles of glomerules, seeds enclosed by flattened bracteoles

**Facts**

The saltbush genus is complex, and species are difficult to identify during much of the growing season. Possible *Atriplex* species found in GSL wetlands include, *A. dioica*, *A. gardneri*, *A. micrantha*, *A. patula*, and *A. prostrata.*
**Chenopodiaceae**

**Atriplex micrantha**

Twoscale saltbush

**Habitat**
Frequently saturated, disturbed wetlands

**Stems and Roots**
40–150 cm (1.3–4.9 ft) tall, erect, branched stems; taproots

**Leaves**
Mostly alternate (lowest opposite), triangular to hastate blades, sparsely farinose (green with age), margins entire or irregularly toothed, petiolate

**Flowers and Seeds**
Long, branching spikes of glomerules; bracteoles ovate to circular, smooth margins; seeds shiny black or brown

**Facts**
Synonym: *A. heterosperma*

Twoscale saltbush is distinguished from other *Atriplex* spp. (pp. 80, 119) by its smooth, round bracteoles.
Chenopodiaceae

*Chenopodium glaucum*

Oakleaf goosefoot

**Habitat**
Saturated, saline wetlands

**Stems and Roots**
7–25 cm (3–10 in) long, prostrate to ascending, sparsely farinose stems, branched from base

**Leaves**
Alternate, thick, rhombic to ovate blades, green and smooth above, white and farinose below; wavy or toothed margins

**Flowers and Seeds**
Short spikes of round, 3–5 parted glomerules; round, greenish fruit enclosing red-brown seeds

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Chenopodiaceae

*Chenopodium rubrum*

Red goosefoot

**Habitat**
Exposed, saline mudflats

**Stems and Roots**
10–90 cm (4 in–3 ft) tall (erect) or 3–20 cm (1–8 in) long (prostrate), reddish stems

**Leaves**
Alternate, rhomboid-ovate blades, wavy margins, petiolate; dark green turning red

**Flowers and Seeds**
Short spikes or panicles of glomerules; 3–4 parted, green flowers and fruits; dark brown or black seeds

**Facts**
Red goosefoot leaves are red underneath, while *Chenopodium glaucum* leaves are white underneath.

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</table>
**Chenopodiaceae**  
*Salicornia rubra*  
Pickleweed

**Habitat**  
Temporarily saturated to shallow-flooded, alkaline and saline wetlands

**Stems and Roots**  
10–30 cm (4 in–1 ft) tall, simple or branched, succulent, segmented stems; slender taproots

**Leaves**  
Opposite, succulent, scale-like leaves, green turning red

**Flowers**  
Cylindrical spikes of inconspicuous flowers; scales form triad, central scale higher than lateral pair

**Facts**  
Synonyms: red swampfire, red glasswort

Pickleweed is one of the most salt-tolerant species in the western United States.

*See pp. 111–112 for additional information.*
Chenopodiaceae

*Sarcobatus vermiculatus*

Greasewood

**Habitat**
Infrequently flooded, alkaline and saline wetlands

**Stems and Roots**
1–2 m (3.2–6.5 ft) tall, woody, branched shrubs with thorns

**Leaves**
Opposite below, alternate above, linear, succulent blades

**Flowers and Seeds**
Spikes of two flower types; staminate flowers catkin-like, pistillate flowers fused to form circular disks

**Facts**
Greasewood has been used for making tools, weapons, and instruments.

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**Wetland indicator:** FACU
**Duration & growth:** PS
**Nativity in lower 48:** N
**Commonness:** U
Chenopodiaceae

*Suaeda calceoliformis*

Pursh seepweed

**Habitat**
Saturated to shallow-flooded, alkaline wetlands

**Stems and Roots**
20–50 cm (8 in–1.6 ft) tall, erect stems, simple or with ascending branches

**Leaves**
Alternate, round, linear, succulent blades

**Flowers and Seeds**
Crowded spikes of glomerules with 3–7 keeled flowers, leafy bracts; shiny black seeds

**Facts**
Synonyms: *S. americana*, *S. depressa*, *S. maritima*, *S. minutiflora*, *S. occidentalis*; *Dondia depressa*, *Schoberia occidentalis*

*See pp. 111–112 for additional information.*
**Convolvulaceae**

*Cressa truxillensis*

Spreading alkaliweed

**Habitat**
Temporarily saturated, alkaline wetlands

**Stems and Roots**
10–15 cm (4–6 in) long, low and spreading stems, woody at base

**Leaves**
Alternate, ovate leaves with gray, woolly surface, sessile

**Flowers and Seeds**
Solitary white to purple flowers with 5 petals fused at base, stamens exerted; hairy seed capsule

**Facts**
Synonyms: *C. depressa, C. insularis*

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</table>
Frankeniaceae
*Frankenia pulverulenta*
European seaheath

**Habitat**
Infrequently flooded, saline wetlands

**Stems and Roots**
15–30 cm (6–12 in) long, decumbent to ascending stems, sparse white hairs, branched at base; taproots

**Leaves**
Opposite, obovate blades with short hairs or powdery surface, short petioles

**Flowers and Seeds**
Solitary, white to pink flowers, 5 petals fused at the base, 6 stamen
Poaceae

*Cryopsis schoenoides*
Swamp pricklegrass

**Habitat**
Exposed, alkaline mudflats

**Stems and Roots**
2–75 cm (0.8 in–2.5 ft) long, prostrate, branching stems with red nodes, forming mats

**Leaves**
Flat or folded blades, open sheaths that become inflated, ligule of hairs

**Flowers and Seeds**
Short, compact panicle (spike-like) partially enclosed by a leaf sheath, spikelets laterally compressed with 1 floret

**Facts**
Synonyms: *Heleochloa schoenoides, Sporobolus schoenoides*

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**Wetland indicator:** OBL
**Duration & growth:** AG
**Nativity in lower 48:** I
**Commonness:** U
Poaceae
*Hordeum marinum*
Mediterranean barley

