Ecological site R144AY049RI Subaqueous Haline Slopes

Last updated: 10/04/2024
Accessed: 05/11/2025

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): 144A–New England and Eastern New York Upland, Southern Part

MLRA 144A: New England and Eastern New York Upland, Southern Part
The eastern half of the eastern part of this MLRA is in the Seaboard Lowland Section of the New England Province of the Appalachian Highlands. The western half of the eastern part and the southeastern half of the western part are in the New England Upland Section of the same province and division. The northwestern half of the western part is in the Hudson Valley Section of the Valley and Ridge Province of the Appalachian Highlands. This MLRA is a very scenic area of rolling to hilly uplands that are broken by many gently sloping to level valleys that terminate in coastal lowlands. Elevation ranges from sea level to 1,000 feet (0 to 305 meters) in much of the area, but it is 2,000 feet (610 meters) on some hills. Relief is mostly about 6 to 65 feet (2 to 20 meters) in the valleys and about 80 to 330 feet (25 to 100 meters) in the uplands.
This area has been glaciated and consists almost entirely of till hills, drumlins, and bedrock-controlled uplands with a mantle of till. It is dissected by narrow glacio-fluvial valleys. The southernmost boundary of the area marks the farthest southward extent of Wisconsinian glaciation on the eastern seaboard. The river valleys and coastal plains are filled with glacial lake sediments, marine sediments, and glacial outwash. The bedrock in the eastern half of the area consists primarily of igneous and metamorphic rocks of early Paleozoic age. Granite is the most common igneous rock, and gneiss, schist, and slate are the most common metamorphic rocks. In the parts of the MLRA in eastern and southeastern New York, Devonian- to Pennsylvanian-age sandstone, shale, and limestone are dominant. Carbonate rocks, primarily dolomite and limestone, are the dominant kinds of bedrock in the part of this MLRA in northwestern Connecticut.

Ecological site concept

The Subaqueous Haline Slopes ecological site consists of very deep, subaqueous soils permanently submerged beneath 100 through 250 cm of tidal estuarine water on flood tidal delta slopes and slopes in coastal lagoons and bays. Slope ranges from 2 through 15 percent. Representative soils are Marshneck and Nagunt sloping phase. Marshneck soils are formed in coarse loamy marine and estuarine sediments transported by flood tidal currents and estuarine silts. Nagunt soils are formed in sandy marine deposits as a result of washover events, eolian deposition, and tidal flooding. Buried surface horizons and stratification are often identified. Native vegetation includes eelgrass (*Zostera marina*) and widgeon grass (Ruppia maritma). Vegetation cover ranges from 0 in shallow and intertidal flats through 80 percent on sloping units of this soil. Benthic fauna such as tubeworms, clams, juvenile blue crabs, scallops and juvenile finfish are associated with this soil. Native vegetation includes eelgrass (*Zostera marina*) and widgeon grass (Ruppia maritma). Vegetation cover ranges from 0 in shallow and intertidal flats through 80 percent on sloping units of this soil. Areas of this soil are used for recreational fishing and boating. Commercial uses include shell fishing and aquaculture.

Associated sites

R144AY047RI	**Subaqueous Haline Glacial Deposits**

R144AY048RI	**Subaqueous Haline Low Energy Basins**
R144AY050RI	**Subaqueous Haline Flats**

Similar sites

R144AY047RI	**Subaqueous Haline Glacial Deposits**
R144AY048RI	**Subaqueous Haline Low Energy Basins**
R144AY050RI	**Subaqueous Haline Flats**

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Zostera marina* (2) *Ruppia maritima*

Physiographic features

This site consists of permanently submerged (up to 250 cm) flood tidal delta slopes and shoals in coastal lagoons and bays, in submerged stream valleys and mainland coves, or in the intertidal zone of tidal estuarine washover fan flats, washover fan slopes, sandy shoals, submerged beaches and flood tidal deltas in estuaries. Slope ranges from 0 through 15 percent.

