

## Appendix C



USFWS

*Wetland vegetation*

# Vegetation Alliances and Associations of Monomoy National Wildlife Refuge

- I. Forest
- II. Woodland
- III. Shrubland
- IV. Dwarf-shrubland
- V. Herbaceous Vegetation
- VII. Sparse Vegetation



**INTERNATIONAL ECOLOGICAL  
CLASSIFICATION STANDARD:  
TERRESTRIAL ECOLOGICAL CLASSIFICATIONS**

**Alliances and Associations of  
Monomoy National Wildlife Refuge**

19 November 2010

by

NatureServe

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This subset of the International Ecological Classification Standard covers vegetation alliances and associations of Monomoy National Wildlife Refuge. This classification has been developed in consultation with many individuals and agencies and incorporates information from a variety of publications and other classifications. Comments and suggestions regarding the contents of this subset should be directed to Mary J. Russo, Central Ecology Data Manager, Durham, NC <[mary\\_russo@natureserve.org](mailto:mary_russo@natureserve.org)> and Lesley A. Sneddon, Senior Regional Ecologist, Boston, MA <[lesley\\_sneddon@natureserve.org](mailto:lesley_sneddon@natureserve.org)>.



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## I. Forest

### I.B.2.N.A. LOWLAND OR SUBMONTANE COLD-DECIDUOUS FOREST

*AMELANCHIER CANADENSIS* - *VIBURNUM* SPP. - *MORELLA PENNSYLVANICA* SCRUB FOREST (CEGL006379)

Canadian Serviceberry - Viburnum species - Northern Bayberry Scrub Forest

Northern Tall Maritime Shrubland

Classif. Resp.: East

#### ELEMENT CONCEPT

**Summary:** This tall maritime shrubland or scrub forest community characteristically replaces maritime forests that have been cleared. The community is variable in composition and generally includes *Amelanchier canadensis*, *Prunus serotina*, *Sassafras albidum*, *Nyssa sylvatica*, *Acer rubrum*, *Juniperus virginiana* in the canopy. The oaks *Quercus velutina*, *Quercus stellata*, *Quercus alba* may or may not be present. The shrubs *Morella pensylvanica* (= *Myrica pensylvanica*), *Photinia* spp. (= *Aronia* spp.), *Viburnum* spp. may form an understory or contribute substantial cover to the canopy. Vines are often prevalent, including *Smilax* spp., *Vitis* spp., *Toxicodendron radicans*, *Parthenocissus quinquefolia*. The herbaceous layer is generally sparse. These shrublands are usually very dense, and often maintained in their current state by constant winds and salt spray.

#### ELEMENT DESCRIPTION

**Environment:** This tall maritime shrubland or scrub forest community characteristically replaces maritime forests that have been cleared. It occurs at former agricultural sites on sandy loam soils. These shrublands are usually very dense and often maintained in their current state by constant winds and salt spray.

**Vegetation:** This tall shrubland community is variable in composition and generally includes *Amelanchier canadensis*, *Prunus serotina*, *Sassafras albidum*, *Nyssa sylvatica*, *Acer rubrum*, and *Juniperus virginiana* in the canopy. The oaks *Quercus velutina*, *Quercus stellata*, and *Quercus alba* may or may not be present. The shrubs *Morella pensylvanica*, *Photinia* spp., *Viburnum* spp., and *Gaylussacia baccata* may form an understory or contribute substantial cover to the canopy. Vines are often prevalent, including *Smilax* spp., *Vitis* spp., *Toxicodendron radicans*, and *Parthenocissus quinquefolia*. The herbaceous layer is generally sparse.

**Dynamics:** This tall maritime shrubland community characteristically replaces maritime forests that have been cleared. Successional relationships with maritime forest associations need to be determined.

#### Related Concepts:

- Coastal dune shrubland (Breden 1989) ?
- Coastal dune woodland (Breden 1989) ?
- SNE coastal rocky headland community (Rawinski 1984) ?

#### Conservation Ranking

**GRank:** GNR (1-Dec-1997) **Reasons:**

#### ELEMENT DISTRIBUTION

##### Range:

**Nations:** CA, US

**Subnations:** CT, MA, ME?, NH, NJ, NY, RI, QC

##### Distribution with Crosswalk data:

#### ELEMENT SOURCES

**References:** Breden 1989, Breden et al. 2001, Eastern Ecology Working Group n.d.\*, Edinger et al. 2002, Metzler and Barrett 2001, NRCS 2001b, Rawinski 1984, Reschke 1990, Swain and Kearsley 2001

## II. Woodland

### II.A.4.N.A. ROUNDED-CROWNED TEMPERATE OR SUBPOLAR NEEDLE-LEAVED EVERGREEN WOODLAND

#### PINUS RIGIDA WOODLAND ALLIANCE (A.524)

##### PITCH PINE WOODLAND ALLIANCE

**Alliance Summary:** This alliance includes evergreen woodlands of rock outcrops, summits, exposed slopes or, less frequently, sandy soils. In the southeastern United States, associations are dominated by *Pinus rigida* with or without an admixture of *Pinus virginiana*. In the northeastern United States, associated canopy species include *Pinus resinosa*,

*Pinus strobus*, and *Pinus banksiana*, sometimes with an understory of *Quercus ilicifolia*. In the northeastern United States, associations in this alliance occur on xeric, sandy terraces within the Coastal Plain from southern Maine to Cape Henlopen, Delaware, including paleodunes and other habitats of the New Jersey pine barrens. Examples also occur on coastal acidic rock outcrops and rocky summits of southern Maine, eastern New York, and Cape Cod, Massachusetts. Other possible habitats include sand plains, flat glacial outwash plains, sand dunes and glacial till. In the North Atlantic Coast ecoregion, stands are on sandy soils, which are typically well-drained and nutrient-poor. The habitats are fire-maintained or with a maritime influence. In the southeastern United States, associations in this alliance occur at low elevations in the Ridge and Valley, and Cumberland Mountains, on sites outside the geographic range of *Pinus pungens*. Fire plays an important role in maintaining these communities, but on the most extreme sites, these communities are maintained by topo-edaphic conditions.

*PINUS RIGIDA* / *QUERCUS ILICIFOLIA* / *MORELLA PENNSYLVANICA* WOODLAND (CEGL006315)

Pitch Pine / Bear Oak / Northern Bayberry Woodland

Coastal Pitch Pine / Scrub Oak Barrens

**ELEMENT CONCEPT**

**Summary:** These woodlands of pine barrens in the North Atlantic Coast ecoregion are characterized by droughty, fire-prone vegetation, sandy soils and maritime influence. *Pinus rigida* is strongly dominant in the canopy. *Quercus ilicifolia* forms a dense, 1- to 2-m tall shrub layer with occasional *Quercus prinoides*. Dwarf-shrubs such as *Gaylussacia baccata*, *Morella pensylvanica* (= *Myrica pensylvanica*), *Vaccinium pallidum*, and *Vaccinium angustifolium* intermingle with the tall shrubs. Herbs tend to be sparse, although more open areas may support patches of *Schizachyrium scoparium* and *Deschampsia flexuosa*, or *Carex pensylvanica* and *Carex swanii*. Additional scattered herbs include *Comptonia peregrina*, *Pteridium aquilinum*, *Gaultheria procumbens*, and *Arctostaphylos uva-ursi*. Diagnostic characteristics include the presence of *Morella pensylvanica* to indicate coastal setting.

**Environment:** These woodlands of pine barrens in the North Atlantic Coast ecoregion are characterized by droughty, fire-prone vegetation, sandy soils and maritime influence. Soils are acidic and well-drained.

**Vegetation:** *Pinus rigida* is strongly dominant in the canopy. *Quercus ilicifolia* forms a dense, 1- to 2-m tall shrub layer with occasional *Quercus prinoides*. Dwarf-shrubs such as *Gaylussacia baccata*, *Morella pensylvanica*, *Vaccinium pallidum*, and *Vaccinium angustifolium* intermingle with the tall shrubs. Herbs tend to be sparse, although more open areas may support patches of *Schizachyrium scoparium* and *Deschampsia flexuosa*, or *Carex pensylvanica* and *Carex swanii*. Additional scattered herbs include *Comptonia peregrina*, *Pteridium aquilinum*, *Gaultheria procumbens*, and *Arctostaphylos uva-ursi*. Diagnostic characteristics include the presence of *Morella pensylvanica* to indicate coastal setting.

**Dynamics:** These are fire-maintained systems.

**Related Concepts:**

- CNE Mesic hardwood Forest on acidic bedrock / till (Rawinski 1984) B
- Maritime forest (Rawinski 1984) B
- Maritime forest, dune subtype (Rawinski 1984) ?
- New England pitch pine/scrub oak barrens (Rawinski 1984) ?
- SNE dry oak/pine forest on sandy/gravelly soils (Rawinski 1984) B
- SNE dry oak/pine forests on acidic bedrock or till (Rawinski 1984) B
- Southern New England oak / pine forest on sandy / gravelly soils (Rawinski 1984) B

**CONSERVATION RANKING**

**GRank:** G3 (1997-12-1) **Reasons:**

**ELEMENT DISTRIBUTION**

**Range:** Occurs in coastal areas of Massachusetts, Rhode Island, New York, and New Jersey.

**Subnations:** CT, MA, NJ, NY, RI

**TNC Ecoregions:** 61:C, 62:C

**USFS Ecoregions:** 221Ab:CCC, 221Ac:CCP, 221B:CC, 232Aa:CCC, 232Ab:CCC

**Federal Lands:** NPS (Cape Cod); USFWS (Massasoit?, Monomoy, Parker River)

**ELEMENT SOURCES**

**References:** Breden et al. 2001, Eastern Ecology Working Group n.d., Lundgren et al. 2000, Motzkin and Foster 2002, Rawinski 1984, Swain and Kearsley 2001

### III. Shrubland

#### III.B.2.N.A. TEMPERATE COLD-DECIDUOUS SHRUBLAND

##### *MORELLA PENNSYLVANICA* - (*PRUNUS MARITIMA*) SHRUBLAND ALLIANCE (A.902)

###### NORTHERN BAYBERRY - (BEACH PLUM) SHRUBLAND ALLIANCE

**Alliance Summary:** This alliance includes maritime shrublands and dune thickets of the Mid-Atlantic Coast dominated by *Morella pensylvanica* (= *Myrica pensylvanica*), with *Baccharis halimifolia*, *Rhus copallinum*, and stunted individuals of *Pinus taeda*. *Prunus maritima* is characteristic of this community from Maryland to the north. The constant movement of sand in this community limits the herbaceous cover. Typical herbaceous species include *Ammophila breviligulata*, *Cenchrus tribuloides*, *Chamaesyce polygonifolia*, *Cyperus grayi*, *Dichanthelium acuminatum*, *Diodia teres*, *Hudsonia tomentosa*, *Lechea maritima*, *Oenothera humifusa*, *Panicum amarum* var. *amarulum*, *Parthenocissus quinquefolia*, *Rumex acetosella*, *Solidago sempervirens*, *Spartina patens*, *Toxicodendron radicans*, and *Triplasis purpurea*. This maritime shrubland usually occupies the intermediate areas between the very unstable oceanward portions of the dunes and the more protected backdunes, where it forms partially open to dense shrub thickets. The substrate is sand with no soil profile development, and with variable amounts of accumulated leaf litter. Where this community occupies the lee side of foredunes, greater exposure to winds and storms contributes to a shorter stature and more open aspect of the vegetation. Here there are large patches of open unvegetated or sparsely vegetated sand.

##### *MORELLA PENNSYLVANICA* - *PRUNUS MARITIMA* SHRUBLAND (CEGL006295)

Northern Bayberry - Beach Plum Shrubland

Northern Bayberry Dune Shrubland

###### ELEMENT CONCEPT

**Summary:** This association comprises maritime dune shrublands of protected slopes and hollows of dry, stabilized maritime backdunes along the northern Atlantic Coast. It is dominated by *Morella pensylvanica* (= *Myrica pensylvanica*) and *Prunus maritima*. Additional shrubs that are commonly present but with low cover can include *Rosa carolina*, *Rosa rugosa*, *Baccharis halimifolia*, *Rhus typhina*, or *Juniperus virginiana*. Although *Rosa rugosa* is not a native species, it is naturalized and is nearly restricted to this vegetation, where it grows in similar habit and physiognomy as the other two shrubs characteristic of this vegetation. The herbaceous layer tends to be sparse and low, particularly where shrub growth is dense, and can include dune grassland or adjacent upland species such as *Ammophila breviligulata*, *Solidago sempervirens*, *Hudsonia tomentosa*, *Lechea maritima*, *Juncus greenii*, *Carex silicea*, *Polygonella articulata*, *Symphotrichum subulatum* (= *Aster subulatus*), *Solidago rugosa*, *Achillea millefolium*, *Oenothera parviflora*, *Euthamia* spp., *Cyperus grayi*, *Cyperus polystachyos*, *Schizachyrium scoparium*, and others. Typical vine associates are *Toxicodendron radicans*, *Parthenocissus quinquefolia*, and *Smilax* spp. Large patches of open unvegetated or sparsely vegetated sand are present in some examples. Depending on exposure, these shrublands range from over 2 m tall in sheltered areas to less than 1 m tall in areas with greater exposure to winds and storms.

**Environment:** This association occurs on protected slopes and hollows of dry, stabilized maritime backdunes where the water table is greater than 1 m from the surface.

**Vegetation:** This shrubland vegetation is dominated by *Morella pensylvanica* (= *Myrica pensylvanica*) and *Prunus maritima*. Additional shrubs that are commonly present but with low cover can include *Rosa carolina*, *Rosa rugosa*, *Baccharis halimifolia*, *Rhus copallinum*, *Rhus typhina*, or *Juniperus virginiana*. The herbaceous layer tends to be sparse and can include dune grassland or adjacent upland species such as *Ammophila breviligulata*, *Solidago sempervirens*, *Hudsonia tomentosa*, *Lechea maritima*, *Juncus greenii*, *Carex silicea*, *Polygonella articulata*, *Symphotrichum subulatum* (= *Aster subulatus*), *Solidago rugosa*, *Achillea millefolium*, *Oenothera parviflora*, *Euthamia* spp., *Cyperus grayi*, *Cyperus polystachyos*, *Schizachyrium scoparium*, and others. Typical vine associates are *Toxicodendron radicans*, *Parthenocissus quinquefolia*, and *Smilax* spp. Large patches of open unvegetated or sparsely vegetated sand are present in some examples. Depending on exposure, these shrublands range from over 2 m tall in sheltered areas to less than 1 m tall in areas with greater exposure to winds and storms.

**Dynamics:** This vegetation can be a probable intermediate in succession between beach dune and sunken forest; further dune development and protection from salt spray allows development of sunken forest vegetation (Art 1976).

###### Similar Associations:

- *Morella pensylvanica* / *Diodia teres* Shrubland (CEGL003881)
- *Prunus serotina* - *Rhus typhina* Scrub Forest (CEGL006399)

**Related Concepts:**

- *Myrica* thicket (Chrysler 1930) ?
- Coastal dune community (Rawinski 1984) ?
- Dune shrubland (Breden 1989) ?
- Low dune thicket (Martin 1959b) ?
- Maritime Shrubland on Dunes (Lundgren 2000) ?
- Rose - Bayberry Maritime Shrubland (Gawler 2002) B
- SNE coastal rocky headland community (Rawinski 1984) ?
- Short shrub thicket (Dunlop and Crow 1985) ?

**Classification Comments:** This vegetation is compositionally similar to maritime rocky headland, *Prunus serotina* - *Rhus typhina* Scrub Forest (CEGL006399). *Morella pensylvanica* / *Diodia teres* Shrubland (CEGL003881) is the southern analog of this association.

**CONSERVATION RANKING**

**GRank:** G4 (1997-12-1) **Reasons:**

**ELEMENT DISTRIBUTION**

**Range:** This association occurs from Maine to New Jersey.

**Subnations:** CT, DE?, MA, ME, NH, NJ, NY, RI

**TNC Ecoregions:** 62:C

**USFS Ecoregions:** 221Ab:CCC, 221Ac:CCC, 221Ad:CCC, 221Ak:CCC, 232Aa:CCC, 232Ab:CCC, 232Ac:CCC

**Federal Lands:** NPS (Cape Cod, Fire Island, Gateway); USFWS (E.B. Forsythe, Monomoy, Muskeget Island, Nomans Land Island, Parker River)

**ELEMENT SOURCES**

**References:** Art 1976, Breden 1989, Breden et al. 2001, Chrysler 1930, Conard 1935, Dunlop and Crow 1985, Eastern Ecology Working Group n.d., Edinger et al. 2002, Enser 1999, Gawler 2001, Gawler 2002, Lundgren 2000, Martin 1959b, McDonnell 1979, Metzler and Barrett 2001, Metzler and Barrett 2004, Moul 1969, NRCS 2001b, Nelson and Fink 1980, Nichols 1920, Rawinski 1984, Reschke 1990, Sneddon and Lundgren 2001, Sperduto 1997b, Sperduto 2000a, Swain and Kearsley 2001

### III.B.2.N.E. SEASONALLY FLOODED COLD-DECIDUOUS SHRUBLAND

#### ***MORELLA (CERIFERA, PENNSYLVANICA) - VACCINIUM FORMOSUM SEASONALLY FLOODED SHRUBLAND ALLIANCE (A.1010)***

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#### **(WAX-MYRTLE, NORTHERN BAYBERRY) - SOUTHERN BLUEBERRY SEASONALLY FLOODED SHRUBLAND ALLIANCE**

**Alliance Summary:** This alliance includes shrub wetlands of mid-Atlantic barrier islands. The two most characteristic shrubs are *Morella cerifera* (= *Myrica cerifera*) and *Vaccinium corymbosum*. *Rosa palustris* and *Morella pensylvanica* (= *Myrica pensylvanica*) are two other common shrub associates. Unlike the *Morella cerifera* wetland alliance, this alliance is of generally shorter stature and total shrub cover; and, although quite variable, is usually considerably more open. Herbaceous composition is variable, but *Panicum virgatum*, *Andropogon virginicus*, *Schizachyrium scoparium*, and other grasses are common. Other herbs include *Juncus* spp., *Pluchea foetida*, *Triadenum virginicum*, *Drosera intermedia*, and *Osmunda regalis*. Standing water is commonly found in the spring, but water levels may drop substantially toward the end of the summer. The southern range limit of this alliance is not well known, but it is confined to barrier islands from Delaware south.

