

# Ecological site F149BY006NY

## Well Drained Outwash

Last updated: 9/17/2024

Accessed: 05/25/2025

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### General information

**Provisional.** A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

### MLRA notes

Major Land Resource Area (MLRA): 149B—Long Island-Cape Cod Coastal Lowland

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This area is in the Embayed Section of the Coastal Plain Province of the Atlantic Plain. It is part of the partially submerged coastal plain of New England. It is mostly an area of nearly level to rolling plains, but it has some steeper hills (glacial moraines). Ridges border the lower plains. The Peconic and Carmans Rivers are on the eastern end of Long Island. The parts of this area in Massachusetts and Rhode Island have no major rivers. This entire area is made up of deep, unconsolidated glacial outwash deposits of sand and gravel. A thin mantle of glacial till covers most of the surface. Some moraines form ridges and higher hills in this area of generally low relief. Sand dunes and tidal marshes are extensive along the coastline.

### Classification relationships

USDA-NRCS (USDA, 2006):

Land Resource Region (LRR): S—Northern Atlantic Slope Diversified Farming Region

Major Land Resource Area (MLRA): 149B—Long Island-Cape Cod Coastal Lowland

USDA-FS (Cleland et al., 2007):

Province: 221 Eastern Broadleaf Forest Province

Section: 221A Lower New England

Subsection: 221Ab Cape Cod Coastal Lowland and Islands

Subsection: 221An Long Island Coastal Lowland and Moraine

## Ecological site concept

This site consists of very deep, well drained soils formed in loamy over sandy and gravelly outwash. They are nearly level through moderately sloping soils on outwash plains, valley trains, terraces, and water-sorted moraine deposits. Representative soils are Haven, Riverhead, Hempsted, and Katama.

Many of the plant communities are considered maritime if influenced by salt spray from coastal storms or coastal if only influenced by the coastal climate. The representative plant communities are varied but generally consist of pines (pitch, white) and oaks (chestnut, black, scarlet, bear) e.g., "white-pine - oak forest" (Swain and Kearsley 2001) ,pitch pine - oak Forest (Swain and Kearsley 2001, Edinger et al. 2014); "black oak- scarlet oak woodland (Swain and Kearsley 2001); "coastal oak [heath/hickory/ laurel]" (Edinger et al. 2014); "maritime oak" (Edinger et al. 2014); "maritime red cedar" (Edinger et al. 2014); plus open sites like "scrub oak barrens" (Swain and Kearsley 2001, Edinger et al. 2014); "pitch pine oak woodland/barrens" (Edinger et al. 2014); "sandplain heathlands/grasslands" (Swain and Kearsley 2001); maritime shrublands/heathlands/grasslands (Edinger et al. 2014); and the Hempsted Plains grasslands(Edinger et al. 2014). Influences include development, drought, fire, and invasive plants like winged Euonymous and Asiatic bittersweet.

## Associated sites

F149BY005MA	<b>Dry Outwash</b> Dry Outwash
F149BY007NY	<b>Moist Outwash</b> Moist Outwash

## Similar sites

F149BY011MA	<b>Well Drained Till Uplands</b> Well-drained Till Uplands
F149BY005MA	<b>Dry Outwash</b> Dry Outwash

Table 1. Dominant plant species

Tree	(1) <i>Quercus coccinea</i> (2) <i>Pinus rigida</i>
Shrub	(1) <i>Vaccinium pallidum</i>
Herbaceous	Not specified

## Physiographic features

Well-Drained Ecological Sites occur on nearly level to gently sloping soils on outwash plains.

**Table 2. Representative physiographic features**

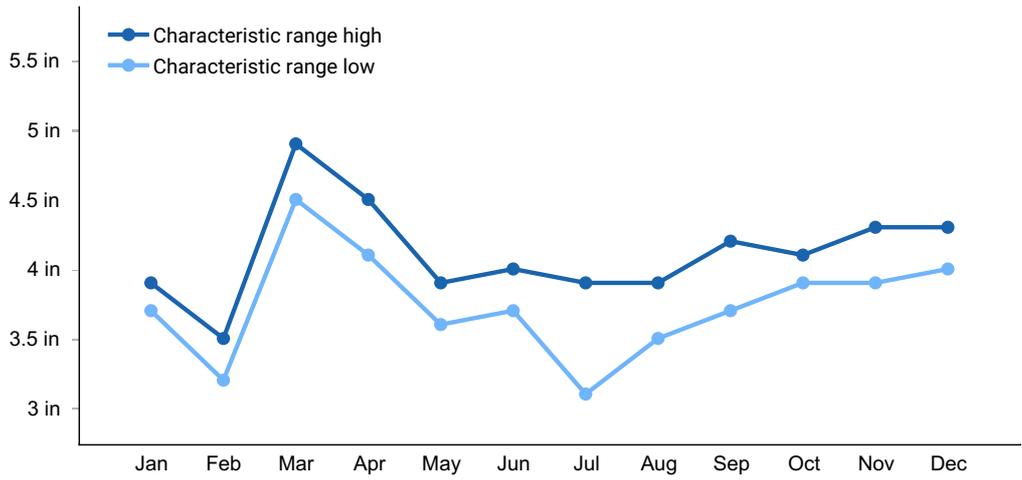
Landforms	(1) Outwash plain > Outwash plain (2) Moraine (3) Terrace
Runoff class	Very low to very high
Flooding frequency	None
Ponding frequency	None
Elevation	0–377 ft
Slope	0–60%
Water table depth	72 in
Aspect	Aspect is not a significant factor

