

FIELD GUIDE AND RESOURCE MANUAL



This is your publication. We have included things for you to keep handy, as a reference to avoid unnecessary problems. Thank you, Gordon Peabody, 2018.

INDEX:

Vocabulary

Laws we work under

Beach Grass, Biomimicry and Erosion Control

Plant and Animal Species

Vocabulary

ECOLOGY: Plants and animals live where they can survive. Natural Resource “**Systems**”, are complex, interconnected cofactors of biological (species diversity and abundance); environmental (physical: landform; precipitation), and energy (wind; sunlight; storms). When any degree of change occurs, anywhere in a *System*, multiple species may experience changes in survivability: A previously “Flourishing” population, with Net Growth, could transition to “Stasis”, with no net growth or net loss; or experience “Attrition”, with net loss. Under these same circumstances, conditions may improve the Survivability (net gain) of another species. This is the value of “Diversity”: it allows habitat systems to laterally transfer internal energy from one species to another; changing form; maintaining performance to be sustainable.

ECOLOGICAL TERMS

Abiotic elements are the non-living components of an area, such as exposure, landform, elevation and soil chemistry.

Abundance refers to the population size of one type of plant (or animal) found in one particular area. Abundance may mean an area is productive but populations with no diversity are stress sensitive.

Accretion refers to the gradual accumulation by deposition of new land, eroded elsewhere and transported by wind and water.

Adaptive management focuses on lateral alternatives to achieve project goal.

Aesthetics-non-scientific term with discretionary, unestablished standards.

Alert distance-the distance at which an approaching human catches an animal’s attention. They stop whatever they are doing (i.e. feeding).

Allopathic- refers to a species, usually an invasive plant, which produces chemicals that control which other plants can grow near them.

Anadromous-refers to fish which live in the ocean but migrate through fresh water rivers to breed in the rivers (i.e. Salmon), or in ponds (i.e. Herring).

Anomalous-events without linkage to scale or history of patterned event.

Angled Cuts-in reference to vegetation, stepped cuts between restricted height areas to prevent tunneling.

Appeal Proof-careful crafting-specifying that protected public interest is protected in which jurisdictional areas and by which mitigations.

Biodiversity-refers to a healthy variety of different plants (or animals) found within a habitat.

Biotic elements-are the living components of an area, including bacteria, microbes and all plants and animals.

Bioturbators-marine animals, such as crabs, which stir up bottom sediments as part of their feeding process. This often de-stabilizes bottom vegetation.

Biomass-refers to the total volume and weight of living organisms. We use carbohydrate biomass when discussing plants and protein biomass for animals.

Brumation-referring to turtles, hibernating beneath water in soft mud.

Canopy-lower, mid and upper levels of trees.

Catadromous-refers to fish which live in fresh water but migrate to salt water to breed (i.e. eels), or that live in fresh water seasonally (i.e. Salter/Brown Trout).

Coat Racking-trim term used to describe lack of vertical articulation.

Conservation of Biomass- principle maintaining overall vegetative mass within a habitat while transitioning from vertical to horizontal growth OR intentional invasive removal synchronized with native revegetation plan.

Cut Nodes-Healed cuts from previous work. Can be used as a reference for vegetation management.

DBH-term used to identify tree diameter at breast height.

Delineations-specific boundaries defining protected resource areas. Usually determined by interactive elements: 1. Specific (obligate) vegetation; 2. Distinct elevation change; 3. Current or historic (core sample) presence of black hydric soil or water; landform.

Diurnal-usually refers to tidal patterns or any other daily 24 hr. cycles.

Diversity-refers to the variety of different plants (or animals) found in one particular area.

Ectotherm-referring to animals, usually amphibians or reptiles, which must depend on external sources of heat. In cold weather they slow down.

Endangered species-species close to tipping points, requiring protection.

Erosion-the result of the weight of a point source discharge accelerating downs any slope and displacing silt and sediment. This principle can also be applied to wind displacement of soil or sand.

Erosion control-requires site specific, zero discharge systems.