#### ***MORELLA PENNSYLVANICA – TOXICODENDRON / TYPHA LATIFOLIA SHRUBLAND (CEGL006444)***

Northern Bayberry – Poison Ivy / Cattail Shrubland

Bayberry Shrub Wetland

**ELEMENT CONCEPT**

**Summary:** This shrub wetland of shallow basins occurs in coastal southern New England. It occurs in interdunal swales of barrier beaches, or in wetlands of regions underlain by morainal deposits. The dominant shrub is *Morella pensylvanica*, which can achieve heights of 2.5m on the periphery of the wetland. Associated shrubs may include *Vaccinium corymbosum*, *Clethra alnifolia*, *Decodon verticillatus*, and *Toxicodendron radicans*. The herbaceous layer is variable, but generally includes *Typha latifolia* or *Typha angustifolia*, *Thelypteris palustris*, *Osmunda cinnamomea*,

*Euthamia tenuifolia*, and *Triadenum virginicum*. Other associated herbs may include *Vaccinium macrocarpon*, *Lysimachia terrestris*, *Scirpus cyperinus*, and species of *Polygonum*. The substrate is usually peat of variable depth overlying sand. This association is known from Cape Cod, Massachusetts, and Block Island, Rhode Island and may occur elsewhere.

**Environment:** This community occurs in interdunal depressions of barrier island dunes or in areas underlain by morainal deposits. The substrate is peat of variable depth.

**Vegetation:** The dominant shrub is *Morella pensylvanica*, which can achieve heights of 2.5m on the periphery of the wetland. Associated shrubs may include *Vaccinium corymbosum*, *Clethra alnifolia*, *Decodon verticillatus*, and *Toxicodendron radicans*. The herbaceous layer is variable, but generally includes *Typha latifolia* or *Typha angustifolia*, *Thelypteris palustris*, *Osmunda cinnamomea*, *Euthamia tenuifolia*, and *Triadenum virginicum*. Other associated herbs may include *Vaccinium macrocarpon*, *Lysimachia terrestris*, *Scirpus cyperinus*, and species of *Polygonum*.

**Dynamics:**

**Similar Associations:**

(*Morella cerifera*) - *Panicum virgatum* - *Spartina patens* Herbaceous Vegetation (CEGL004129)

**Related Concepts:**

- Mesic shrub thicket (Martin 1959b) ?

**Classification Comments:**

**CONSERVATION RANKING**

**GRank:** GNR **Reasons:** this association has not yet been ranked.

**ELEMENT DISTRIBUTION**

**Range:** This association is known from Massachusetts and Rhode Island, and may occur elsewhere.

**Subnations:** MA, RI

**TNC Ecoregions:** 62:C

**USFS Ecoregions:** 221Ab:CCC, 232Aa:CCC

**Federal Lands:** USFWS (Monomoy, Nomans Land Island)

**ELEMENT SOURCES**

**References:** Hadjian 1995; Sneddon 2010

## IV. Dwarf-shrubland

### IV.A.1.N.A. CESPITOSE NEEDLE-LEAVED OR MICROPHYLLOUS EVERGREEN DWARF-SHRUBLAND

#### *HUDSONIA TOMENTOSA* DWARF-SHRUBLAND ALLIANCE (A.1062)

##### WOOLLY BEACH-HEATHER DWARF-SHRUBLAND ALLIANCE

**Alliance Summary:** This alliance consists of sandy or rocky areas dominated by *Hudsonia tomentosa*. This alliance is largely confined to maritime interdunes. This alliance occurs on well-drained sands of back dunes and interdunes, and is documented from Assateague Island; it is a maritime dwarf-shrubland characterized by *Hudsonia tomentosa*, a species adapted to sand burial. *Hudsonia tomentosa* is dominant, occurring as discrete patches that may coalesce into a dense mat on older, more stabilized dunes. A number of other shrubs, such as *Morella pensylvanica* (= *Myrica pensylvanica*), *Morella cerifera* (= *Myrica cerifera*), *Pinus taeda* saplings, and *Prunus maritima*, may occur but are low in abundance and cover. *Morella pensylvanica* shrubs and *Pinus taeda* saplings are almost non-existent but can occur as scattered individuals. Herbaceous vegetation is also quite sparse (less than 5% cover) but may include scattered individuals of *Panicum amarum* var. *amarulum*, *Panicum amarum* var. *amarum*, *Solidago sempervirens*, *Nuttallanthus canadensis*, *Lechea maritima*, *Ammophila breviligulata*, *Pseudognaphalium obtusifolium* (= *Gnaphalium obtusifolium*), *Schizachyrium littorale* (= *Schizachyrium scoparium* ssp. *littorale*), *Dichanthelium acuminatum*, *Oenothera humifusa*, *Cyperus grayi*, *Artemisia stelleriana*, *Chamaesyce polygonifolia*, and *Diodia teres*. *Toxicodendron radicans* is a common vine. Scattered vines of *Smilax rotundifolia* and canes of *Rubus argutus* are occasional. The unstable substrate is influenced by wind-deposited sand and supports no soil development; large patches of sparsely vegetated or unvegetated sand are common.

*HUDSONIA TOMENTOSA* - *ARCTOSTAPHYLOS UVA-URSI* DWARF-SHRUBLAND (CEGL006143)

Woolly Beach-heather - Kinnikinnick or Bearberry Dwarf-shrubland

Northern Beach-heather Dune Shrubland

**ELEMENT CONCEPT**

**Summary:** This association comprises dune heathlands of the north Atlantic coast from southern Maine to Long Island, New York, dominated by *Hudsonia tomentosa*. It occurs in well-developed dune systems in the lee side of primary dunes or on secondary dunes with active sand deposition and movement. *Hudsonia tomentosa* is a dominant as well as keystone species of this community, binding sand in place and forming more suitable habitat for other plants to become established. Associated herbs generally occur in low abundance and include *Polygonella articulata*, *Lechea maritima*, *Deschampsia flexuosa*, *Minuartia caroliniana*, *Ionactis linariifolius*, *Solidago sempervirens*, *Lathyrus japonicus*, *Artemisia stelleriana*, *Carex silicea*, *Chamaesyce polygonifolia*, *Cyperus polystachyos*, and scattered *Ammophila breviligulata*. Older, more stabilized dunes tend to have greater species diversity and less sand deposition. In these areas *Arctostaphylos uva-ursi* can displace *Hudsonia tomentosa* or codominate, and Asteraceae species and *Cladina* spp. are common. Scattered individuals of *Morella pensylvanica* (= *Myrica pensylvanica*), *Rosa rugosa*, *Prunus maritima*, or *Gaylussacia baccata* may occur within this community.

**Environment:** This association occurs in well-developed sand dune systems in the lee side of primary dunes or on secondary dunes with active sand deposition and movement. Conditions are xeric; plants must be adapted to low moisture, high surface temperature, and high light intensity.

**Vegetation:** This dwarf-shrubland is dominated by *Hudsonia tomentosa*. Associated species generally occur in low abundance and include *Polygonella articulata*, *Lechea maritima*, *Minuartia caroliniana*, *Ionactis linariifolius*, *Solidago sempervirens*, *Lathyrus japonicus*, *Artemisia stelleriana*, *Carex silicea*, *Chamaesyce polygonifolia*, *Cyperus polystachyos*, and scattered *Ammophila breviligulata*. Older, more stabilized dunes tend to have greater species diversity and less sand deposition. In these areas *Arctostaphylos uva-ursi* can displace *Hudsonia tomentosa* or codominate, and Asteraceae species and *Cladina* spp. are common. Scattered individuals of *Morella pensylvanica* (= *Myrica pensylvanica*), *Rosa rugosa*, *Prunus maritima*, or *Gaylussacia baccata* may occur within this community.

**Dynamics:** This association occurs in large dune systems with active sand deposition and movement. This association grades into dune grasslands dominated by *Ammophila breviligulata* or into maritime shrub thickets.

**Similar Associations:**

- *Ammophila breviligulata* - *Lathyrus japonicus* Herbaceous Vegetation (CEGL006274)
- *Hudsonia tomentosa* / *Panicum amarum* var. *amarulum* Dwarf-shrubland (CEGL003950)
- *Hudsonia tomentosa* Dune Dwarf-shrubland (CEGL004024)

**Related Concepts:**

- Coastal dune community (Rawinski 1984) ?
- Dune heath (Johnson 1985b) ?
- Interdune (McDonnell 1979) ?
- New England heath sand barrens / coastal heathland (Rawinski 1984) ?
- Pitch Pine Dune Woodland (Gawler 2002) B

**Classification Comments:** *Hudsonia tomentosa* / *Panicum amarum* var. *amarulum* Dwarf-shrubland (CEGL003950) is a southern analog of this association.

**CONSERVATION RANKING**

**GRank:** G2G3 (2007-1-30) **Reasons:** This small-patch community is restricted to coastal sand dunes from southern Maine to Long Island, New York, and is faced with threats to most coastal areas of the Northeast in general: commercial and residential development, trampling by beach users, and beach stabilization in particular. An estimated 70 occurrences covering 1000-1300 acres in total exist rangewide.

**ELEMENT DISTRIBUTION**

**Range:** This association is restricted to coastal sand dunes from southern Maine to Long Island, New York.

**Subnations:** CT, MA, ME, NJ, NY, QC, RI

**TNC Ecoregions:** 62:C

**USFS Ecoregions:** 221Ab:CCC, 221Ac:CCC, 221Ad:CCC, 221Ak:CCC, 232Aa:CCC

**Federal Lands:** NPS (Cape Cod, Fire Island, Gateway); USFWS (Monomoy, Parker River)

**ELEMENT SOURCES**

**References:** Conard 1935, Dowhan and Rozsa 1989, Dunlop and Crow 1985, Eastern Ecology Working Group n.d., Edinger et al. 2002, Enser 1999, Gawler 2002, Godfrey et al. 1978, Gwilliam unpubl. data 1998, Johnson 1985b, Lundgren 1998, Lundgren et al. 2000, McDonnell 1979, Metzler and Barrett 2001, NRCS 2001b, Nelson and Fink 1980, Rawinski 1984, Reschke 1990, Robichaud and Buell 1973, Swain and Kearsley 2001, Van Luven 1990, Zaremba 1989

**IV.A.1.N.G. SATURATED NEEDLE-LEAVED OR MICROPHYLOUS EVERGREEN DWARF-SHRUBLAND*****VACCINIUM MACROCARPON* SATURATED DWARF-SHRUBLAND ALLIANCE (A.1094)****LARGE CRANBERRY SATURATED DWARF-SHRUBLAND ALLIANCE**

**Alliance Summary:** This alliance, found in parts of the northeastern United States, contains vegetation found in maritime dune-swale communities and mountain bogs of Central Appalachians (beyond the range of *Chamaedaphne calyculata*), as well as cranberry bogs in Ohio. Further information is needed to characterize this alliance.

***CLADIUM MARISCOIDES* / *VACCINIUM MACROCARPON* - *MORELLA PENNSYLVANICA* DWARF-SHRUBLAND (CEGL006141)**

Smooth Sawgrass / Large Cranberry - Northern Bayberry Dwarf-shrubland  
Northern Interdunal Cranberry Swale

**ELEMENT CONCEPT**

**Summary:** This association is a small-patch seasonally flooded wetland within low swales behind backdunes of major dune systems of the northeastern coast. Vegetation is characterized by *Vaccinium macrocarpon*, *Sphagnum* spp., and scattered *Morella pensylvanica* (= *Myrica pensylvanica*), *Myrica gale*, and/or *Vaccinium corymbosum*. *Vaccinium macrocarpon* is generally dominant, but a number of rushes, sedges, grasses, and forbs co-occur and often obscure the low-growing *Vaccinium macrocarpon*. *Morella pensylvanica*, although a minor component of the vegetation and generally restricted to the wetland edge, characterizes this community as coastal. The wetland is seasonally flooded and is often dry on the surface late in the growing season. A shallow layer of peat overtops deep sand deposits. Associated species commonly include *Juncus* spp. (*Juncus canadensis*, *Juncus greenei*, *Juncus balticus*, *Juncus biflorus*, *Juncus scirpoides*, *Juncus pelocarpus* and/or others), *Cladium mariscoides*, *Xyris torta*, *Xyris difformis*, *Rhynchospora capitellata*, *Rhynchospora alba*, *Cyperus* spp., *Drosera rotundifolia*, *Drosera intermedia*, *Drosera filiformis*, *Pogonia ophioglossoides*, and scattered clumps of *Schoenoplectus pungens* or *Scirpus cyperinus* in small wet pockets. *Sphagnum* spp. (*Sphagnum rubellum*, *Sphagnum compactum*, and possibly others) cover the surface. Species occurring less frequently can include *Linum striatum*, *Lycopodiella inundata* (= *Lycopodium inundatum*), *Polygala cruciata*, *Calopogon* spp., *Platanthera* spp., *Utricularia subulata*, *Triadenum* sp., and others. Floristics can vary among swales due to hydrology, soils, or disturbance regime.

**Environment:** This association occurs in small, low, wet swales between coastal backdunes. These wet swales occur where the dune surface intersects fresh groundwater lens. These swales are seasonally flooded and often superficially dry by late summer. The duration of flooding is long enough to prevent extensive shrub establishment and to allow carpets of *Sphagnum* to develop. Substrate is shallow peat over sand.

**Vegetation:** Species composition can vary considerably between swales. This association comprises a later successional phase of freshwater coastal swale development. Vegetation is characterized by *Vaccinium macrocarpon*, *Sphagnum* spp., and scattered *Morella pensylvanica*, *Myrica gale*, and/or *Vaccinium corymbosum*. *Vaccinium macrocarpon* can have up to 90% cover, but can be obscured by taller herbs. Associated species commonly include *Juncus* spp. (*Juncus canadensis*, *Juncus greenei*, *Juncus balticus*, *Juncus biflorus*, *Juncus pelocarpus*, and/or others), *Cladium mariscoides*, *Xyris torta*, *Xyris difformis*, *Rhynchospora capitellata*, *Rhynchospora scirpoides*, *Rhynchospora alba*, *Cyperus* spp., *Drosera rotundifolia*, *Drosera intermedia*, *Drosera filiformis*, *Pogonia ophioglossoides*, and scattered clumps of *Schoenoplectus pungens* or *Scirpus cyperinus* in small wet pockets. *Sphagnum* spp. (*Sphagnum rubellum*, *Sphagnum compactum*, and possibly others) cover the surface. Species occurring less frequently can include *Linum striatum*, *Lycopodiella inundata* (= *Lycopodium inundatum*), *Polygala cruciata*, *Calopogon* spp., *Platanthera* spp., *Utricularia subulata*, *Triadenum* sp., and others. Floristics can vary between swales due to hydrology, soils, or disturbance regime.

**Dynamics:** This association occurs in wet swales where the dune surface intersects fresh groundwater lens. Water table fluctuations depend on precipitation, which is the primary water input, and the rate of subsurface drainage. Short-term dynamics in vegetation composition are driven by water level fluctuations; drought conditions allow tree and shrub

colonization, which can shade out herbs, while increased flooding favors herbaceous species and eliminates shrubs. This vegetation can grade into mesic shrubland or dune grassland vegetation.

**Similar Associations:**

- *Myrica gale* - *Morella pensylvanica* Saturated Shrubland (CEGL006339)
- *Pinus rigida* / *Vaccinium macrocarpon* Woodland (CEGL006127)
- *Vaccinium oxycoccos* - (*Vaccinium macrocarpon*) / *Rhynchospora alba* - *Drosera rotundifolia* / *Sphagnum* spp. Dwarf-shrubland (CEGL007856)

**Related Concepts:**

- *Cladium mariscoides* Herbaceous Vegetation (Clancy 1996) F
- *Vaccinium macrocarpon* - Mixed orchid / *Sphagnum* (McAvoy and Clancy 1994) ?
- *Vaccinium macrocarpon* Dwarf-shrubland (Clancy 1996) F
- Coastal interdunal marsh/swale (Rawinski 1984) ?
- Cranberry bog (Martin 1959b) ?
- Cranberry marsh (Johnson 1985b) ?
- Cranberry swale (Lundgren 2000) ?
- Cranberry swale (McDonnell 1979) ?
- Interdunal swales (Breden 1989) ?
- Wet poor fen (Dowhan and Rozsa 1989) ?
- Wet swale (Dunlop and Crow 1985) ?

**CONSERVATION RANKING**

**GRank:** G2G3 (2007-1-31) **Reasons:** This association is a small-patch community with occurrences confined to low areas that are influenced by the water table between sand dunes. This vegetation is naturally limited by the intersection of two features: (1) swales dominated by large cranberry, which as a vegetation type occurs from Cape Henlopen, Delaware, north to Massachusetts; and (2) major dune systems of relatively broad extent that are characterized by dune and swale microtopography, a landform within that limited range that is restricted to Cape Cod, Long Island, and the barrier islands of New Jersey. The vegetation is restricted to large dune systems because it requires habitat to allow for the extirpation and re-creation of individual occurrences that may be naturally extirpated by coastal storms and overwash. Average size of this community is usually less than one acre, ranging to no more than a few acres at maximum. Fewer than 100 occurrences are estimated in five states, totaling no more than 125 acres. Coastal systems in general are severely threatened due to habitat loss imposed by housing expansion, and by foot traffic created by recreation seekers on beaches.

