

# Ecological site F146XY071ME Sandy

Last updated: 5/20/2025 Accessed: 05/20/2025

## **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): 146X–Aroostook Area

This area is entirely in Maine and it makes up about 1,275 square miles (3,305 square kilometers). Presque Isle is the largest city in the area. Interstate 95 ends in the town of Houlton, at the border with New Brunswick, Canada. Aroostook State Park, Fort Kent Historic Site, and Loring Commerce Center are in this area. The Big Rock ski area is in the middle of this MLRA and is on the highest point, which is Mars Hill Mountain.

## **Ecological site concept**

This site occurs on deep sandy and gravelly deposits associated with eskers, kames, outwash plains and outwash terraces. Soils range from excessively drained, which are sandy throughout, to well-drained which have a gravelly or sandy loam cap over a sandy subsoil. All of these soils formed in deposits of coarse sediment by fast-moving glacial meltwater. These landforms are dominated by softwoods, particularly red pine, white pine, hemlock and/or red spruce with sparse understory cover. However, hardwood and herbaceous species are more abundant where soils are loamier. Common hardwood species are red maple, white birch, bigtooth aspen, and black cherry.

This site is subject to logging, wind, insects and disease, and other natural and human disturbances resulting in a variety of alternative states. Cultivated sites occur on flatter slopes, and are mostly pasture or hay land. Abandoned hay land may transition to pine, spruce-fir, or reference pine-dominated mixed-conifer forests.

When managed for timber production, several different ecological states are possible. The pine forest state, reference mixed conifer state, and spruce-fir state are managed to

maintain dominance of their respective conifer species, and to facilitate profitable harvests along predictable timelines. Hemlock forests may also result from logging practices, though these are typically less-desirable and may result from selective harvest of more valuable species, leaving the hemlock behind. As hemlock increases on the site, it inhibits the establishment of other species by shading, reducing soil moisture availability to other plants, and especially by acidifying the soil.

With sufficient economic inputs, any of the states that occur on this site may transition from one to another, however, due to cost limitations, forests are typically managed for whatever timber species are currently present on the site.

## Associated sites

F146XY072ME	Loamy Over Sandy
	This site may grade into the Loamy over Sandy site as soil textures become
	finer. This results in increased hardwoods and decreased conifers.

## Similar sites

F146XY072ME Loar	amy Over Sandy
The	e Loamy over Sandy site occurs on similar landforms as the Sandy site, but
has t	s finer soil textures, wetter drainage classes, and greater hardwood
abur	undance.

#### Table 1. Dominant plant species

Tree	(1) Pinus resinosa (2) Pinus strobus
Shrub	(1) Gaylussacia baccata
Herbaceous	(1) Pteridium aquilinum (2) Maianthemum canadense

## **Physiographic features**

This site occurs on deep sandy deposits associated with eskers, kames, outwash plains and outwash terraces at elevations up to 2000 feet. Slopes are flat to very steep ranging from 0-45 percent. As glaciers receded, high-energy meltwater deposited coarse sediments, resulting in the sandy and gravelly landforms typical of this site.

Table 2. Representative	physiographic features
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Landforms	<ul><li>(1) Esker</li><li>(2) Kame</li><li>(3) Outwash terrace</li></ul>
Runoff class	Negligible to low

Flooding frequency	None	
Ponding frequency	None	
Elevation	10–2,000 ft	
Slope	0–45%	
Water table depth	72 in	
Aspect	Aspect is not a significant factor	

## **Climatic features**

The climate of this site is characterized by cold, snowy winters, and cool summers. Precipitation is nearly equally distributed throughout the year, with slightly more moisture falling in June-October. During winter months, and sometimes fall and spring, cold winds from the north bring severe weather events. The effects of a relatively short growing season are somewhat mitigated by long summer days associated with the high latitudes of the region. Occasionally high winds, microbursts, or freezing rain events damage vegetation over small portions of the landscape.