Eutrophication-nutrient enrichment stimulates the growth of aquatic plant biomass in excess of healthy habitat limits. The decaying vegetation generates excess CO₂, which suffocates aquatic organisms. Most commonly occurring in

contained ponds with adjacent residential development (septic systems and lawns).

Exotic-refers to intentionally planted, decorative value vegetation, needing fertilizers. These can become invasive, displacing habitat.

Fecundity-refers to the reproductive success of a species, not just effort.

Floodplain-an area that borders rivers. These low areas accommodate excess floodwater and contain sediment deposited by floods.

Flush distance- the distance at which an approaching human triggers an animal's instinct to flee (usually used with birds).

Groin-a perpendicular structure, usually of stone, built out 90 degrees from an eroding coastal beach to trap long shore sediment. One side of a groin does trap sediment but the other side shows a lower sediment deposit from scouring.

Ground Cover-lowest level vegetation area with no vertical articulation.

Growth Regulators-hormonal products that slow plant growth.

Ground Water Recharge-infiltrates impervious sheet flow, perhaps collected at point sources, into the ground water table.

Habitat-applies to a land area where specific types of exposure and stress conditions determine specific vegetation, which in turn creates shelter and food sources for specific animals.

Endangered habitat-a habitat necessary for an endangered species to survive.

Rare habitat-linked to rare species requiring specific habitat to survive.

Habitat transition-a major, well thought out strategy to generate a completely new ecological paradigm. Such as replacing invasive habitat with native plantings or replacing vista conflict vegetation with vegetation that never needs trimming.

Heathland-low profile vegetation common to open habitat.

Horizontal migration-the movement of ground water beneath the surface, always down slope, towards a wetland.

Hydrology-the study of surface and subsurface movement of water.

Indigenous-plants and animals, which have coevolved during the past 1,000 years and achieved a sustainable balance of abundance and diversity.

Infiltration refers to the natural path of rainfall, from sky to earth to ground water table. Impervious surfaces interrupt this natural path and require mitigation for storm water.

Intertidal-refers to area exposed at low tide, between high and low tide.

Invasive-refers to often fast growing, non-indigenous plants and animals that displace habitat. These plants and animals exhibit aggressive behavior, replacing indigenous species but not contributing to habitat or diversity.

Limiting their nutrients will discourage them.

Invasive species-these plants or animals do not contribute to ecosystems.

Invasive management-long term strategy to displace invasive species.

Learning, single loop-classical response to problem's effects.

Learning, double loop-innovative response to problem's cause.

Lolly popping-a pruning term used when mid story limbs are removed.

Linkage, internal-refers to diverse energy pathways for sustainability.

Linkage, lateral-refers to parallel energy pathways.

Linkage, vertical-refers to trophic levels within a system.

Linkage to scale-refers to the integrity of connection with adjacent habitat.

Micro Habitats-are sub sets with slightly different stress factors.

Mitigations-specific measures designed and implemented to prevent negative impacts to specific resource area public interests.

Percolation-the vertical rate of gravity driven water movement through site-specific soil and subsurface soil profiles.

Performance-refers to the specific manner in which a particular resource area actually performs a particular function in the public interest. This qualifies a resource area for protection under the Act.

Performance Standards-best defined as minimal standards to be maintained while working within a resource area to avoid impacting the performance of any protected public interests.

Point source-refers to collected sheet flow discharged from a single point, by design or chance.

Post Leaf Drop-temperature related timing of annual vegetation cycle.

Preferential Cutting-selective cutting targeting invasives, and avoiding native plants.

Protected Resource Areas-specific landforms or water bodies qualifying for protection under the Wetlands Protection Act.

Public interests-any one of a group of specific functions that a resource area may provide to qualify for protection under the Act:

Flood Control; Habitat; Storm Damage Prevention; Prevention of Pollution; Water Quality; Shell and Fin Fisheries; & local bylaws.

Rare species-populations stressed by loss of habitat.

Seed Heads-reproductive structures in grasses. “Ready to seed”.

Sentinel species-A critical ecological term, referring to particular species in each habitat that are especially sensitive to change.

Sheet flow-is created by a mass of rain moving across an impervious, paved or roofed surface.

Storm water-when more rain falls than can be absorbed by the soil. 1 inch per hour or 3 inches over three days (100-year storm).