**ELEMENT DISTRIBUTION**

**Range:** This community is confined to major dune systems of the northeastern coast (over an estimated 350 square km). Most occurrences are found in Massachusetts, New York, New Jersey, with occasional occurrences in Rhode Island and Delaware. There is one degraded occurrence in New Hampshire. There are no known occurrences in Connecticut.

**Subnations:** DE, MA, NH, NJ, NY, QC, RI

**TNC Ecoregions:** 58:C, 62:C

**USFS Ecoregions:** 221Ab:CCC, 221Ac:CCC, 221Ak:CCC, 232Aa:CCC, 232Bz:CCC

**Federal Lands:** NPS (Cape Cod, Fire Island); USFWS (Monomoy?, Nomans Land Island?, Parker River)

**ELEMENT SOURCES**

**References:** Benedict 1977a, Bowman 2000, Breden 1989, Breden et al. 2001, Clancy 1996, Conard 1935, Dowhan and Rozsa 1989, Dunlop and Crow 1985, Eastern Ecology Working Group n.d., Edinger et al. 2002, Johnson 1981b, Johnson 1985b, Lundgren 1998, Lundgren 2000, Martin 1959b, McAvoy and Clancy 1994, McDonnell 1979, Moul 1969, Rawinski 1984, Sperduto 2000a, Sperduto 2000b, Swain and Kearsley 2001

## V. Herbaceous Vegetation

### V.A.5.N.c. MEDIUM-TALL SOD TEMPERATE OR SUBPOLAR GRASSLAND

#### AMMOPHILA BREVILIGULATA HERBACEOUS ALLIANCE (A.1207)

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#### AMERICAN BEACHGRASS HERBACEOUS ALLIANCE

**Alliance Summary:** This dune grassland alliance occurs almost exclusively on sandy, unstable, droughty substrates with no soil profile development. Eolian processes cause active sand deposition and erosion. The sand substrate is usually

visible, and litter accumulation from plant debris is nearly absent. This alliance generally occurs on foredunes that receive the force of wind and salt spray but is beyond the influence of most storm tides. It includes maritime dune grasslands dominated by *Ammophila breviligulata*, *Panicum amarum* var. *amarum*, and *Panicum amarum* var. *amarulum*. Plant cover is variable, ranging from 10-75%, but is usually low. Other associated species include *Solidago sempervirens*, *Strophostyles helvula*, *Triplasis purpurea*, *Cenchrus tribuloides*, *Chamaesyce polygonifolia*, *Oenothera humifusa*, *Schoenoplectus pungens* (= *Scirpus pungens*) (where overwashed by sand), *Diodia teres*, *Cakile edentula* ssp. *edentula*, *Nuttallanthus canadensis*, *Salsola kali* ssp. *kali* (= *Salsola caroliniana*), *Lechea maritima*, and *Spartina patens*. Sparse individuals of stunted *Morella pensylvanica* (= *Myrica pensylvanica*) shrubs and seedlings may occur, but make up less than 2% of the total vegetation cover. Diagnostic species are *Ammophila breviligulata*, *Solidago sempervirens*, *Panicum amarum* var. *amarulum*, and *Oenothera humifusa*.

#### *AMMOPHILA BREVILIGULATA* - *LATHYRUS JAPONICUS* HERBACEOUS VEGETATION (CEGL006274)

American Beachgrass - Beach Pea Herbaceous Vegetation

Northern Beachgrass Dune

##### ELEMENT CONCEPT

**Summary:** This dune grassland of maritime beaches occurs along the North Atlantic coast from New Jersey north to central Maine. This association primarily occurs on active maritime dunes, on both foredunes that are exposed to onshore winds and salt spray as well as more protected interdunes. The substrate is wind-deposited sand with no soil development. *Ammophila breviligulata* is the dominant species, often occurring monotypically. *Lathyrus japonicus* is a common associate and can be codominant. Other associated species include *Solidago sempervirens*, *Lechea maritima*, *Aristida tuberculosa*, *Schizachyrium scoparium*, *Carex silicea*, *Polygonella articulata*, and *Artemisia stelleriana*. Dwarf-shrubs, such as *Hudsonia tomentosa*, can occur sporadically and form locally dominant patches. Vegetation cover is often sparse, and bare sand is usually evident.

**Environment:** This association primarily occurs on active maritime dunes, on both foredunes that are exposed to onshore winds and salt spray as well as more protected interdunes. This grassland generally occurs beyond the influence of storm tides. Substrate is sand with no soil profile development.

**Vegetation:** This association is characterized and dominated by *Ammophila breviligulata*, which can occur monotypically, especially on foredunes or other areas of active and rapid sand deposition. *Lathyrus japonicus* is the most common associate and can be codominant. Other associated species include *Solidago sempervirens*, *Lechea maritima*, *Aristida tuberculosa*, *Schizachyrium scoparium*, *Carex silicea*, *Polygonella articulata*, and *Artemisia stelleriana*. Dwarf-shrubs, such as *Hudsonia tomentosa*, *Rosa rugosa*, *Morella pensylvanica* (= *Myrica pensylvanica*), or stunted *Prunus maritima*, can occur sporadically and form locally dominant patches within the grassland.

**Dynamics:** This association occurs on the shifting sands of active dune systems. Sand is wind-deposited and tends to accumulate where vegetation slows the surface wind velocity (Martin 1959b). Rhizomes of *Ammophila breviligulata* stabilize the dunes, growing upward through layers of sand deposition. *Ammophila breviligulata* tends to grow best where there is relatively rapid sand deposition; it can grow through one meter of sand accumulation (Zaremba and Leatherman 1984). Species diversity of this association tends to increase landward in more protected areas where the substrate is more stable. This dune grassland can merge into beach strand vegetation seaward and maritime heath communities landward.

##### Similar Associations:

- *Ammophila breviligulata* - *Panicum amarum* var. *amarum* Herbaceous Vegetation (CEGL004043)
- *Hudsonia tomentosa* - *Arctostaphylos uva-ursi* Dwarf-shrubland (CEGL006143)

##### Related Concepts:

- Coastal dune community (Rawinski 1984) ?
- Coastal dune grass community (Breden 1989) B
- Dune Grassland (Gawler 2002) =
- Dune grass community (Nelson and Fink 1980) =
- Dunegrass (Martin 1959b) ?

**Classification Comments:** The southern analog of this dune grassland association is *Ammophila breviligulata* - *Panicum amarum* var. *amarum* Herbaceous Vegetation (CEGL004043), which is differentiated by having *Panicum amarum* as a codominant species in addition to the presence of more southern species such as *Cenchrus tribuloides* and *Oenothera humifusa*, plus the absence of *Lathyrus japonicus*. These two *Ammophila breviligulata*-dominated associations overlap geographically in New Jersey. This association is often adjacent to *Hudsonia tomentosa* dwarf-shrublands and they have much species overlap; when dwarf-shrub cover exceeds 25%, the community is considered *Hudsonia tomentosa* - *Arctostaphylos uva-ursi* Dwarf-shrubland (CEGL006143).

**CONSERVATION RANKING**

**GRank:** G4? (1997-12-1) **Reasons:**

**ELEMENT DISTRIBUTION**

**Range:** This association occurs along the northern Atlantic Coast from Maine to New Jersey.

**Subnations:** CT, DE?, MA, ME, NH, NJ, NY, QC, RI

**TNC Ecoregions:** 62:C, 63:C

**USFS Ecoregions:** 212Cb:CCC, 212Db:CCC, 212Dc:CCC, 221Aa:CCC, 221Ab:CCC, 221Ac:CCC, 221Ad:CCC, 221Ak:CCC, 232Aa:CCC, 232Ab:CCC, 232Ac:CCC

**Federal Lands:** NPS (Acadia, Boston Harbor Islands, Cape Cod, Fire Island, Gateway, Sagamore Hill); USFWS (E.B. Forsythe, Monomoy, Muskeget Island, Nomans Land Island, Parker River)

**ELEMENT SOURCES**

**References:** Breden 1989, Breden et al. 2001, Dowhan and Rozsa 1989, Eastern Ecology Working Group n.d., Edinger et al. 2002, Enser 1999, Gawler 2001, Gawler 2002, Johnson 1981b, Johnson 1985b, Martin 1959b, Metzler and Barrett 2001, Moul 1969, NRCS 2001b, Nelson and Fink 1980, Rawinski 1984, Reschke 1990, Sperduto 1997a, Swain and Kearsley 2001, Zaremba and Leatherman 1984

**V.A.5.N.E. SHORT SOD TEMPERATE OR SUBPOLAR GRASSLAND**

***SPARTINA PATENS* - (*SCHOENOPLECTUS PUNGENS*) HERBACEOUS ALLIANCE (A.1274)**

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**SALTMEADOW CORDGRASS - (COMMON THREESQUARE) HERBACEOUS ALLIANCE**

**Alliance Summary:** This alliance includes upland dune grassland of barrier islands of the Mid-Atlantic and Gulf coasts. *Spartina patens* and *Schoenoplectus pungens* (= *Scirpus pungens*) are characteristically dominant, though other graminoids such as *Schoenoplectus pungens*, *Sporobolus virginicus*, *Cenchrus spinifex* (= *Cenchrus incertus*), *Cenchrus tribuloides*, and *Paspalum distichum* may be codominant or prominent within their respective ranges. In parts of the range of this alliance, *Spartina patens* is dominant and *Schoenoplectus pungens* may be absent. This community characteristically occupies overwash terraces or low dunes, less well-developed than those dominated by *Uniola paniculata* (from North Carolina south and west to Texas and Tamaulipas, Mexico) or by *Ammophila breviligulata* (from North Carolina northwards). Total vegetation cover is variable, ranging from quite sparse (25% cover) to dense. Bare sand is often visible through the vegetation, and there is no soil profile development. Species diversity is variable; although it may be quite low and confined to the nominal species in the northern part of the range, it may be of greater diversity. Other components of this vegetation include *Strophostyles helvula*, *Solidago sempervirens*, *Cenchrus tribuloides*, *Setaria parviflora*, *Distichlis spicata*, *Sabatia stellaris*, *Ammophila breviligulata*, *Suaeda linearis*, *Bassia hirsuta* (an exotic), *Atriplex patula*, *Polygonum glaucum*, *Spergularia salina* (= *Spergularia marina*), *Salicornia bigelovii*, *Salicornia virginica*, *Fimbristylis castanea*, and *Cakile edentula ssp. edentula*. Woody species may include scattered individuals of *Toxicodendron radicans*, *Solidago sempervirens*, *Lythrum lineare*, *Kosteletzkya virginica*, and seedlings of *Baccharis halimifolia*. The plants of this community are influenced by sand deposited by storm surges. Storm overwash is a prevalent natural disturbance to this community. This community appears to be successional between interdunal herbaceous wetlands and interdunal herbaceous/shrub uplands.

***SPARTINA PATENS* - *SCHOENOPLECTUS PUNGENS* - *SOLIDAGO SEMPERVIRENS* HERBACEOUS VEGETATION (CEGL004097)**

Saltmeadow Cordgrass - Common Threesquare - Seaside Goldenrod Herbaceous Vegetation  
Overwash Dune Grassland

**ELEMENT CONCEPT**

**Summary:** This community is an upland dune grassland or overwash area of Atlantic barrier islands on embryo dunes or back sides of beaches forming from overwash terraces ranging from Massachusetts to North Carolina. It forms a drier, later successional phase beginning from water-deposited sand of storm overwash. Sand movement, plant burial, and dune formation rates are not so high as to form *Ammophila breviligulata*-dominated primary dunes, but can be found as a fringe around the outer edge of those dunes. *Spartina patens* is dominant, ranging from quite sparse (25% cover) to dense, and can be monotypic in early-successional expressions. As the vegetation develops, common associated species can include *Schoenoplectus pungens* (= *Scirpus pungens*) or *Solidago sempervirens*. Less common associates can include *Cyperus grayi*, *Cenchrus tribuloides*, *Setaria parviflora*, *Festuca rubra*, *Schizachyrium littorale*, *Pseudognaphalium obtusifolium* (= *Gnaphalium obtusifolium*), and occasional scattered individuals of *Toxicodendron radicans* and seedlings of *Baccharis*

*halimifolia*. Bare sand is often visible through the vegetation, and there is no soil profile development. *Ammophila breviligulata* or *Uniola paniculata* may invade from the surrounding dunes. This community appears to be a successional step between interdunal herbaceous wetlands and interdunal herbaceous/shrub uplands.

**Environment:** This community is an upland dune grassland or overwash area of Atlantic barrier islands on embryo dunes or back sides of beaches forming from overwash terraces. The plants of this community are influenced by water-deposited sand caused by storm surges. They differ ecologically from dune grasslands dominated by *Ammophila breviligulata* or *Uniola paniculata*, which are primarily impacted by wind-deposited sand. Storm overwash is a prevalent natural disturbance to this community.

**Vegetation:** *Spartina patens* is dominant, ranging from quite sparse (25% cover) to dense, and can be monotypic in early-successional expressions. As the vegetation develops, common associated species can include *Schoenoplectus pungens* (= *Scirpus pungens*) or *Solidago sempervirens*. Less common associates can include *Cyperus grayi*, *Cenchrus tribuloides*, *Setaria parviflora*, *Festuca rubra*, *Schizachyrium littorale*, *Pseudognaphalium obtusifolium* (= *Gnaphalium obtusifolium*), and occasional scattered individuals of *Toxicodendron radicans* and seedlings of *Baccharis halimifolia*. *Ammophila breviligulata* or *Uniola paniculata* may invade from the surrounding dunes. This community is characterized by upland maritime dune grassland vegetation. *Spartina patens*, and sometimes *Schoenoplectus pungens* (= *Scirpus pungens*), or both are dominant on dunes or overwash terraces. Total vegetation cover is variable, ranging from quite sparse (25% cover) to dense. Bare sand is often visible through the vegetation, and there is no soil profile development. Species diversity is variable; although it may be quite low and confined to the nominate species in the northern part of the range, it may be of greater diversity, including *Strophostyles helvula*, *Solidago sempervirens*, *Cenchrus tribuloides*, *Setaria parviflora*, *Distichlis spicata*, *Sabatia stellaris*, *Ammophila breviligulata*, *Suaeda linearis*, *Bassia hirsuta*, *Atriplex patula*, *Fimbristylis castanea*, and *Cakile edentula ssp. edentula*.

**Dynamics:** This association forms a drier, later successional phase of an overwash community begun from water-deposited sand of storm overwash; it appears to be a successional step between interdunal herbaceous wetlands and interdunal herbaceous/shrub uplands. Undisturbed water-deposited sand is colonized by *Spartina patens* and/or *Schoenoplectus pungens* plus additional associates like *Suaeda linearis*, *Bassia hirsuta*, *Atriplex patula*, and *Fimbristylis castanea* that have low percent cover. This wetter, early-successional phase is currently covered by *Spartina patens* - *Eleocharis parvula* Herbaceous Vegetation (CEGL006342). With time since overwash, sand movement, plant burial, and dune formation rates increase, but are not so high as to form *Ammophila breviligulata*-dominated primary dunes. However, this association can be found as a fringe around the lower, outer edge of those dunes.

**Similar Associations:**

- *Spartina patens* - *Eleocharis parvula* Herbaceous Vegetation (CEGL006342)
- *Spartina patens* - *Schizachyrium maritimum* - *Solidago sempervirens* Herbaceous Vegetation (CEGL008445)

**Related Concepts:**

- *Spartina patens* - *Schoenoplectus pungens* - *Solidago sempervirens* Herbaceous Vegetation (Bowman 2000) =
- Dry community of barrier flats (Travis and Godfrey 1976) B
- Dry maritime grassland (Lea 2002b) ?
- Dunegrass community (Higgins et al. 1971) B
- Grassland community (Baumann 1978b) =
- Low dune community (Boule 1979) =
- Maritime Dry Grassland (Schafale and Weakley 1990) ?
- Maritime Dry Grassland (Typic Subtype) (Schafale 2000) ?
- Maritime Dune Grassland (Harrison 2004) B
- Maritime Dune Grassland (Fleming and Coulling 2001) B
- Secondary dunes (Klotz 1986) B
- Wash (Hill 1986) =
- Wash (Higgins et al. 1971) =

**Classification Comments:** This community differs ecologically from dune grasslands dominated by *Ammophila breviligulata* or *Uniola paniculata*, which are primarily impacted by wind-deposited sand. This community is impacted by wave-deposited sand. It is drier than brackish swales and vegetation that immediately colonizes water-borne sand from storm overwash, such as *Spartina patens* - *Eleocharis parvula* Herbaceous Vegetation (CEGL006342). *Spartina patens* - *Schizachyrium maritimum* - *Solidago sempervirens* Herbaceous Vegetation (CEGL008445) is a southern analog of this association that occurs along the Gulf Coast.

#### CONSERVATION RANKING

**GRank:** G2G3 (1998-11-4) **Reasons:** This dune grassland community is restricted to overwash areas of major maritime dune systems. It is typically small in extent, not usually more than a few acres in size. It is best developed on barrier islands of Delaware, Maryland, Virginia, and North Carolina; it extends sporadically farther north to Massachusetts. As part of a dynamic system, the community is in a sense ephemeral, being buried over time by sand deposition, and being formed anew in other areas subjected to overwash. Because of the dynamic forces structuring the community, it requires sufficient area in large dune systems to accommodate this shifting mosaic. Although not extremely rare (an estimated 100-200 occurrence exist rangewide), the community is restricted to a specialized habitat and is threatened by a number of activities, including dune stabilization, and outright destruction of habitat through human activities.

#### ELEMENT DISTRIBUTION

**Range:** This community is an upland dune grassland or overwash area of Atlantic barrier islands from Massachusetts to North Carolina.

