Coastal Habitat Restoration Primer

Habitat Restoration

Habitat restoration is the process of returning a habitat (the place where a plant or animal lives) to the condition that existed prior to its being degraded by human activities. Habitat restoration encompasses a range of remedies to repair, rehabilitate, or reestablish parts of the ecological system that have been lost or degraded. The primary goal of restoration is to enable the habitat to resume its normal ecological functions.

Restoration projects endeavor to reestablish the same functions and values that are characteristic of an undisturbed habitat of the same type. Properly planned and structured coastal habitat restoration can be very effective, depending on the type of habitat. Restoring the natural habitat structure predictably involves supplying living elements that would innately occur in the habitat (e.g., planting suitable native trees, grass, or shrubs). Appropriately restored habitats generally reestablish some natural biological functions within three to five years.

The Coastal Habitat Restoration Program within the Department of Energy and Environmental Protection (DEEP) coordinates the restoration of ecologically significant coastal shorelines and habitats in Connecticut. The ecosystems of each coastal habitat are unique and, thus, require distinct approaches to restore their characteristic functions.

Coastal Habitats

There are twelve coastal habitat types that are a priority management issue for Long Island Sound. These habitats are also classified in Connecticut's Coastal Management Act (CCMA) as coastal resources that together form an integrated terrestrial and estuarine ecosystem. These coastal habitats are further categorized as upland, wetlands, or open water habitats, depending on the influence that Long Island Sound and the tidal cycle have on an individual habitat.

Upland habitats

Bluff Point State Park, Groton

Coastal and Island Forests

Coastal forests occur on shorelands, which are comprised of typical upland features but are not subject to dynamic coastal processes, whereas island forests exist on islands located within coastal waters. Coastal and island forests typically have structural complexity with multiple vegetative layers.

Value and Functions

These forests provide shade and wildlife habitat; they sequester carbon, supply oxygen and nutrient cycling to the coastal environment, and influence local climate. They inhibit erosion and help protect the coast from severe winds and storm surges. They also reduce air and water pollution and protect watersheds and riparian buffers. Conservation of these forests is a more effective means of reducing atmospheric carbon dioxide than many current emission reduction techniques.

Coastal Grasslands

Lynde Point, Old Saybrook

Coastal grasslands are the rarest of the coastal habitat types. They are dominated by tall grasses growing on the rolling glacial outwash plains of shorelands, which are influenced by the coastal climate.

Value and Functions

These grasslands often have diverse communities of wildflowers and serve as critical habitat for several species. Their root systems are extremely efficient in absorption and utilization of water, which fosters soil conservation and enables them to withstand long stretches of drought better than other plant communities. Coastal grasslands also provide superior carbon sequestration compared to farmland.


Bluff along Ocean Drive, Stamford

Cliffs and Bluffs

These occur on at the edge of shorelands marked by steeply sloped escarpments or sea cliffs that are naturally eroded by the dynamic coastal environment.

Value and Functions

The natural erosion of bluffs and escarpments provides sediment that is transported by coastal waters. The eroded sediment is carried through currents and wave action – a process called littoral transport; this transported sediment then gets deposited downdrift away from the bluff, nourishing beaches and intertidal flats and providing nutrients to these habitats. Winds also blow the sand shoreward, which builds up dunes situated along the backshore.

Coastal Barriers, Beaches & Dunes


Barrier spit at Bluff Point State Park, Groton

These dynamic systems occur at the transitional sandy or cobble shoreline area, fluctuating between states of erosion and deposition from tidal action, currents, and wind. They include barrier spits and tombolos, barrier beaches, pocket beaches, and land contact beaches with related dunes and sand flats.

Value and Functions

Beaches and dunes serve as critical habitat for several species of rare, threatened, and endangered species. They serve as foraging grounds for numerous migratory species, breeding grounds for some fish and shellfish species, and nesting grounds for many shorebirds and sea turtles. Beaches and dunes are also the first line of defense against coastal storm events. They help to dissipate energy from wave surges and also help to inhibit erosion of shorelands. Barriers, beaches, and dunes also protect estuarine embayments and tidal wetlands established behind them. Coastal barriers also alter the exchange between marine and freshwaters, increasing freshwater input into and lowering the salinity of the embayment. The species diversity of these estuarine embayments located behind coastal barriers is much greater than on their exposed shorelines.

Wetland habitats


Osbornedale State Park, Derby

Freshwater Wetlands

These are transitional land areas that are moderately or regularly saturated, flooded, or submerged by non-tidal freshwater sources. They characteristically contain an array of hydrophytic (water plant) species that have little to no salt tolerance.

Value and Functions

Freshwater wetlands contribute to the diversity and abundance of wetland fauna and serve very important functions to the watershed. Their vegetation traps particulate matter, which decreases erosion, sedimentation, and pollution in the watershed. They can inhibit chemical pollutants from traveling through the watershed and even transform them before they seep into underground aquifers. These wetlands also absorb and convert nutrients, which helps decrease oxidation and nitrification within watersheds. Wetlands help to retain and absorb flood waters, slowing their flow and then slowly releasing the waters back into the watershed. Wetlands plants also modify streamflow by slackening currents, establishing more hospitable conditions for fish and wildlife and providing cover for juvenile fish, invertebrates, and amphibians.