## Climatic features

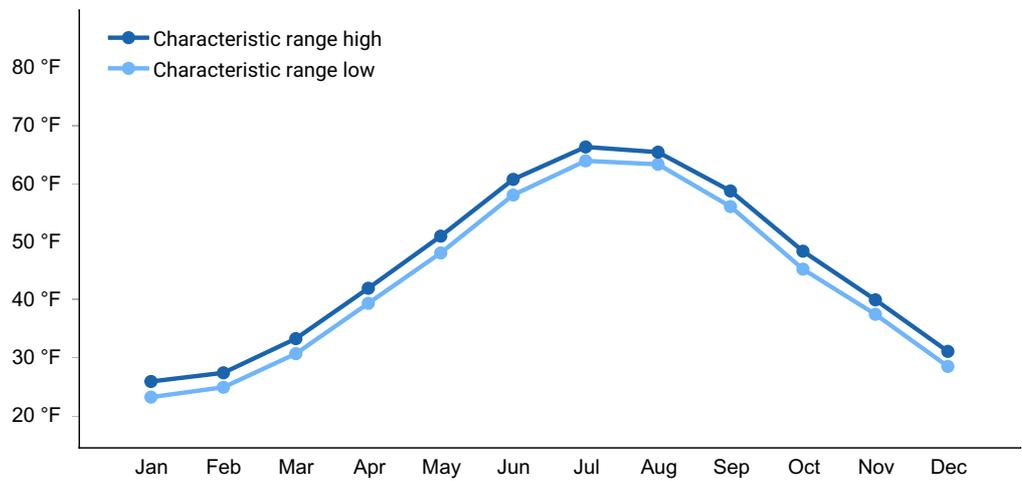
Coastal regions' climate generally considered maritime, experiences a more moderate climate than inland, i.e., cooler summers and warmer winters and delayed onset of spring. However, coastal regions do experience the brunt of extreme weather such as nor'easters and tropical storms, e.g., hurricanes.

**Table 3. Representative climatic features**

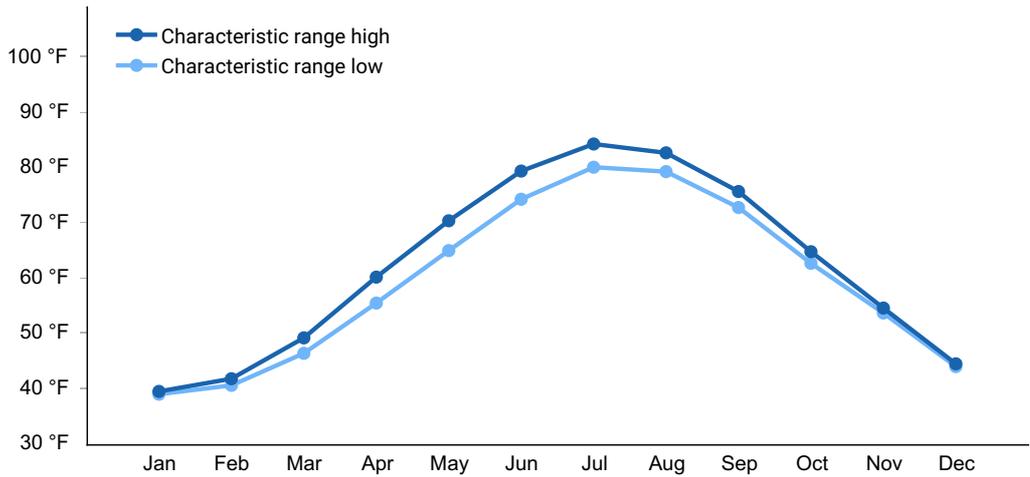
Frost-free period (characteristic range)	152-182 days
Freeze-free period (characteristic range)	202-222 days
Precipitation total (characteristic range)	45-49 in
Frost-free period (actual range)	147-189 days
Freeze-free period (actual range)	193-227 days
Precipitation total (actual range)	44-50 in
Frost-free period (average)	167 days
Freeze-free period (average)	212 days
Precipitation total (average)	47 in