Stress-refers to a normal but variable cofactor for sustainable species.

Surge-a layer of seawater added to tidal levels, generated by onshore wave loading or slow moving, low barometric pressure storm.

Surprise factor-a poorly defined term regarding exponential negative or positive feedbacks.

Survival rate-refers to planting success rates. 90% or better is expected from conservation mix seeding. 75% or better is expected from (appropriate) commercial plantings and 50% is expected from indigenous transplants (using our indigenous transplant protocol), at end of growing season.

Sustainability-refers to any system, which has built in cofactors allowing, continued performance under changing conditions.

Synoptic-refers to a limited observation, which does not take into account linkage to scale or longer-term patterns over time.

Stump Sprout- basal cut stump, allowed to proliferate by re-sprouting.

Trend-a longer-term pattern incorporating consistent events.

Tidal prism-the cumulative effect of basin cross-section and tidal access.

Tipping point-refers to the imbalance within any single species, between cumulative mortality rates and the reproductive rates. A “vanishing point”.

Trophic levels-habitat layers of transition from basic nutrients and sunlight to carbohydrates and from carbohydrates to protein.

Translocation-usually refers to chemical, mineral or nutrient transport, internally, trans membrane, through biological systems, usually plants.

Uncertainty-refers to synergistic variables, which may or may not contribute to any event in time and any subsequent consequences.

RESPONSIBILITIES AND EXPECTATIONS

1. You are considered a sub contractor, responsible for your own financial records and insurance.
2. Think smart: work safe; protect each other.
3. Be equipped with proper gear. Bring gloves, hat, water and extra clothing for weather conditions.
4. Understand how to read and use Tide Tables, before going to any coastal project. (<http://www.capetides.com>)
5. Use notebook and pen to track time on each job site; subtract personal time (visitors, phone calls), and meals. Use time sheet.
6. Keep track of tasks left undone and report unfinished work to Gordon.
7. You are responsible for materials and tools you work with. Know where they should be stored at the end of the day.
8. It is your responsibility to communicate your availability.
9. Recognize problems; make a call before making a decision.
10. You are responsible for documenting job related purchases.

UNDERSTANDING MITIGATIONS: SYSTEMS TO PROTECT RESOURCES:

Demolition, excavation, construction and concrete over pour have the potential to impact the public interests within the resource area and are reviewed by the Conservation Commissions. Commissions evaluate submitted materials to determine potential impacts. Potential impacts need to be avoided by designing techniques or protocols to Mitigate these impacts. Mitigations are the conditions that will allow a project to go forward.

There are three classes of mitigations: primary, secondary and tertiary.

Primary Mitigations include the **Limit of Work (L.O.W.)** and standard erosion control systems. These are implemented prior to the pre-construction site conference. **Secondary Mitigations** might be necessary to address treatment of excavated materials, de-vegetated areas or equipment movement and materials. **Tertiary Mitigations** address re-vegetation, hydrology and water quality.

The Massachusetts Wetlands Protection Act:

Identity of eight public interests that wetlands protect.

PUBLIC & PRIVATE DRINKING WATER SUPPLIES – Wetlands contribute to both the quality and quantity of public and private drinking water supplies by contributing to the ground water supply, protecting against storm damage, and prevention of pollution.

POLLUTION PREVENTION - Wetland plants and soils slow down the flow of water, allowing suspended sediments to settle out. The plants in a wetland also trap, remove, and/or dissolve pollutants in the water such as phosphates, nitrates, and heavy metals.

GROUNDWATER SUPPLY - Not only does groundwater contribute to drinking water supplies, as mentioned above, it is also very important in maintaining water levels in many rivers, streams, lakes and ponds. Finally, groundwater provides a vital source of water to plants between rainstorms.

FLOOD CONTROL - Wetlands help control flooding by slowing down and storing floodwaters. The plants and soils in the wetland absorb much of the water. The remainder is released at a slower, steadier rate.

STORM DAMAGE PREVENTION - During a storm, wetland vegetation stabilizes the soil and prevents erosion from wind, ice, and fast-moving water. Friction from the plants found in wetlands also slows down the velocity of potentially damaging storm waters.

