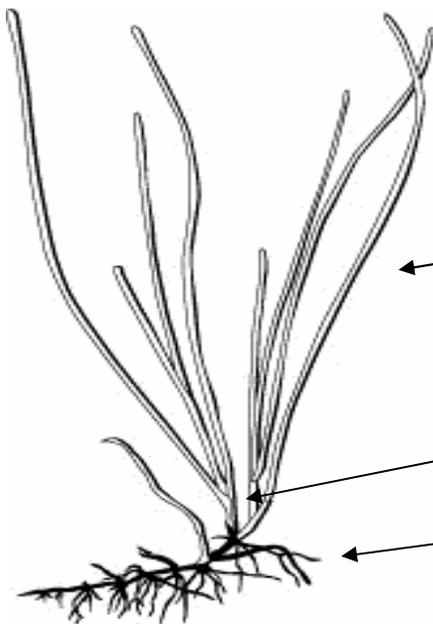


## *Eelgrass Fact Sheet*



### What is Eelgrass?

Eelgrass is a type of submerged aquatic vegetation (referred to as SAV) that grows in estuaries and shallow bays. Eelgrass is *not* a seaweed - it is a perennial flowering plant. Eelgrass grows both by vegetative growth and by seed germination. Most growth of eelgrass in the Pacific Northwest is vegetative. There are two species of eelgrass in the Pacific Northwest: *Zostera marina* (native species) and *Zostera japonica* (exotic species).



**Figure 18-2.** Eelgrass (*Zostera marina*).

"ZOSTERA" comes from the Greek word ZOSTER meaning: A BELT, describing the ribbon-shaped leaves.

Blades/Shoots - The main vegetative components of eelgrass are the rich green shoots that extend upward from the sediment surface.

Sheath - The central stem of the plant from which the blades protrude.

Rhizomes - The fleshy roots of the plant. Rhizomes grow horizontally to the sediment surface and are the main means of plant propagation.

### Distribution and Abundance of Eelgrass

Eelgrass grows in intertidal and subtidal portions of estuaries, shallow bays, and coves around the world in temperate climates. *Zostera marina* tends to grow in lower ranges of the intertidal zone, while *Zostera japonica* inhabits higher elevation zones.

Eelgrass abundance varies seasonally, with winter die-off and spring/summer re-growth. There is considerable annual variation in abundance due to a variety of factors. These factors include (but are not limited to) physical and chemical disturbance, changes in nutrient availability, and changes in water quality parameters such as turbidity and salinity. It follows that these factors can result in long term changes in eelgrass abundance if the unfavorable conditions persist.

### **Effects of Light and Turbidity on Eelgrass Growth**

Light is one of the primary factors determining the limits of eelgrass growth. Numerous studies have shown a positive correlation between eelgrass production and radiative energy. Light limitation may result from turbidity, epiphytic growth, plankton blooms, shading from algae (such as *Ulva* spp. or *Enteromorpha* spp.), and man-made structures. The maximum depth at which eelgrass grows is dependent on the availability of suitable substrate, acceptable current velocity, and light penetration. Turbidity plays a major role in light penetration.

### **Ecological Importance of Eelgrass**

Seagrass ecosystems are among the most diverse and productive ecosystems in the world. In ecological and economic value, they rival tropical rainforests and the world's richest farmlands. Eelgrass creates a highly structured habitat from loose and shifting sands. Healthy eelgrass beds form dense underwater meadows that provide habitat for invertebrates, substrate for diatom and algae growth, and food and cover for a myriad of species.

Eelgrass beds are recognized as "nursery" areas for many marine and anadromous species. Eelgrass provides food, shelter and protection from predators for many juvenile fish and shellfish of ecological, commercial and recreational importance. Seagrass beds play an important role in the life cycles of shellfish, crabs, finfish, and waterfowl. Of particular interest to current efforts to restore native salmonid populations, eelgrass has been designated as "Essential Fish Habitat" for juvenile salmonids. Juveniles utilize eelgrass beds for cover and forage as they move from freshwater to the ocean. In addition, Pacific herring and other coastal fish specifically spawn in eelgrass.

### **Role of Eelgrass in Estuarine Food Chain**

As a green plant converting sunlight energy to plant material, eelgrass is an essential "primary producer." In other words, plant material from eelgrass forms the foundation of the estuarine dinner plate that many species depend on for food. Live shoots of eelgrass are directly consumed by such waterfowl as Canada geese, black brant geese, and several duck species as well as marine organisms such as snails and sea urchins. Eelgrass beds are an important feeding area for migrating birds. Eelgrass blades provide a surface on which layers of diatoms and algae can grow. This layer of "epiphytes" is grazed by a variety of small invertebrates.