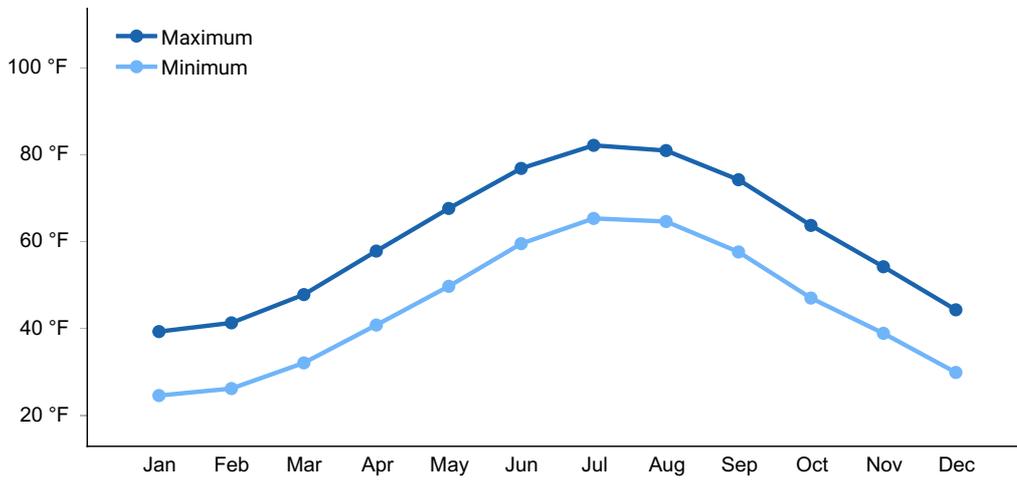
**Figure 1. Monthly precipitation range**



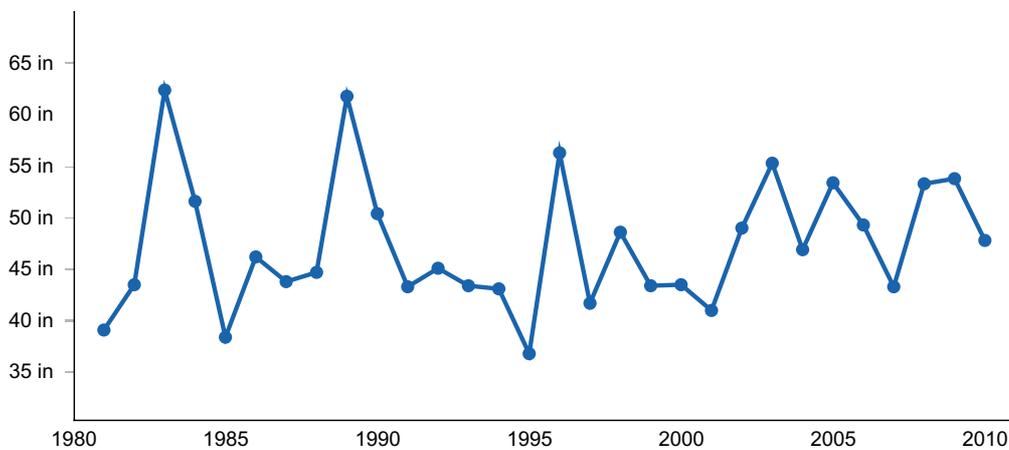
**Figure 2. Monthly minimum temperature range**



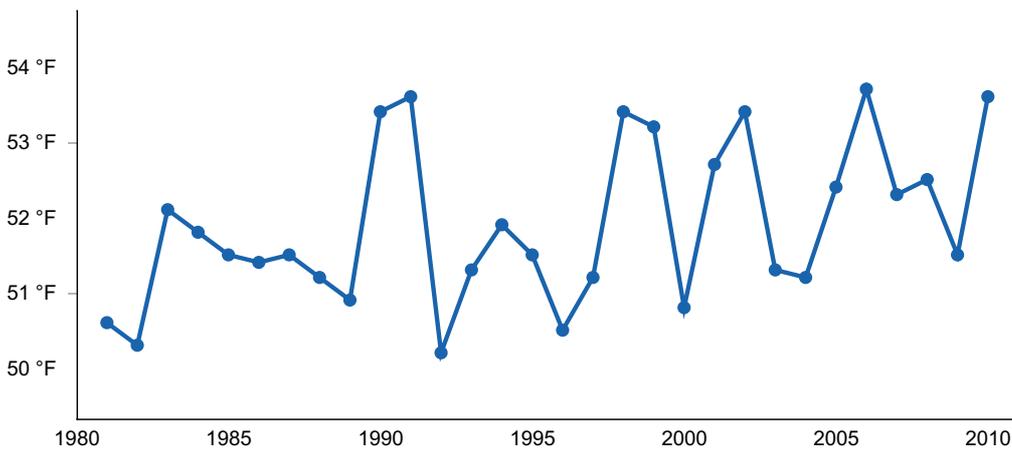
**Figure 3. Monthly maximum temperature range**