#### Table 3. Representative climatic features

Frost-free period (characteristic range)	80-94 days
Freeze-free period (characteristic range)	126-134 days
Precipitation total (characteristic range)	37-42 in
Frost-free period (actual range)	61-107 days
Freeze-free period (actual range)	103-141 days
Precipitation total (actual range)	36-42 in
Frost-free period (average)	85 days
Freeze-free period (average)	127 days
Precipitation total (average)	39 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) FT KENT [USC00172878], Fort Kent, ME
- (2) CARIBOU MUNI AP [USW00014607], Caribou, ME
- (3) ALLAGASH [USC00170200], Saint Francis, ME
- (4) BRIDGEWATER [USC00170833], Bridgewater, ME

- (5) HOULTON 5N [USC00173944], Houlton, ME
- (6) PRESQUE ISLE [USC00176937], Presque Isle, ME
- (7) HOULTON INTL AP [USW00014609], Houlton, ME

## Influencing water features

Due to its landscape position, this site is not influenced by streams or wetlands.

## Soil features

The soils of this site are deep and sandy, often with gravels that occur in patches or throughout the soil profile. This site includes both excessively drained soils which are sandy throughout, and well drained to somewhat excessively well drained soils which have a gravelly or sandy loam cap over a sandy subsoil. All of these soils formed in deposits of relatively coarse sediment deposited by fast-moving glacial meltwater. Water holding capacity is low and pH ranges from 3.6 to 6.5. The soil temperature regime is frigid and the soil moisture regime is udic.

Parent material	(1) Glaciofluvial deposits-granite	
Surface texture	<ul><li>(1) Gravelly sandy loam</li><li>(2) Gravelly loam</li><li>(3) Extremely gravelly coarse sand</li></ul>	
Family particle size	(1) Sandy	
Drainage class	Well drained to excessively drained	
Permeability class	Moderately slow to moderate	
Soil depth	60 in	
Surface fragment cover <=3"	0–5%	
Surface fragment cover >3"	0–1%	
Available water capacity (0-40in)	1.4–6.3 in	
Calcium carbonate equivalent (0-40in)	0%	
Electrical conductivity (0-40in)	0 mmhos/cm	
Sodium adsorption ratio (0-40in)	0	
Soil reaction (1:1 water) (0-40in)	3.6–6.5	

#### Table 4. Representative soil features

Subsurface fragment volume <=3" (Depth not specified)	25–62%
Subsurface fragment volume >3" (Depth not specified)	5–9%

# **Ecological dynamics**

[Caveat: The vegetation information contained in this section and is only provisional, based on concepts, and future projects support validation through 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) and localized associations provided by the Maine Natural Areas Program (Gawler and Cutko, 2010).

The reference plant communities on this site are red pine, white pine, hemlock and/or red spruce with sparse understory cover. However, hardwood and herbaceous species are more abundant where soils become finer. Common hardwood species are red maple, white birch, bigtooth aspen, and black cherry.

This site is subject to logging, wind, insects and disease, and other natural and human disturbances resulting in a variety of alternative states. Cultivated sites occur on flatter slopes, and are mostly pasture or hay land. Abandoned hay land may transition to pine, spruce-fir, or reference pine-dominated mixed-conifer forests.

When managed for timber production, several different ecological states are possible. The pine forest state, reference mixed conifer state, and spruce-fir state are managed to maintain dominance of their respective conifer species, and to facilitate profitable harvests along predictable timelines. Hemlock forests may also result from logging practices, though these are typically less-desirable and may result from selective harvest of more valuable species, leaving the hemlock behind. As hemlock increases on the site, it inhibits the establishment of other species by shading, reducing soil moisture availability to other plants, and especially by acidifying the soil.