**Subnations:** DE, MA, MD, NC, NJ, NY, QC, VA

**TNC Ecoregions:** 57:C, 58:C, 62:C

**USFS Ecoregions:** 221Ab:CCC, 232Aa:CCC, 232Ab:CCC, 232Ac:CCC, 232Bz:CCC, 232Ci:CCC

**Federal Lands:** NPS (Assateague Island, Boston Harbor Islands, Cape Hatteras, Cape Lookout, Fire Island, Gateway, Sagamore Hill); USFWS (Back Bay?, E.B. Forsythe, Monomoy, Prime Hook)

#### ELEMENT SOURCES

**References:** Baumann 1978b, Berdine 1998, Boule 1979, Bowman 2000, Breden et al. 2001, Eastern Ecology Working Group n.d., Edinger et al. 2002, Fleming and Coulling 2001, Fleming et al. 2001, Harrison 2004, Harrison and Stango 2003, Higgins et al. 1971, Hill 1986, Klotz 1986, Lea 2002b, NRCS 2001b, Reschke 1990, Schafale 2000, Schafale 2003b, Schafale and Weakley 1990, TNC 1995c, Travis and Godfrey 1976, Zaremba and Leatherman 1984

#### *SPARTINA PATENS* - *THINOPYRUM PYCNANTHUM* HERBACEOUS VEGETATION (CEGL006149)

Saltmeadow Cordgrass - Tick Quackgrass Herbaceous Vegetation

Salt Hay Dune

#### ELEMENT CONCEPT

**Summary:** This dune grassland of central New England occurs on the interface between upper salt marshes and sand dunes. These low dunes may be periodically flooded by storm tides, most frequently during the winter when plants are dormant. The association is characterized by a dominance of *Spartina patens* (= var. *monogyna*), *Elymus repens* (= *Agropyron repens*), or *Thinopyrum pycnanthum* (= *Agropyron pungens*). All three species may be present or one may occur alone. Other associates are rare, but when present may include *Ammophila breviligulata*, *Oenothera biennis*, *Artemisia campestris* ssp. *caudata* (= *Artemisia caudata*), *Solidago sempervirens*, and *Rosa rugosa*.

**Environment:** This dune grassland of central New England occurs on the interface between upper salt marshes and sand dunes. These low dunes may be periodically flooded by storm tides, most frequently during the winter when plants are dormant.

**Vegetation:** The association is characterized by a dominance of *Spartina patens*, *Elymus repens*, or *Thinopyrum pycnanthum*. All three species may be present or one may occur alone. Other associates are rare but, when present, may include *Ammophila breviligulata*, *Oenothera biennis*, *Artemisia campestris* ssp. *caudata*, *Solidago sempervirens*, and *Rosa rugosa*.

**Dynamics:**

**Similar Associations:**

**Related Concepts:**

**Classification Comments:**

#### CONSERVATION RANKING

**GRank:** GNR **Reasons:** this association has not yet been ranked.

#### ELEMENT DISTRIBUTION

**Range:** This association is documented from coastal Massachusetts.

**Subnations:**

**TNC Ecoregions:** 62:C

**USFS Ecoregions:** 221Ab:CCC

**Federal Lands:** NPS (Cape Cod); USFWS (Monomoy)

**Element Sources**

**References:** McDonnell 1979.

**V.A.5.N.k. SEASONALLY FLOODED TEMPERATE OR SUBPOLAR GRASSLAND*****SPARTINA PATENS* SEASONALLY FLOODED HERBACEOUS ALLIANCE (A.1390)****SALTMEADOW CORDGRASS SEASONALLY FLOODED HERBACEOUS ALLIANCE**

**Alliance Summary:** This alliance consists of seasonally flooded (non-tidal) wetlands dominated by *Spartina patens*, occurring from northeastern United States south and west to Tamaulipas, Mexico.

***SPARTINA PATENS* - *ELEOCHARIS PARVULA* HERBACEOUS VEGETATION (CEGL006342)**

Saltmeadow Cordgrass - Dwarf Spikerush Herbaceous Vegetation  
Northeastern Atlantic Brackish Interdunal Swale

**ELEMENT CONCEPT**

**Summary:** This brackish, interdunal swale and overwash community of the northeastern Atlantic coast occurs in low areas behind primary or secondary sand dunes. The substrate is sand with little or no organic accumulation. The water source for this wetland community is variable, including seasonally high groundwater table, salt spray, and sporadic tidal overwash, resulting in widely variable salinity levels. The dominant species is generally *Spartina patens*, but it can be *Eleocharis parvula*, *Schoenoplectus pungens* (= *Scirpus pungens*), *Cyperus polystachyos*, and/or *Juncus articulatus*. Associated species depend on salinity and hydrology of a site and can include *Leptochloa fusca ssp. fascicularis* (= *Diplachne maritima*), *Schoenoplectus maritimus* (= *Scirpus maritimus*), *Juncus ambiguus* (= *Juncus bufonius var. halophila*), *Juncus scirpoides*, *Ptilimnium capillaceum*, *Rumex maritimus*, *Symphyotrichum subulatum* (= *Aster subulatus*), *Chenopodium rubrum*, *Pluchea odorata*, *Hibiscus moscheutos ssp. moscheutos* (= *Hibiscus palustris*), *Polygonum ramosissimum*, *Triglochin maritima*, *Panicum virgatum*, *Schoenoplectus robustus*, and *Argentina anserina* (= *Potentilla anserina*). *Iva frutescens* and *Baccharis halimifolia* may occur on hummocks within the swale. Mats of blue-green and/or brown algae can proliferate across the soil surface.

**Environment:** This community occupies brackish interdunal swales and overwash flats between coastal sand dunes. Surface water is oligo- to mesohaline; the dune surface intersects the freshwater lens with salinity input from salt spray and/or storm tide overwash. Substrate is deep sand with or without a layer of surficial peat.

**Vegetation:** This association is dominated by graminoids, especially *Spartina patens*, *Eleocharis parvula*, *Schoenoplectus pungens* (= *Scirpus pungens*), *Cyperus polystachyos*, and *Juncus articulatus*, although local dominance can change from year to year. Associated species depend on salinity and hydrology of a site and can include *Leptochloa fusca ssp. fascicularis* (= *Diplachne maritima*), *Schoenoplectus maritimus* (= *Scirpus maritimus*), *Juncus ambiguus* (= *Juncus bufonius var. halophila*), *Juncus scirpoides*, *Ptilimnium capillaceum*, *Rumex maritimus*, *Symphyotrichum subulatum* (= *Aster subulatus*), *Chenopodium rubrum*, *Pluchea odorata*, *Hibiscus moscheutos ssp. moscheutos* (= *Hibiscus palustris*), *Polygonum ramosissimum*, *Triglochin maritima*, *Panicum virgatum*, *Schoenoplectus robustus*, and *Argentina anserina* (= *Potentilla anserina*). *Iva frutescens* and *Baccharis halimifolia* may occur on hummocks within the swale. Mats of blue-green and/or brown algae can proliferate across the soil surface. *Phragmites australis* can readily invade in this environmental setting.

**Dynamics:** Brackish swale vegetation can be ephemeral or can represent early stages of salt marsh or coastal salt pond development (Reschke 1990). Overwash flats can succeed into dune grasslands with sand accumulation and plant burial.

**Similar Associations:**

- *Schoenoplectus pungens* - *Eleocharis parvula* Herbaceous Vegetation (CEGL006398)
- *Spartina patens* - *Schoenoplectus pungens* - *Solidago sempervirens* Herbaceous Vegetation (CEGL004097)

**Related Concepts:**

- Coastal interdunal marsh/swale (Rawinski 1984) ?
- Maritime Wet Grassland (Fleming and Coulling 2001) B
- Overwash Community (Lea 2002b) ?

**Classification Comments:** This association is similar to coastal salt pond vegetation, *Schoenoplectus pungens* - *Eleocharis parvula* Herbaceous Vegetation (CEGL006398).

**CONSERVATION RANKING**

**GRank:** GNR (1997-12-1) **Reasons:**

**ELEMENT DISTRIBUTION**

**Range:** This association is currently described from Maryland, New Jersey, New York, Massachusetts, and New Hampshire. It likely occurs in other states.

**Subnations:** DE, MA, MD, NH, NJ, NY, QC, VA

**TNC Ecoregions:** 57:?, 58:C, 62:C

**USFS Ecoregions:** 221Ab:CCC, 221Ac:CCC, 221Ak:CCC, 232Aa:CCC, 232Ac:CCC, 232Bz:CCC

**Federal Lands:** NPS (Fire Island, Gateway); USFWS (Monomoy?)

#### ELEMENT SOURCES

**References:** Breden et al. 2001, Dowhan and Rozsa 1989, Eastern Ecology Working Group n.d., Edinger et al. 2002, Fleming and Coulling 2001, Harrison 2004, Hunt 1997b, Lea 2002b, Lundgren 1998, NRCS 2001b, Rawinski 1984, Reschke 1990, Sneddon and Lundgren 2001, Sperduto 2000b, Swain and Kearsley 2001

### V.A.5.N.L. SEMIPERMANENTLY FLOODED TEMPERATE OR SUBPOLAR GRASSLAND

#### *TYPHA (ANGUSTIFOLIA, LATIFOLIA) - (SCHOENOPECTUS SPP.) SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE (A.1436)*

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##### (NARROWLEAF CATTAIL, BROADLEAF CATTAIL) - (CLUBRUSH SPECIES)

##### SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE

**Alliance Summary:** This alliance, found in virtually every state in the United States and probably most Canadian provinces, contains stands dominated by *Typha angustifolia* and/or *Typha latifolia*, either alone or in combination with other tall emergent marsh species. This alliance is found most commonly along lake margins and in shallow basins, and occasionally in river backwaters. Lacustrine cattail marshes typically have a muck-bottom zone bordering the shoreline, where cattails are rooted in the bottom substrate, and a floating mat zone, where the roots grow suspended in a buoyant peaty mat. *Typha angustifolia* can grow in deeper water compared to *Typha latifolia*, although both species reach maximum growth at a water depth of 50 cm. *Typha* often occurs in pure stands, and can colonize areas recently exposed by either natural or human causes. *Lythrum salicaria*, an exotic species from Europe, has become a common associate of many eastern *Typha* marshes. In the Southeast, this alliance is widespread and currently representative of a wide variety of mixed marshes with no clear dominants. Vegetation in this alliance may be natural or semi-natural and includes mixed stands of the nominal species, as well as essentially monospecific stands of *Typha latifolia*. These monospecific stands occur especially in artificial wetlands, such as borrow pits or ponds. This alliance occurs on hydric soils in wetlands, ditches, ponds, lakes, and rivers, as well as on shorelines and streambanks. Inundation is commonly 3-6 dm (1-2 feet) in depth. These marshes have hydric soils and are flooded with water levels ranging from several centimeters to more than 1 m for a significant part of the growing season. Occurrences may display areas of open water, but emergent vegetation dominates (80% cover). Seasonal flooding during winter and spring or flooding during heavy rains help maintain these marshes by causing water exchange which replenishes freshwater and circulates nutrients and organic debris. Soils which support this community can be mineral or organic but are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part. Vegetative diversity and density is highly variable in response to water depth, water chemistry, and natural forces. Associated species vary widely; in the Midwest they include many sedges such as *Carex aquatilis*, *Carex rostrata*, *Carex pellita* (= *Carex lanuginosa*), bulrushes such as *Schoenoplectus americanus* (= *Scirpus americanus*), *Schoenoplectus acutus* (= *Scirpus acutus*), and *Schoenoplectus heterochaetus* (= *Scirpus heterochaetus*), and broad-leaved herbs such as *Thelypteris palustris*, *Asclepias incarnata*, *Impatiens capensis*, *Sagittaria latifolia*, *Scutellaria lateriflora*, *Sparganium eurycarpum*, *Hibiscus moscheutos*, and *Verbena hastata*. Floating aquatics such as *Lemna minor* may predominate in deeper zones.

#### *SCHOENOPECTUS PUNGENS* VAR. *PUNGENS* - *JUNCUS CANADENSIS* HERBACEOUS VEGETATION (CEGL006935)

Common Threesquare - Canadian Rush Herbaceous Vegetation

Coastal Freshwater Marsh

#### ELEMENT CONCEPT

**Summary:** This non-tidal freshwater marsh of the coastal Northeast occupies flooded depressions and swales in coastal dunes. The substrate varies from sand to peat or muck, depending on hydrological regime. Water is present most of the year and does not typically exhibit a seasonal drawdown. The vegetation is dominated by *Schoenoplectus pungens* var. *pungens*, in association with *Hibiscus moscheutos* ssp. *moscheutos*, *Juncus canadensis*, *Juncus effusus*, *Eleocharis erythropoda*, *Osmunda regalis*, *Osmunda cinnamomea*, *Thelypteris palustris*, and *Triadenum virginicum*. *Typha latifolia* may be present, but generally only occurs at low cover. A diverse range of other forbs may also be associated with this community.

**Environment:** This non-tidal freshwater marsh of the coastal Northeast occupies flooded depressions and swales in coastal dunes. The substrate varies from sand to peat or muck, depending on hydrological regime. Water is present most of the year and does not typically exhibit a seasonal drawdown.

**Vegetation:** The vegetation is dominated by *Schoenoplectus pungens* var. *pungens*, in association with *Hibiscus moscheutos* ssp. *moscheutos*, *Juncus canadensis*, *Juncus effusus*, *Eleocharis erythropoda*, *Osmunda regalis*, *Osmunda cinnamomea*, *Thelypteris palustris*, and *Triadenum virginicum*. *Typha latifolia* may be present, but generally only occurs at low cover. A diverse range of other forbs may also be associated with this community. Shrubs may be present as sparsely distributed individuals, or more densely from the wetland edge. Typical shrubs include *Rosa rugosa*, *Vaccinium corymbosum*, and *Morella pensylvanica*.

**Related Concepts:**

Fresh marsh (Martin 1959b) ?

**Classification Comments:** New community described based on Gap Project sample sites (“FM1”, “FM2”, “FM4”) at Island Beach State Park.

**CONSERVATION RANKING**

**GRank:** GNR (2000-11-8) **Reasons:**

**ELEMENT DISTRIBUTION**

**Range:** This association is known from Massachusetts and New Jersey but is likely to occur in other coastal states of the Northeast.

**Subnations:** MA, NJ, NY, QC

**TNC Ecoregions:** 62:C

**USFS Ecoregions:** 221Ab:CCC, 232Ab:CCC

**Federal Lands:** NPS (Cape Cod); USFWS (Monomoy)

**ELEMENT SOURCES**

**References:** Eastern Ecology Working Group n.d., Martin 1959b

*TYPHA* (*ANGUSTIFOLIA*, *LATIFOLIA*) - (*SCHOENOPLECTUS* spp.) EASTERN HERBACEOUS VEGETATION (CEGL006153)

(Narrowleaf Cattail, Broadleaf Cattail) - (Clubrush species) Eastern Herbaceous Vegetation

Eastern Cattail Marsh

**ELEMENT CONCEPT**

**Summary:** These tall emergent marshes are common throughout the northeastern United States and adjacent Canadian provinces. They occur in permanently flooded basins, often as part of a larger wetland mosaic and associated with lakes, ponds, or slow-moving streams. The substrate is muck over mineral soil. Lacustrine cattail marshes typically have a muck-bottom zone bordering the shoreline, where cattails are rooted in the bottom substrate, and a floating mat zone, where the roots grow suspended in a buoyant peaty mat. Tall graminoids dominate the vegetation; scattered shrubs are often present (usually totaling less than 25% cover) and are frequently shorter than the graminoids. Trees are absent. Bryophyte cover varies and is rarely extensive; bryophytes are mostly confined to the hummocks. *Typha angustifolia*, *Typha latifolia*, or their hybrid *Typha X glauca* dominate, either alone or in combination with other tall emergent marsh species. Associated species vary widely; sedges, such as *Carex aquatilis*, *Carex lurida*, *Carex rostrata*, *Carex pellita* (= *Carex lanuginosa*), *Carex stricta*, *Scirpus cyperinus*, and bulrushes, such as *Schoenoplectus americanus* (= *Scirpus americanus*) and *Schoenoplectus acutus* (= *Scirpus acutus*), occur along with patchy grasses, such as *Calamagrostis canadensis*. Broad-leaved herbs include *Thelypteris palustris*, *Asclepias incarnata*, *Onoclea sensibilis*, *Symplocarpus foetidus*, *Calla palustris*, *Impatiens capensis*, *Sagittaria latifolia*, *Scutellaria lateriflora*, *Sparganium eurycarpum*, and *Verbena hastata*. Floating aquatics, such as *Lemna minor*, may be common in deeper zones. Shrub species vary across the geographic range of this type; in the northern part of its range, *Myrica gale*, *Ilex verticillata*, and *Spiraea alba* are common. The invasive exotic plants *Lythrum salicaria* and *Phragmites australis* may be abundant in parts of some occurrences. This association is distinguished from other northeastern freshwater marshes by the strong dominance of *Typha* spp.

**Environment:** These tall emergent marshes are common throughout the northeastern United States and adjacent Canadian provinces. They occur in permanently flooded basins, often as part of a larger wetland mosaic and associated with lakes, ponds, or slow-moving streams. The substrate is muck over mineral soil. Lacustrine cattail marshes typically have a muck-bottom zone bordering the shoreline, where cattails are rooted in the bottom substrate, and a floating mat zone, where the roots grow suspended in a buoyant peaty mat. This association is often found in impounded waters.

**Vegetation:** Tall graminoids dominate the vegetation; scattered shrubs are often present (usually totaling less than 25% cover) and are frequently shorter than the graminoids. Trees are absent. Bryophyte cover varies and is rarely extensive; bryophytes are mostly confined to the hummocks. *Typha angustifolia*, *Typha latifolia*, or their hybrid *Typha*

*X glauca* dominate, either alone or in combination with other tall emergent marsh species. Associated species vary widely; sedges, such as *Carex aquatilis*, *Carex lurida*, *Carex rostrata*, *Carex pellita* (= *Carex lanuginosa*), *Carex stricta*, *Scirpus cyperinus*, and bulrushes, such as *Schoenoplectus americanus* (= *Scirpus americanus*) and *Schoenoplectus acutus* (= *Scirpus acutus*), occur along with patchy grasses, such as *Calamagrostis canadensis*. Broad-leaved herbs include *Thelypteris palustris*, *Asclepias incarnata*, *Onoclea sensibilis*, *Symplocarpus foetidus*, *Calla palustris*, *Impatiens capensis*, *Sagittaria latifolia*, *Scutellaria lateriflora*, *Sparganium eurycarpum*, and *Verbena hastata*. Floating aquatics, such as *Lemna minor*, may be common in deeper zones. Shrub species vary across the geographic range of this type; in the northern part of its range, *Myrica gale*, *Ilex verticillata*, and *Spiraea alba* are common. The invasive plants *Lythrum salicaria* and *Phragmites australis* may be abundant in parts of some occurrences.