**Habitat**
Infrequently to temporarily saturated, alkaline wetlands

**Stems and Roots**
10–50 cm (4 in–1.6 ft) tall, hollow culms, erect or jointed near base, hairy with smooth nodes; caespitose

**Leaves**
Flat, lax blades, hairy surface, open sheaths, membranous ligule

**Flowers and Seeds**
Short spike, 3 spikelets per node (1 fertile, 2 infertile), 1 floret per spikelet; central spikelet glumes scabrous and slender with stout awn; awned lemma

**Facts**
Synonym: seaside barley

Mediterranean barley is distinguished from *H. pusillum* and *H. murinum* by its central, scabrous, slender spikelet that has no broadened parts.
Poaceae
*Sporobolus airoides*
Alkali sacaton

**Habitat**
Temporarily to semi-permanently saturated, alkaline wetlands

**Stems and Roots**
40–90 cm (1.3–3 ft) tall, round stems; caespitose, forming large clumps

**Leaves**
Basal, flat or rolled blades, roughened lower surface, ligule of hairs

**Flowers and Seeds**
Long, open, pyramidal panicles; spikelets located at the end of branches; glumes deciduous, palea and lemma split at maturity

**Facts**
Synonym: *Agrostis airoides*

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<td>Commonness:</td>
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Habitat
Temporarily to permanently saturated, alkaline wetlands and streambanks; disturbed areas

Stems and Roots
2–5 m (6.5–16 ft) tall trees, brown to black bark; deep taproots

Leaves
Alternate, overlapping, scale-like leaves with pointed tips

Flowers and Seeds
Long racemes of small, lavender, 5-petal, 5-stamen flowers

Facts
Multiple *Tamarix* species have invaded Utah wetlands and are difficult to identify to species. *T. aphylla*, *T. chinensis*, *T. parviflora*, and *T. ramosissima* have all been found in Utah.

Saltcedar is classified as a noxious weed in Utah; it can reproduce via seeds and stem parts.
Birds

GSL playas and mudflats host some of the world’s largest breeding and staging shorebird populations; thus, conservation of these salty habitats has a significant impact on species that migrate across the entire Western Hemisphere. Seasonal flooding of playas often leads to brief but critical hatches of protein-rich macroinvertebrates that support shorebird and wading bird foraging (pp. 133–134). What playas offer in foraging they equally lack in cover, so it is essential to manage playas as part of a wetland complex with nearby or adjacent vegetated wetlands that provide cover and nesting habitat for birds that use unvegetated playas for foraging.

Many bird species prefer playas and mudflats for nesting. Snowy plovers (*Charadrius nivosus*) nest on playas by building scrapes or shallow depressions on the open ground. American avocets (*Recurvirostra americana*) and black-necked stilts (*Himantopus mexicanus*) build crude nests, barely more than a scrape, on sparsely vegetated playas near water; rarely will they nest on unvegetated playas or mudflats. While sometimes near vegetation, killdeer (*Charadrius vociferus*) typically build scrapes in open, pebbly playa. Several shorebirds prefer to nest in open areas but frequently locate their scrapes near a clump of saltgrass.

Mudflats host a rich source of food for many birds and are particularly crucial habitat for shorebirds. The salty, bare ground provides habitat for numerous types of burrowing invertebrates. American avocets, black-necked stilts, and long-billed dowitchers (*Limnodromus scolopaceus*) forage on these invertebrates by probing. Snowy plovers prefer foraging on mudflats by gleaning insects off the surface.

Birds use various strategies for accessing prey on playas or mudflats. American avocets are best known for their scything method of foraging, in which they sweep their open bills through flooded mudflats to catch invertebrates. Black-necked stilts forage in areas that are bare or very shallowly flooded, typically pecking at insects on the surface of the water or mud. Long-billed dowitchers use their bills to probe into the mud to find hidden invertebrates. Smaller shorebirds, such as western...
sandpiper (*Calidris mauri*) and lesser yellowlegs (*Tringa flavipes*), also probe to find invertebrates, but the bills of these species are much shorter than that of the long-billed dowitcher. Each bird species has varying bill lengths, an adaptation specifically allowing them access to different mud depths and invertebrate prey.
Long-billed dowitcher
*Limnodromus scolopaceus*

Lesser yellowlegs
*Tringa flavipes*

Western sandpiper
*Calidris mauri*
Rather than a wetland community, this collection of upland plants represents species that are often found in or disperse to Great Salt Lake (GSL) wetlands—particularly under conditions of drought and disturbance. This listing is not comprehensive of upland plants, but the selected species often indicate previous or regular wetland disturbance, so they are important to note. Often disturbance to wetlands comes in the form of drought, which increases the likelihood of upland and invasive species establishing in a wetland.

Also, upland habitat and its plants benefit wetlands. A mosaic of upland habitat interspersed with wetland habitat provides structural diversity to wetland plant complexes and supports a wide variety of bird species. Although some wetlands surrounding GSL include small portions of upland habitat in their management plans, most upland habitat is not explicitly managed.

**Plants**

Upland plants grow where soil conditions are dry, on small topographic rises within large marshes, or on elevated areas near roads and dikes. Due to the proximity of GSL to agricultural lands, many upland plants found in its wetlands are agricultural or pasture weeds. A group of upland plants, including bassia (*Bassia hyssopifolia*, p. 157) and intermediate wheatgrass (*Thinopyrum intermedium*, p. 175), were deliberately planted after the construction of dikes and roads to prevent erosion.
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Asclepiadaceae

Asclepias speciosa
Showy milkweed

Habitat
Roadsides, streams, and ditchbanks

Stems and Roots
60–120 cm (2–3.9 ft) tall, stout, erect stems with milky latex; woody rhizomes

Leaves
Opposite, ovate blades, finely hairy on top surface, densely hairy undersides

Flowers and Seeds
Umbelliform cymes of pink to purple, 5-part flowers, petals with cream corona; large, soft follicle of seeds with tufts of hair

Facts
Synonym: A. giffordii
Showy milkweed is habitat for butterflies, and its latex has been used as an antiseptic.
Asteraceae