Table 2. Representative physiographic features

Landforms	(1) Bay > Flood-tidal delta slope (2) Lagoon > Shoal (3) Estuary > Mainland cove (4) Washover-fan flat (5) Washover-fan slope (6) Submerged mainland beach (7) Flood-tidal delta
Elevation	0 ft
Slope	0–15%
Water table depth	0 in
Aspect	Aspect is not a significant factor

Climatic features

The Koppen-Geiger climate classification of the area in which this MLRA occurs varies between Dfb (Warm-summer humid continental) in the North, and Dfa (Hot-summer humid continental) in the southern portion of the MLRA. Precipitation is usually uniformly distributed throughout the year. Near the coast, however, it is slightly lower in summer. Precipitation is slightly higher in spring and fall in inland areas. Rainfall occurs as high-intensity, convective thunderstorms during the summer. During the winter, most of the precipitation occurs as moderate-intensity storms (northeasters) that produce large amounts of rain or snow. The freeze-free period increases in length to the south.

Table 3. Representative climatic features

Frost-free period (characteristic range)	142-186 days
Freeze-free period (characteristic range)	183-219 days
Precipitation total (characteristic range)	46-48 in
Frost-free period (actual range)	142-198 days

Freeze-free period (actual range)	176-229 days
Precipitation total (actual range)	44-49 in
Frost-free period (average)	166 days
Freeze-free period (average)	203 days
Precipitation total (average)	46 in