**Figure 4. Monthly average minimum and maximum temperature**



**Figure 5. Annual precipitation pattern**



**Figure 6. Annual average temperature pattern**

## Climate stations used

- (1) BRIDGEHAMPTON [USC00300889], Sag Harbor, NY
- (2) RIVERHEAD RSCH FM [USC00307134], Riverhead, NY
- (3) HYANNIS [USC00193821], Hyannis, MA
- (4) MINEOLA [USC00305377], Mineola, NY

## Influencing water features

N/A

## Wetland description

N/A

## Soil features

This site consists of very deep, well to excessively drained soils formed in wind, water, and glacially deposited parent materials. They are nearly level through moderately sloping soils on outwash plains, terraces, and water-sorted moraine deposits. Representative soils are Chilmark, Haven, Riverhead, Hempsted, and Katama.

**Table 4. Representative soil features**

Parent material	(1) Glaciofluvial deposits—granite and gneiss (2) Eolian deposits (3) Outwash (4) Glaciolacustrine deposits (5) Till
Surface texture	(1) Sandy loam (2) Loam (3) Very fine sandy loam (4) Silt loam (5) Loamy coarse sand (6) Very stony sandy loam
Family particle size	(1) Coarse-loamy (2) Coarse-loamy over sandy or sandy-skeletal (3) Coarse-silty over sandy or sandy-skeletal (4) Fine-loamy (5) Sandy
Drainage class	Well drained to excessively drained
Permeability class	Very slow to moderate
Depth to restrictive layer	23–72 in
Surface fragment cover ≤3"	0%
Surface fragment cover >3"	0–2%
Available water capacity (Depth not specified)	3–7 in
Soil reaction (1:1 water) (Depth not specified)	3.5–7.3

Subsurface fragment volume ≤3" (Depth not specified)	3–35%
Subsurface fragment volume >3" (Depth not specified)	0–6%

## Ecological dynamics

[Caveat: The vegetation information contained in this section and is only provisional, based on concepts, not yet validated with field work.\*]

The vegetation groupings described in this section are based on the terrestrial ecological system classification and vegetation associations developed by NatureServe (Comer 2003). Terrestrial ecological systems are specifically defined as a group of plant community types (associations) that tend to co-occur within landscapes with similar ecological processes, substrates, and/or environmental gradients. They are intended to provide a classification unit that is readily mappable, often from terrain and remote imagery, and readily identifiable by conservation and resource managers in the field. A given system will typically manifest itself in a landscape at intermediate geographic scales of tens-to-thousands of hectares and will persist for 50 or more years. A vegetation association is a plant community that is much more specific to a given soil, geology, landform, climate, hydrology, and disturbance history. It is the basic unit for vegetation classification and recognized by the US National Vegetation Classification (US FDGC 2008; USNVC 2017). Each association will be named by the diagnostic and often dominant species that occupy the different height strata (tree, shrub, and herb). Within the NatureServe Explorer database, ecological systems are numbered by a community Ecological System Code (CES) and individual vegetation associations are assigned an identification number called a Community Element Global Code (CEGL).

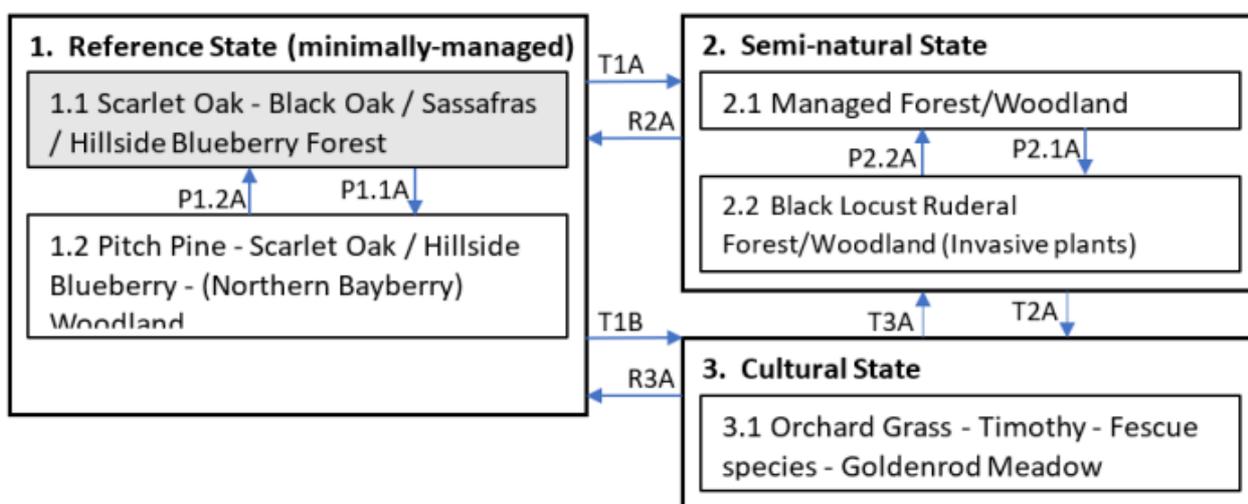
[\*Caveat] The information presented is representative of very complex vegetation communities. Key indicator plants and ecological processes are described to help inform land management decisions. Plant communities will differ across the MLRA because of the naturally occurring variability in weather, soils, and geography. The reference plant community is not necessarily the management goal. The drafts of species lists are merely representative and are not botanical descriptions of all species occurring, or potentially occurring, on this site. They are not intended to cover every situation or the full range of conditions, species, and responses for the site.