*Ambrosia artemisiifolia*

Common ragweed

**Habitat**
Dry to saturated soils

**Stems and Roots**
10–100 cm (4–3.2 ft) tall, branching stems; taproots

**Leaves**
Opposite below, alternate above, blades 1–2 times pinnatifid, variously hairy

**Flowers and Seeds**
Hanging cymes of nodding, cup-shaped flowers

**Facts**
Ragweed is a primary cause of hay fever.

*A. psilostachya*, a perennial species with opposite leaves, is more common in rangelands than *A. artemisiifolia.*
Asteraceae

Arctium minus
Common burdock

Habitat
Dry to saturated soils

Stems and Roots
50–150 cm (1.6–4.9 ft) tall, stout, branching stems; taproots

Leaves
Alternate, ovate to cordate blades, thinly hairy surface, petiolate

Flowers and Seeds
Spreading, branched inflorescences, green heads of disk flowers; corollas pink or purple, involucre bracts with hooked bristles

Facts
Synonym: Lappa minor
**Asteraceae**

*Cichorium intybus*

Chicory

**Habitat**
Dry to saturated soils

**Stems and Roots**
30–170 cm (1–5.6 ft) tall stems with milky juice; deep taproots

**Leaves**
Oblanceolate blades, toothed to pinnatifid and petiolate below, entire and sessile above

**Flowers and Seeds**
Spikes of blue flowers, all ray flowers

**Facts**
Chicory roots are used to strengthen the bitter flavor of coffee.
Asteraceae

*Cirsium arvense*

Canada thistle

**Habitat**
Dry, disturbed soils

**Stems and Roots**
30–150 cm (1–4.9 ft) tall, smooth stems; deep, creeping roots

**Leaves**
Alternate blades, longer than wide, deeply lobed to pinnatifid, often spine-tipped, smooth above, wooly below

**Flowers and Seeds**
Many solitary, pink to purple flowers at the end of branches, pappus longer than corollas, involucre bracts with spiny tips

**Facts**
Synonyms: *Breca arvensis*, *B. incana*, *Carduus arvensis*, *C. incanum*, *Serratula arvensis*, *S. setosum*
Asteraceae
*Cirsium vulgare*
Bull thistle

**Habitat**
Dry soils or near roads

**Stems and Roots**
50–150 cm (1.6–4.9 ft) tall, spiny-winged stems; taproots

**Leaves**
Alternate, pinnatifid blades with spiny wings, decurrent leaf bases, surface scabrous above, wooly below

**Flowers and Seeds**
Several large, flat-topped flower heads, purple, involucre bracts spine-tipped

**Facts**
Synonyms: *C. lanceolatum*, *Carduus lanceolatus*, *C. vulgaris*
Asteraceae

Conyza canadensis
Horseweed

Habitat
Dry to saturated, disturbed soils

Stems and Roots
10–150 cm (4 in–4.9 ft) tall, simple stems; taproots

Leaves
Many alternate, cauline, linear to oblanceolate blades, some deciduous

Flowers and Seeds
Long panicles of small flowers, white ray flowers and yellow disk flowers

Wetland indicator: NA
Duration & growth: AF
Nativity in lower 48: N
Commonness: U
Asteraceae

*Erigeron divergens*

Spreading fleabane

**Habitat**
Dry to temporarily flooded soils near a disturbance

**Stems and Roots**
10–70 cm (4 in–2.3 ft) tall stems, branching near base and above; taproots

**Leaves**
Alternate, hairy blades, basal blades oblanceolate, cauline blades narrower

**Flowers and Seeds**
Diffuse inflorescence of white, pink, or blue ray flowers, yellow disk flowers; double pappus of bristles and scales
Asteraceae
Grindelia squarrosa
Curlycup gumweed

Habitat
Dry soils near roads

Stems and Roots
10–100 cm (4 in–3.2 ft) tall, smooth stems; taproots

Leaves
Alternate, simple, thick blades with minutely toothed margins

Flowers and Seeds
Solitary heads with yellow disk and ray flowers; receptacle with reflexed, sticky resinous bracts
**Asteraceae**

*Gutierrezia sarothrae*

Broom snakeweed

**Habitat**
Dry to saturated soils; pristine to disturbed areas

**Stems and Roots**
20–60 cm (8 in–2 ft) tall, slender, brittle, branching stems, woody at base

**Leaves**
Alternate, linear blades, resinous and scabrous

**Flowers and Seeds**
Flat-topped corymbs of small, yellow flowers

**Facts**
Synonyms: *G. diversifolia, G. lepidota, G. linearis, Solidago sarothrae, Xanthocephalum sarothrae*

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Asteraceae

*Helianthus annuus*
Common sunflower

**Habitat**
Various disturbed soils

**Stems and Roots**
2+ m (6.5+ ft) tall, rough, branching stems

**Leaves**
Opposite below and alternate above, ovate to cordate blades, surface rough with stiff hairs, petiolate

**Flowers and Seeds**
Solitary or corymbos of large flowers with flat, green receptacle; yellow ray flowers, red-brown disk flowers

**Facts**
Synonyms: *H. aridus*, *H. lenticularis*

Common sunflower has been cultivated for sunflower seeds.
Asteraceae

*Lactuca serriola*

Prickly lettuce

**Habitat**
Dry, disturbed soils

**Stems and Roots**
30–150 cm (1–4.9 ft) tall stems with milky juice

**Leaves**
Alternate, smooth, pinnately-lobed blades with prickly margins, spines along back midrib; clasping and twisted at base

**Flowers and Seeds**
Solitary, small, yellow, all-ray flowers, blue when dried

**Facts**
Synonym: *L. scariola*
Asteraceae

*Matricaria recutita*

German chamomile

**Habitat**
Roadsides and exposed soils

**Stems and Roots**
20–80 cm (0.6–2.6 ft) tall, branching stems, aromatic

**Leaves**
Alternate, pinnate blades, ultimate segments linear

**Flowers and Seeds**
Corymbs of flower heads with cone-shaped receptacles, white ray flowers, yellow disk flowers

**Facts**
Synonyms: stinking chamomile, *M. suaveolens*, *Chamomilla chamomilla*, *C. recutita*

*M. discoidea* is more frequent in rangelands and distinguished by a lack of ray flowers.
Asteraceae  
**Sonchus asper**  
Spiny sowthistle