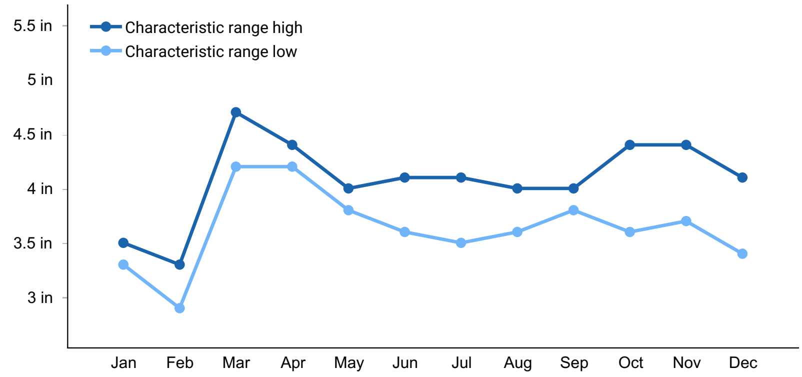


Figure 1. Monthly precipitation range

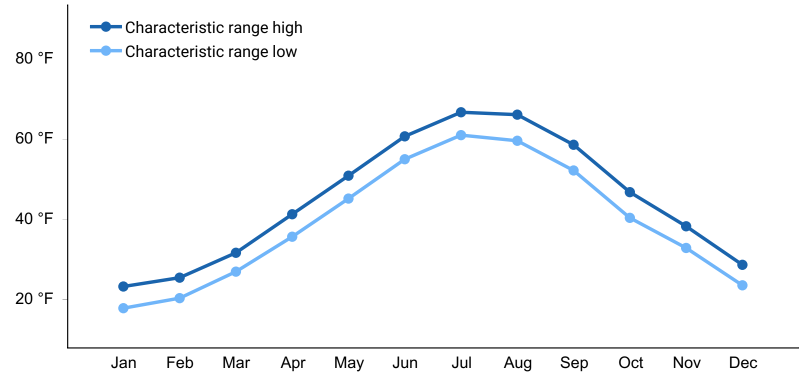


Figure 2. Monthly minimum temperature range

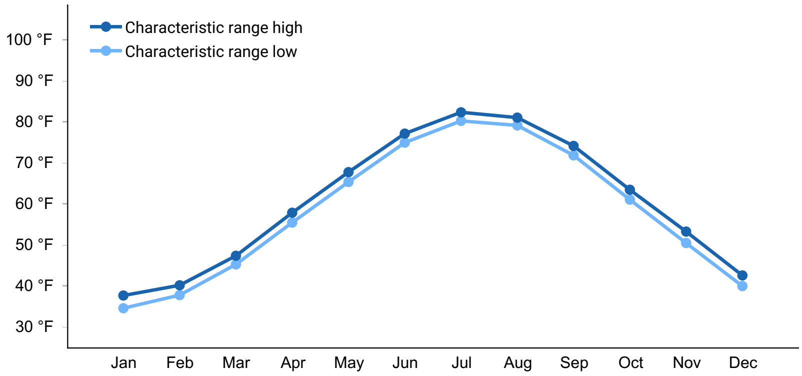


Figure 3. Monthly maximum temperature range

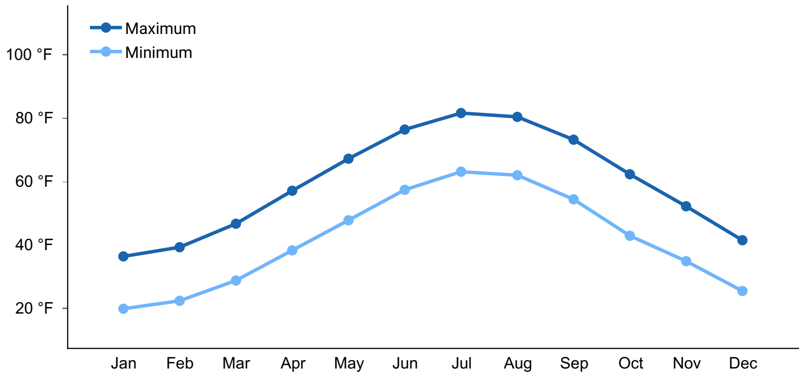


Figure 4. Monthly average minimum and maximum temperature

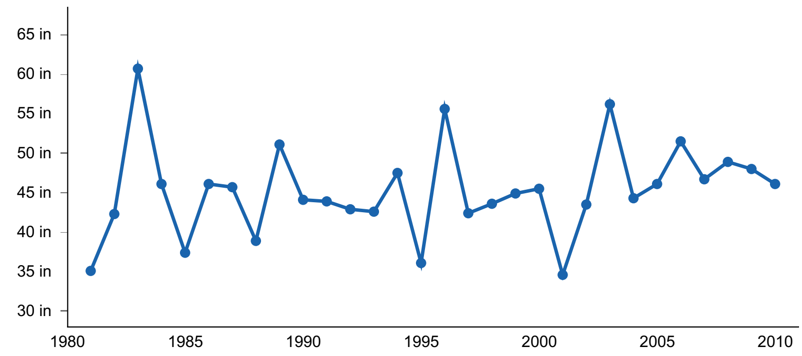


Figure 5. Annual precipitation pattern

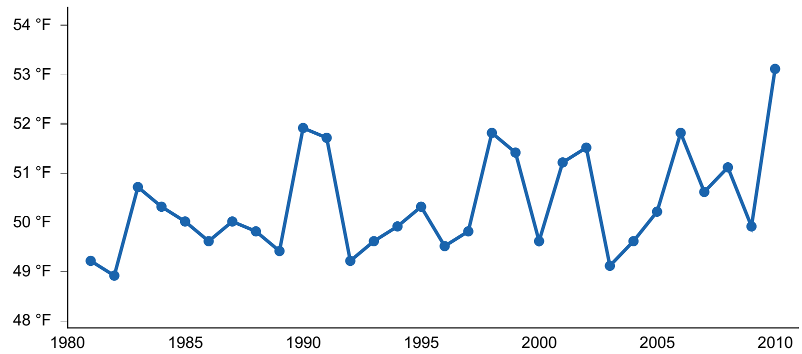


Figure 6. Annual average temperature pattern

Climate stations used

- (1) DURHAM 2 SSW [USW00054795], Durham, NH
- (2) BEVERLY MUNI AP [USW00054733], Wenham, MA
- (3) PLYMOUTH MUNI AP [USW00054769], Carver, MA
- (4) GROTON NEW LONDON AP [USW00014707], Groton, CT
- (5) BRIDGEPORT SIKORSKY MEM AP [USW00094702], Stratford, CT
- (6) NEWARK INTL AP [USW00014734], Newark, NJ

Influencing water features

Subaqueous soils differ from subaerial, or terrestrial, soils by having perennial water on the soil surface in either shallow freshwater or marine environments. These subaqueous soils are formed in the subtidal areas of estuaries and tidal embayments.