**Dynamics:** This association is often found in impounded waters.

**Similar Associations:**

- *Typha latifolia* Southern Herbaceous Vegetation (CEGL004150)
- *Typha* spp. - *Schoenoplectus acutus* - Mixed Herbs Midwest Herbaceous Vegetation (CEGL002229)
- *Typha* spp. - *Schoenoplectus tabernaemontani* - Mixed Herbs Southern Great Lakes Shore Herbaceous Vegetation (CEGL005112)
- *Typha* spp. Midwest Herbaceous Vegetation (CEGL002233)

**Related Concepts:**

- *Typha (angustifolia, latifolia)* - (*Scirpus* spp.) Herbaceous Vegetation (Clancy 1996) =
- Cattail Marsh (Thompson 1996) ?
- Cattail Marsh (Gawler 2002) =
- Cattail marsh (CAP pers. comm. 1998) ?
- Palustrine Narrow-leaved Persistent Emergent Wetland, Permanently Flooded (PEM5H) (Cowardin et al. 1979) ?
- Robust Emergent Marsh (Breden 1989) ?
- Southern New England nutrient-poor streamside/lakeside marsh (Rawinski 1984) ?
- Southern New England nutrient-rich streamside/lakeside marsh (Rawinski 1984) ?

**Classification Comments:** *Typha angustifolia* can grow in deeper water compared to *Typha latifolia*, although both species reach maximum growth at a water depth of 50 cm (Grace and Wetzel 1981). *Typha* often occurs in pure stands and can colonize areas recently exposed by either natural or human causes.

**CONSERVATION RANKING**

**GRank:** G5 (1997-12-1) Reasons:

**ELEMENT DISTRIBUTION**

**Range:** This association occurs throughout the northeastern U.S. from Maine to North Carolina.

**Subnations:** CT, DC?, DE, MA, MD, ME, NC, NH, NJ, NY, PA, RI, VA, VT, WV

**TNC Ecoregions:** 48:C, 49:C, 51:C, 52:C, 58:P, 59:C, 60:C, 61:C, 62:C, 63:C, 64:C

**USFS Ecoregions:** 212Cb:CCC, 212Da:CCC, 212Db:CCC, 212Fa:CCC, 212Fb:CCC, 212Fc:CCC, 212Fd:CCC, 212Ga:CCC, 212Gb:CCC, 221Aa:CCP, 221Ab:CCC, 221Ae:CCC, 221Ai:CCC, 221Al:CCC, 221Ba:CCP, 221Bb:CCC, 221Bc:CCC, 221Bd:CCC, 221Da:CCC, 221Fa:CCC, 222Ib:CCC, 222Ic:CCC, 231:C, 232Ab:CCC, 232Ac:CCC, M212A:CP, M212Bb:CCC, M212C:CP, M212D:CC, M212Ea:CCC, M212Eb:CCC, M221Aa:CCC, M221Ab:CCC, M221Ac:CCC, M221Ad:CCC, M221Ba:CCC, M221Bb:CCC, M221Bc:CCC, M221Bd:CCC, M221Be:CCC, M221Bf:CCC, M221Da:CCC, M221Db:CCP, M221Dc:CCP, M221Dd:CCP

**Federal Lands:** NPS (Acadia, Appalachian Trail, Blue Ridge Parkway?, Boston Harbor Islands, C&O Canal, Cape Cod, Delaware Water Gap, Johnstown Flood, Minute Man, National Capital-East, Saint-Gaudens, Saratoga, Upper Delaware); USFS (Nantahala?, Pisgah?); USFWS (Aroostook, Assabet River, Carlton Pond?, E.B. Forsythe, Erie, Great Meadows, Great Swamp, Iroquois, Monomoy, Montezuma, Moosehorn, Nomans Land Island, Nulhegan Basin, Oxbow, Pondicherry?, Prime Hook)

**ELEMENT SOURCES**

**References:** Breden 1989, Breden et al. 2001, CAP pers. comm. 1998, Clancy 1996, Cowardin et al. 1979, Eastern Ecology Working Group n.d., Edinger et al. 2002, Fike 1999, Gawler 2002, Grace and Wetzel 1981, Harrison 2004, Metzler and Barrett 2001, NRCS 2004a, Northern Appalachian Ecology Working Group 2000, Rawinski 1984, Sperduto and Nichols 2004, Swain and Kearsley 2001, Thompson 1996, Thompson and Sorenson 2000

***PHRAGMITES AUSTRALIS* SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE (A.1431)****COMMON REED SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE**

**Alliance Summary:** This alliance consists of non-tidal *Phragmites* marshes with semipermanently or, rarely, seasonally flooded hydrology, occurring either in depressions or along rivers with seasonal fluctuation in water level throughout the United States and adjacent Canada. This includes semipermanently flooded marshes, ditches, impoundments, etc., which are strongly dominated by essentially monospecific stands of *Phragmites australis*, which is rapidly spreading in disturbed areas and excluding native vegetation. Stands may be composed entirely of *Phragmites australis*, with few or no other vascular plants present.

***PHRAGMITES AUSTRALIS* EASTERN NORTH AMERICA TEMPERATE SEMI-NATURAL HERBACEOUS VEGETATION (CEGL004141)**

Common Reed Eastern North America Temperate Semi-natural Herbaceous Vegetation

Eastern Reed Marsh

**ELEMENT CONCEPT**

**Summary:** This reed marsh type is found across the east-temperate regions of the United States and Canada. Stands occur in semipermanently flooded marshes, ditches, impoundments, etc., that have often been disturbed by human activity. The vegetation is variable, as *Phragmites australis* will often invade into existing natural or semi-natural communities present on the site. Once firmly established, this community is usually strongly dominated by *Phragmites australis*, with few or no other vascular plants present.

**Environment:** Stands occur in semipermanently flooded marshes, ditches, impoundments, etc. that have often been disturbed by human activity.

**Vegetation:** The vegetation is often variable, as *Phragmites australis* will often invade into existing natural or semi-natural communities present on the site. Once firmly established, this community is usually strongly dominated by *Phragmites australis*, with few or no other vascular plants present.

**Similar Associations:**

- *Phragmites australis* Tidal Herbaceous Vegetation (CEGL004187)
- *Phragmites australis* Western North America Temperate Semi-natural Herbaceous Vegetation (CEGL001475)

**Related Concepts:**

- *Phragmites australis* community (Metzler and Barrett 1992) ?
- *Phragmites australis* tidal marsh association (Clancy 1993b) ?
- Inland Emergent Marsh (Chapman et al. 1989) B
- Southern New England nutrient-poor streamside/lakeside marsh (Rawinski 1984) ?
- Southern New England nutrient-rich streamside/lakeside marsh (Rawinski 1984) ?

**Classification Comments:** This is not a native community but is the result of the invasion of alien *Phragmites australis* into natural or semi-natural vegetation. The vegetation has variable hydrology and, unless *Phragmites* is clearly dominant, is often treated as part of other marsh and meadow types. The geographic distribution of the type is arbitrarily limited to Bailey's Humid Temperate Domain in eastern North America (Bailey 1997, 1998). Stands in northern Minnesota and farther north in Canada may represent native stands. If so, they should be tracked as a different type. Tidal vegetation of the Gulf Coast of Louisiana and Texas dominated by *Phragmites australis* is classified in the *Phragmites australis* Tidal Herbaceous Alliance (A.1477).

**CONSERVATION RANKING**

**GRank:** GNA (invasive) (1997-11-23) **Reasons:** Although almost always occurring as a naturalized type that arises from human disturbance, some stands in northern Minnesota and further north in Canada may be native. If so, they should be tracked as a separate type.

**ELEMENT DISTRIBUTION**

**Range:** This reed marsh type is found across the east-temperate regions of the United States and Canada, ranging from Maine west to the eastern Dakotas and Manitoba, south to Texas and east to Florida.

**Subnations:** AL, AR, CT, DE, FL, GA, IA, IN, LA, MA, MD, ME, MI, MN, MS, NC, NH, NJ, NY, OH, ON, PA, QC, RI, SC, TX, VA, VT, WI, WV

**TNC Ecoregions:** 31:C, 40:C, 41:C, 42:P, 47:C, 48:C, 52:P, 53:C, 55:C, 56:C, 57:C, 59:C, 60:C, 61:C, 62:C

**USFS Ecoregions:** 212C:CP, 212Fc:CCC, 212Ho:CCC, 212Hw:CCC, 221Aa:CCP, 221Ab:CCC, 221Ae:CCC, 221Ai:CCC, 221Bc:CCC, 221Da:CCC, 222Ic:CCC, 222Jj:CCC, 231Fb:CCC, 232Ab:CCC, 232Ac:CCC, 232C:CC, 232Dc:CCC, 232E:CC, 232G:CC, 234A:PP, 255Dc:CCC, M212:C, M221:P

**Federal Lands:** NPS (Assateague Island, Boston Harbor Islands, Cape Cod, Indiana Dunes, Minute Man, Saint Croix, Saratoga, Sleeping Bear Dunes, Upper Delaware, Voyageurs); USFWS (Alligator River, Aransas, Bon Secour, Brazoria, Cape May, E.B. Forsythe, Great Dismal Swamp, Great Meadows, Great Swamp, Matagorda Island, Monomoy, Montezuma, Nomans Land Island?, Oxbow, Parker River, Prime Hook, Supawna Meadows)

**ELEMENT SOURCES**

**References:** Bailey 1997, Bailey 1998, Bell et al. 2002, Chapman et al. 1989, Clancy 1993b, Harris et al. 1996, INAI unpubl. data, Metzler and Barrett 1992, Metzler and Barrett 2001, NRCS 2004a, Nelson 1986, Rawinski 1984, Schafale and Weakley 1990, Schotz pers. comm., Southeastern Ecology Working Group n.d., Swain and Kearsley 2001

***SCHOENOPLECTUS ACUTUS* - (*SCHOENOPLECTUS TABERNAEMONTANI*) SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE (A.1443)**

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**HARDSTEM BULRUSH - (SOFTSTEM BULRUSH) SEMIPERMANENTLY FLOODED HERBACEOUS ALLIANCE**

**Alliance Summary:** This alliance is found in the midwestern and western United States and central Canada. Stands of this alliance are flooded for most or all of the growing season and can have water from 0 (exposed soil) to approximately 1.5 m deep, but usually is less than 1 m. Within a stand, water levels can vary by up to 1 m during the year. The water can be fresh to mildly saline throughout most of this alliance's range; however, in the Nebraska Sandhills, some stands occur in moderately alkaline water. Across the range of this alliance, soils are deep, poorly drained, muck, peat, or mineral. Vegetation is characterized by medium to tall graminoids which typically range from 1 to over 2 m. The vegetation is moderately dense to dense. Some stands are heavily dominated by one or two *Schoenoplectus* spp. (= *Scirpus* spp.), while others have several graminoids common throughout the stand. The most abundant species are typically *Schoenoplectus acutus* (= *Scirpus acutus*), *Schoenoplectus fluviatilis* (= *Scirpus fluviatilis*), and *Schoenoplectus tabernaemontani* (= *Scirpus tabernaemontani*). Species composition and abundance can vary from year to year depending mostly on water level fluctuations. In most years, typical species include *Lemna* spp., *Phragmites australis*, *Schoenoplectus americanus* (= *Scirpus americanus*) (in alkaline stands), *Triglochin maritima* (in alkaline stands), *Typha latifolia*, and *Utricularia macrorhiza*. *Potamogeton* spp. often occur in the deeper parts of stands of this alliance and where emergent species are not densely packed. Shrubs, such as *Salix* spp., are not common but may become established in shallow water areas. During droughts, species more tolerant of low water, such as *Polygonum amphibium*, may invade and alter the species composition of stands of this alliance.

*SCHOENOPLECTUS (TABERNAEMONTANI, ACUTUS)* EASTERN HERBACEOUS VEGETATION (CEGL006275)  
(Softstem Bulrush, Hardstem Bulrush) Eastern Herbaceous Vegetation  
Bulrush Deepwater Marsh

**ELEMENT CONCEPT**

**Summary:** These deepwater bulrush marshes occur across the northeastern United States and adjacent Canadian provinces. They are found in a variety of wetland settings, most commonly in quiet-water areas along the shores of ponds, lakes, rivers, and larger streams, but also in flooded basins and ditches. The vegetation occurs in deep water (usually 0.4-1 m deep) that is present in all but the driest of conditions. Seasonal spring flooding and heavy rainstorms provide nutrient input. The substrate is usually deep muck overlying mineral soil; where wave action is more prevalent, the mineral soil may be exposed. The vegetation is dominated by bulrushes and robust graminoids, with scattered emergent forbs. Trees and shrubs are absent. Dominant species are usually *Schoenoplectus acutus* (= *Scirpus acutus*), *Schoenoplectus tabernaemontani* (= *Scirpus tabernaemontani*), and/or *Schoenoplectus americanus* (= *Scirpus americanus*). Associated herbs include *Scirpus cyperinus*, *Carex aquatilis*, *Carex pellita* (= *Carex lanuginosa*), *Carex utriculata*, *Thelypteris palustris*, *Typha latifolia*, *Asclepias incarnata*, *Impatiens capensis*, *Pontederia cordata*, *Sagittaria latifolia*, *Schoenoplectus fluviatilis* (= *Scirpus fluviatilis*), *Scutellaria lateriflora*, *Verbena hastata*, *Leersia oryzoides*, *Ludwigia palustris*, and others. Floating-leaved and submerged plants (such as *Potamogeton* spp., *Sparganium* spp., *Elodea canadensis*, *Ceratophyllum* spp.) may be scattered among the emergent plants. This association is distinguished from other northeastern standing-water marsh communities by the strong dominance of tall bulrush species.

**Environment:** These deepwater bulrush marshes occur across the northeastern United States and adjacent Canadian provinces. They are found in a variety of wetland settings, most commonly in quiet-water areas along the shores of ponds, lakes, rivers, and larger streams, but also in flooded basins and ditches. The vegetation occurs in deep water (usually 0.4-1 m deep) that is present in all but the driest of conditions. Seasonal spring flooding and heavy rainstorms provide nutrient input. The substrate is usually deep muck overlying mineral soil; where wave action is more prevalent, the mineral soil may be exposed.

**Vegetation:** The vegetation is dominated by bulrushes and robust graminoids, with scattered emergent forbs. Trees and shrubs are absent. Dominant species are usually *Schoenoplectus acutus* (= *Scirpus acutus*), *Schoenoplectus tabernaemontani* (= *Scirpus tabernaemontani*), and/or *Schoenoplectus americanus* (= *Scirpus americanus*). Associated herbs include *Scirpus cyperinus*, *Carex aquatilis*, *Carex pellita* (= *Carex lanuginosa*), *Carex utriculata*, *Thelypteris palustris*, *Typha latifolia*, *Asclepias incarnata*, *Impatiens capensis*, *Pontederia cordata*, *Sagittaria latifolia*, *Schoenoplectus fluviatilis* (= *Scirpus fluviatilis*), *Scutellaria lateriflora*, *Verbena hastata*, *Leersia oryzoides*, *Ludwigia palustris*, and others. Floating-leaved and submerged plants (such as *Potamogeton* spp., *Sparganium* spp., *Elodea canadensis*, *Ceratophyllum* spp.) may be scattered among the emergent plants.

**Similar Associations:**

- *Schoenoplectus acutus* - (*Schoenoplectus fluviatilis*) Freshwater Herbaceous Vegetation (CEGL002225)
- *Schoenoplectus acutus* - *Carex lasiocarpa* Herbaceous Vegetation (CEGL006358)
- *Schoenoplectus tabernaemontani* Temperate Herbaceous Vegetation (CEGL002623)

**Related Concepts:**

- *Schoenoplectus (tabernaemontani, fluviatilis)* Eastern Herbaceous Vegetation (Clancy 1996) =
- Bulrush Bed (Gawler 2002) =
- Bulrush marsh (CAP pers. comm. 1998) ?
- Deep Rush Marsh (Thompson 1996) B
- Palustrine Narrow-leaved Persistent Emergent Wetland, Permanently Flooded (PEM5H) (Cowardin et al. 1979) ?
- Spring swamp (Hill 1923) ?

**CONSERVATION RANKING**

**GRank:** GNR (1997-12-1) **Reasons:**

**ELEMENT DISTRIBUTION**

**Range:** This variable deepwater marsh community occurs in the northeastern United States and adjacent Canadian provinces.

**Subnations:** CT, DE, MA, MD, ME, NH, NJ, NY, PA, QC, RI, VA?, VT, WV

**TNC Ecoregions:** 49:C, 58:?, 59:C, 60:C, 61:C, 62:C, 63:C, 64:C

**USFS Ecoregions:** 212B:CP, 212Cb:CCC, 212D:CC, 212Ed:CCC, 212Fa:CCC, 212Fb:CCC, 212Fc:CCC, 212Fd:CCC, 212Ga:CCC, 212Gb:CCC, 221Ab:CCC, 221Ah:CCC, 221Bd:CCP, 221Fa:CCC, 231:P, 232:C, M212Ea:CCP, M212Eb:CCP, M221Ab:CCC, M221Ba:CCC

**Federal Lands:** NPS (Acadia, Assateague Island); USFWS (Assabet River, Erie, Great Meadows?, Monomoy, Oxbow, Parker River?)