When eelgrass shoots die back or break away from the base of the plant they form "detritus" (dead plant material). Detritus is a key component of the estuarine food chain, as it is consumed by fungi and bacteria and small invertebrates. In turn, adult and larval forms of these invertebrates are relied on as a food source for small aquatic organisms, larval and juvenile fish, and shellfish. Detritus derived from eelgrass beds often moves into adjacent marshes, beaches, and offshore areas - where it contributes substantially to the food chain in those areas.

### **Sediment Interactions**

Eelgrass blades form a three-dimensional baffle in the water that softens the impact of waves and currents preventing coastal erosion and providing a calm space where organic matter and sediments are deposited. Thus, eelgrass serves as somewhat of a sediment filter for estuarine waters - settling sediment from the water column to the estuary floor. In addition, the thick sub-surface mat of eelgrass root rhizomes provides structure to the substrate and prevents current-induced erosion.

### **Nutrient Dynamics**

Eelgrass beds uptake nutrients from the water column for their growth and reproduction. Uptake of nutrients by eelgrass and other SAVs can help to prevent nuisance algae blooms and can improve water clarity. The presence of eelgrass therefore helps mitigate the impact of excessive nutrient input to the estuary from human activities.

### **How do Human Activities Impact Eelgrass?**

- **Nutrient Pollution**  
Increased nutrient-loading (from lawn fertilizers, car emissions, detergents, sewage, etc.) causes excessive epiphyte growth on eelgrass blades and algae blooms in the water column, blocking out light.
- **Dredging**  
Not only are the plants removed, but the entire physical, biological and chemical structure of the ecosystem is changed. Plumes of loose silt bury plants, smother animals, and reduce light penetration away from the dredge site.
- **Logging**  
Clear-cutting, logging roads, and steep slope failures in watersheds can increase sedimentation and turbidity in estuaries below. This reduces the ability of light to penetrate the water and reach the eelgrass beds.
- **Shoreline or Over-water Construction**  
Changes in the shoreline that alter the absorption of wave energy may erode the bottom and also increase turbidity. Structures built over the water prevent eelgrass from getting enough light to grow.
- **Spilled Oil**  
Direct contact with oil causes eelgrass plants to lose their leaves.
- **Herbicides**  
Runoff of herbicides used on coastal land can kill or damage eelgrass.

- **Shellfish Production and Harvest**  
Commercial and recreational shellfish production and harvest activities can be detrimental to the density and extent of eelgrass beds. Digging and dredging harvest methods are particularly damaging.
- **Boating and Mooring**  
Propellers and anchors can directly damage eelgrass beds.

### **Why Monitor Eelgrass?**

SAV forms the critical link between the physical habitat and the biological community. The plants require specific physical and chemical conditions to remain vigorous. In turn, they stabilize sediments and provide habitat, nourishment, and oxygen to other species in the estuary. A viable and self-sustaining SAV population is an indicator of a healthy estuary (in estuaries that naturally support SAV). By monitoring the occurrence of SAV beds and the changes in their distribution, density, and species composition, trained volunteers can help determine the health and status of SAV in an estuary. Scientists can then compare this information to historical data of SAV beds and monitor changes. Documented declines in eelgrass beds can be used to justify increased protection of existing beds, provide motivation to improve estuarine water quality, and can document the need to provide funding for restoration work.

### **Mitigation and Restoration of Eelgrass Habitat**

Near-shore or in-water development or disturbance in an estuarine area where eelgrass beds are present often negatively impacts or destroys these existing beds. If these impacts are regulated, they are often linked to requirements to mitigate the negative effects. Thus "mitigation" tries to compensate for permitted damage to existing eelgrass beds. Conversely, "restoration" works to restore eelgrass beds back to areas where beds grew historically, or improve the health of existing beds.

The science of mitigation and restoration of habitats is in its infancy. It is very difficult to re-create a complex habitat type that has its own unique blend of chemical, physical, and biological attributes. The successful creation and/or restoration of eelgrass beds has a great deal of uncertainty associated with it. However, in some areas these efforts have been fruitful. Having access to historical information about where eelgrass beds have grown in the past is a helpful tool in guiding where to pursue restoration efforts. This is one reason good monitoring information is important. It is critical to address the factors negatively impacting eelgrass habitat prior to, or concurrently with, undertaking restoration efforts. For instance, if excessive nutrients have decreased the water quality of an estuary and caused a decline in seagrass beds, restoration efforts are not likely to be successful without first addressing the sources of nutrient pollution.