The Well-drained Outwash ecological site is characterized by a wide mix of xeric plant communities with coastal affinities from Long Island, New York, north to Cape Cod, Massachusetts. These plant communities coincide with Northern Atlantic Coastal Pitch Pine Barrens system (CES203.269), Northern Atlantic Coastal Plain Dry Oak-Hardwood Forest system (CES203.475), and Northern Atlantic Coastal Plain Heathland and Grassland (CES203.895). The prevailing ecological processes are related to coastal influences, such as a coastal climate and storms, and if within close proximity to the coast, maritime effects of wind exposure, salt spray, and sand movement. This ecological site is

influenced by fire. A decadal fire frequency maintains the character of pine barrens, dominated by pitch Pine (*Pinus rigida*), as well as some heathlands and grasslands with characteristic shrubs Northern bayberry (*Morella pensylvanica*) kinnikinnik (*Arctostaphylos uva-ursi*), and goldenheathers (Hudsonia spp.) with grasses little bluestem (*Schizachyrium scoparium*) or coastal little bluestem (*Schizachyrium littorale*). Longer fire intervals and/or cold-air drainage (frostpockets) will support various oaks (*Quercus*), predominately scrub oak (*Q. ilicifolia*), dwarf chesnut oak (*Q. prinoides*), scarlet oak (*Q. coccinea*), black oak (*Q. velutina*), as well as white oak (*Q. alba*) and chesnut oak (*Q. montana*). Threats include development and fragmentation, fire-suppression, off road vehicles, and invasive plants such as, but not limited to, Morrow's honeysuckle, (*Lonicera morowii*), oriental bittersweet (*Celastrus orbiculatus*), wineberry (*Rubus phoenicolasius*) tree-of-heaven (*Ailanthus altissima*). (Source: NatureServe 2018 [accessed 2019], USNVC 2017 [accessed 2019]).

## State and transition model

### 149BY006 – Well-drained Outwash



Transition	Drivers/practices
T1A	disturbance, invasive plant establishment
T1B, T2A	cutting, land clearing, plant establishment, wind erosion control
R2A, R3A	herbaceous weed treatment, plant removal, plant establishment, successional management
T3A	abandonment, disturbance, invasive plant establishment
P1.1A	disturbance, greater fire frequency, coastal proximity
P1.2A	succession
P2.1A	invasive plant establishment, succession
P2.2A	invasive plant management