PROTECTION OF FISHERIES - In addition to preventing contamination, wetlands provide a valuable food source and habitat to many fish species.

WILDLIFE HABITAT - Wetlands provide habitat for various animals. Birds, mammals, reptiles, and amphibians use wetlands for food, shelter, breeding and nesting. Wetlands are also valuable migratory areas.

PROTECTION OF LAND CONTAINING SHELLFISH - In coastal areas, wetlands provide habitat and protection against pollution for shellfish such as mussels, clams, and oysters.

	A	B	C	D	E	F	G	H	I
1									
2	Coastal Beaches	x		x	x				
3	Barrier Beach	x	x	x	x				
4	Coastal Dunes	x	x	x					
5	Coastal Bank	x	x	x					
6	ILSF								
7	LSCSF	x				x			
8	Intertidal Land			x	x				
9	Salt Marshes	x	x	x	x	x			
10	Fresh Water Ponds	x		x					
11	Land Under Water			x	x				
12									

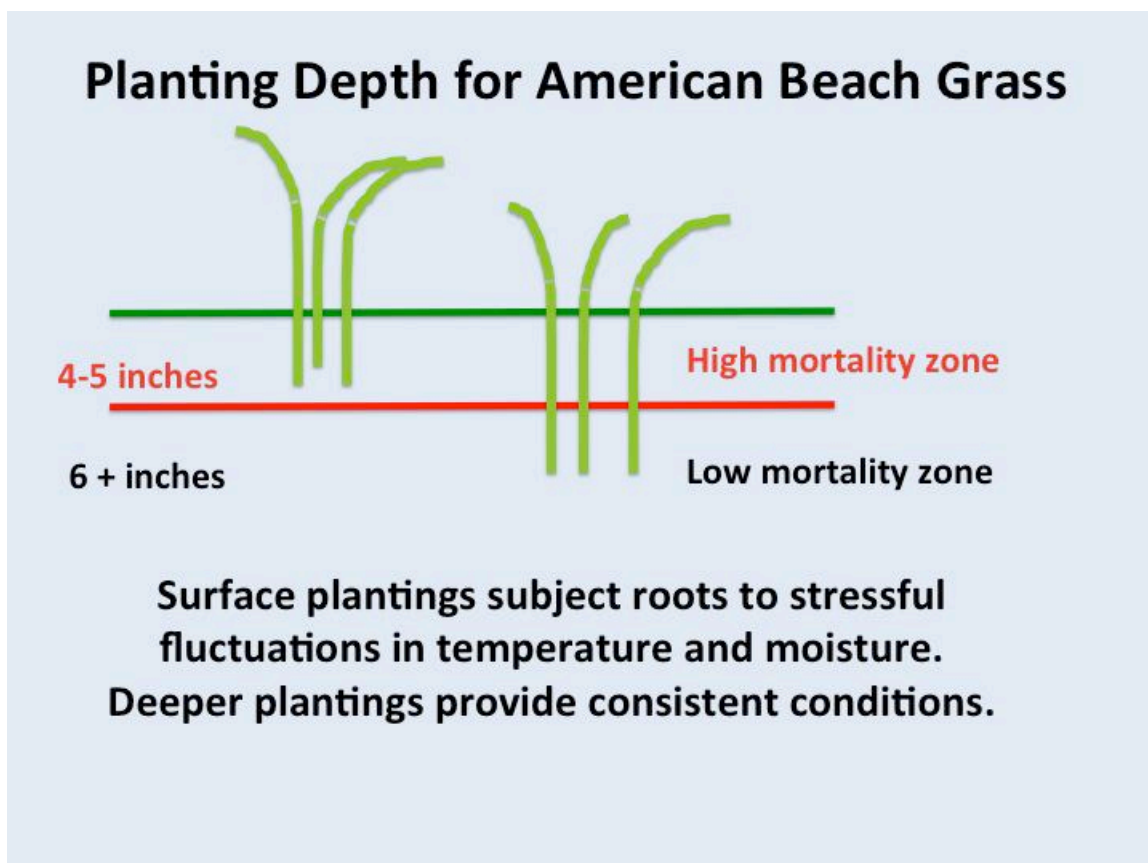


Safe Harbor Image: Gordon Peabody with Harwich Regional H.S. Honors Biology Class, studying habitat changes, Herring River Estuary Restoration.