**Habitat**  
Saturated, disturbed soils or streambanks

**Stems and Roots**  
10–200 cm (4 in–6.5 ft) tall, smooth stems with milky juice

**Leaves**  
Alternate, obovate to pinnatifid blades, prickly margins, auriculate bases

**Flowers and Seeds**  
Corymbs of yellow flowers, all ray flowers; pappus of capillary bristles

**Facts**  
Synonym: *S. nymanii*
Brassicaceae

Cardaria draba
Whitetop

Habitat
Dry to moist, alkaline soils near agriculture

Stems and Roots
20–45 cm (0.6–1.5 ft) tall, erect stems, forming dense colonies; strongly rhizomatous

Leaves
Alternate, oblanceolate leaves, irregularly toothed margins; short, soft hairs; lower leaves petiolate

Flowers and Seeds
Branched corymb of many small, white flowers; inflated, cordate silicles

Facts
Synonym: Lepidium draba
Whitetop is classified as a noxious weed in Utah.

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Brassicaceae

*Lepidium latifolium*
Perennial pepperweed

**Habitat**
Moist soils; disturbed areas

**Stems and Roots**
40–150 cm (1.3–4.9 ft) tall, erect stems, profusely branched above; taproots

**Leaves**
Alternate, lanceolate blades, lower petiolate and deciduous

**Flowers and Seeds**
Short, diffusely branched panicles of small, white, 4-petal flowers; ovate silicles

**Facts**
*Synonyms: Cardaria latifolia*
Perennial pepperweed is classified as a noxious weed in Utah.
**Brassicaceae**  
*Lepidium perfoliatum*  
Clasping pepperweed

**Habitat**  
Dry, alkaline soils

**Stems and Roots**  
15–40 cm (0.5–1.3 ft) tall, erect, simple stems drying light brown; taproots

**Leaves**  
Alternate blades of two types; upper leaves cordate with perfoliate leaf attachment, lower leaves 2–3 times pinnatifid in linear segments

**Flowers and Seeds**  
Long racemes of small, yellow, 4-petal flowers, inflorescences widely branched; obovate silicles
Capparaceae
*Cleome serrulata*
Rocky Mountain beeplant

**Habitat**
Various areas, often disturbed

**Stems and Roots**
30–200 cm (1–6.3 ft) tall, erect stems; unpleasant smelling; taproots

**Leaves**
Alternate, palmate blades with 3 elliptical leaflets, petiolate

**Flowers and Seeds**
Showy racemes of pink to purple flowers, 4 distinct petals, 6 exserted stamen; long pods

**Facts**
Synonym: *Peritoma serrulata*
Beeplant attracts bees through copious nectar production.

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Chenopodiaceae

*Atriplex gardneri*

Gardner’s saltbush

**Habitat**
Infrequently flooded, saline soils

**Stems and Roots**
10–40 cm (4 in–1.3 ft) tall, erect or ascending stems, woody at base

**Leaves**
Alternate (lowest opposite), deciduous, linear to ovate blades: grayish to green, farinose surface

**Flowers and Seeds**
Spikes of glomerules; yellow to brown, staminate glomerules; pistillate glomerules axillary, enclosed by long or round bracteoles; brown seeds

**Facts**
Synonyms: *A. buxifolia*, *A. gordonii*

---

**Wetland indicator:** NA
**Duration & growth:** PS
**Nativity in lower 48:** N
**Commonness:** U
Chenopodiaceae

*Bassia hyssopifolia*

Fivehorn bassia

**Habitat**
Roadsides

**Stems and Roots**
20–100 cm (0.6–3.2 ft) tall, branched, red-tinged, ribbed stems; taproots

**Leaves**
Alternate, linear blades with wooly surface and prominent midvein, sessile

**Flowers and Seeds**
Dense panicles of hairy glomerules, 5-lobed flowers with 5 hooked spines

**Facts**
Synonyms: *Echinopsilon hyssopifolius, Kochia hyssopifolia*

Fivehorn bassia is planted for erosion control, and its persistent hooks on the fruits stick to clothing and fur.

*See p. 135 for additional information.*
Chenopodiaceae

*Bassia scoparia*

Annual kochia

**Habitat**
Dry to temporarily flooded alkaline or saline soils

**Stems and Roots**
30–100 cm (1–3.2 ft) tall, branched stems; taproots

**Leaves**
Alternate, oblanceolate blades, 3 parallel veins, petiolate

**Flowers and Seeds**
Axillary glomerules, leafy or ciliate bracts, flowers develop 5 membranous wings

**Facts**
Synonyms: burningbush, *B. sieversiana*, *Kochia alata*, *K. scoparia*

*B. scoparia* is distinguished from *B. hyssopifolia* by its 3 leaf veins.
Chenopodiaceae

\textbf{Chenopodium album}

Lambsquarter

\begin{itemize}
  \item **Habitat**
  Various disturbed places

  \item **Stems and Roots**
  20–70 cm (0.6–2.3 ft) tall, erect, reddish stems

  \item **Leaves**
  Alternate rhombic to ovate blades, irregular waved or toothed margins, pale green, farinose, petiolate

  \item **Flowers and Seeds**
  Dense panicles of glomerules, 5 flower parts, overlapping and keeled; black seeds

  \item **Facts**
  Lambsquarters can be cultivated as a valued source of calcium, phosphorus, and potassium. It is distinguished from \textit{Atriplex} species by its round (not flat) fruits.
\end{itemize}
Chenopodiaceae
*Salsola tragus*
Russian thistle

**Habitat**
Dry, alkaline to saline soils

**Stems and Roots**
10–100 cm (4in–3.2 ft) tall, spiny, branched stems

**Leaves**
Alternate, narrowly linear blades with spine-like tip

**Flowers and Seeds**
Flowers separated by lengths of stem; bracteoles of 5 fused, wing-like parts with spines

**Facts**
Synonyms: *S. australis, S. pestifer, S. ruthenica*

Russian thistle is the most common species of tumbleweed.
Cuscutaceae
*Cuscuta pentagona*
Five-angled dodder