## State 1

### Reference State (Well-drained Outwash)

The predominant plant communities of the Well-drained Outwash ecological site Reference State (minimally-managed) include: • Northeastern Coastal Oak / Heath Forest, (Scarlet Oak - Black Oak / Sassafras / Hillside Blueberry Forest), [*Quercus coccinea* - *Quercus velutina* / *Sassafras albidum* / *Vaccinium pallidum* Forest], - C EGL006375 Or with greater fire frequency: • Pitch Pine - Scarlet Oak Woodland, (Pitch Pine - Scarlet Oak / Hillside Blueberry - (Northern Bayberry) Woodland), [*Pinus rigida* - *Quercus coccinea* / *Vaccinium pallidum* - (*Morella pensylvanica*) Woodland] - C EGL006381. Other associated coastal/maritime communities can include: • Coastal Oak / Mountain Laurel Forest, (Black Oak - Scarlet Oak - Chestnut Oak / Mountain Laurel Forest), [*Quercus velutina* - *Quercus coccinea* - *Quercus montana* / *Kalmia latifolia* Forest], - C EGL006374 • Northeastern Atlantic Coastal Beech - Oak Forest, (American Beech - White Oak - Northern Red Oak Forest), [*Fagus grandifolia* - *Quercus alba* - *Quercus rubra* Forest], - C EGL006377 • Northern Tall Maritime Scrub Forest, (Canadian Serviceberry - Viburnum species - Northern Bayberry Scrub Forest), [*Amelanchier canadensis* - Viburnum spp. - *Morella pensylvanica* Scrub Forest], - C EGL006379 • Northeastern Maritime Forest, (Black Cherry - Sassafras - Canadian Serviceberry - Black Oak / Roundleaf Greenbrier Forest), [*Prunus serotina* - *Sassafras albidum* - *Amelanchier canadensis* - *Quercus velutina* / *Smilax rotundifolia* Forest], - C EGL006145 • Maritime Red-cedar Woodland, (Eastern Red-cedar / Northern Bayberry Woodland), [*Juniperus virginiana* / *Morella pensylvanica* Woodland], - C EGL006212 • Long Island Maritime Beech Forest, (American Beech / Roundleaf Greenbrier Forest), [*Fagus grandifolia* / *Smilax rotundifolia* Forest], - C EGL006043 • Sandplain Heathland, (Black Huckleberry - Lowbush Blueberry - Bearberry / Shore Little Bluestem Dwarf-shrubland), [*Gaylussacia baccata* - *Vaccinium angustifolium* - *Arctostaphylos uva-ursi* / *Schizachyrium littorale* Dwarf-shrubland], - C EGL006066 • Sandplain Grassland, (Northern Bayberry / Shore Little Bluestem - Poverty Oatgrass Shrub Grassland), [*Morella pensylvanica* / *Schizachyrium littorale* - *Danthonia spicata* Shrub Grassland], - C EGL006067 • Hempstead Plain Grassland, (Little Bluestem - Indiangrass - Common Goldstar - Horseflyweed Grassland), [*Schizachyrium scoparium* - *Sorghastrum nutans* - *Hypoxis hirsuta* - *Baptisia tinctoria* Grassland], - C EGL006187 • Little Bluestem Old-field Meadow, (Little Bluestem - (Broomsedge Bluestem) - Goldenrod species Ruderal Meadow), [*Schizachyrium scoparium* - (*Andropogon virginicus*) - *Solidago* spp. Ruderal Meadow], - C EGL006333 (Source: NatureServe 2018 [accessed 2019], USNVC 2017 [accessed 2019])

### Community 1.1

#### Scarlet Oak - Black Oak / Sassafras / Hillside Blueberry Forest

Northeastern Coastal Oak / Heath Forest, (Scarlet Oak - Black Oak / Sassafras / Hillside Blueberry Forest), [*Quercus coccinea* - *Quercus velutina* / *Sassafras albidum* / *Vaccinium pallidum* Forest], - C EGL006375 This dry coastal forest occurs on rapidly drained, nutrient-poor, sandy or gravelly outwash and till soils. This plant community is dominated by scarlet oak (*Quercus coccinea*), black oak (*Quercus velutina*), and occasionally white oak

(*Quercus alba*). Other less abundant canopy associates include chestnut oak (*Quercus montana*), black birch (*Betula lenta*), and American holly (*Ilex opaca*) (usually less than 15% cover). Pitch pine (*Pinus rigida*) is also common in low cover. Sassafras (*Sassafras albidum*) can occur in low cover and may indicate influence by coastal (but not maritime) climate. American chestnut (*Castanea dentata*) saplings may be present. A dense dwarf-shrub heath layer of hillside blueberry (*Vaccinium pallidum*), lowbush blueberry (*Vaccinium angustifolium*), and black huckleberry (*Gaylussacia baccata*) occurs. Blue huckleberry (*Gaylussacia frondosa*) can sometimes occur. The herbaceous layer is usually sparse, with Pennsylvania sedge (*Carex pensylvanica*), brackenfern (*Pteridium aquilinum*), and eastern teaberry (*Gaultheria procumbens*) being common. Species richness increases with greater canopy gaps, where kinnikinnik (*Arctostaphylos uva-ursi*), and bushclovers (*Lespedeza* spp.) occur, and where possibly Canada frostweed (*Helianthemum canadense* [= *Crocyanthemum canadense*]), Virginia tephrosia [= wild goat's rue] (*Tephrosia virginiana*), false foxgloves (*Aureolaria* spp.), and pinweeds (*Lechea* spp.) can occur. (Source: NatureServe 2018 [accessed 2019], USNVC 2017 [accessed 2019]). Cross-referenced plant community concepts (typically by political state): BlackOak - Scarlet Oak Woodland (Swain 2016) [MA] Coastal oak-heath forest (Edinger et al. 2014) [NY] Northeastern Coastal Oak-Heath Forest (Sneddon et al. 2010) [Cape Cod National Seashore]