Planting Guidelines for American Beach Grass

Gordon Peabody, Safe Harbor Environmental, 2018

Native American Beachgrass, *Ammophila breviligulata*, performs by collecting and stabilizing wind blown sand in our coastal resource systems. Suggested **planting protocol** consists of dormant stem winter planting. Plant 3 culms together, 6” deep, randomly spaced 10-12” apart. Overplanting increases competition for limited nutrients. **Planting protocol** should use ladders to avoid contact with loose sand on banks.





Gordon Peabody, Safe Harbor Environmental Services gordonpeabody@gmail.com

BIOLOG-SILT FENCE EROSION CONTROL SYSTEMS

Massachusetts Laws relevant to our work:

1. Wetlands Protection Act, “the Act”, or 310.10 CMR.

- **This identifies and defines** specific, “Wetland Resource Areas”, or “Resource Areas”, and “100 foot Buffer Zones”, adjacent to Resource Areas, which qualify for protection.
- **“The Act” further defines why these specific areas qualify for protection:** because they **“Perform”** by protecting or contributing to protection of the following **“Public Interests”**: shell fisheries; fin fisheries; water pollution prevention; storm damage prevention; flood control; habitat; drinking water supply. *Example: coastal dune: performs by protecting the public interest of storm damage prevention by preventing storm over wash from ocean storms.*
- **“Conservation Commissions”** created by “The Act”, in every MA town, to review wetland resource area and buffer zone projects. **“Activity”** in these areas **are not allowed to “Negatively Impact”** the performance of protected interests.
- **“Mitigations”** are designed through the review process of submissions and public hearings, to avoid or prevent negative impacts to public interests. *Two examples of mitigations are: erosion control systems to replicate the role of vegetation that was removed during the project; and revegetation upon project completion, to replace habitat.*
- **Conservation Commissions issue an Order of Conditions**, which specifies site specific protocols, compliance monitoring and mitigations, allowing project to go forward.
- **Abutter notifications by the Applicant**, are required under “The Act”. These require written notifications delivered by certified mail to all abutters within 100’ of the property line of the parcel where the activity is proposed.
- **MA Department of Environmental Protection (MA DEP)** also reviews every project and issues a project number.

2. Open Meeting Law

- ✓ **Protects the decision making process through Transparency**, requiring that all municipal deliberations regarding a decision be made in a public venue, open to all, which has been advertised.
- ✓ This protects the **“Rights”** of the applicant and the abutters.
- ✓ This allows participation by property owners and abutters, whom may be affected by the decision.

- ✓ **All deliberations** between Commissioners regarding a proposal before them should be made at the advertised public hearing.
- ✓ **This does not exclude** Commissioners from making site visits or discussing **facts** of the proposal.
- ✓ **Under no circumstances, should a quorum of Commissioners ever discuss a proposal outside of a “Public Hearing”.**

3. Public Records Law

- ✓ Any document, hard copy or email or facsimile, transmitted electronically, by mail or by hand, between any “Municipal Official” and public or private party, becomes “**Public Record**”.
- ✓ **Public records must be made available** to the public.
- ✓ **This includes:** any meeting minutes, even in draft form; submitted documents, mail, photos and communications; any materials in any Commission files.
- ✓ All materials, including documents and emails, that we submit to Conservation Commissions, becomes public record.
- ✓ Any statements we make at public hearings are public record
- ✓ Informal meetings with Town employees could possibly be considered public record.

4. Natural Heritage and Endangered Species Program

The NHESP administers the Massachusetts Endangered Species Act (MESA). Map overlay systems are used to document specific areas the state’s endangered species are dependent on. These can be related to mating, feeding, hibernation, nursery or other areas. When we include the species of plants, there are hundreds of species protected. If a project area includes listed areas, the applicant submits a site plan and photo set, along with the environmental management plan. Most reviewed projects may not result in the “take” of an endangered species. A few require careful conditioning (dark sky lighting, limit of work, storm water management) to be approved. A small percentage require redesign, usually developments with multiple structures near wetlands.