**Habitat**
Dry to temporarily flooded soils

**Stems and Roots**
Parasitic plants, slender, orange, twining stems; rootless

**Leaves**
Alternate, highly reduced, scale-like blades

**Flowers and Seeds**
Glomerules of small, white, 5-petal flowers

**Facts**
Dodder is a parasitic plant that obtains nutrients from other plants.
**Dipsacaceae**

*Dipsacus fullonum*

Fuller’s teasel

**Habitat**
Roadsides and ditchbanks

**Stems and Roots**
0.5–2 m (1.6–6.5 ft) tall, stout, prickly, ribbed stems; taproots

**Leaves**
Opposite, oblanceolate blades, united at base, prickly

**Flowers and Seeds**
Terminal, dense, cylindrical heads of blue, 4-lobed flowers, spiny involucre bracts, pedunculate

**Facts**
Synonym: *D. sylvestris*

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Elaeagnaceae

Elaeagnus angustifolia

Russian olive

Habitat
Stream and ditch banks

Stems and Roots
5–10 m (16-33 ft) tall, thorny trees, young branches with silvery scales

Leaves
Alternate, lanceolate to elliptical blades, silvery with hairs or scales below, green above

Flowers and Seeds
Clusters of yellow, 4-lobed flowers, with hypanthium; ellipsoid drupes with dense white scales

Facts
Russian olive is classified as a noxious weed in Utah.
**Fabaceae**

**Medicago lupulina**

**Black medic**

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**Habitat**
Escaping from lawns

**Stems and Roots**
10–40 cm (4 in–1.3 ft) long, prostrate or decumbent stems; taproots

**Leaves**
Alternate, pinnate blades, 3 obovate to rhombic leaflets, toothed margins, petiolate

**Flowers and Seeds**
Dense, head-like racemes of 6–25 small, yellow flowers, pedunculate
**Fabaceae**

**Medicago sativa**

**Alfalfa**

**Habitat**
Escaping from irrigated fields

**Stems and Roots**
40–120 cm (1.3–3.9 ft) tall, erect or spreading stems; deep taproots

**Leaves**
Alternate, pinnate blades with 3 oblong to lanceolate leaflets, toothed margins

**Flowers and Seeds**
Pedunculate racemes of 10–40 small, bilaterally symmetrical, purple flowers

**Facts**
Alfalfa has been cultivated as livestock forage for more than 3,000 years.
Fabaceae
*Melilotus officinalis*
Sweetclover

**Habitat**
Various dry to infrequently flooded places

**Stems and Roots**
40–150 cm (1.3–4.9 ft) tall, branching stems; taproots

**Leaves**
Alternate, pinnate blades with 3 obovate to elliptical leaflets, toothed margins, petiolate

**Flowers and Seeds**
Pedunculate racemes of numerous, small, nodding, white or yellow, bilaterally symmetrical flowers

**Facts**
Synonyms: *M. alba*, *M. arvensis*, *M. leucanthus*, *M. lutea*
**Fabaceae**

*Trifolium repens*  
White clover

**Habitat**  
Irrigated pastures

**Stems and Roots**  
8–35 cm (3-12 in) long, wiry stems, rooting at nodes, forming dense mats; stoloniferous

**Leaves**  
Alternate, palmate blades with 3 obovate leaflets united at base, minutely toothed margins, petiolate

**Flowers and Seeds**  
Pedunculate, spherical heads of white or pink, bilaterally symmetrical flowers, turning brown and hemispherical with age

**Facts**  
The 4-leafed variation of white clover is a symbol of good luck.
Lamiaceae

*Nepeta cataria*

Catnip

**Habitat**
Roadsides and ditchbanks

**Stems and Roots**
30–100 cm (1-3.2 ft) tall, square stems with ascending branches

**Leaves**
Opposite, ovate to oblong blades, serrated margins; covered in short, matted hairs

**Flowers and Seeds**
Cymes of 5-parted, tubular, bilaterally symmetrical flowers, white with purple spots

**Facts**
Cats are strongly attracted to and affected by catnip.

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Wetland indicator: **FACU**
Duration & growth: **PF**
Nativity in lower 48: **I**
Commonness: **O**
Malvaceae

*Malva neglecta*

Common mallow

**Habitat**
Dry, disturbed soils

**Stems and Roots**
15–60 cm (0.5–2 ft) long, prostrate stems, branched near base; caudex

**Leaves**
Alternate, kidney-shaped blades, surface with short, stiff hairs; petiolate

**Flowers and Seeds**
Axillary groups of 3–4 white, 5-petal flowers, pedicellate; schizocarp

**Facts**
Synonym: *M. rotundifolia*

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|--------------------|----|--------------------|-----|----------------------|---|--------------|---|
Onagraceae

*Oenothera curtiflora*

Velvetweed

### Habitat
Dry to temporarily saturated soils; disturbed areas

### Stems and Roots
50–150 cm (1.6–4.9 ft) tall stems with hairy or glandular surface

### Leaves
Alternate, elliptical to lanceolate blades with spreading hairs

### Flowers and Seeds
Long racemes or panicles of numerous flowers with long (1.5–5 mm or 0.02–0.2 in) hypanthium, 4 small, white or pink petals; hard, 4-sided fruits

### Facts
Synonyms: *Gaura mollis*, *G. parvillora*
**Habitat**
Dry to temporarily saturated soils; disturbed areas

**Stems and Roots**
20–80 cm (8 in–6.2 ft) tall, smooth culms with hairs at nodes

**Leaves**
Flat blades covered in soft, straight hairs; closed sheaths, membranous ligule

**Flowers and Seeds**
Open, nodding panicle with strongly laterally compressed spikelets and spreading florets, short glumes, broad lemmas with 4–5 mm (0.1–0.2 in) curving awn
Poaceae