Wetland description

National Wetland Classification (Cowardin et al., 1979):
System: Marine/estuarine

Subsystem: Subtidal
Class: Unconsolidated Bottom, Aquatic Bed, Unconsolidated Shore, Emergent
Subclass: Cobble-Gravel, Sand, Mud, Algal, Rooted/Floating Vascular, Organic, Persistent/Non-persistent
Water Regime: Subtidal

Soil features

This site consists of very deep, subaqueous soils formed in marine and estuarine deposits, sometimes over deep buried organic materials. These materials are transported by flood tidal currents and estuarine silts settling in low energy areas, or as a result of washover events, and eolian deposition. Representative soils are Marshneck, and Nagunt.

Table 4. Representative soil features

Parent material	(1) Estuarine deposits (2) Marine deposits (3) Organic material (4) Eolian deposits
Surface texture	(1) Loam (2) Silt loam (3) Fine sandy loam (4) Sandy loam (5) Fine sand (6) Mucky loam (7) Mucky silt loam (8) Mucky fine sandy loam (9) Mucky sandy loam (10) Mucky fine sand (11) Very fine sandy loam (12) Loamy fine sand (13) Loamy very fine sand (14) Sand (15) Mucky loamy fine sand (16) Mucky loamy sand (17) Loamy sand (18) Loamy coarse sand (19) Mucky loamy coarse sand
Family particle size	(1) Coarse-loamy (2) Loamy (3) Sandy
Drainage class	Subaqueous
Permeability class	Slow
Depth to restrictive layer	72 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (Depth not specified)	0–7 in
Soil reaction (1:1 water) (Depth not specified)	2.6–8.5
Subsurface fragment volume <=3" (Depth not specified)	0–50%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

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

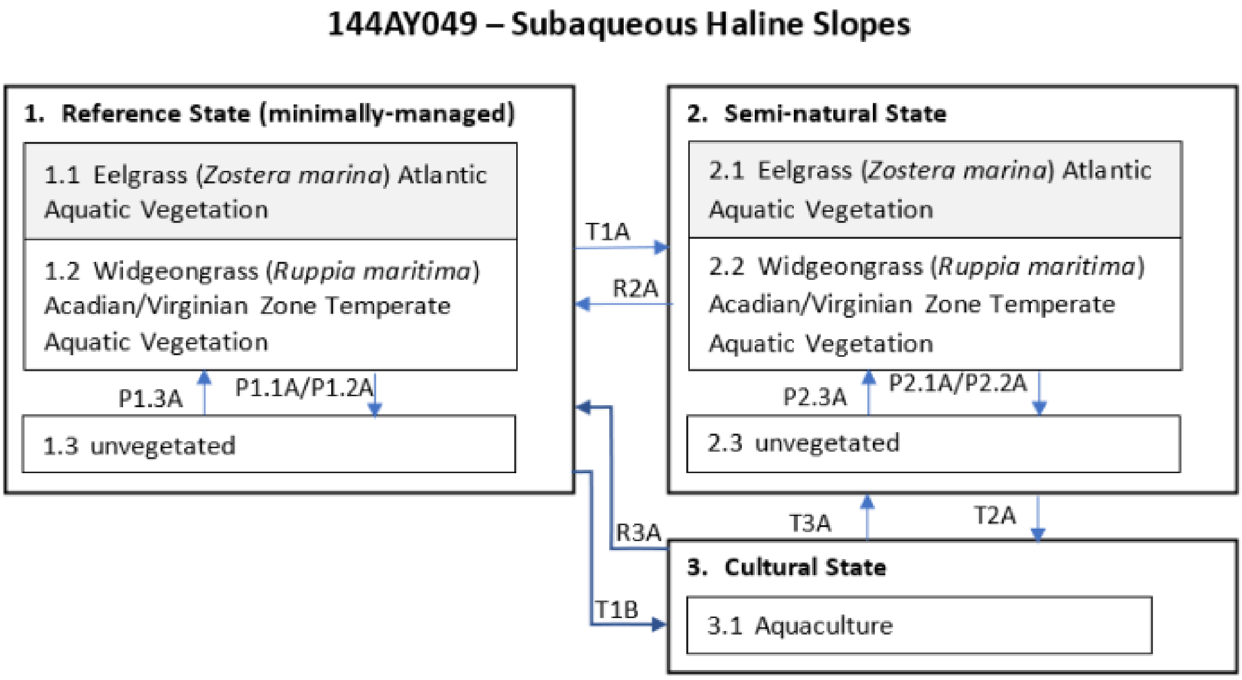
The vegetation groupings described in this section are based on the terrestrial ecological system classification and vegetation associations developed by NatureServe (Comer 2003). Terrestrial ecological SYSTEMS are specifically defined as a group of plant community-types called ASSOCIATIONS that tend to [co-]occur within landscapes with similar ecological processes, substrates, and/or environmental gradients. Any 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). Each association will be named by the diagnostic and often dominant species that occupy the different height strata (tree, sapling, shrub, and herb). Within the NatureServe Explorer database (NatureServe, 2015), 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).