## Community 1.2

### Pitch Pine - Scarlet Oak / Hillside Blueberry - (Northern Bayberry) Woodland

Pitch Pine - Scarlet Oak Woodland, (Pitch Pine - Scarlet Oak / Hillside Blueberry - (Northern Bayberry) Woodland), [*Pinus rigida* - *Quercus coccinea* / *Vaccinium pallidum* - (*Morella pensylvanica*) Woodland] - CEGLO06381. This vegetation is a matrix woodland/low forest comprising the pine-barren lands from Long Island, New York, north to Cape Cod, Massachusetts. Typically, it occurs on very well-drained sandy outwash. The canopy is largely pitch pine (*Pinus rigida*) plus an admixture of oaks (*Quercus*): scarlet oak (*Q. coccinea*), black oak (*Q. velutina*), dwarf chestnut oak (*Q. prinoides*), white oak (*Q. alba*), and northern red oak (*Q. rubra*) and occasionally post oak (*Q. stellata*). Tall shrubs are dominated by bear or scrub oak (*Quercus ilicifolia*) can be sporadic to locally well-developed and northern bayberry (*Morella pensylvanica*) can also commonly occur. Heaths tend to form a dense dwarf-shrub layer, especially black huckleberry (*Gaylussacia baccata*), lowbush blueberry (*Vaccinium angustifolium*), and hillside blueberry (*Vaccinium pallidum*). The herb layer is often sparse and characterized by brackenfern (*Pteridium aquilinum*), eastern teaberry (*Gaultheria procumbens*), and wavy hairgrass (*Deschampsia flexuosa*). (Source: NatureServe 2018 [accessed 2019], USNVC 2017 [accessed 2019]). Cross-referenced plant community concepts (typically by political state): Coastal Forest/Woodland (Swain 2016) [MA] Pitch pine – oak Forest (Edinger et al. 2014) [NY] Pitch pine – oak Forest (Sneddon et al. 2010) [Cape Cod National Seashore]

## Pathway P1.1A

## **Community 1.1 to 1.2**

Disturbance, greater fire frequency, invasive plant establishment

### **Pathway P1.2A**

## **Community 1.2 to 1.1**

Herbaceous weed treatment, plant removal, native plant establishment, succession

## **State 2**

### **Semi-natural State**

Vegetation on lands somewhat conditioned by land use, e.g., managed native plant communities or invasive plant communities.

## **Community 2.1**

### **Managed Forest Woodland**

## **Community 2.2**

### **Black Locust Ruderal Forest / Woodland (Invasive plants)**

Ruderal Black Locust Forest, (Black Locust Ruderal Forest), [*Robinia pseudoacacia* Ruderal Forest], - C EGL007279 Black locust (*Robinia pseudoacacia*) can establish on abandoned croplands, pasturing, and former homesites. Associated plants can vary from site to site and include black cherry (*Prunus serotina*), red cedar (*Juniperus virginiana*), American elm (*Ulmus americana*), slippery elm (*Ulmus rubra*), shagbark hickory (*Carya ovata*), hackberry (*Celtis occidentalis*), black walnut (*Juglans nigra*), red oak (*Quercus rubra*), and in some areas Norway Maple (*Acer platanoides*) or tree-of-heaven (*Ailanthus altissima*). The understory vegetation is also highly variable depending on site history and often includes (poison ivy) *Toxicodendron radicans*; northern spicebush (*Lindera benzoin*) is sometimes present in loamy, more mesic conditions. The invasive non-native shrub multiflora rose (*Rosa multiflora*) and bramble wineberry (*Rubus phoenicolasius*) can be present. Other non-native plants like, garlic mustard (*Alliaria petiolata*), major celandine (*Chelidonium majus*), ground ivy (*Glechoma hederacea*), and European lily-of-the-valley (*Convallaria majalis*), can characterize the herb layer, which may also include native plants. (Source: NatureServe 2018 [accessed 2019], USNVC 2017 [accessed 2019]). Other non-native plants can include white poplar (*Populus alba*), winged burningbush (*Euonymus alatus*), Japanese knotweed (japanese knotweed (*Polygonum cuspidatum*), and oriental bittersweet (*Celastrus orbiculatus*) Cross-referenced plant community concepts (typically by political state): Successional southern hardwoods (Edinger et al. 2014) [NY] Black Locust successional forest (Sneddon et al. 2010) [Cape Cod National Seashore]

### **Pathway P2.1A**

## **Community 2.1 to 2.2**

Invasive plant establishment, succession

## Pathway P2.2A

### Community 2.2 to 2.1

Invasive plant management

#### Conservation practices

Invasive Plant Species Control
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## State 3

### Cultural State

Landscapes heavily conditioned by land use, e.g., Plantations/gardens/croplands.