**ELEMENT SOURCES**

**References:** Bartgis 1983, Bowman 2000, Breden et al. 2001, Byers et al. 2007, CAP pers. comm. 1998, Clancy 1996, Cowardin et al. 1979, Eastern Ecology Working Group n.d., Edinger et al. 2002, Fike 1999, Gawler 2002, Harrison 2004, Hill 1923, Northern Appalachian Ecology Working Group 2000, Sperduto 2000b, Swain and Kearsley 2000, Thompson 1996, Thompson and Sorenson 2000

## V.A.5.N.N. TIDAL TEMPERATE OR SUBPOLAR GRASSLAND

### *TYPHA (ANGUSTIFOLIA, DOMINGENSIS) TIDAL HERBACEOUS ALLIANCE (A.1472)*

#### (NARROWLEAF CATTAIL, SOUTHERN CATTAIL) TIDAL HERBACEOUS ALLIANCE

**Alliance Summary:** Tidal marshes dominated by *Typha angustifolia* and/or *Typha domingensis*. Examples of this alliance are composed of a mixture of salt marsh and freshwater tidal marsh species. The vegetation is dense and characterized by tall graminoids such as *Typha angustifolia*, with associates including *Spartina cynosuroides*, *Phragmites australis* or *Schoenoplectus americanus* (= *Scirpus americanus*), *Pontederia cordata*, *Lilaeopsis chinensis*, *Hibiscus moscheutos* (= *Hibiscus palustris*), and *Pluchea odorata*. Other characteristic species include *Hibiscus moscheutos*, *Spartina patens*, *Distichlis spicata*, *Schoenoplectus pungens* (= *Scirpus pungens*), *Lycopus americanus*, *Eleocharis palustris*, *Hydrocotyle umbellata*, *Eupatorium capillifolium*, *Ptilimnium capillaceum*, *Bidens* spp., and *Spartina alterniflora*. This community is typically a brackish tidal marsh occurring where water salinity ranges from 0.5-18.0 ppt. Brackish marshes are most extensive on large tidal rivers, but smaller marshes of this alliance also occur at the upper

limits of larger tidal creeks. The alliance occurs along the Atlantic coast from Maine through South Carolina and along the Gulf coast in Alabama and Texas. Alabama and Texas communities occur in oligohaline tidal marshes and are dominated by *Typha domingensis*. Further research is necessary to determine the classification, and thus the range, with confidence.

*TYPHA ANGUSTIFOLIA* - *HIBISCUS MOSCHEUTOS* HERBACEOUS VEGETATION (CEGL004201)

Narrowleaf Cattail - Eastern Rosemallow Herbaceous Vegetation

Cattail Brackish Marsh

**ELEMENT CONCEPT**

**Summary:** This community is a brackish marsh of the northern to central Atlantic coast, occurring along the margin of tidal rivers and at the upper margins of some high salt marshes and coastal salt ponds where water salinity ranges from 0.5-18.0 ppt. Brackish marshes are most extensive on large tidal rivers, but smaller marshes of this alliance also occur at the upper limits of larger tidal creeks and salt ponds. The vegetation of this tall grassland is a mixture of freshwater and saltmarsh species dominated by *Typha angustifolia*. *Phragmites australis* and/or *Typha latifolia* can be codominant. The *Phragmites australis* component is the native strain. Common associates include *Hibiscus moscheutos*, *Schoenoplectus pungens*, *Impatiens capensis*, *Amaranthus cannabinus*, *Peltandra virginica*, *Pontederia cordata*, and *Bidens* spp., plus *Spartina cynosuroides* in the south. Other infrequent associates include *Mikania scandens*, *Polygonum punctatum*, *Pluchea odorata*, *Eleocharis* spp., and *Schoenoplectus robustus*, plus *Schoenoplectus americanus* farther south. Species from adjacent high salt marsh may also be present. Substrate is muck or peat, and there is often an accumulation of *Typha* litter.

**Environment:** This association occurs in oligohaline to mesohaline areas of tidal marshes (0.5-18 ppt). In estuarine systems, it can occur in the uppermost zone of brackish marshes where there is freshwater influence; it receives diurnal tidal flooding of brackish water. In salt marshes behind barrier beaches it can occur in the upper reaches of larger tidal creeks within brackish areas and also at the upland border where there is significant freshwater input from the adjacent upland; here it receives irregular tidal flooding only during high spring tides. Substrate is muck or peat, and there is often an accumulation of *Typha* litter.

**Vegetation:** The vegetation of this tall grassland is a mixture of freshwater and saltmarsh species dominated by *Typha angustifolia*. *Phragmites australis*, *Typha latifolia*, *Spartina cynosuroides*, or *Schoenoplectus pungens* can codominate. The *Phragmites australis* component is the native strain (Saltonstall 2002). Common associates include *Hibiscus moscheutos*, *Schoenoplectus pungens*, *Impatiens capensis*, *Amaranthus cannabinus*, *Peltandra virginica*, *Pontederia cordata*, and *Bidens* spp., plus *Spartina cynosuroides* in the south. Other infrequent associates include *Mikania scandens*, *Pluchea odorata*, *Polygonum punctatum*, *Eleocharis* spp., and *Schoenoplectus robustus*, plus *Schoenoplectus americanus* farther south. Species from adjacent high salt marsh may also be present.

**Dynamics:** Brackish marsh complexes commonly occur as mosaics of patches dominated by a single graminoid species. Patches dominated by *Typha angustifolia* tend to occur where there is more freshwater influence near the upper reaches of estuaries or at the upland border of high salt marshes where there is freshwater input from the surrounding upland. As the marsh becomes more brackish, *Schoenoplectus pungens* or *Spartina patens* can become dominant. As the marsh becomes less brackish, *Peltandra virginica*, *Pontederia cordata*, *Acorus calamus*, *Schoenoplectus tabernaemontani*, and *Zizania aquatica* can become more prevalent. The pattern of alternating dominance between *Typha angustifolia* and *Phragmites australis* that can occur in these environmental settings may reflect disturbance history of the site and of the surrounding watershed.

**Similar Associations:**

- *Typha domingensis* Tidal Herbaceous Vegetation (CEGL008456)

**Related Concepts:**

- *Hibiscus* marsh (Cahoon and Stevenson 1986) ?
- *Typha (angustifolia, latifolia) - Hibiscus moscheutos* Herbaceous Vegetation (Harrison 2001) =
- *Typha angustifolia - Hibiscus moscheutos* Herbaceous Vegetation (Bowman 2000) =
- *Typha angustifolia - Hibiscus palustris* community (Metzler and Barrett 1992) ?
- *Typha angustifolia* community (Good and Good 1975b) ?
- *Typha angustifolia* type (Ferren et al. 1981) ?
- *Typha* association (Shreve et al. 1910) =
- Brackish Tidal Marsh (Rawinski 1984) ?
- Brackish Tidal Marsh (Gawler 2002) B
- Brackish marsh (Sperduto 1994) ?
- Brackish tidal marsh (Reschke 1990) ?
- Brackish tidal marsh community (MENHP 1991) ?
- Brackish tidal marsh complex (Breden 1989) ?

- Cattail Community Type (Odum et al. 1984) ?
- Fresh-brackish marsh (Klotz 1986) ?
- Narrowleaf cattail type (McCormick and Ashbaugh 1972) ?
- Tidal Freshwater Marsh (Schafale and Weakley 1990) B
- Tidal Freshwater Marsh (Narrowleaf Cattail Subtype) (Schafale 2000) ?
- Tidal Oligohaline Marsh (Harrison 2004) B
- Tidal Oligohaline Marsh (Fleming and Coulling 2001) B
- Transitional fresh marsh (Hill 1986) B

**Classification Comments:** A non-tidal barrier wetland documented at the Cove Point Wetland, Calvert County, Maryland (Steury 1999), appears to fit this concept.

#### CONSERVATION RANKING

**GRank:** G4G5 (2006-1-19) **Reasons:** This common small-patch community occurs in the estuarine areas of up to 13 northeastern states, several of which rank this vegetation as S4. It is threatened by pollution and by encroachment of *Phragmites australis*.

#### ELEMENT DISTRIBUTION

**Range:** This association occurs along the Atlantic coast from Maine to Virginia and possibly to South Carolina.

**Subnations:** CT, DE, MA, MD, ME, NC, NH, NJ, NY, RI, SC?, VA

**TNC Ecoregions:** 56:?, 57:C, 58:C, 61:C, 62:C, 63:C

**USFS Ecoregions:** 212Cb:CCC, 221Aa:CCC, 221Ab:CCC, 221Ac:CCC, 221Ad:CCC, 221Ak:CCC, 232Aa:CCC, 232Ab:CCC, 232Ac:CCC, 232Ad:CCC, 232Br:CCC, 232Bt:CCC, 232Bx:CCC, 232Bz:CCC, 232Cb:CCC, 232Ch:CCC, 232Ci:CCC

**Federal Lands:** NPS (Acadia, Assateague Island, Boston Harbor Islands, Cape Cod, Fire Island, Saugus Iron Works); USFWS (Back Bay?, Cape May, Chesapeake Marshlands, Chincoteague, E.B. Forsythe, Monomoy?, Parker River?, Prime Hook, Supawna Meadows)

#### ELEMENT SOURCES

**References:** Bowman 2000, Breden 1989, Breden et al. 2001, Cahoon and Stevenson 1986, Coulling 2002, Dowhan and Rozsa 1989, Eastern Ecology Working Group n.d., Edinger et al. 2002, Ferren et al. 1981, Fleming 2001a, Fleming and Coulling 2001, Fleming and Moorhead 1998, Fleming et al. 2001, Gawler 2002, Good and Good 1975b, Harrison 2001, Harrison 2004, Hill 1986, Klotz 1986, MENHP 1991, McCormick and Ashbaugh 1972, Metzler and Barrett 1992, Metzler and Barrett 2001, Odum et al. 1984, Rawinski 1984, Reschke 1990, Saltonstall 2002, Schafale 2000, Schafale 2003b, Schafale and Weakley 1990, Shreve et al. 1910, Sperduto 1994, Sperduto 1997a, Sperduto 2000b, Steury 1999, Swain and Kearsley 2001

### ***PHRAGMITES AUSTRALIS* TIDAL HERBACEOUS ALLIANCE (A.1477)**

#### **COMMON REED TIDAL HERBACEOUS ALLIANCE**

**Alliance Summary:** This alliance includes both natural and invasive fresh to brackish tidal marsh communities dominated by (often essentially monospecific) *Phragmites australis*. Although *Phragmites australis* rhizomes have been noted in salt marsh sediments exceeding 3000 years in age and it is thus a native component of salt marshes in some areas of North America, the growth habit of the species in its native condition was likely to have been significantly different than the dense monotypic, invasive stands documented in this alliance. Evidence suggests that a new, more invasive genotype of *Phragmites australis* was introduced to the U. S. from the Old World. This new genotype, along with a continued increase in and variety of disturbances, may explain the heightened invasiveness of this species. Evidence suggests that along the Gulf Coast of Louisiana and Texas, the genotype found in invasive communities differs from the genotype found in natural, stable communities. Although invasive and natural communities of *Phragmites australis* are difficult to differentiate, this can be accomplished by considering the degree of disturbance at a site and observing a given stand over time to determine the degree of invasiveness. Based on observations of this nature by individuals familiar with the coastal marshes of Louisiana and Texas, apparently stable, natural communities dominated by *Phragmites australis* are present. However, the dominance of *Phragmites australis* in many tidal wetlands today often indicates human-induced disturbance, either through direct habitat manipulation or through passive introduction of reproductive material to naturally disturbed substrates.

In many areas of the southeastern United States, it is well documented that *Phragmites* is recently introduced and spreading rapidly in tidal and non-tidal situations. In invasive communities, associated species are highly variable, depending on the vegetation that has been invaded. Spreading in large colonies, *Phragmites* may eventually dominate

disturbed areas at coverage up to 100%. More typically, though, scattered individuals of other species may occur, such as sparse *Morella cerifera* (= *Myrica cerifera*) shrubs, *Kosteletzkya virginica*, *Calystegia sepium*, *Boehmeria cylindrica*, *Typha angustifolia*, *Apocynum cannabinum*, *Rosa palustris*, *Polygonum* sp., and *Mikania scandens*. Vines of *Toxicodendron radicans* are also frequent, but typically occur at low cover.

In areas where *Phragmites australis* is highly invasive, if *Phragmites australis* is a significant component of the vegetation but the vegetation retains sufficient species composition to retain its identity, the site is considered an unhealthy or degraded example of that vegetation type. In these same areas, if *Phragmites australis* cover is so high that native species have been excluded and the original community is no longer recognizable, then the occurrence falls within an invasive association within the *Phragmites australis* Tidal Herbaceous Alliance (A.1477). In natural communities, associated species may include *Sagittaria platyphylla*, *Spartina alterniflora*, *Schoenoplectus americanus* (= *Scirpus americanus*), *Vigna luteola*, *Typha* spp., and others.

### *PHRAGMITES AUSTRALIS* TIDAL HERBACEOUS VEGETATION (CEGL004187)

Common Reed Tidal Herbaceous Vegetation

Reed Tidal Marsh

#### ELEMENT CONCEPT

**Summary:** This community is a dense tall grassland indicative of disturbance. It occurs in a range of tidal wetland habitats from fresh to brackish in salinity. It is characterized by dense stands of *Phragmites australis*, a species which tends to grow in colonies of tall, stout, leafy plants often to the exclusion of all other vascular plant species. Associated species are highly variable, depending on the community that has been invaded. Spreading in large colonies, *Phragmites* eventually dominates disturbed areas at coverage up to 100%. More typically, though, scattered individuals of other species may occur, such as sparse *Morella cerifera* (= *Myrica cerifera*) shrubs, *Kosteletzkya virginica*, *Calystegia sepium*, *Boehmeria cylindrica*, *Typha angustifolia*, *Apocynum cannabinum*, *Rosa palustris*, *Polygonum* sp., and *Mikania scandens*. Vines of *Toxicodendron radicans* are also frequent, but typically occur at low cover. This community has a broad geographic range, including coastal areas of the eastern and southeastern United States and Canada.

**Environment:** This community is a dense tall grassland indicative of disturbance. It occurs in a range of tidal wetland habitats from fresh to brackish in salinity.

**Vegetation:** This community is a broadly defined reed-grass marsh. It is characterized by dense stands of *Phragmites australis*, a species which tends to grow in colonies of tall, stout, leafy plants often to the exclusion of all other vascular plant species. Associated species are highly variable, depending on the community that has been invaded. Spreading in large colonies, *Phragmites* eventually dominates disturbed areas at coverage up to 100%. More typically, though, scattered individuals of other species may occur, such as sparse *Morella cerifera* (= *Myrica cerifera*) shrubs, *Kosteletzkya virginica*, *Calystegia sepium*, *Boehmeria cylindrica*, *Typha angustifolia*, *Apocynum cannabinum*, *Rosa palustris*, *Polygonum* sp., and *Mikania scandens*. Vines of *Toxicodendron radicans* are also frequent but typically occur at low cover.

#### Similar Associations:

- *Phragmites australis* - (*Sagittaria platyphylla*, *Vigna luteola*) Tidal Herbaceous Vegetation (CEGL007891)
- *Phragmites australis* Eastern North America Temperate Semi-natural Herbaceous Vegetation (CEGL004141)

#### Related Concepts:

- *Phragmites australis* Association (Fleming 1998) ?
- *Phragmites australis* Tidal Herbaceous Vegetation (Bowman 2000) =
- *Phragmites australis* community (Metzler and Barrett 1992) ?
- *Phragmites australis* tidal marsh association (Clancy 1993b) ?
- Brackish Tidal Marsh (Rawinski 1984) ?
- Salt Marsh Complex (Breden 1989) B
- Successional / Modified Estuarine Herbaceous Vegetation (Fleming et al. 2006) ?

**Classification Comments:** Although *Phragmites australis* rhizomes have been noted in salt marsh sediments exceeding three thousand years in age (Niering and Warren 1977) and is thus a native component of salt marshes in some areas in North America, the growth of the species in its native condition was likely to have been significantly different than the dense monotypic stands that characterize this community in parts of its range today. The invasive, non-native strain has been labeled haplotype M (Saltonstall 2002). The presence of the *Phragmites australis* community in wetlands today generally indicates human-induced disturbance, either through direct habitat manipulation or through passive introduction of reproductive material to naturally disturbed substrates. Historically, without alteration, these sites would generally be more saline. In New England, *Phragmites* tends to invade behind artificial/man-made levees where regular salt input is

blocked, making the sites more brackish and less saline than prior to levee construction and anthropogenic modification. In cases where *Phragmites australis* is a significant component of the vegetation but the vegetation retains sufficient species composition to retain its identity, the site is considered an unhealthy or degraded example of that original community. Where *Phragmites australis* cover is so high that native species have been excluded and the original community is no longer recognizable, the occurrence is then treated as an example of *Phragmites australis* Tidal Herbaceous Vegetation (CEGL004187).

#### CONSERVATION RANKING

**GRank:** GNA (invasive) (1997-11-22) **Reasons:**

#### ELEMENT DISTRIBUTION

**Range:** This community has a broad geographic range, including coastal areas of the eastern and southeastern United States and Canada.