5. Conflict of Interest Law

- ✓ **Addresses “The Perception” of undue influence**, regarding Municipal decisions. **Remember perception.**
- ✓ This law is administered by the MA Ethics Commission
- ✓ The Ethics Commission has a dedicated phone line for questions or complaints.
- ✓ Only first parties will be responded to. You must be the person requesting an opinion on your situation.
- ✓ Most definitions of possible conflict are focused on finances; will the decision maker (s) benefit financially from the decision? Will the decision maker’s direct family benefit from the decision?
- ✓ Has there been an exchange of any direct or indirect financial value between the applicant and decision maker (s)?
- ✓ Has any exchange exceeded \$50.00 in value?

Other possible conflicts:

- ✓ Is the decision maker an abutter to the proposal?
- ✓ Unnecessary social contact is not only unprofessional; it may contribute to the perception of special treatment. (Cups of coffee for a Commission Agent or Commissioner should be acceptable but it is professional to ask first).
- ✓ **Pay attention**, if you have made an Agent or Commissioner uneasy by contributing, paying or donating anything of value to them directly or perhaps even indirectly to a cause they support but then specifically mentioning it to them.
- ✓ It should be considered inappropriate to solicit information regarding an impending Commission vote from Commissioners.
- ✓ It could be considered inappropriate to discuss specific cases pending before a Commission, with Commissioners outside of a public hearing.
- ✓ Public Officials, no longer in Municipal employ, are banned from participating in any specific project they were part of.
- ✓ Public Officials, no longer in Municipal employ, are banned from appearing before any Town board with any project for 3 years.

Oriental bittersweet

Celastrus orbiculatus

- **INVASIVE VEGETATION**
- Introduced to U.S. in 1876
Identification: A tangled or high-climbing vine with nearly circular leaves. Climbs to 60'
- Buds: small, pointed, sharply set at right angles to stems.
- Stems: round, hairless, thornless, brown.
- Leaves: 2"-5" ..
- Flowers: small, green, clustered, Bloom May-June.
- Fruits: ornamental clustered orange-colored pods that open to reveal scarlet seed-coverings, Sept.-Dec.



- Small, black winged fruits that are three-sided
- Looks like bamboo

Japanese knotweed

Polygonum cuspidatum

- **INVASIVE VEGETATION**
- Herbaceous perennial five to eight feet tall, all habitats, mainly inland
- Smooth, stout stems that are swollen where leaf meets stem
- Spade-shaped leaves that are broadly oval
- Lack of hairs underneath leaves
- Greenish-white flowers that branch in clusters in the summer





Poison Ivy **SKIN IRRITANT**

Toxicodendron radicans

- May be shrub or vine with three leaflets on long, oppositely placed stems (leaf of 3, let it be!)
- Leaves: glossy or dull and almond shaped, usually shiny
- Leaves: reddish in Autumn
- Flowers: Inconspicuous greenish-white located in clusters, May to June
- Produces round, green berries in bunches from August to November



Japanese **honeysuckle**

Lonicera japonica

- **INVASIVE VEGETATION**
- Perennial vine that climbs by twisting its stems around vertical structures, found in all habitats
- Leaves: in pairs and are oval
- Stems: and leaves may be covered in soft, fine hairs
- Flowers: Fragrant, tubular with five petals, white to pink



- Blooms: April - July
- Fruit: Produces small black fruits
September – November

American Beachgrass

Ammophila breviligulata

- Dominant plant within dune systems
- Stems are stiff and rise upwards
- Leaves are long and curved outward; many stems per clump
- May reach height of two to three feet
- Seed head is spike-like; fruiting September to October
- Has strong rhizomes that spread and give rise to new plants beneath the sand



Beach Plum

Prunus maritima

- Low, woody shrub with reddish brown branches, 3-5' tall
- Leaves are oval shaped and dull green, folding inward
- Flowers are snowy-white and blooms from late April to early July
- Fruits are round, reddish-purple to blue-purple that form from August to October





