

Ecological site F149BY011MA Well Drained Till Uplands

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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

The site consists of very deep, well drained, coarse-loamy soils formed in glacial till. They are on nearly level through moderately steep soils on moraines. Representative soil is Barnstable.

The reference plant community is considered to be an oak-pitch pine forest. Oaks were found to be dominant on terminal moraines within Cape Cod while pitch pine dominated sandy outwash sites (Parshall et al. 2003). Common oaks include black oak, scarlet oak, white, and scrub oak. Pitch pine is subdominant with lesser amounts of beech and hickories. Common shrubs include lowbush blueberry and black huckleberry. Post settlement clearing of forests and an increase in fire has led to a dominance of pitch pine over oaks on terminal moraines within Cape Cod (Parshall et al. 2003). In the absence of severe or frequent fire, oaks replaces pitch pine while other hardwoods such as beech and hickories become a larger component of the forests on more mesic sites.(Parshall et al. 2003).

Associated sites

F149BY010MA	Moist Till Uplands Moist Till
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Similar sites

F149BY006NY	Well Drained Outwash Well-drained outwash
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Table 1. Dominant plant species

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

Physiographic features

The site occurs on nearly level to steep moraines and is not subject to flooding/ponding.

Table 2. Representative physiographic features

Landforms	(1) Upland > Moraine (2) Ground moraine
Runoff class	Low to very high
Flooding frequency	None

Ponding frequency	None
Elevation	0–1,000 ft
Slope	0–35%
Water table depth	27–72 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)	156-157 days
Freeze-free period (characteristic range)	199-207 days
Precipitation total (characteristic range)	45-49 in
Frost-free period (actual range)	156-157 days
Freeze-free period (actual range)	197-209 days
Precipitation total (actual range)	44-50 in
Frost-free period (average)	157 days
Freeze-free period (average)	203 days
Precipitation total (average)	47 in