**Subnations:** AL, CT, DC?, DE, FL, GA, LA, LB?, MA, MD, ME, MS, NC, NF?, NH, NJ, NS?, NY, PA, PE?, QC, RI, SC, TX, VA

**TNC Ecoregions:** 53:C, 56:C, 57:C, 58:C, 62:C

**USFS Ecoregions:** 221Ab:CCC, 232Aa:CCC, 232Ab:CCC, 232Ac:CCC, 232Bz:CCC, 232Ch:CCC, 232Ci:CCC, 232Dc:CCC

**Federal Lands:** NPS (Assateague Island, Boston Harbor Islands, Cape Cod, Cape Hatteras, Colonial, Fire Island, Gateway, George Washington Birthplace, George Washington Parkway, National Capital-East, Saugus Iron Works); USFWS (Back Bay, Bon Secour, Cape May, Chesapeake Marshlands, E.B. Forsythe, Monomoy, Supawna Meadows)

#### ELEMENT SOURCES

**References:** Bell et al. 2002, Bowman 2000, Breden 1989, Clancy 1993b, Edinger et al. 2002, Fleming 1998, Fleming et al. 2006, Harrison 2001, Metzler and Barrett 1992, Metzler and Barrett 1996, Metzler and Barrett 2001, NRCS 2001b, Nelson 1986, Niering and Warren 1977, Odum et al. 1984, Rawinski 1984, Saltonstall 2002, Schafale and Weakley 1990, Schotz pers. comm., Southeastern Ecology Working Group n.d., Swain and Kearsley 2001

### *SPARTINA PATENS* - (*DISTICHLIS SPICATA*) TIDAL HERBACEOUS ALLIANCE (A.1481)

#### SALTMEADOW CORDGRASS - (INLAND SALTGRASS) TIDAL HERBACEOUS ALLIANCE

**Alliance Summary:** This alliance comprises “high salt marsh” vegetation dominated or codominated by *Spartina patens* along the Gulf and Atlantic coasts from Maine to Texas. The high salt marsh is irregularly flooded by tides and forms at slightly higher elevations than regularly flooded low marshes; they establish where peat accumulation raises the marsh surface above mean high tide. Landward the vegetation can transition to brackish marsh or upland vegetation. Vegetation of this alliance also occurs in mesohaline zones along lower reaches of tidal rivers.

Variation in codominant species occurs across the geographic range. From the Canadian maritime provinces south to Delaware (discontinuously south to Virginia), this alliance is characterized by the dominance of *Spartina patens*, *Distichlis spicata*, and *Juncus gerardii* and the presence of more northerly distributed marsh species such as *Puccinellia fasciculata*, *Plantago maritima*, and *Triglochin maritima*. In brackish reaches of tidal rivers, this alliance includes *Spartina patens*-dominated vegetation that may also be characterized by the presence of *Agrostis stolonifera*, *Festuca rubra*, *Symphotrichum novi-belgii* (= *Aster novi-belgii*), *Hierochloa odorata*, *Carex paleacea*, or *Spartina pectinata*.

From Delaware south to Florida, this high salt marsh coastal community is dominated by *Spartina patens*, forming meadows at slightly higher elevations in relation to the adjacent *Spartina alterniflora* Tidal Herbaceous Alliance (A.1471). Diagnostic species for this community are *Spartina patens*, *Distichlis spicata*, *Borrchia frutescens*, *Kosteletzkya virginica*, and *Pluchea odorata*. Shrub seedlings such as *Baccharis halimifolia* and *Morella cerifera* (= *Myrica cerifera*) may also be present. The associated *Juncus roemerianus* Tidal Herbaceous Alliance (A.1475) often occurs as discrete patches which may reach substantial size.

This alliance also includes mesohaline to oligohaline marshes of the Gulf Coast of Texas and Louisiana. In these associations, *Spartina patens* may strongly dominate, *Distichlis spicata*, *Spartina alterniflora*, and *Spartina patens* may codominate, *Distichlis spicata* may form pure stands, *Paspalum vaginatum* may strongly dominate, or *Spartina patens* and *Vigna luteola* may codominate. Other characteristic species include *Juncus roemerianus*, *Spartina spartinae*, *Spartina cynosuroides* (within its range), *Schoenoplectus robustus*, *Schoenoplectus americanus*, *Sagittaria lancifolia*, *Phragmites australis*, and *Eragrostis* spp. Here, this alliance forms mosaics with *Spartina spartinae* and *Spartina alterniflora* marshes and saline herbaceous vegetation.

Western states have a different alliance for inland situations dominated by *Distichlis spicata*, the *Distichlis spicata* Intermittently Flooded Herbaceous Alliance (A.1332).

### SCHOENOPLECTUS PUNGENS - ELEOCHARIS PARVULA HERBACEOUS VEGETATION (CEGL006398)

Common Threesquare - Dwarf Spikerush Herbaceous Vegetation

Coastal Salt Pond Marsh

#### ELEMENT CONCEPT

**Summary:** This association encompasses the brackish marshes of coastal salt ponds of the northeastern Atlantic Coast. Coastal salt ponds are ponds separated from the ocean by a barrier beach. They generally form when a lagoon or bay is closed off from regular tidal flooding by a sand spit or other barrier. Salinity depends on the length of time since enclosure of the lake/pond; freshwater input from precipitation and overland flow dilutes the enclosed seawater resulting in meso- to oligohaline conditions. Depending on the distance from the ocean, saltwater input is infrequent and a result of tidal breaches or storm overwash, although there can be some saltwater seepage across the barrier beach. Shorelines usually have gentle slopes that magnify gradients of salinity and saturation. Depending on local water balance, ponds can draw down to a certain degree exposing mud or sand flats. Substrate ranges from sand to mud to peat. Vegetation of coastal salt ponds is highly variable both spatially and temporally given the variable nature of the habitat and processes affecting it. Although not constant, vegetation zonation often occurs along shores of coastal salt ponds along gradients of salinity and flooding or saturation. Dominant species can be variable depending on local conditions but are generally characterized by *Schoenoplectus pungens*, *Eleocharis parvula*, and/or *Spartina patens*, *Spartina pectinata*, or *Panicum virgatum*. Where salinity is less *Typha angustifolia* can be common. Mudflat habitat can develop in lower areas that tend to be exposed later in the season with *Eleocharis parvula*, *Eleocharis halophila*, *Eleocharis flavescens*, *Schoenoplectus maritimus*, *Crassula aquatica*, *Spergularia salina* (= *Spergularia marina*), *Cyperus filicinus*, or others. In higher zones, vegetation can be similar to high salt marsh habitat; *Panicum virgatum*, *Spartina patens*, or *Spartina pectinata* can be characteristic, plus *Schoenoplectus smithii*, *Echinochloa walteri*, *Cladium mariscoides*, *Distichlis spicata*, or *Chenopodium* spp. Species found farther south include *Ptilimnium capillaceum*, *Pluchea odorata*, *Schoenoplectus americanus*, *Hibiscus moscheutos*, plus scattered individuals of *Iva frutescens* or *Baccharis halimifolia*. Ponds often support aquatic plants that are tolerant of brackish/saline conditions, such as *Ruppia maritima*, *Stuckenia pectinata* (= *Potamogeton pectinatus*), *Potamogeton perfoliatus*, or *Zannichellia palustris*, plus some marine algal species. Several associations may be warranted in these highly variable systems; collection of further data will likely support the division of more associations.

**Environment:** Coastal salt ponds are ponds separated from the ocean by a barrier beach. They generally form when a lagoon or bay is closed off from regular tidal flooding by a sand spit or other barrier. However, some ponds have a permanent, often artificially maintained, inlet/outlet and thus have regular saltwater exchange. Salinity depends on the length of time since enclosure of the lake/pond; freshwater input from precipitation and overland flow dilutes the enclosed seawater resulting in meso- to oligohaline conditions. Depending on the distance from the ocean, saltwater input is infrequent and a result of tidal breaches or storm overwash, although there can be some saltwater seepage across the barrier beach. Shorelines usually have gentle slopes that magnify gradients of salinity and saturation. Depending on local water balance, ponds can draw down to a certain degree exposing mud or sand flats. Substrate ranges from sand to mud to peat. These ponds occur in glaciated areas in moraine or outwash deposits.

**Vegetation:** Vegetation of coastal salt ponds is highly variable both spatially and temporally given the variable nature of the habitat and processes affecting it. Although not constant, vegetation zonation often occurs along shores of coastal salt ponds along gradients of salinity and flooding or saturation. Dominant species can be variable depending on local conditions but are generally characterized by *Schoenoplectus pungens*, *Eleocharis parvula*, and/or *Spartina patens*, *Spartina pectinata*, or *Panicum virgatum*. Where salinity is less *Typha angustifolia* can be common. Mud flat habitat can develop in lower areas that tend to be exposed later in the season with *Eleocharis parvula*, *Eleocharis halophila*, *Eleocharis flavescens*, *Schoenoplectus maritimus*, *Crassula aquatica*, *Spergularia salina* (= *Spergularia marina*), or others. In higher zones, vegetation can be similar to high salt marsh habitat; *Panicum virgatum*, *Spartina patens*, or *Spartina pectinata* can be characteristic, plus *Schoenoplectus smithii*, *Echinochloa walteri*, *Cladium mariscoides*, *Distichlis spicata*, and *Chenopodium* spp. Species found farther south include *Ptilimnium capillaceum*, *Pluchea odorata*, *Schoenoplectus americanus*, *Hibiscus moscheutos*, plus scattered individuals of *Iva frutescens* or *Baccharis halimifolia*. Ponds often support aquatic plants that are tolerant of brackish/saline conditions, such as *Ruppia maritima*, *Stuckenia pectinata* (= *Potamogeton pectinatus*), *Potamogeton perfoliatus*, or *Zannichellia palustris*, plus some marine algal species.

**Dynamics:** Coastal salt ponds are adjacent to ocean shores and result from the enclosure of a lagoon or bay by a sand spit or barrier. Salinity fluctuates relative to the proportion of freshwater input from precipitation and overland flow and

saltwater input from tidal breaches and storm overwash. Fluctuations can be a gradual lessening of salinity with time since enclosure where there is sufficient and continual freshwater influence or a gradual increase in salinity following evaporative concentration. Rapid changes in salinity can result from storm breaches or overwash.

**Similar Associations:**

- *Panicum virgatum* - *Spartina patens* Herbaceous Vegetation (CEGL006150)
- *Ruppia maritima* Acadian/Virginian Zone Temperate Herbaceous Vegetation (CEGL006167)
- *Schoenoplectus pungens* Tidal Herbaceous Vegetation (CEGL004188)
- *Spartina patens* - *Eleocharis parvula* Herbaceous Vegetation (CEGL006342)

**Related Concepts:**

- Brackish Tidal Marsh (Gawler 2002) B
- Coastal Salt Pond (Rawinski 1984) ?
- Coastal Salt Pond Marsh (Rawinski 1984) ?

**Classification Comments:** This association encompasses a highly variable and shifting vegetation mosaic in a variable and dynamic habitat. Several associations may be warranted; collection of further data will likely support the division of this type into more associations.

**CONSERVATION RANKING**

**GRank:** GNR (1997-12-1) **Reasons:**

**ELEMENT DISTRIBUTION**

**Range:** Coastal salt ponds occur in a limited geomorphological setting in New Hampshire, Massachusetts, Rhode Island, and Long Island, New York.

**Subnations:** MA, ME, NH, NJ, NY, RI

**TNC Ecoregions:** 62:C

**USFS Ecoregions:** 221Ab:CCC, 221Ac:CCC, 221Ad:CCP, 221Ak:CCC, 232Aa:CCC, 232Ac:CCC

**Federal Lands:** NPS (Boston Harbor Islands, Cape Cod, Gateway); USFWS (Monomoy)

**ELEMENT SOURCES**

**References:** Eastern Ecology Working Group n.d., Edinger et al. 2002, Elliman 2003, Gawler 2002, Island Alliance 2001, Karanaukas 2001, Lundgren 1998, Lundgren 2000, NRCS 2001b, Rawinski 1984, Reschke 1990, Sperduto 2000a, Sperduto 2000b, Swain and Kearsley 2000, Swain and Kearsley 2001, Thorne-Miller et al. 1983, Zaremba 1999

***SPARTINA PATENS* - *DISTICHLIS SPICATA* - (*JUNCUS GERARDII*) HERBACEOUS VEGETATION (CEGL006006)**

Saltmeadow Cordgrass - Inland Saltgrass - (Black-grass) Herbaceous Vegetation

North Atlantic High Salt Marsh

**ELEMENT CONCEPT**

**Summary:** This high salt marsh vegetation dominated by *Spartina patens* or codominated by *Distichlis spicata* forms distinct “cowlicked” meadows above low salt marsh communities. This high marsh association generally occurs behind barrier beaches along the north Atlantic coast from the Canadian maritime provinces south to New Jersey. It occupies the irregularly flooded zone extending from mean high tide landward to the limit of spring tides. The substrate is peat overlying sand, silt, or bedrock. Vegetation of this marsh community occurs in mosaics of patches generally dominated by a single graminoid species, *Spartina patens*, *Distichlis spicata*, or *Juncus gerardii*. Other characteristic associates that occur in low abundance include *Symphyotrichum tenuifolium* (= *Aster tenuifolius*), *Limonium carolinianum*, *Solidago sempervirens*, *Symphyotrichum subulatum* (= *Aster subulatus*), *Polygonum ramosissimum*, *Argentina anserina* (= *Potentilla anserina*), *Atriplex patula*, *Lythrum lineare*, and *Panicum virgatum*. Salt pannes are often a prominent feature within this association.

**Environment:** This high salt marsh association generally occurs behind barrier beaches, but also in the outer reaches of estuaries, occupying the zone extending from mean high tide landward approximately to the limit of spring tides. They are often adjacent to low salt marshes dominated by *Spartina alterniflora* (tall form), which are regularly flooded by diurnal tides. *Spartina patens*-dominated high marshes form very dense peat with high organic matter content. Peat forms over sand, silt or bedrock.

**Vegetation:** Vegetation of this marsh community occurs in mosaics of patches generally dominated by a single graminoid species, *Spartina patens*, *Distichlis spicata*, or *Juncus gerardii*. Other characteristic associates that occur in low abundance include *Symphyotrichum tenuifolium* (= *Aster tenuifolius*), *Limonium carolinianum*, *Solidago sempervirens*, *Symphyotrichum subulatum* (= *Aster subulatus*), *Polygonum ramosissimum*, *Argentina anserina* (= *Potentilla anserina*), *Atriplex patula*, *Lythrum lineare*, and *Panicum virgatum*.

**Dynamics:** Vegetation of this association occurs as a shifting mosaic of patches dominated by a single graminoid species. Species composition at a particular site results from the interaction of hydroperiod, nutrient availability, salinity gradients, soil oxygen, concentrations of growth inhibitors in the soil, and interspecific competition. As sedimentation increases marsh elevation, vegetation may shift to upland border communities dominated by *Panicum virgatum* and *Juncus gerardii*. Local disturbance, i.e., from ice scouring, can cause invasion by *Spartina alterniflora*, or can lead to the formation of salt pannes.

**Similar Associations:**

- *Spartina patens* - *Agrostis stolonifera* Herbaceous Vegetation (CEGL006365)
- *Spartina patens* - *Distichlis spicata* - (*Juncus roemerianus*) Herbaceous Vegetation (CEGL004197)

**Related Concepts:**

- *Spartina patens* - *Distichlis spicata* Herbaceous Vegetation (Harrison 2001) I
- Salt Marsh (Rawinski 1984) ?
- Salt marsh complex, high marsh (Breden 1989) ?
- *Spartina* Saltmarsh (Gawler 2002) B

**Classification Comments:** This community is differentiated from *Spartina patens* - *Distichlis spicata* - (*Juncus roemerianus*) Herbaceous Vegetation (CEGL004197) to the south by the importance of *Juncus gerardii*, *Plantago maritima*, and *Triglochin maritima* and absence or relatively infrequent occurrence of species of southern distribution such as *Borrhchia frutescens*, *Kosteletzkya virginica*, *Fimbristylis castanea*, and *Lythrum lineare*.

**CONSERVATION RANKING**

**GRank:** G5 (1997-12-1) **Reasons:**

**ELEMENT DISTRIBUTION**

**Range:** This high salt marsh association occurs from the Canadian maritime provinces south to Delaware.

**Subnations:** CT, DE, MA, MD, ME, NH, NJ, NY, RI

**TNC Ecoregions:** 62:C, 63:C

**USFS Ecoregions:** 212Cb:CCC, 212Db:CCC, 212Dc:CCC, 221Ab:CCC, 221Ac:CCC, 221Ad:CCC, 221Ae:CCC, 221Ak:CCC, 221Dc:CCC, 232Aa:CCC, 232Ab:CCC, 232Ac:CCC

**Federal Lands:** NPS (Acadia, Boston Harbor Islands, Cape Cod, Fire Island, Gateway, Sagamore Hill); USFWS (Cape May, E.B. Forsythe, Monomoy, Moosehorn, Muskeget Island?, Parker River?, Prime Hook)

**ELEMENT SOURCES**

**References:** Bell et al. 2002, Bertness et al. 1992, Breden 1989, Breden et al. 2001, Coulling pers. comm., Dowhan and Rozsa 1989, Eastern Ecology Working Group n.d., Edinger et al. 2002, Enser 1999, Fleming 2001a, Gawler 2001, Gawler 2002, Harrison 2001, Hill 1923, Metzler and Barrett 2001, Nixon 1982, Rawinski 1984, Reschke 1990, Soil Conservation Service 1987, Sperduto 2000a, Sperduto 2000b, Swain and Kearsley 2001

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***SPARTINA ALTERNIFLORA* TIDAL HERBACEOUS ALLIANCE (A.1471)**

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**SMOOTH CORDGRASS TIDAL HERBACEOUS ALLIANCE**

**Alliance Summary:** This alliance includes various tidal marshes dominated by *Spartina alterniflora*. The hydrology is usually regularly tidally flooded. In the northern part of its range, southern Maine to Cape Hatteras, North Carolina, this alliance is generally limited to the zone between mean sea level and the mean high water level. The habitat occurs in protected inlets behind barrier beaches or in drowned river valleys. Peat depth ranges from a few feet, if the community formed over a mudflat, to 24 m (80 feet) in drowned river valleys. *Spartina alterniflora* is limited to the low marsh zone by moderate salinity; it can withstand longer submergence than other salt marsh grasses, but still requires periodic exposure of the substrate. It also requires moderately high levels of iron (7-15 ppm). This community is commonly known as “low salt marsh,” occurring as a tall grassland strongly dominated by *Spartina alterniflora*. There is little variation in vascular plant species composition across the range. It occurs in nearly pure stands, with occasional low growing species such as *Spergularia salina* (= *Spergularia marina*), *Salicornia* spp., *Suaeda maritima*, and seaweeds such as *Ulva lactuca* and other algae such as *Fucus vesiculosus* and *Ascophyllum nodosum*, which grow at the bases of the *Spartina* plants. Herbs of *Salicornia virginica* and *Salicornia bigelovii* can be quite common mixed in with the *Spartina*, often becoming more apparent later in the growing season. *Limonium carolinianum* is another characteristic herb, but only as scattered individuals. More detailed information is needed on the variability of the alliance in the southern parts of its range.