- Flowers: are generally smaller than flowers of *Rosa rugosa*
- Fruits: have rounder shape and are smaller than “rose-hips” of *Rosa rugosa*
- Found in coastal habitats
- Found on beaches, primary dunes and inter-dune areas

Salt Spray Rose

Rosa Rugosa

- Considered naturalized
- Dense thickets on beaches & dunes
- Leaves: wrinkled, almond shaped
- Stems: covered with thin, spines
- Flowers: white to dark pink
- Bloom: throughout summer
- Fruit: ripens late summer; large, smooth shiny, deep red “rose-hips”



Virginia Rose

Rosa Virginiana

- Small deciduous shrub native to North America
- Alternate leaf arrangement with compound leaves
- Single, pink flowers that bloom June until August



Dusty Miller

Artemisia stellariana

- Nonnative, naturalized plant that is typically found in dune systems
- Leaves are pale green and covered with white, woolly hairs
- Flowers are yellow, blooming July - September
- Found on beaches, primary dunes and inter-dune areas

Beach Pea

Lathyrus japonicus

- grows trailing stems
- Waxy leaves in two to five pairs of leaflets on each stem
- Flowers are in clusters and are violet to purple in color
- Flowers blossom throughout summer
- Has elongated, flattened pods about two inches in length that form in the late summer and fall
- Found on primary and inter-dune areas





Butterfly Milkweed

Asclepias tuberosa

- Tall perennial with multiple stems emerging from root
- Shiny, alternate leaves with presence of tiny hairs
- Has clusters of bright, orange flowers towards top of the plant
- 4 – 5" smooth, slightly hairy pods develop during late summer

Seaside Goldenrod

Solidago sempervirens

- Tall perennial found in dunes and uplands
- Conspicuous, yellow flowers blooming throughout summer to November
- Thick leaves that are long and hardy
- The latest blooming wildflower on the Cape





Bayberry

Myrica pensylvanica

- 2 – 4' tall shrub that inhabits areas between fields and forests; also seen in backshore dunes
- Leaves are slightly toothed at the tip
- Females form clusters of round berries that are covered with greenish-white wax
- Male or female (with berries)
- Capable of fixing Nitrogen

Bearberry or Hog Cranberry

Arctostaphylos uva-ursi

- Low, ground-hugging shrub
- Small, dark-green leaves that are arranged densely along woody stalks
- Light-pink flowers bloom early in spring
- Bright-red, round berries form in early September





Pitch Pine

Pinus rigada

- 50 – 60' tall evergreen found in woody uplands
- Sappy wood found in crooked postures
- Needles come in bundles of three
- Round, prickly cones about 3" long

Arrowwood

Viburnum dentatum

- Shrub with tall, slender stalks found in moist thickets along borders of woods
- Shiny, toothed leaves that are ovate in shape
- Flowers are white and bloom late May to early June
- Clusters of round, bluish-purple berries
- Important food source for migrating birds





Lowbush Blueberry

Vaccinium angustifolium

- 1 – 2' tall bush found in forest understory's
- Flowers are whitish pink that bloom in spring
- grow into edible blueberries

Brunswick

- Leaves are glossy, dark-green and turn red-orange in fall

Burgundy

- Leaves are grey-green and turn deep-burgundy in fall

Huckleberry

Gaylussacia baccata

- Deciduous shrub found in forest understory's
- Several feet high
- Shiny, alternating leaves with resinous dots
- Produces purplish-black edible berries
- Produces red leaves in Autumn





Big Bluestem

Andropogon gerardii

- 4 – 8' tall perennial grass that grows in bunches
- Has bluish-green stems with long leaf blades
- Seedhead is branched into three parts
- Also referred to as “Turkey foot” due to shape of characteristic seed head

Little Bluestem

Schizachyrium scaparium

- 2 – 3' tall native perennial that grows in bunches
- Stems are tan to reddish-brown in fall
- Leaf blades are long and curl outward
- Leaves can be light green to light blue
- Flowering stalks have seedheads that branch into multiple parts





New England Aster

Symphotrichum novae-angliae

- Tall, slender perennial
- Hairy, clasping leaves densely arranged on the stems
- Conspicuous, bright purple flowers with orange-yellow centers
- Flowers form at the tips of stems