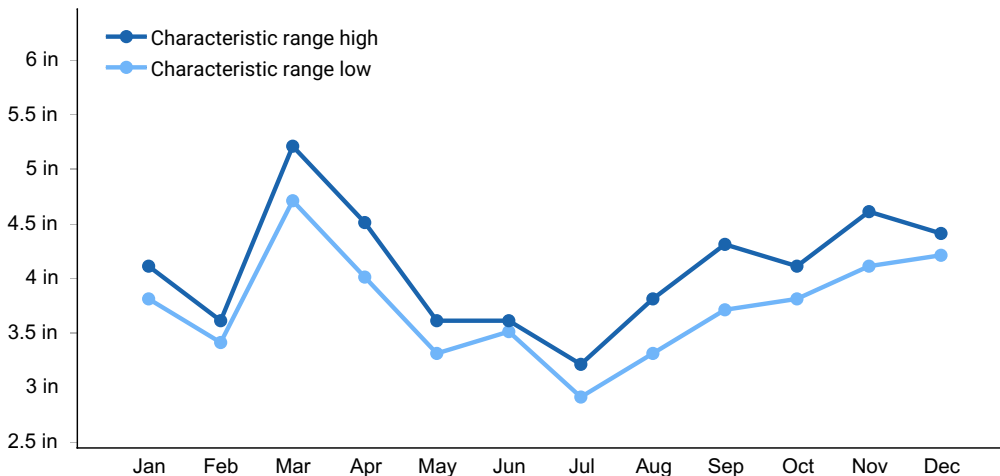


Figure 1. Monthly precipitation range

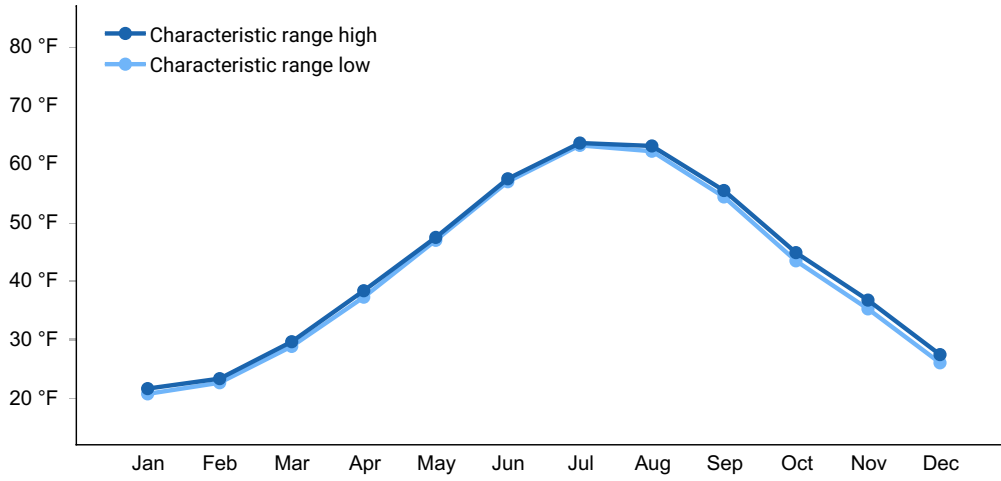


Figure 2. Monthly minimum temperature range

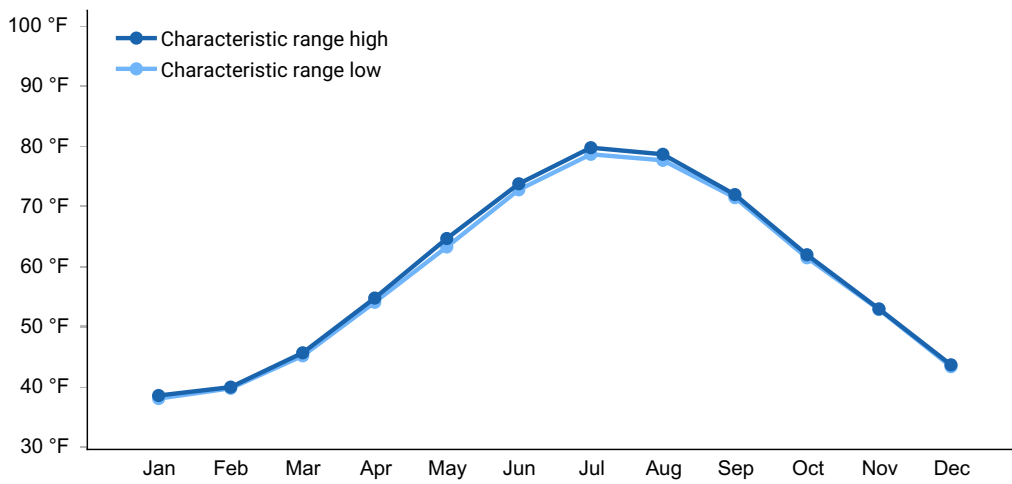


Figure 3. Monthly maximum temperature range

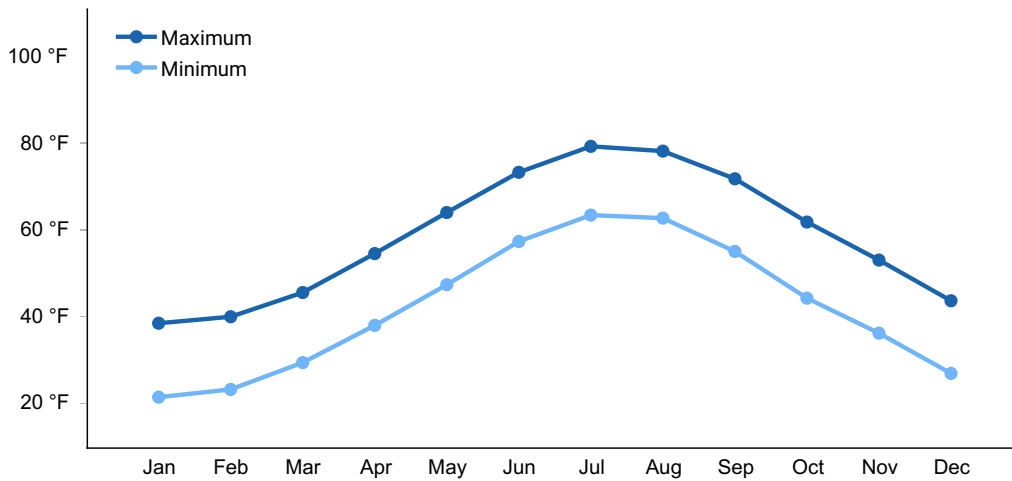


Figure 4. Monthly average minimum and maximum temperature

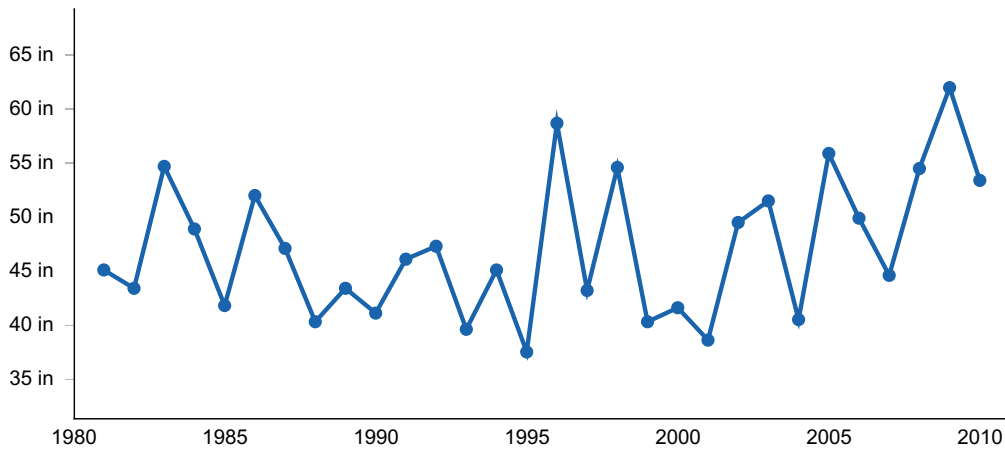


Figure 5. Annual precipitation pattern

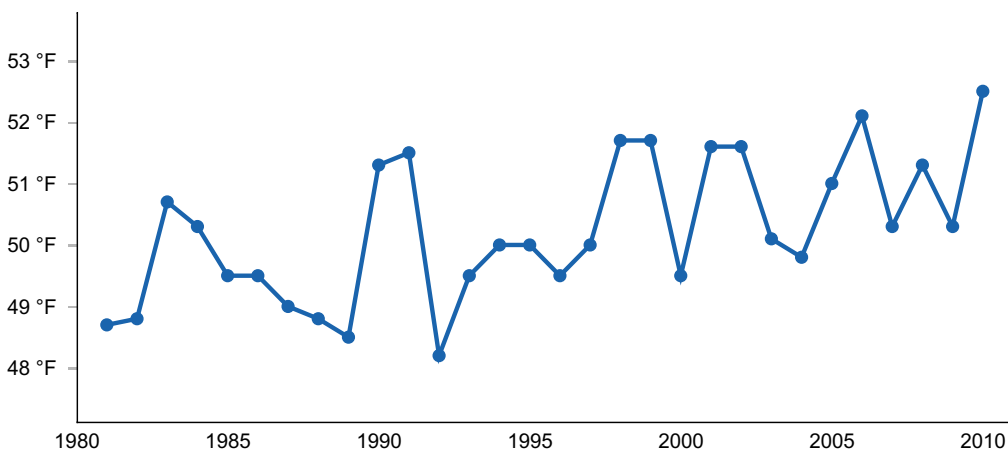


Figure 6. Annual average temperature pattern

Climate stations used

- (1) HYANNIS [USC00193821], Hyannis, MA
- (2) EAST WAREHAM [USC00192451], East Wareham, MA

Influencing water features

No associated water features

Wetland description

N/A

Soil features

The site consists of moderate to very deep, well drained soils formed in glacial and water deposited materials. Representative soil is Barnstable.

Table 4. Representative soil features

Parent material	(1) Till (2) Glaciofluvial deposits (3) Outwash
Surface texture	(1) Sandy loam (2) Loamy sand
Family particle size	(1) Coarse-loamy over sandy or sandy-skeletal (2) Sandy
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Depth to restrictive layer	27–72 in
Surface fragment cover ≤3"	0%
Surface fragment cover >3"	0–9%
Available water capacity (Depth not specified)	3 in
Soil reaction (1:1 water) (Depth not specified)	3.5–6
Subsurface fragment volume ≤3" (Depth not specified)	3–20%
Subsurface fragment volume >3" (Depth not specified)	5–10%