**Bromus tectorum**
Cheatgrass

**Habitat**
Dry roadsides and disturbed soil

**Stems and Roots**
10–50 cm (4 in–1.6 ft) tall culms covered in soft hairs

**Leaves**
Flat, softly hairy blades, closed sheaths, membranous ligule

**Flowers and Seeds**
Drooping, 1-sided panicle; lemmas narrow with two-pronged apex and straight or slightly bent, 7–17 mm (0.3–0.6 in) long awns

**Facts**
Synonym: *Anisantha tectorum*
Poaceae

**Poa bulbosa**

Bulbous bluegrass

**Habitat**
Irrigated pastures

**Stems and Roots**
15–50 cm (0.5–1.6 ft) tall, wiry culms arising from a small bulb; caespitose

**Leaves**
Flat blades, thin and withering, sheaths open to base, membranous ligule

**Flowers and Seeds**
Ovoid panicles with ascending to spreading branches, florets modified into small bulbs; spikelets laterally compressed, glume with scabrous keel
Poaceae

Poa pratensis
Kentucky bluegrass

Habitat
Temporarily saturated lawns and pastures

Stems and Roots
15–70 cm (0.5–2.3 ft) tall culms; creeping, sod-forming rhizomes

Leaves
Folded blades with pointed tips, sheaths open to base, ligule membranous and flat-topped

Flowers and Seeds
Pyramidal panicle with spreading branches; spikelets green or purplish, laterally compressed; glumes unequal and short; hairs on lemma keel

Facts
Kentucky bluegrass is cultivated as a grass for lawns.
Poaceae

**Thinopyrum intermedium**
Intermediate wheatgrass

**Habitat**
Roadsides

**Stems and Roots**
70–100 cm (2.3–3.2 ft) tall culms with waxy surface; rhizomatous

**Leaves**
Blades smooth on top, stiff-haired underside, ribbed; sheaths open, auricles present, membranous ligule with short hairs

**Flowers and Seeds**
Erect spike with 1 spikelet per node, 3–10 florets per spikelet; glumes thick, oblong with blunt tips

**Facts**

*See p. 135 for additional information.*
**Polygonaceae**

*Polygonum argyrocoleon*

Silversheath knotweed

**Habitat**
Dry, saline, disturbed soils

**Stems and Roots**
15–100 cm (0.5–3.2 ft) long, decumbent to erect, ribbed stems

**Leaves**
Alternate, small, linear to lanceolate, blue-green leaves, sessile or petiolate; green ocrea disintegrating into fibers

**Flowers and Seeds**
Bundles of 4–6 small, axillary and terminal, 5-parted flowers, usually pink but sometimes white to green

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| Wetland indicator: | FAC | Duration & growth: | AF | Nativity in lower 48: | I | Commonness: | U |
Polygonaceae

*Rumex crispus*

Curly dock

**Habitat**
Dry to temporarily saturated, disturbed soils

**Stems and Roots**
40–100 cm (1.3–3.2 ft) tall, erect stems, branched above; vertical rhizome

**Leaves**
Alternate, lanceolate blades, margins strongly crisped and wavy, petiolate

**Flowers and Seeds**
Large, terminal panicles along half stem length, green to reddish valvate flower in whorls of 10–25, valves with smooth margins, pedicellate
Rubiaceae

*Galium aparine*

Stickywilly

**Habitat**
Dry to temporarily flooded soils

**Stems and Roots**
10–100 cm (4 in–3.2 ft) tall, hooked, square stems; growing on other plants

**Leaves**
Whorled, narrow blades with pointed tip, scabrous

**Flowers and Seeds**
Axillary groups of 3–5 small, white-green, hooked flowers, pedunculate

**Facts**
Synonyms: *G. spurium*, *G. vaillanti*
Birds

Upland areas typically provide habitat for upland bird species (p. 180) such as western kingbirds (*Tyrannus verticalis*), sparrows (family Emberizidae), and yellow-headed blackbirds (*Xanthocephalus xanthocephalus*). Large upland game birds, such as ring-necked pheasants (*Phasianus colchicus*), use and can be flushed from small upland habitats.

Upland plants are important for wetland birds during different stages of their life cycle. Dabbling ducks will often nest in a variety of upland plants, and a number of shorebirds that usually nest on mudflats will sometimes nest in sparsely vegetated upland habitat. While long-billed curlews (*Numenius americanus*) select nesting sites on mudflats near meadows, they will also nest in and forage throughout sparse and dense upland grasses.

One challenge to managing upland plants and upland habitat for birds is that mammalian predators also thrive in upland habitat. Species such as coyotes (*Canis latrans*), red foxes (*Vulpes vulpes*), striped skunks (*Mephitis mephitis*), and raccoons (*Procyon lotor*) take refuge in upland habitat and prey upon ground nesting birds and eggs in nearby wetlands. Predator control or other techniques can be used to reduce predation on upland-nesting birds.
Western kingbird
*Tyrannus verticalis*

Yellow-headed blackbird
*Xanthocephalus xanthocephalus*

White-crowned sparrow (Sparrows)
*Zonotrichia leucophrys* (Family Emberizidae)

Ring-necked pheasant
*Phasianus colchicus*

Long-billed curlew
*Numenius americanus*
Threats to Great Salt Lake wetlands

Wetlands around the world, including Great Salt Lake (GSL) wetlands, currently face many threats. The most challenging threats to GSL wetlands are invasive plant species, urbanization, and drought.

Invasive plant species are a major conservation issue at GSL wetlands because they outcompete native plants. Purple loosestrife (Lythrum salicaria, p. 92), whitetop (Cardaria draba, p. 152), poison hemlock (Conium maculatum, p. 34), thistles (Cirsium spp., pp. 142–143) and pepperweeds (Lepidium spp., pp. 155–156) are invasive species that thrive under dry or more nutrient-rich conditions and are capable of rapidly invading disturbed areas. In addition to those invasive species, over 89 km² (22,000 ac) of wetland habitat around GSL’s shorelines are densely populated with an invasive lineage of phragmites (Phragmites australis, p. 50).