Tidal Wetlands

These systems also contain hydrophytic species that occur in moderately or regularly saturated intertidal areas where daily tidal action moves water in and out of the systems, but they can also contain species that are halophilic (salt loving). Information about tidal wetlands values and functions and their restoration can be found on the Tidal Wetlands page.

Dudley Creek, Madison

Open water habitats

Lower Guilford Lake, East River

Riverine Migratory Corridors

These are rivers that drain into coastal waters, between which migratory (diadromous) fish species travel for specific parts of their life cycle.

Value and Functions

These corridors are important for several migratory fish species, many of which are endangered, threatened, or of special concern. Anadromous fish travel far up into the freshwater areas of these rivers to spawn; catadromous fish spawn in estuarine or marine waters and travel to freshwater areas to live. These riverine corridors also serve as passageways that many migratory fish use to develop to maturity. They also support freshwater wetlands and help to recharge groundwater.

Estuarine Embayments

Mumford Cove, Groton

These are protected coastal waterbodies having an open connection to the sea, in which salty sea water is diluted by fresh water, including tidal rivers, bays, lagoons, and coves. They typically have narrow inlets providing freshwater flow and shallow nearshore water depths.

Value and Functions

Estuarine embayments serve as concentration sites for wildlife, important nurseries for finfish, and essential habitat for forage species, promoting productivity within the coastal area. The soft-sediment characteristics of estuarine embayments also support extraordinary aquatic habitat for submerged aquatic vegetation and productive shellfish beds, which play a role in processing contaminants deposited from the streams draining into the embayments.

Nearshore & offshore waters viewed from Bluff Point, Groton

Nearshore and offshore waters

Nearshore waters are those waters and their substrates lying between mean high water and an approximate depth of ten meters; offshore waters are those waters and their substrates lying beyond the ten meter contour. Habitats occurring in one or both of these waters include:

Intertidal Flats

Low tide at Rocky Neck Beach, East Lyme

These are very gently sloping or flat areas located between high and low tides that are composed of muddy, silty and fine sandy sediments and generally devoid of vegetation.

Values and Functions

Intertidal flats are significant to the ecological function of estuarine ecosystems, contributing to water quality and primary and secondary production. Extremely productive microalgal communities occupy the surface sediments of intertidal flats. They help to stabilize sediments and control the exchange of nutrients (nitrogen and phosphorus) between the sediment and the water

column. Phytoplankton and detritus deposited by wave action support diverse and highly productive populations of animals that burrow in or live upon the flats, such as clams, crabs, and juvenile flounder. Intertidal flats also provide foraging habitat for many migratory birds at critical points of their migration.

Crescent Beach, East Lyme

Rocky Intertidal Zones

These are rocky shorefronts composed of bedrock, boulders and cobbles existing between extreme high and low tides and characterized by attached organisms, like algae, mollusks, and barnacles. They are highly erosion resistant, so they are an insignificant source of sediments for other coastal landforms.

Values and Functions

Rocky shorefronts attenuate wave energy and help to stabilize inshore sediment. They provide habitat and shelter for many organisms, and they serve as nurseries for many fish and crustacean species. The species that attach themselves to this habitat remain exposed during low tides but filter nutrients from the water in higher tides, improving water quality. Thus, they provide a food source for both terrestrial and aquatic marine organisms.

Submerged aquatic vegetation beds

SAV beds are comprised of rooted, vascular plants, which grow on shallow bay bottoms below the lowest low tide. These beds can be dense or sparse and also be transient, at times relocating depending on the season and conditions. SAV beds may contain one species, such as eelgrass, or many; generally, species diversity increases as salinity decreases.

SAV bed - Avery Point, Groton

Values and Functions

Eelgrass beds are one of the most productive coastal habitats. They provide vital refuge for shellfish and juvenile fish, and they are critical to maintaining scallop and hard clam fisheries. They provide a direct food source for several bird species and form concentrated feeding areas of small prey fish for predatory birds. These grassy beds also trap sediments, absorb nutrients, and oxygenate the water column, thereby improving water quality. Dense beds can also help buffer water currents, reducing suspension of sediments and inhibiting shoreline erosion.

Blue mussel bed

Shellfish Reefs

These are formed by clusters of clams, oysters, or mussels. The reef structure forms on top of soft sediments within the intertidal or subtidal zone or on other submerged structures. Intertidal beds are more seasonal in nature and less structurally complex than subtidal beds. CCMA defines shellfish concentration beds as actual, potential, or historic areas of shellfish clusters.

Values and Functions

Shellfish reefs provide several benefits, including food, habitat, and recreation. These reefs support many diverse species of fish, birds, and invertebrates, and supply important recreational and commercial fisheries. The shellfish of these reefs filter algae and particulate matter in the water column, cycling nutrients and improving water quality and clarity. The structure of oyster reefs in particular reduce the flow and direction of water, enabling them to process nutrients at a higher rate. The structure of shellfish reefs also imparts some protection against the effects of coastal storms. Reefs situated nearshore can reflect or reduce wave energy, helping to stabilize the shoreline and reduce erosion.

See the Restoration Approaches and Efforts pages to learn more about DEEP's Coastal Habitat Restoration program. For more information about coastal resources and coastal habitat restoration, see the Connecticut Coastal Management Manual and the Long Island Sound Study Thriving Habitats and Abundant Wildlife page.

Dune restoration at East Beach, Rocky Neck State Park, Niantic.