Additional and more localized vegetation information is provided by the State Natural Heritage Programs of Connecticut (Metzler and Barrett 2001), Massachusetts (Swain and Kearsley 2001), New Hampshire (Sperduto and Nichols, 2011), New York (Edinger et al., 2014), and Rhode Island (Enser and Lungren, 2006).

The Subaqueous Haline Slopes ecological site is characterized by the the North Atlantic Tidal Sand Flat system (CES201.049), the North Atlantic Intertidal Mudflat system (CES201.050) and the Northern Atlantic Coastal Seagrass Bed system (CES203.246). The site occurs in flood tidal delta slopes and shoals in coastal lagoons and bays, in submerged stream valleys and mainland coves, or in the intertidal zone of tidal estuarine washover fan flats, washover fan slopes, sandy shoals, submerged beaches and flood tidal deltas in estuaries. Slope ranges from 0 through 15 percent. Benthic fauna such as tubeworms, clams, juvenile blue crabs, scallops and juvenile finfish are associated with this soil. Representative soils are Marshneck, and Nagunt. Benthic fauna such as tubeworms, clams, juvenile blue crabs, scallops and juvenile finfish are associated with this soil. Native vegetation includes eelgrass (*Zostera marina*) and widgeon grass (Ruppia maritma). Vegetation cover ranges from 0 in shallow and intertidal flats through 80 percent on sloping units of this soil. Areas of this soil are used for recreational fishing and boating. Commercial uses include shell fishing and aquaculture.

[*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.

State and transition model



Transition	*Drivers/practices*
T1A,	Disturbance, dredging
T1B, T2A	Aquacultural Practices
R2A, R3A	Seagrass establishment
T3A	Abandonment
P1.3A. P2.3A	Seagrass development
P1.1A/P1.2A, P2.1A/P2.2A	Disturbance

State 1
Minimally-managed reference state

Reference State (minimally managed) Association • *Zostera marina* Atlantic Aquatic Vegetation Translated Name: Seawrack Atlantic Aquatic Vegetation Common Name: North Atlantic Seawrack Bed (CEGL004336) • *Ruppia maritima* Acadian/Virginian Zone Temperate Aquatic Vegetation Translated Name: Widgeongrass Acadian/Virginian Zone Temperate Aquatic Vegetation Common Name: North Atlantic Coast Widgeongrass Bed (CEGL006167) Other associations may include: • Intertidal Mudflats Sparse Vegetation Common Name: North Atlantic Coast Estuarine Intertidal Mudflats (CEGL006614)

Community 1.1
Eelgrass (Zostera marina) Atlantic aquatic vegetation (CEGL004336)

Zostera marina Atlantic Aquatic Vegetation Translated Name: Seawrack Atlantic Aquatic Vegetation Common Name: North Atlantic Seawrack Bed (CEGL004336) Eelgrass (*Zostera marina*) is dominant and occurs most often in nearly pure stands. Widgeonweed (*Ruppia maritima*) can occur sporadically in this association, especially as waters become less saline. Additional associated species include various macroalgae, especially Ulva lactuca , Enteromorpha spp., Cladophora spp., and Polysiphonia spp. Where water is less saline, Enteromorpha, Chaetomorpha, Gracilaria, Agardhiella, and Ectocarpus can occur. Elevation/depth of the beds is determined by low tide level at the upper end and light penetration at the lower end, the latter being a function of water depth and turbidity. The beds generally occur in areas with only moderate wave action where salinity fluctuations are minor.