Phragmites, colloquially called phrag, is a tall grass that grows in dense monocultures, outcompeting native vegetation, changing the course of rivers, and degrading wildlife habitat. Soras (Porzana carolina), rails (Family Rallidae), and blackbirds (Icteridae family), can use stands of phragmites, but very few other bird species are adapted to living in such dense vegetation. In addition, phragmites also causes many problems for humans and their domestic animals. Hunters frequently lose equipment and their navigation when walking through phragmites stands. Often, hunting dogs suffer cuts to their feet, faces, and tongues by phragmites leaves and broken, sharp stems.

As with most invasive species, controlling phragmites is a daunting task that needs our attention. Dry phragmites is a fire hazard,
while phragmites growing in water control structures can clog them and prevent the flow of water to wetlands. Many emergent wetland species benefit from seasonal/summer drawdown, but during the drawdown period, exposed, unvegetated areas are at increased risk of phragmites invasion via seed, thus creating a complex management challenge.

While invasive phragmites is incredibly damaging to GSL wetlands, there is also a lineage of North American native phragmites that is found throughout Utah. Shiny stems (rather than ribbed) and deciduous leaf sheaths reliably distinguish native phragmites (*Phragmites australis subsp. americanus*, p. 51) from the invasive strain. Native phragmites does not grow as densely as invasive phragmites, so other native plants can still grow alongside it and create interspersed layers of plants that can be utilized by many wildlife groups. Native phragmites is widespread in riparian and wetland areas in the southern half of the state, but occurs only rarely in GSL wetlands.

Most of Utah’s population lives on the Wasatch Front in cities and suburbs adjacent to GSL, and urbanization is expected to continue. This urban expansion result in wetland habitat loss and poses threats such as water diversion and increased nutrient inputs. Additional homes built along the Wasatch Front increasingly push into the buffer zones around GSL wetlands. These buffer zones are necessary to protect wetlands from surrounding land and water use changes. The combined impacts of development and roads results in significant wetland habitat loss, and the loss of native plants can be devastating to birds.

Water is already a scarce resource for GSL wetlands. Climate change models suggest water availability problems will worsen as winter snowpack is likely to decrease and summertime evapotranspiration increases. Urbanization further threatens water availability because water diverted to urban and suburban areas does not return to wetlands like excess runoff from irrigation. The water that will make it to GSL wetlands in the future will likely have higher concentrations of nutrients, leading to hypereutrophic conditions.

Healthy GSL wetlands are important for human needs such as flood control, erosion control, and water filtration, and they are vital for countless native species of wildlife, particularly birds. Understanding the invasive plant, urbanization, and drought threats to GSL wetlands and knowing wetland communities and their plant species, will help ensure sustainable wetland ecosystems for all stakeholders.
{notes}
Flowers

Generalized Flower

- Anther
- Stamen
- Petal
- Pistil
- Sepal
- Pedicel

Corolla

Calyx

Composite Flower of Asteraceae Species

- Disk flowers
- Receptacle
- Ray flowers
- Pappus

Figure 1.1

Figure 1.2
Flower parts

Anther: pollen-bearing portion of the stamen
Beak: the pointed, end projection of a fruit
Bract: a leaf- or stem-like structure at the base of a flower or inflorescence
Capillary bristle: slender, hair-like bristles; often attached to the achenes of Asteraceae flowers
Corolla: collection of flower petals
Corona: crown-like structures on the petals of Asclepias species
Disk flowers: small tubular flowers of Asteraceae
Hypanthium: a cup-shaped extension of the flowers formed by the fused, lower parts of the corolla and calyx
Involucre: bracts located below inflorescences of Asteraceae
Pappus: awns, scales, or bristles at the base of Asteraceae flowers and the apex of achenes
Peduncle/Pedicil (pedunculate/pedicellate): the stalk or stem of a single flower or an inflorescence
Pistil: female reproductive parts
Pistillate: flowers bearing pistils, lacking stamens
Ray flowers: narrow, petal-like composite flowers, often surrounding disk flowers
Receptacle: the part of the Asteraceae peduncle where the flowers of the head are borne
Scale: thin, dry, membranous structure
Sepal: a segment of the calyx (outer whorl of a flower)
Stamen: male reproductive parts
Staminate: flowers bearing stamens but not pistils
Tepal: an undifferentiated flower segment
Valve: segments of a fruit that separate from each other
Valvate: opening by valves, like the fruit of Rumex species

Figure 1.3
Grass parts

**Auricle:** ear-shaped appendage of a grass leaf where it meets the stem

**Awn:** bristle-like extension at the tip or back of lemma or glume

**Dorsally compressed:** spikelets that are flattened from front to back

**Floret:** an individual flower within a grass spikelet

**Glume:** paired bracts at the base of grass florets’

**Laterally compressed:** spikelets that are flattened from the sides

**Lemma:** lower of two bracts of a grass floret, often partially surrounding the palea

**Ligule:** in Poaceae species, an appendage at the junction of the inner leaf with the leaf sheath; can be membranous or ciliate (with hairs)

**Palea:** the upper of two bracts of a grass floret, often partially enclosed by lemma

**Sheath:** the base of the grass leaf that surrounds the stem; can be open or closed; sides of closed sheaths touch, and open sheaths have a gap between sides (Poaceae and Potamogetonaceae species)

**Spike:** a long, unbranched inflorescence with sessile flowers, maturing from the bottom upward

**Spikelet:** basic unit of a grass flower usually consisting of two glumes and one or more florets
Inflorescence types

- Corymb
- Cyme
- Panicle
- Raceme
- Spike
- Umbel–flat
- Umbel–round

Figure 1.5
Inflorescence types

Axillary: arising from leaf or stem axil

Bilaterally symmetrical: with two mirrored sides, often with distinct top and bottom petals

Compound: with two or more similar parts

Corymb: flat or round-topped inflorescence, lower pedicels are longer than upper

Cyme: flat or round-topped inflorescence, the terminal flower blooms first (Cymose)