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

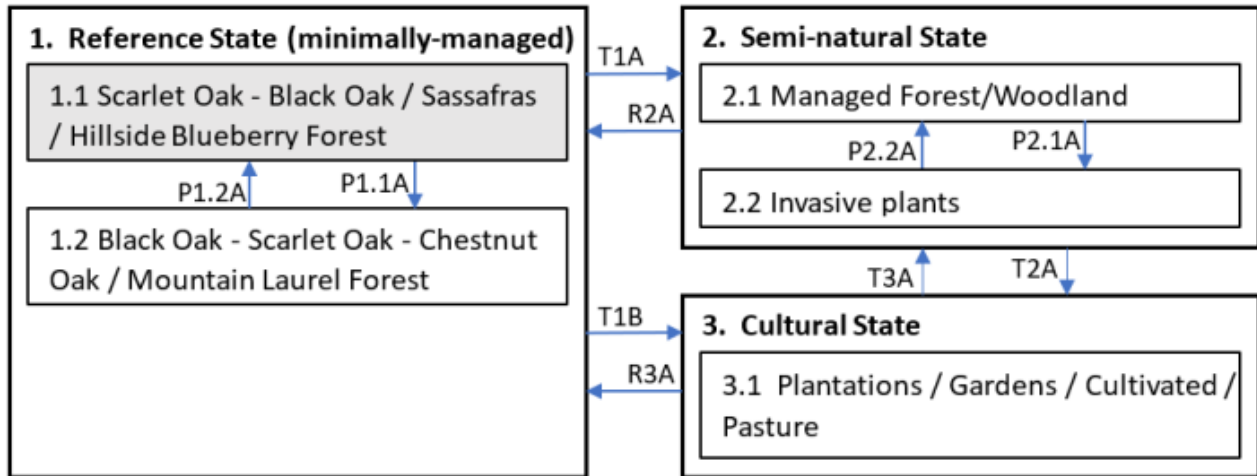
NatureServe Explorer database, ecological systems are numbered by a community Ecological System Code (CES) and individual vegetation associations are assigned an identification number called a Community Element Global Code (CEGL).

[*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.

This ecological site, set in well-drained till environments, is characterized by a wide mix of plant communities with coastal affinities from Long Island, New York, north to Cape Cod, Massachusetts. These plant communities coincide Northern Atlantic Coastal Plain Dry Oak-Hardwood Forest system (CES203.475), and Northern Atlantic Coastal Plain Heathland and Grassland (CES203.895). Well-drained Till ecological site supports reference plant communities of the oak (*Quercus*)/heath (*Vaccinium* spp.) type. oaks (*Quercus*, spp.). Other canopy hardwoods may include, hickories (*Carya* spp.), and to a lesser extent, American beech (*Fagus grandifolia*), and tuliptree (*Liriodendron tulipifera*) and occasional pines (*Pinus* spp.). Oaks were found to be dominant on terminal moraines within Cape Cod while pines dominated sandy outwash sites (Parshall et al. 2003). Post settlement clearing of forests and an increase in fire has led to a dominance of pitch pine over oaks on terminal moraines within Cape Cod (Parshall et al. 2003). In the absence of severe or frequent fire, oaks replaces pitch pine while other hardwoods such as beech and hickories become a larger component of the forests on more mesic sites (Parshall et al. 2003). These plant communities coincide with 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. Fire can be an influence. Threats include development and fragmentation, fire-suppression, off road vehicles, and invasive plants such as, but not limited to, black locust (*Robinia pseudoacacia*), tree-of-heaven (*Ailanthus altissima*), autumn olive (*Elaeagnus umbellata*), white poplar (*Populus alba*), multiflora rose (*Rosa multiflora*), Honeysuckles, (*Lonicera* spp.), oriental bittersweet (*Celastrus orbiculatus*), japanese knotweed (*Polygonum cuspidatum*) wineberry (*Rubus phoenicolasius*), and Asiatic tearthumb (*Polygonum perfoliatum*). (Source: NatureServe 2018 [accessed 2019], USNVC 2017 [accessed 2019]).

State and transition model

149BY011 – Well-drained Till Uplands



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	succession
P1.2A	disturbance
P2.1A	invasive plant establishment
P2.2A	invasive plant management
P3.1	changing land management

State 1

Reference State (Well-drained Till Uplands)

The predominant plant communities of the Well-drained Till ecological site's 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], - CEGLO06375
- Coastal Oak / Mountain Laurel Forest, (Black Oak - Scarlet Oak - Chestnut Oak / Mountain Laurel Forest), [*Quercus velutina* - *Quercus coccinea* - *Quercus montana* / *Kalmia latifolia* Forest], - CEGLO06374
- 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], - CEGLO06381.