Panic Grass

Panicum virgatum

- Species of 3 – 6' tall grass that forms in bunches
- Bright green leaves form up and down the stem and turn bright yellow in fall
- Leaves are persistent and curve outward
- During summer, it forms lacy sprays holding the seeds
- Seedheads are reddish-purple





Purple Gerardia: *Gerardia purpurea*



Highbush Blueberry: *Vaccinium corymbosum*



Lichen



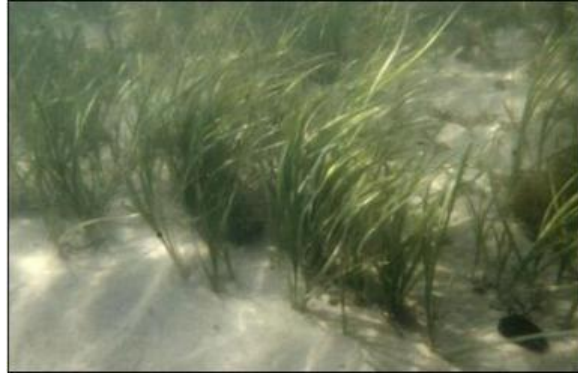
Cranberry: *Vaccinium macrocarpon*



Saltmeadow Cordgrass: *Spartina patens*



Eel Grass: *Zostera marina*



Rockweed: *Fucus vesiculosus*



Salt Marsh Cordgrass: *Spartina alterniflora*



Knotted Wrack: *Ascophyllum nodosum*
(Shown as ECAD with *Spartina alterniflora*)



Glasswort: *Salicornia europaea*



Irish Moss: *Chondris crispus*



Green Fleece: *Codium fragile*



Sea Lettuce: *Ulva lactuca*



Quahog: *Mercenaria mercenaria*



Shelter Weed: *Enteromorpha intestinalis*



Soft-shell Clam: *Mya arenaria*



Slipper Snail: *Crepidula fornicata*

Blue Mussel: *Mytilus edulis*



Common Periwinkle: *Littorina littorea*



Common Oyster: *Crassostrea virginica*



Northern Moon Snail: *Lunatia heros*



Bay Scallop: *Aequipecten irradians*



Salt-Marsh Snail:

Melampus bidentatus



Green Crab: *Carcinus maenas*



Sand Shrimp: *Crangon septemspinosa*



Long-Clawed Hermit Crab: *Pagurus longicarpus*



Ribbed Mussel: *Modiolis demissus*



Horseshoe Crab: *Limulus polyphemus*

Common Razor Clam: *Ensis directus*



Mud Fiddler Crab: *Uca pugnax*



Blue Crab: *Callinectes sapidus*



Mole Crab: *Emerita talpoida*



Lady Crab: *Ovalipes ocellatus*



Mud Dog Whelk: *Nassarius obsoletus*



Common Sea Star: *Asterias forbesii*



Spirorbis Worms: *Spirorbis spirorbis*



Sand dollar: *Echinarachnius parma*



Black Racer: *Coluber constrictor*



Sandworm: *Nereis virens*



Snapping Turtle: *Chelydra serpentina*



Brant Goose: *Branta bernicla*



Common Tern: *Sterna hirundo*



Eider Duck: *Somateria mollissima*



Herring Gull: *Larus smithsonianus*



Blue Heron: *Ardea herodias*



Great White Egret: *Ardea alba*



Piping Plover: *Charadrius melodus*



Bluebird: *Sialia sialis*



Osprey: *Pandion haliaetus*



Red Fox: *Vulpes vulpes*



Red-Tailed Hawk: *Buteo jamaicensis*



Eastern Cottontail: *Sylvilagus floridanus*



Meadow Vole: *Microtus pennsylvanicus*



Gray Seal: *Halichoerus grypus*



Long-Tailed Weasel: *Mustela frenata*



Fisher: *Martes pennanti*



Opossum: *Didelphis virginianus*



American Turkey: *Meleagris gallopavo*



Eastern Coyote: *Canis latrans*



Thank you for supporting Safe Harbor