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## State and transition model

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Transition	Drivers/practices
T1A	Introduction of invasive species, pests, and/or pathogens; alteration of ecological dynamics, functions, and composition, etc.
R2A	Mechanical, biological, or chemical management of invasive species, pests, and/or pathogens; establishment of native plants through seeding and/or planting
T2A, T1B	Timber management and harvesting, landscape clearing, mechanical landscape alteration, mechanical soil disturbance, planting, seeding, cultivation
R3A, R3B	Restoration of native plant communities, planting, seeding, removal of obstructions or barriers

# State 1 Reference State (minimally managed)

The forest canopy typically exceeds 65%, with red pine dominant or co-dominant (at least 33% cover) with other conifers; the shrub layer is usually sparse (<15%).

#### **Dominant resource concerns**

- Plant productivity and health
- Plant structure and composition
- Plant pest pressure
- Terrestrial habitat for wildlife and invertebrates

## Community 1.1 Red Pine - White Pine Forest

These ecological sites re usually on flats, slopes of <25% or low ridges (<1000'), on drymesic to xeric soils that are somewhat to very shallow (10-50 cm to obstruction, usually bedrock). Soils are coarse (sandy loams to sands) and acidic (pH 4.8-5.2). These are upland forests with red pine as the dominant tree. The canopy may be somewhat open but is more typically >70%. Especially in post-fire sites, the canopy may include deciduous trees, while lower layers are generally sparse (<25% cover) and contain few species Graminoids are virtually absent. The ground is typically covered with conifer litter and patches of bryophytes, or less commonly, lichens. (Gawler and Cutko, 2010)

**Resilience management.** Maine Natural Areas Program State Rank: Vulnerable – At moderate risk of extinction or elimination due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors. Red pine has been widely planted in the past, but natural occurrences of this type are fairly rare outside of eastern Maine. Under natural conditions, these forests apparently require fire for persistence or regeneration, but community dynamics are not well documented, and at some known sites clearcut harvesting has perpetuated the type. Most known sites are small, lack formal protection, and could be maintained within a forested matrix. (Gawler and Cutko, 2010)

## **Dominant plant species**

- bigtooth aspen (Populus grandidentata), tree
- red pine (*Pinus resinosa*), tree
- red spruce (Picea rubens), tree
- eastern white pine (Pinus strobus), tree
- eastern hemlock (Tsuga canadensis), tree
- black huckleberry (Gaylussacia baccata), shrub
- brackenfern (*Pteridium*), other herbaceous
- Canada mayflower (Maianthemum canadense), other herbaceous
- starflower (Trientalis borealis), other herbaceous
- American wintergreen (Pyrola americana), other herbaceous

#### **Dominant resource concerns**

- Sheet and rill erosion
- Wind erosion
- Plant productivity and health
- Plant structure and composition
- Plant pest pressure
- Wildfire hazard from biomass accumulation
- Terrestrial habitat for wildlife and invertebrates

# State 2 Semi-natural State

Shifts in ecological site composition, functionality, and dynamics driven by natural disturbances, processes, and pressures (may have some anthropogenic influences). More research is needed to determine the extent of the Semi-natural state associated with this ecological site.

## **Dominant resource concerns**

- Plant productivity and health
- Plant structure and composition

- Plant pest pressure
- Terrestrial habitat for wildlife and invertebrates
- Aquatic habitat for fish and other organisms

## Community 2.1 Invasiveness and Biological Introductions

Introduction of invasive species, pests, and pathogens

### **Dominant resource concerns**

- Plant productivity and health
- Plant structure and composition
- Plant pest pressure
- Terrestrial habitat for wildlife and invertebrates
- Aquatic habitat for fish and other organisms

## State 3 Cultural State

Shifts in ecological site composition, functionality, and dynamics that are primary driven by anthropogenic disturbances and pressures (may have some associated natural influences). More research is needed to determine the extent of the cultural state associated with this ecological site.