Exserted: protruding beyond surrounding parts

Globular: globe-shaped or spherical

Glomerule: a dense, head-like cluster of flowers

Inconspicuous: small, often 1 mm or less

Inflorescence: a cluster or arrangement of flowers

Ovoid: egg-shaped

Panicle: branched inflorescence in which flowers mature from the bottom up

Pyramidal: pyramid-shaped

Raceme: an unbranched, elongate inflorescence with pedicellate flowers

Spike: a long, unbranched inflorescence with sessile flowers, maturing from the bottom upward

Spathe: a large bract that often encloses an inflorescence

Terminal: borne at the tip or apex

Umbel: a flat-topped or round inflorescence with pedicels arising from the same point like an umbrella

Umbelliform: with the appearance, but not structure, of an umbel
Leaf attachments

Alternate: arising singly from each node
Auriculate: leaf attachment with ear-shaped lobes
Basal: arising from the base of the stem
Cauline: arising from along the stem above ground
Clasping: surrounding the stem
Deciduous: falling off, not persistent
Decurrent: extending downward
Opposite: two leaves arising from the same node on opposite sides of the stem
Perfoliate: a leaf with margins surrounding the stem so the stem appears to pass through the leaf
Petiolate: attached via a leaf stalk called a petiole
Sessile: leaf attached directly to stalk, without petiole
Whorls: arranged in rings around nodes

Figure 1.6
Leaves

Margins (edge of the leaf)
  Crisped: wavy or crinkly
  Entire: smooth, not toothed
  Serrrated: saw-like margin with forward-facing teeth

Parts
  Axil: space formed between the axis of the stem and leaf
  Blade: the broad part of a leaf
  Leaflet: divisions of compound leaves
  Margin: the edge of a leaf blade
  Ocrea: a membranous sheath around stems in Polygonaceae species
  Petiole: leaf stalk
  Stipule: leaf-like structures at the base of the petiole
  Thallus: undifferentiated plant body
  Wing: thin, flat margin extending from a structure

Surface
  Farinose: surface with powdery or mealy substance
  Glabrous: surface lacking hairs or glands
  Glandular: bearing glands
  Hirsute: surface with (usually soft) hairs resent
  Scabrous: roughened surface due to thick cells or stiff hairs
Leaf shapes

- Cordate
- Deltoid
- Elliptic
- Hastate
- Lanceolate
- Linear
- Oblong
- Ovate
- Reniform
- Rhomboid

Figure 1.7
Leaves

Shapes

**Cordate**: heart-shaped with a notched base
**Deltoid**: shaped like an equilateral triangle
**Dissected**: divided into narrow segments
**Elliptical**: shaped like an oval, broadest in center
**Hastate**: shaped like an arrowhead with outward-turned bottom lobes
**Keeled**: with a ridge, like the keel of a boat
**Lanceolate**: shape that is longer than wide, and widest below the center
**Linear**: long and narrow shaped, with near-parallel sides
**Lobe**: a rounded segment or division
**Oblanceolate**: inversely lanceolate shape, longer than wide, attached at the narrowest end
**Oblong**: shape that is longer than wide, sides near parallel
**Obovate**: egg-shaped, attached at the narrow end
**Orbicular**: approximately circular
**Ovate**: egg-shaped, attached at the broadest end
**Palmate**: lobed or divided at a single point like the fingers of a hand
**Pinnatifid**: divided or lobed with parts arranged on opposite sides of the axis
**Pinnate**: dissected with leaflets arranged on opposite sides of leaf axis
**Rhombic**: diamond-shaped
**Succulent**: juicy and fleshy
Measurements and abbreviations

**ac:** acres  
**cm:** centimeters  
**ft:** feet  
**in:** inches  
**km²:** square kilometers  
**m:** meters  
**mm:** millimeters  
**p.:** page  
**pp.:** pages  
**pH:** a number between 0–14 indicating a chemical’s alkalinity or acidity  
**ppt:** parts per thousand  
**ssp:** multiple species

Seeds

**Achene:** a small dry fruit with a single seed  
**Apex:** the tip  
**Bracteole:** a small bract enclosing the seeds of *Atriplex* species  
**Capsule:** a dry fruit, opening at maturity  
**Coma:** a seed with a tuft of hair  
**Druplet:** a small, fleshy fruit  
**Follicle:** a dry pod, opening along the side at maturity  
**Keel:** a prominent ridge along longest axis  
**Lenticular:** biconvex, lentil-shaped  
**Nutlet:** small, lobed, nut-like fruits  
**Perigynia:** scale-like bract enclosing the pistil in *Carex* species  
**Schizocarp:** a dry fruit that splits into segments at maturity  
**Silicle:** a dry fruit of *Brassicaceae* species, less than twice as long as wide, with two valves splitting at maturity  
**Silique:** a dry fruit, more than twice as long as wide, with two valves splitting at maturity; *Brassicaceae* fruit  
**Tubercle:** a small swelling or projection
Stems and roots

**Ascending:** growing upward, usually curved  
**Caespitose (cespitose):** growing in dense tufts  
**Caudex:** a persistent woody base  
**Colonies:** growing in groups connected by underground parts  
**Creeping:** growing along the surface or just below  
**Culm:** hollow or pithy stems of Cyperaceae, Juncaceae, and Poaceae species  
**Decumbent:** reclining on the ground but with the tip ascending  
**Erect:** vertical, straight  
**Fibrous:** roots system with branches of approximate equal thickness  
**Node:** section of stem from where leaves originate  
**Pithy:** spongy tissue  
**Prostrate:** growing flat along the ground  
**Punctate:** dotted with pits and/or sunken glands  
**Rhizoid:** a root-like structure  
**Rhizome:** thick, horizontal, underground stems  
**Ribbed:** surface with prominent veins, ribs, or ridges  
**Scape:** a long, leafless peduncle  
**Spreading:** growing or reaching horizontally  
**Stipitate-glandular:** surface with glands born on stalks  
**Stolon:** long, horizontal, creeping stem, rooting at nodes  
**Taproot:** main root axis from which small root branches arise  
**Tuber:** thickened portion of a rhizome bearing nodes and buds  
**Tufted:** growing in dense clusters  
**Turion:** small, over-wintering shoot
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