Eel-grass beds tend to stabilize and enrich substrate and provide habitat for epiphytes and other marine organisms. (Source: NatureServe 2018 [accessed 2019], USNVC 2017 [accessed 2019]). Cross-referenced plant community concepts (typically by political State): CT: Eelgrass Permanently Flooded Vegetation (Metzler and Barrett, 2006) MA: Seagrass commmunity (Swain and Kearsley, 2001) NH: Eelgrass Bed (Sperduto and Nichols, 2011) NY: Marine Eelgrass Meadow (Edinger et al., 2014) RI: Marine Subtidal Aquatic Bed (Enser and Lundgren, 2006)

Community 1.2
Widgeonweed (Ruppia maritima) Acadian/Virginian zone temperate aquatic vegetation (CEGL006167)

Ruppia maritima Acadian/Virginian Zone Temperate Aquatic Vegetation Translated Name: Widgeongrass Acadian/Virginian Zone Temperate Aquatic Vegetation Common Name: North Atlantic Coast Widgeongrass Bed (CEGL006167) This brackish/saline tidal community of the central and northern Atlantic coast is dominated by widgeonweed (*Ruppia maritima*). It occurs in large beds in estuarine bays as well as small patches within saline/brackish tidal creeks. Substrates are sand or muck, and salinity is generally more brackish. Widgeonweed has a wide range of salinity tolerance and overlaps with other species, although generally not in the same locations. Common associates in more brackish/freshwater tidal conditions include horned pondweed (*Zannichellia palustris*), sago false pondweed (*Stuckenia pectinata*), and clasping-leaved pondweed (*Potamogeton perfoliatus*) or eelgrass (*Zostera marina*) as waters get deeper and more saline. There can also be a diverse array of macroalgae. (Source: NatureServe 2018 [accessed 2019], USNVC 2017 [accessed 2019]). Cross-referenced plant community concepts (typically by political State): CT: Widgeonweed Permanently Flooded Vegetation (Metzler and Barrett, 2006) MA: Seagrass commmunity (Swain and Kearsley, 2001) NH: Undisclosed (Sperduto and Nichols, 2011) NY: Brackish Subtidal Aquatic Bed (Edinger et al., 2014) RI: Marine Subtidal Aquatic Bed (Enser and Lundgren, 2006)

Community 1.3
Unvegetated

Unvegetated

State 2
Semi-natural State

The Semi-natural State would expect plant communities where ecological processes are primarily operating with some land conditioning in the past or present, e.g., aquiculture, boat moorings.

Community 2.1
Eelgrass (Zostera marina) Atlantic aquatic vegetation CEGL004336)

Community 2.2
Widgeonweed (Ruppia maritima) Acadian / Virginian zone temperate aquatic vegetation (CEGL006167)

Community 2.3
Unvegetated

Unvegetated

State 3
Cultural state

The Cultural State would expect the ecological site to be very strongly conditioned/transformed by management, e.g., dredging, aquaculture

Community 3.1
Aquaculture

Transition T1A
State 1 to 2

Dredging

Transition T1B
State 1 to 3

Aquacultural practices

Restoration pathway R2A
State 2 to 1

Fill and seagrass planting

Transition T2A
State 2 to 3

Aquacultural practices

Restoration pathway R3A
State 3 to 1

Fill and seagrass planting

Transition T3A
State 3 to 2

Dredging

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

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Contributors

Nels Barrett, Ph.D.
Michael Margo

Approval

Greg Schmidt, 10/04/2024

Acknowledgments

Acknowledgements to Dr. Mark Stolt (URI) for developing the subaqueous soil descriptions.

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	05/11/2025
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:**

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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:**