# Community 3.1 Plantation

Alteration of landscapes for timber or crop production and harvesting

#### **Dominant resource concerns**

- Compaction
- Pesticides transported to surface water
- Pesticides transported to ground water
- Plant productivity and health
- Plant structure and composition
- Terrestrial habitat for wildlife and invertebrates
- Aquatic habitat for fish and other organisms

# Transition T1A State 1 to 2

Introduction of invasive species, pests, and/or pathogens; alteration of ecological dynamics, functions, and composition, etc.

# Transition T1B State 1 to 3

Timber management and harvesting, landscape clearing, mechanical landscape alteration, mechanical soil disturbance, planting, seeding, cultivation

## Restoration pathway R2A State 2 to 1

Mechanical, biological, or chemical management of invasive species, pests, and/or pathogens; establishment of native plants through seeding and/or planting

#### **Conservation practices**

Vegetated Treatment Area	
Restoration and Management of Rare and Declining Habitats	
Early Successional Habitat Development/Management	
Invasive Plant Species Control	
Invasive Species Pest Management	
Precision Pest Control Application	
Restoration and Management of Rare or Declining Habitats	
Monitoring and Evaluation	

## Transition T2A State 2 to 3

Timber management and harvesting, landscape clearing, mechanical landscape alteration, mechanical soil disturbance, planting, seeding, cultivation

#### **Conservation practices**

Cover (	Crop
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Land Clearing

High residue cover crop or mixtures of high residue cover crops for weed suppression and soil health

Intensive no-till (Organic or Non-organic systems)

Crop management system on crop land acres recently converted

Restoration of native plant communities, planting, seeding, removal of obstructions or barriers

### **Conservation practices**

Critical Area Planting	
Obstruction Removal	
Vegetated Treatment Area	
Early Successional Habitat Development/Management	
Restoration and Management of Natural Ecosystems	
Native Plant Community Restoration and Management	
Forest stand improvement for habitat and soil quality	
Multi-species Native Perennials for Biomass/Wildlife Habitat	
Monitoring and Evaluation	

# Restoration pathway R3B State 3 to 2

Restoration of native plant communities, planting, seeding, removal of obstructions or barriers

## **Conservation practices**

Early Successional Habitat Development/Management
Restoration and Management of Natural Ecosystems
Native Plant Community Restoration and Management

Monitoring and Evaluation

# Additional community tables

## Inventory data references

Future work is needed, as described in a future 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.

## **Other references**

Comer, P., D. Faber-Langendoen, R. Evans, S. Grawler, C. Josse, G. Kittel, S. Menard, M. Pyne, M. Reid, K. Schultz, K. Snow, and J. Teague. 2003. Ecological Systems of the United States: A Working Classification of U.S. Terrestrial Systems. NatureServe, Arlington, Virginia

Gawler, S. and A. Cutko. 2010. Natural Landscapes of Maine: A Guide to Natural Communities and Ecosystems. Maine Natural Areas Program, Maine Department of Conservation, Augusta, Maine.

NatureServe. 2018. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. NatureServe Explorer (accessed 10 July. 2021).

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. 2006. Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin. Agricultural Handbook 296

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Official Soil Series Descriptions. Available online. (accessed 11 Aug. 2021).

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Soil Climate Research Station Data. Available online. (accessed 23 June. 2021).

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Soil Survey Geographic (SSURGO) Database for [MLRA 146, Maine]. Available online. (accessed 14 Oct. 2021).

USNVC [United States National Vegetation Classification]. 2017. United States National Vegetation Classification Database V2.01. Federal Geographic Data Committee, Vegetation Subcommittee, Washington DC. Available The U.S. National Vegetation Classification (usnvc.org) (accessed 2 March. 2021).

## Contributors

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## Approval

Greg Schmidt, 5/20/2025

## Acknowledgments

Nels Barrett, Nick Butler, and Carl Bickford provided considerable review of this ecological

site concept.

## **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	05/06/2025
Approved by	Greg Schmidt
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: