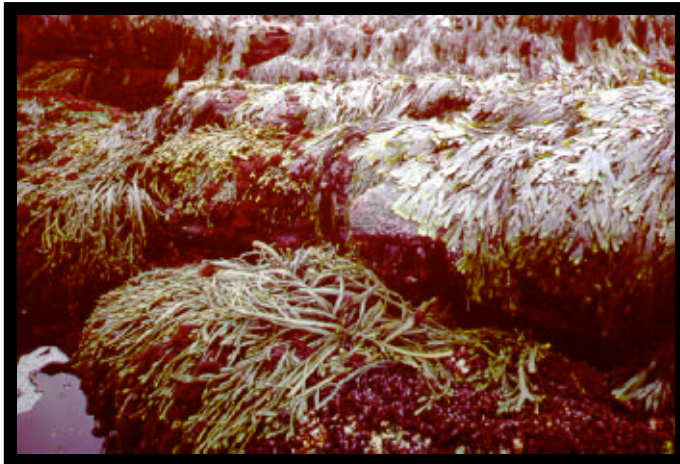


Functions and Values of Rockweeds:



What are Rockweeds?

Rockweeds are brown macroalgae such as *Ascophyllum spp.* and *Fucus spp.* Like kelps, they are primary producers converting inorganic nutrients into organic biomass by using the energy of the sun. They lack true roots, stems and leaves and because they lack a vascular system, absorb dissolved nutrients directly through the blades. The holdfast is used to attach the algae to intertidal rocks. Without attachment to hard substrates, algae will die. Unlike kelp, rockweeds have a higher light requirement, a higher water temperature tolerance (0 - 28°C), a higher tolerance to low salinity waters and, to some degree, can resist desiccation, ultraviolet radiation and overheating. Rockweeds can grow vegetatively or sexually. For *Fucus spp.* sexual reproduction can occur year-round while *Ascophyllum nodosum* reproduces in the late spring and early summer. In Maine, the life span of rockweeds ranges from approximately three years of age for *Fucus vesiculosus* to 16 years for *Ascophyllum nodosum* (Wippelhauser 1996). They grow slowly, therefore the recovery period for damaged or uprooted rockweeds can be decades.

Where are Rockweeds Located in Maine?

Rockweeds inhabit all intertidal zones with rocky substrates and seldom populate shallow subtidal habitats. They are the dominant algae in Maine, commonly found on rocky shores statewide. Rockweeds are located on sheltered and high energy ledge, boulder, and mixed coarse intertidal habitats. Small clumps can be found on sand flats or mud flats attached to rocks.

What are the Functions of Rockweeds?

Rockweeds are primary producers converting inorganic (e.g. phosphate and nitrate) nutrients into organic matter for grazers. They play an essential role in removing inorganic nutrients and trace metals and converting them into usable products for commercial and ecological use. By removing nutrients and metals (e.g. arsenic, copper, zinc) from the water column they help maintain water quality in bays, estuaries and rocky shores. Like eelgrass and kelp, portions of the algae break apart and are transported by

tides and currents to the nearshore forming large deposits of organic detritus. This detritus forms one of the bases of estuarine and marine food webs. The detritus formed from the dead algal matter is consumed by bacteria, and small marine invertebrates and insects which, in turn, feed birds, fish and mammals. Algal fragments also are carried offshore and feed the diverse subtidal benthos. Rockweed beds add structural complexity and surface area to rocky habitats. During low tides when the shores are exposed to air and direct sunlight, rockweeds provided protection to inhabitants from temperature fluctuations and desiccation. They provide shelter from predation and wave action, attachment sites for epiphytes and larvae, food resources for invertebrates and fish, feeding and nursery grounds for crustaceans (Wippelhauser 1996).

What are the Economic Values of Rockweeds?

Rockweeds have both indirect and direct commercial values in Maine.

Approximately 4,000,000 - 7,000,000 pounds of rockweed are harvested annually in Maine (Fried 1999). Rockweeds are commercially harvested and sold as health food, nutritional supplements for humans and pets, fertilizer, agricultural products and packing material for lobsters. Rockweed is used as a stabilizer in food and cosmetics.

Indirectly, rockweeds support recreational and commercial fisheries by providing shelter for lobsters, foraging for juvenile fish, and food for herbivores, the prey of fish, waterfowl, and crustaceans. Juvenile pollock, in the summer feed during high tide on intertidal amphipods, periwinkles, mussels and isopods living on and within rockweed (Rangeley and Kramer 1995). Common periwinkles and sea urchins, worth \$20 million at the dock in 1997, feed on rockweed in the shallow subtidal (NOAA 1997). Juvenile lobsters, supporting a fishery valued at over \$138 million upon landing in 1997 (NOAA 1997), settle, forage and seek refuge in low intertidal rocky habitats covered in rockweed.

How Sensitive are Rockweeds to Disturbance and Development?

Rockweed habitats have been classified by DEP as moderately sensitive to disturbance and development in Maine (see Habitat Ranking). Even though they are ecologically and commercially essential habitats, they are widely distributed and have fewer functions and values than high sensitivity habitats. Due to their ability to resist the severe conditions of the exposed mid intertidal environment, the algae are less susceptible to disturbance.

What are the Threats to Rockweed Communities?

- Shading from physical structures: Shading blocks light and reduces growth.
- Removal and/ or disturbance of habitat: Dredging, filling, blasting of ledges, removal of boulders, impoundment of water, sediment loading and over-turning of rocks displaces, smothers or removes rockweed and its habitat.
- Resuspension of sediments: Resuspension of sediments from dredging, filling, boating and fishing activity smother rockweed.
- Pollution: Run-off of sediments and pollutants from upland construction sites, thermal discharges, industrial discharges, chlorinated effluent, oil pollution, stormwater run-off, sewage, airborne pesticides from agriculture and other activities all damage rockweed. In addition, phytoplankton blooms caused by nutrient loading from pollution cause reductions in light levels harming rockweed communities.

- Over-harvesting

How Should Rockweed Habitats be Managed?

- Avoid permitting activities that remove rockweed and rockweed habitat.
- Water dependent structures should be placed in areas that will not shade rockweed. If unavoidable, structures should be as narrow as possible, as high as possible and oriented as close to north-south as possible (see eelgrass for guidelines).
- Avoid sediment disposal on or around rockweed.
- If applicable, determine if current velocity, tidal flows or wave energy will be altered due to the proposed activity. If so, design the project to minimize physical changes.
- Discharges of freshwater or pollutants should be minimized around rockweed.
- New developments in the upland should maintain pre-development levels of ground water seepage and eliminate increases of stormwater runoff.