Other associated coastal/maritime communities can include:

- Mid-Atlantic Mesic Mixed Hardwood Forest, (American Beech – Oaks (White Oak, Northern Red Oak))

- Tuliptree / (American Holly) Forest, [*Fagus grandifolia* - *Quercus* (*alba*, *rubra*) - *Liriodendron tulipifera* / (*Ilex opaca*) Forest], - CEGLO06075 • Northeastern Atlantic Coastal Beech - Oak Forest (American Beech - White Oak - Northern Red Oak Forest), [*Fagus grandifolia* - *Quercus alba* - *Quercus rubra* Forest, - CEGLO06377 • Little Bluestem Old-field Meadow, (Little Bluestem - (Broomsedge Bluestem) - Goldenrod species Ruderal Meadow), [*Schizachyrium scoparium* - (*Andropogon virginicus*) - *Solidago* spp. Ruderal Meadow], - CEGLO06333 • (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], - CEGLO06375 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

Black Oak - Scarlet Oak - Chestnut Oak / Mountain Laurel Forest

Coastal Oak / Mountain Laurel Forest, (Black Oak - Scarlet Oak - Chestnut Oak / Mountain Laurel Forest), [*Quercus velutina* - *Quercus coccinea* - *Quercus montana* / *Kalmia latifolia* Forest], - CEGLO06374 This association comprises coastal oak-laurel forests occurring on sandy and gravelly soils. Characteristic dominants are scarlet oak (*Quercus coccinea*), black oak (*Quercus velutina*), chestnut oak (*Quercus montana*), and

white oak (*Quercus alba*). Pines (*Pinus*) (pitch pine (*Pinus rigida*), or less commonly white pine (*Pinus strobus*)) can be present at low cover. Mountain laurel (*Kalmia latifolia*) can be the dominant shrub forming extensive, dense patches, with other heath (ericaceous) shrubs such as hillside blueberry (*Vaccinium pallidum*), lowbush blueberry (*Vaccinium angustifolium*), deer blueberry (*Vaccinium stamineum*), and black huckleberry (*Gaylussacia baccata*). The herbaceous layer may be sparse due to the dense *Kalmia latifolia* yet may include bracken fern (*Pteridium aquilinum*), eastern teaberry (*Gaultheria procumbens*), Pennsylvania sedge (*Carex pennsylvanica*), and whitetinge sedge (*Carex albicans*). With fire suppression, fire-sensitive hardwoods such as American beech (*Fagus grandifolia*), red maple (*Acer rubrum*), blackgum (*Nyssa sylvatica*), and American holly (*Ilex opaca*) are sometimes present. (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]

Pathway P1.1A

Community 1.1 to 1.2

Disturbance, greater fire frequency, coastal proximity

Pathway P1.2A

Community 1.2 to 1.1

Succession, reduced fire frequency

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

Invasive plants

Black locust (*Robinia pseudoacacia*), Norway Maple (*Acer platanoides*) or tree-of-heaven (*Ailanthus altissima*), white poplar (*Populus alba*), winged burningbush (*Euonymus alatus*), Japanese knotweed (japanese knotweed (*Polygonum cuspidatum*), and oriental bittersweet (*Celastrus orbiculatus*) multiflora rose (*Rosa multiflora*), bramble wineberry (*Rubus phoenicolasius*), garlic mustard (*Alliaria petiolata*), major celindine (*Chelidonium majus*), ground ivy (*Glechoma hederacea*), and European lily-of-the-valley (*Convallaria majalis*), can be present, which may also include native plants. (Source: NatureServe

2018 [accessed 2019], USNVC 2017 [accessed 2019]).

Pathway P2.1A

Community 2.1 to 2.2

Invasive plant establishment

Pathway P2.2A

Community 2.2 to 2.1

Invasive plant management

Conservation practices

Invasive Plant Species Control

State 3

Cultural State

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

Community 3.1

Plantations / Gardens / Cultivated / Pasture

Transition T1A

State 1 to 2

Disturbance, invasive plant establishment

Conservation practices

Forest Land Management

Transition T1B

State 1 to 3

Cutting, land clearing, plant establishment, wind erosion control

Conservation practices

Brush Management

Land Clearing

Restoration pathway R2A

State 2 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
Forest Land Management
Invasive Plant Species Control
Monitoring and Evaluation

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:

2. Presence of water flow patterns:

3. Number and height of erosional pedestals or terracettes:

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

5. Number of gullies and erosion associated with gullies:

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

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

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

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

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

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

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:

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

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

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

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:

17. Perennial plant reproductive capability:
