



Seagrass and Sonar: Mapping Underwater Gardens

BioSonics and Project Seagrass are helping us understand and preserve some of the world's most vital resources.

Critical Habitat

Seagrasses are submerged flowering plants with bright green leaves found in shallow, coastal waters worldwide. Seagrass often grows in large, dense meadows that serve as some of the world's most valuable and productive marine habitats. Seagrass meadows support vast biodiversity by providing food, nursery areas, and protection for 1000s of marine species. Over 30 times more animals live within seagrass compared to adjacent sandy habitats. Juvenile fish and invertebrates use seagrass to conceal themselves from predators, and infaunal organisms, such as clams, worms, and crabs, use the buffering capabilities of seagrasses for refuge from strong currents. Dense roots established by seagrasses also help deter predators from digging through the substrate to find infaunal prey organisms. Seagrass leaves provide a place of anchor for seaweeds and filter-feeding animals like bryozoans, sponges, and forams, and provide spawning surfaces for species such as the Pacific herring.



Marine Food Webs

Endangered Florida manatees and green sea turtles graze directly on seagrass leaves, while other animals use seagrasses indirectly to provide nutrients. Bottlenose dolphins feed on organisms that live in seagrass areas. Seagrass meadows provide foraging areas for juvenile fish and food for migratory waterfowl and sea turtles. Detritus from bacterial decomposition of dead seagrass plants provides food for worms, sea cucumbers, crabs, and filter feeders such as anemones and ascidians. Further decomposition releases nutrients (such as nitrogen and phosphorus), which, when dissolved in water, are re-absorbed by seagrasses and phytoplankton.

Coastline Protection

Seagrass meadows prevent coastal erosion and stabilize the seabed by trapping sediments and buffering wave action from currents and storms. The extensive root system of seagrass helps stabilize the sea bottom the same way that land grasses prevent soil erosion. The complex structure seagrass creates in the nearshore reduces water flow and allows particulates to settle out. Therefore, seagrasses protect beaches, coastal businesses and homes by reducing the force of currents and wave energy.

Climate and Water Quality Improvements

Seagrasses absorb and store vast amounts of greenhouse gases like carbon dioxide, helping in the fight against climate change. While seagrasses occupy only 0.1% of the seafloor, they are responsible for 11% of the organic carbon buried in the ocean. Seagrass meadows, mangroves and coastal wetlands capture carbon at a rate greater than that of tropical forests. By filtering polluted runoff, absorbing excess nutrients, and trapping fine sediments, seagrasses improve water clarity and quality. Seagrasses absorb carbon dioxide and filter excess nutrients from land-based industrial discharge and stormwater runoff.



Economic Significance

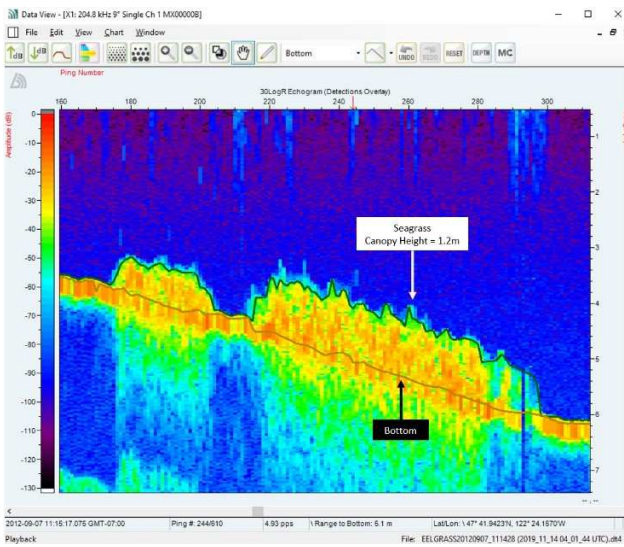
Seagrass meadows form the basis of the world's primary fishing grounds, supplying 20% of the world's fisheries. Seagrass meadows support communities and livelihoods by providing vital nutrition for close to 3 billion people, and 50% of animal protein to 400 million people in the third world.

Threats to Seagrass

Despite its importance, seagrasses are rapidly disappearing and, like rainforests and coral reefs, these incredibly important resource areas are increasingly threatened. Storms, disease, and pollution can have devastating local effects. Physical disturbance from boat propellers and anchoring, urban development, and dredging all contribute to a loss of seagrass. Global estimates suggest an area of seagrass the size of two football fields is lost every hour, so conservation of existing seagrass meadows is vital.

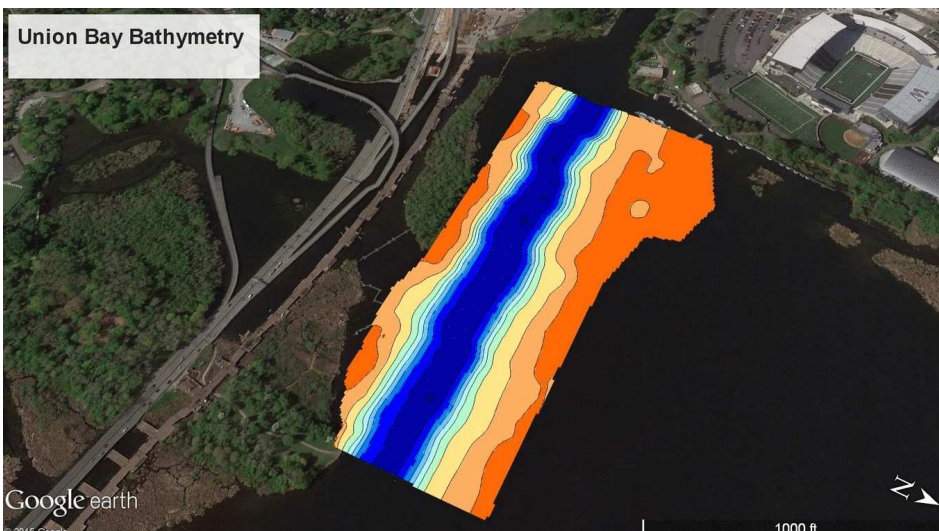
First Steps Towards Preserving Seagrass

Mapping and quantifying the world's seagrass resources is important in establishing a baseline for future conservation and restoration of this critical marine habitat. Hydroacoustics (sonar) offers an efficient means for accurately locating and assessing seagrass meadows. As shown in the image below, seagrass leaves are readily detected by sonar operating at frequencies at or above 200 kHz.



Mapping Seagrass with Sonar

Seattle-based BioSonics, Inc. provides scientific, calibrated sonar systems and specialized software designed specifically for mapping seagrass. BioSonics MX echosounder is a portable, rugged sonar system that can detect the tips of submerged plants and also detect the bottom beneath plants, thus providing accurate and reliable measurements of seagrass canopy height. An integrated DGPS georeferences each sonar ping with lat/long coordinates and provides data that can be readily mapped. BioSonics Visual Aquatic processing software includes mapping tools that allow the user to quickly and easily generate full color maps showing the location, height, and percent coverage of seagrass and other submerged aquatic plants.



The MX echosounder is has emerged as a standard tool used by dozens of agencies and universities worldwide for seagrass mapping and assessment. Recently, an MX system was delivered to Dr. Richard Unsworth of Project Seagrass in the UK. Dr. Unsworth and his team are using their new sonar for mapping seagrass meadows off the coast of Wales near the village of Porthdinllaen. You can see more images and learn about the important work being done by Project Seagrass at their Facebook page here: <https://www.facebook.com/ProjectSeagrass>



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