# Plant Adaptations Wetlands

# Emergent Wetland Plants Adaptations to Saturated Soils

Wetland plants often grow in dense, clay soils. These wet soils are devoid of oxygen. Roots require oxygen; however, wetland plants have evolved adaptations to enable gases to transfer from the air down to the roots. Some wetland plants have floating leaves and stems that rest on the water surface, but "emergent plants" grow straight up out of the water and can handle changing water depths. These plants must have sufficiently rigid stems to hold the flowers and fruits above the water for wind pollination and seed dispersal, while also having spongy channels for carrying oxygen to the roots. Plant populations expand by extending underground stems or by dispersing seeds to wetland edges where the correct balance of light, oxygen and water exists.

**Emergent Plant Adaptations** 

Bulrush Schoenoplectus californicus - Flowers

Flowers are held up high to keep them above water for wind pollination and seed dispersal.

Stems Tall, fibrous stems hold plants erect

through variable water levels.

Spongy, hollow stems transport gases such as oxygen and carbon dioxide to and from roots.



Cattail

Typha latifolia Prairie Bulrush Bolboschoenus maritimus Common Spikerush Eleocharis macrostachya

Roots

Underground stems, called rhizomes, store starchy energy which allows plants to spread vegetatively underwater.

Look around you at the patterns of plant distribution in this wetland. Subtle differences in water depth, duration of flooding and soil salinity create plant community mosaics which reflect the adaptations of plants to their particular environment.

Plants need sunlight, fresh water, oxygen and nutrients to grow; insufficient amounts of any of these resources can create stressful conditions. Over the annual cycle the changes in salinity and water saturation are immense. Since they cannot move, plants must be able to withstand the most stringent conditions.

Storke Wetland, a part of the Goleta Slough, has been cut off from ocean tides by berms and a tide gate since the 1930s, yet salty or "saline" conditions persist due to their long history of tidal influence. Saline soils are stressful because salts can become concentrated in the plants and have toxic effects on cell function. Below are examples of plants that have adapted to these extreme conditions.

# Salt Marsh Plants Adaptations to Extreme Saline Conditions

When plants grow they take in water through their roots and lose water through leaf transpiration. In salt marshes, salts flow into plants during water uptake and become concentrated during transpiration and evaporation. High salt levels interfere with cell function. For this reason, these plants must reduce water loss to keep the salt diluted, so they often develop water conserving adaptations like those found in desert plants. These adaptations include succulent leaves and stems, waxy coatings, and small or vertically-held leaves which help reduce transpiration. Other adaptations allow plants to excrete salt.

### Salt Grass Distichlis spicata



Adaptation: Excess salt is secreted out of the leaves through salt glands.

#### Pickleweed Salicornia virginica



Adaptation: Excludes salts from roots; retains water in succulent stems.

#### Spearscale Atriplex triangularis



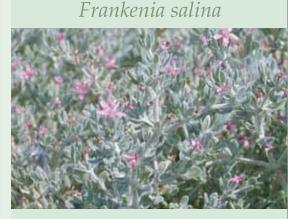
Adaptation: Waxy, vertical leaves reduce water loss.

#### Salt Extrusion



Salt grass is able to actively move salts out of living cells. (Note salt crystals above.)

## Alkali Heath



Adaptation: Small, gray reflective leaves reduce loss of fresh water.

## Plant Community Mosaic

This cross-section illustrates how 1 to 2 foot differences in water depth can create very different environments to which just a few plants are adapted. These wetland plants have evolved novel ways to handle salts, flooding and drought.