## Community 3.1

### Orchard Grass - Timothy - Fescue species - Goldenrod species Herbaceous Vegetation

Northeastern Old Field Meadow, (Orchard Grass - Timothy - Fescue species - Goldenrod species Herbaceous Vegetation), [*Dactylis glomerata* - *Phleum pratense* - *Festuca* spp. - *Solidago* spp. Herbaceous Vegetation], - CEGLO06107 This is a broadly defined vegetation type of pastures and is largely composed of non-native cool-season grasses and herbs (generally of European origin) in the early stages of succession. The fields are typically mowed at least annually. Species composition varies from site to site, from site to site but generally feature Orchard Grass (*Dactylis glomerata*), Timothy (*Phleum pratense*)-Fescue grasses (*Festuca* spp.), and some goldenrods (*Solidago* spp.). Other graminoid associates may include creeping bentgrass (*Agrostis stolonifera*), winter bentgrass (*Agrostis hyemalis*), creeping wildrye (*Elymus repens*), smooth brome (*Bromus inermis*), cheatgrass (*Bromus tectorum*), perennial ryegrass (*Lolium perenne*), Kentucky bluegrass (*Poa pratensis*), Canada bluegrass (*Poa compressa*), and sweet vernalgrass (*Anthoxanthum odoratum*). Forbs scattered among the grasses are varied but include hawkweeds (*Hieracium* spp.), yellow oxalis (*Oxalis stricta*), common yarrow (*Achillea millefolium*), common milkweed (*Asclepias syriaca*), wrinkleleaf goldenrod (*Solidago rugosa*), gray goldenrod (*Solidago nemoralis*), early goldenrod (*Solidago juncea*), Canada goldenrod (*Solidago canadensis*), tall goldenrod (*Solidago altissima*), flattop goldenrod (*Euthamia graminifolia*), field chickweed (*Cerastium arvense*), evening primrose (*Oenothera biennis*), common cinquefoil (*Potentilla simplex*), calico American-aster (*Symphotrichum lateriflorum*), New England American-aster (*Symphotrichum novae-angliae*), white panicle American-aster (*Symphotrichum lanceolatum*), Queen Anne's lace (*Daucus carota*), annual agweed (*Ambrosia artemisiifolia*), bird vetch (*Vicia cracca*), sweetclover (*Trifolium* spp.), and many others (Source: NatureServe 2018 [accessed 2019], USNVC 2017 [accessed 2019]). Cross-referenced plant community concepts

(typically by political state): Cultural Grassland (Swain Swain 2016) [MA] Successional Old Field (Edinger et al. 2014) [NY] Notheastern Old Field (Sneddon et al. 2010) [Cape Cod National Seashore]

## **Transition T1A**

### **State 1 to 2**

Disturbance, invasive plant establishment

#### **Conservation practices**

Forest Land Management
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## **Transition T1B**

### **State 1 to 3**

Cutting, land clearing, plant establishment, wind erosion control

#### **Conservation practices**

Brush Management
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Land Clearing
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## **Restoration pathway R2A**

### **State 2 to 1**

Herbaceous weed treatment, plant removal, plant establishment, successional management

#### **Conservation practices**

Brush Management
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Restoration and Management of Natural Ecosystems
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Native Plant Community Restoration and Management
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Forest Land Management
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Invasive Plant Species Control
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Monitoring and Evaluation
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## **Transition T2A**

### **State 2 to 3**

Cutting, land clearing, plant establishment, wind erosion control

## Conservation practices

Land Clearing
Invasive Plant Species Control
Herbaceous Weed Control

## Restoration pathway R3A State 3 to 1

Herbaceous weed treatment, plant removal, plant establishment, successional management

## Conservation practices

Brush Management
Restoration and Management of Natural Ecosystems
Native Plant Community Restoration and Management
Invasive Plant Species Control
Monitoring and Evaluation
Herbaceous Weed Control

## Transition T3A State 3 to 2

Abandonment, disturbance, invasive plant establishment

## Additional community tables

### Inventory data references

Site Development and Testing Plan

Future work is needed, as described in a project plan, to validate the information presented in this provisional ecological site description. Future work includes field sampling, data collection and analysis by qualified vegetation ecologists and soil scientists. As warranted, annual reviews of the project plan can be conducted by the Ecological Site Technical Team. A final field review, peer review, quality control, and quality assurance reviews of the ESD are necessary to approve a final document.

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## **Contributors**

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## Approval

Nels Barrett, 9/17/2024

## Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	05/23/2020
Approved by	Nels Barrett
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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5. **Number of gullies and erosion associated with gullies:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

Dominant:

Sub-dominant:

Other:

Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth ( in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

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17. **Perennial plant reproductive capability:**

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