*SPARTINA ALTERNIFLORA* / (*ASCOPHYLLUM NODOSUM*) ACADIAN/VIRGINIAN ZONE HERBACEOUS VEGETATION (CEGL004192)

Smooth Cordgrass / (Yellow Tang) Acadian/Virginian Zone Herbaceous Vegetation  
North Atlantic Low Salt Marsh

**ELEMENT CONCEPT**

**Summary:** This tall grassland dominated by *Spartina alterniflora* forms the low salt marsh of the north and mid-Atlantic coast. It is diurnally flooded by tides, occurring in the intertidal zone between mean high tide and mean sea level in protected inlets behind barrier beaches or in the seaward reaches of drowned river valleys. It forms a coarse peat over sandy substrate. The low salt marsh occurs elevationally between high marsh that occurs landward and subtidal communities that occur seaward. *Spartina alterniflora* is limited to the low marsh zone by interspecific competition and by moderate salinity; it can withstand longer submergence than other salt marsh grasses but still requires periodic exposure of the substrate. *Spartina alterniflora* forms nearly monotypic stands with little variation across the geographic range of the community. Tall form *Spartina alterniflora* occurs adjacent to salt water and colonizes unvegetated flats. This association also grades into short form *Spartina alterniflora* landward. Associated species occur in low abundance and commonly include *Limonium carolinianum*, *Salicornia virginica*, *Salicornia bigelovii*, *Spergularia maritima*, *Spergularia canadensis*, and *Suaeda maritima*. Brown algae can form extensive mats at the bases of the grass culms, especially *Ascophyllum nodosum*, *Fucus vesiculosus*, *Enteromorpha* spp., and *Ulva* spp. Macroalgae associates may be sparse or absent at the southern edge of the range. This community occurs from Nova Scotia to Cape Hatteras, North Carolina. Low marshes at the northern edge of the geographic range are far less extensive in size than those farther south due to differences in geomorphology and time since last glaciation.

**Environment:** This low salt marsh community occurs in the regularly flooded intertidal zone, approximately from mean high tide to mean sea level; it is diurnally flooded by tides and classified as polyhaline (18-30 ppt). This low marsh occurs in areas sheltered from direct wave action, such as behind barrier beaches, as pocket marshes at the heads of bays, or in the outer reaches of estuaries. Low salt marshes occur landward of intertidal flats and subtidal communities and seaward of high salt marsh communities. Low salt marshes dominated by *Spartina alterniflora* generally occur on mucky silt to silty coarse fibrous peat, often with high organic matter content. However, peat in the low marsh is generally less dense than farther landward (Bertness 1988). Peat depth ranges from a few feet, if the community formed over a mudflat, to 80 feet in drowned river valleys at the mouths of estuaries.

**Vegetation:** This community is a tall grassland dominated by *Spartina alterniflora* occurring in regularly flooded intertidal zones. *Spartina alterniflora* dominates this physically stressful zone due to limited competition and its ability to tolerate salinity and flooding. It also requires moderately high levels of iron (7-15 ppm) (Adams 1963). *Spartina alterniflora* is strongly dominant, forming a nearly monotypic tallgrass layer. There is little variation in vascular plant composition across the range. Tall-form *Spartina alterniflora* occurs adjacent to saltwater and colonizes unvegetated flats. This association also grades into short-form *Spartina alterniflora* landward where tidal range is more restricted. Common associates, occurring in low abundance, include *Limonium carolinianum*, *Salicornia virginica*, *Salicornia bigelovii*, *Spergularia maritima*, *Spergularia canadensis*, and *Suaeda maritima*. *Distichlis spicata*, *Agalinis maritima*, *Symphyotrichum tenuifolium* (= *Aster tenuifolius*), and *Spartina patens* can also sporadically occur, but are more common in the high salt marsh. Brown algae can form extensive mats at the bases of the grass culms, especially *Ascophyllum nodosum*, *Fucus vesiculosus*, and *Ulva* spp. *Enteromorpha* spp. can occur early in the growing season. Macroalgae associates may be sparse or absent at the southern edge of the range. Microscopic algae, especially diatoms, can be abundant on the marsh surface (Teal 1986).

**Dynamics:** Salt marshes are dynamic habitats. *Spartina alterniflora* readily colonizes soft sediments off the seaward edge of the salt marsh (Bertness 1988). Grass culms and algal mats trap sediments brought in by the tides and begin the process of marsh peat accumulation. As peat development raises marsh elevation, low marsh succeeds to high marsh communities; *Spartina alterniflora* performance declines as peat accumulates and becomes more dense. Flotsam and jetsam brought in by tides can smother local patches of vegetation and form unvegetated to sparsely vegetated pannes, a phenomenon that occurs regularly on high marshes. Tidal creeks form sinuous patterns throughout the low marsh draining the diurnal tides.

**Similar Associations:**

- *Spartina alterniflora* - *Distichlis spicata* Tidal Herbaceous Vegetation (CEGL006586)
- *Spartina alterniflora* - *Juncus roemerianus* - *Distichlis spicata* Louisianian Zone Salt Tidal Herbaceous Vegetation (CEGL004190)
- *Spartina alterniflora* - *Lilaeopsis chinensis* Herbaceous Vegetation (CEGL004193)
- *Spartina alterniflora* Carolinian Zone Herbaceous Vegetation (CEGL004191)

**Related Concepts:**

- *Spartina alterniflora* Herbaceous Vegetation (Clancy 1996) =
- *Spartina alterniflora* Tidal Herbaceous Vegetation (Harrison 2001) =
- *Spartina alterniflora* community (Metzler and Barrett 1992) ?
- *Spartina alterniflora* salt marsh (Clancy 1993b) ?
- Cordgrass saltmarsh community (MENHP 1991) ?
- Low salt marsh (Enser 1993) ?
- Low salt marsh (Reschke 1990) ?
- Low salt marsh community (Sperduto 1994) ?
- Mixed Graminoid - Forb Saltmarsh (Gawler 2002) B
- Salt Marsh (Rawinski 1984) ?
- Salt Marsh (Schafale and Weakley 1990) B
- Salt Marsh (Virginian Subtype) (Schafale 2000) ?
- Salt marsh (Higgins et al. 1971) B
- Salt marsh community (Hill 1986) B
- Salt marsh complex, low marsh (Breden 1989) ?
- Tidal Mesohaline / Polyhaline Marsh (Fleming and Coulling 2001) B
- Tidal Mesohaline Marsh (Harrison 2004) B

**Classification Comments:** The northern limit of this type occurs where there is a slower accumulation of silt and corresponding absence of algal species (Chapman 1937). The southern limit corresponds with the southern limit of the Virginian province of the American Atlantic Temperate Region, a transitional area harboring animal species of both southern and northern affinities (Gosner 1979, Cowardin et al. 1979). Southern occurrences, where *Ascophyllum nodosum* (yellow tang) may be sparse or absent, are placed within this type because of the associated characteristic faunal assemblage, including *Uca pugnax* (Atlantic marsh fiddler), *Littorina saxatilis* (rough periwinkle), *Littorina obtusata* (smooth periwinkle), and *Brachidontes demissus* (ribbed mussel). Analogous low salt marsh associations in other geographic areas include *Spartina alterniflora* Carolinian Zone Herbaceous Vegetation (CEGL004191) and *Spartina alterniflora* - *Juncus roemerianus* - *Distichlis spicata* Louisianian Zone Salt Tidal Herbaceous Vegetation (CEGL004190) for the Atlantic Coast of the southeastern U.S. (Cape Hatteras, North Carolina, to Florida) and the Gulf Coast (Florida to Texas), respectively [see Cowardin et al. (1979) for regional boundaries]. *Spartina alterniflora* - *Lilaeopsis chinensis* Herbaceous Vegetation (CEGL004193) is a *Spartina alterniflora*-dominated association occurring in the mid-tidal range of tidal rivers that have a minimum tidal range of one meter.

**CONSERVATION RANKING**

**GRank:** G5 (1997-12-1) **Reasons:**

**ELEMENT DISTRIBUTION**

**Range:** This association occurs along the Atlantic coastline from Nova Scotia and New Brunswick south to Cape Hatteras, North Carolina.

**Subnations:** CT, DE, MA, MD, ME, NB, NC, NH, NJ, NS, NY, QC, RI, VA

**TNC Ecoregions:** 57:C, 58:C, 62:C, 63:C

**USFS Ecoregions:** 212Cb:CCC, 212Db:CCC, 212Dc:CCC, 221Ab:CCC, 221Ac:CCC, 221Ad:CCC, 221Ak:CCC, 232Aa:CCC, 232Ab:CCC, 232Ac:CCC, 232Ad:CCC, 232Ae:CCC, 232Br:CCC, 232Bt:CCC, 232Bx:CCC, 232Bz:CCC, 232Ch:CCC, 232Ci:CCC

**Federal Lands:** NPS (Acadia, Assateague Island, Boston Harbor Islands, Cape Cod, Fire Island, Gateway, Sagamore Hill); USFWS (Back Bay?, Cape May, Chesapeake Marshlands, E.B. Forsythe, Monomoy, Moosehorn?, Muskeget Island, Parker River, Prime Hook)

**ELEMENT SOURCES**

**References:** Adams 1963, Bell et al. 2002, Bertness 1988, Bowman 2000, Breden 1989, Breden et al. 2001, Chapman 1937, Clancy 1993b, Clancy 1996, Cowardin et al. 1979, Eastern Ecology Working Group n.d., Edinger et al. 2002, Enser 1993, Enser 1999, Fleming and Coulling 2001, Fleming et al. 2001, Gawler 2001, Gawler 2002, Gosner 1979, Harrison 2001, Harrison 2004, Higgins et al. 1971, Hill 1986, MENHP 1991, Metzler and Barrett 1992, Metzler and Barrett 2001, Moul 1973, NRCS 2001b, Rawinski 1984, Reschke 1990, Schafale 2000, Schafale 2003b, Schafale and Weakley 1990, Soil Conservation Service 1987, Sperduto 1994, Sperduto 2000a, Sperduto 2000b, Stalter 1979, Swain and Kearsley 2001, Teal 1986

**V.B.2.N.G. TIDAL TEMPERATE PERENNIAL FORB VEGETATION*****SARCOCORNIA PACIFICA* - (*DISTICHLIS SPICATA*, *SALICORNIA* spp.) TIDAL HERBACEOUS ALLIANCE (A.1704)****SWAMPFIRE - (INLAND SALTGRASS, SALTWORT SPECIES) TIDAL HERBACEOUS ALLIANCE*****SALICORNIA* (*VIRGINICA*, *BIGELOVII*, *MARITIMA*) - *SPARTINA ALTERNIFLORA* HERBACEOUS VEGETATION (CEGL004308)**

(Virginia Glasswort, Dwarf Saltwort, Slender Grasswort) - Smooth Cordgrass Herbaceous Vegetation  
Salt Panne (Salicornia Type)

**ELEMENT CONCEPT**

**Summary:** This association represents tidally flooded hypersaline flats or very shallow depressions (pannes) dominated by halophytic herbs, including *Salicornia virginica*, *Salicornia bigelovii*, *Salicornia maritima*, and stunted *Spartina alterniflora*, that occur in salt marshes of the Atlantic Coast. Vegetation of this association tends to develop in shallow depressions within high or salt marshes where drainage is poor. The depressions are regularly to irregularly flooded by high tides, but as the water evaporates during low tide, the salinity concentration increases forming “salt pannes.” Formation of the pannes may result from ice-scouring, rafting flotsam, peat compaction, mosquito ditch levees, or erosion of tidal creek banks, which create small, sparsely vegetated to unvegetated impoundments. Bare peat and/or mucky soils are prevalent (up to 85% bare soils). Total vegetative cover is variable in pannes, from near total absence of vascular plants to a dense cover of *Salicornia virginica*, *Salicornia bigelovii*, *Salicornia maritima*, *Sarcocornia pacifica*, or *Spartina alterniflora* (short form). Common associates include *Limonium carolinianum*, *Plantago maritima* var. *juncooides*, *Triglochin maritima*, *Spartina patens*, *Suaeda maritima*, and *Atriplex* spp. Algal mats are characteristically present, visible even in densely vegetated pannes. Blue-green algae are an important component of these mats, in some cases contributing significantly more biomass to the community than do vascular species. Diagnostic species include *Salicornia bigelovii* and *Salicornia virginica*.

**Environment:** Vegetation of this association tends to develop in shallow depressions in salt marshes where drainage is poor. They tend to occur more frequently on the high marsh but occur within low marsh as well. Pannes form in depressions that range from 2-30 cm lower than the elevation of the marsh. The depressions are regularly to irregularly flooded by tides, and as the water evaporates during low tide, the salinity concentration increases forming “salt pannes.” Substrate is soft, silty muck or peat of variable density.

**Vegetation:** This association includes tidally flooded hypersaline flats or very shallow depressions (pannes) dominated by halophytic herbs. Total vegetative cover is quite variable in pannes, from near total absence of vascular plants to a dense cover of *Salicornia virginica*, *Salicornia bigelovii*, *Salicornia maritima*, *Sarcocornia pacifica*, or *Spartina alterniflora* (short form). Common associates include *Limonium carolinianum*, *Plantago maritima* var. *juncooides*, *Triglochin maritima*, *Spartina patens*, *Suaeda maritima*, and *Atriplex* spp. Algal mats are characteristically present, visible even in densely vegetated pannes. Blue-green algae are an important component of these mats, in some cases contributing significantly more biomass to the community than do vascular species. The following algae were noted to occur in association with *Spartina alterniflora* in the littoral zone of a Massachusetts salt marsh: *Oscillatoria subuliformis*, *Oscillatoria amphibia*, *Lyngbea* spp., *Microcoleus chthonoplastes*, *Nodularia harveyana*, *Hydrocoleum lyngbyaceum*, and *Symploca* spp. (Webber 1967).

**Dynamics:** Salt pannes are part of the shifting mosaic of plant communities of the salt marsh complex. They tend to occur more frequently on the high marsh, but are present in the low marsh as well. Pannes are variable in shape and likely variable in origin. Formation can result from ice scouring or rafting flotsam that scrapes away or smothers existing vegetation, or from peat compaction, mosquito ditch levees, or tidal creek bank erosion that blocks or impedes drainage. Lack of vegetation decreases local sedimentation, which also maintains lower micro-relief (Redfield 1972). Evaporation from these poorly drained shallow depressions leads to hypersaline conditions (Bertness et al. 1992, Niering and Warren 1980). Gradients of salinity and standing water depth and duration correlate to vegetative cover and composition. The lowest portions of pannes tend to be wetter and more saline and can have little or no vegetation. As duration of wetness and salinity decreases across the micro-relief, forb-dominated species assemblages tend to dominate followed by mixed graminoid-forb assemblages at the outer, higher edges (Redfield 1972). Pannes can be ephemeral features on the marsh, and vegetation cover and composition can vary from year to year. Unvegetated, soft-bottomed pannes generally have plentiful worm and crab burrows (Godfrey et al. 1978).

**Similar Associations:**

- *Batis maritima* - *Sarcocornia pacifica* Dwarf-shrubland (CEGL003956)
- *Sarcocornia pacifica* - (*Batis maritima*, *Distichlis spicata*) Dwarf-shrubland (CEGL002278)
- *Spartina alterniflora* - *Distichlis spicata* Tidal Herbaceous Vegetation (CEGL006586)

**Related Concepts:**

- *Salicornia* - *Bassia* salt flat (Harvill 1965) =
- *Salicornia europaea* - *Spartina alterniflora* community (Metzler and Barrett 1992) =
- *Salicornia virginica* Tidal Dwarf Shrubland (VDNH 2003) =
- *Salicornia* tidal flat (Clovis 1968) =
- *Salicornietum ambiguae* (Conard 1935) =
- *Sarcocornia perennis* - (*Distichlis spicata*, *Spartina alterniflora*) Dwarf-shrubland (Bartgis 1986) =
- *Spartina alterniflora* / *Salicornia europaea* community (Clancy 1993b) =
- Pan (Nichols 1920) =
- Panne (Good 1965) =
- Panne marsh (Baumann 1978b) =
- Pans (Higgins et al. 1971) =
- Pans (Hill 1986) =
- Salt Flat (Schafale and Weakley 1990) =
- Salt Flat (Schafale 2000) =
- Salt Flat (Fleming and Coulling 2001) B
- Salt Marsh (Rawinski 1984) ?
- Salt Panne (Harrison 2004) B
- Salt Panne (Clancy 1996) =
- Salt marsh complex, pannes (Breden 1989) =
- Salt pan (Klotz 1986) =
- Salt panne (Miller and Egler 1950) =
- Salt panne (Clancy 1993b) =
- Salt panne (Reschke 1990) =
- *Spartina* Saltmarsh (Gawler 2002) B
- Stunted *Spartina alterniflora* community (Miller and Egler 1950) =
- Tidal Mesohaline / Polyhaline Marsh (Fleming and Coulling 2001) B

**Classification Comments:** This community occurs in coastal salt marshes from Nova Scotia to the Carolinas, north of the range of *Batis maritima*. Salt pannes can potentially be classified based on morphology, salinity gradients, or substrate (Godfrey et al. 1978), which may elucidate further variation.

**CONSERVATION RANKING**

**GRank:** G5 (1997-12-1) **Reasons:**

**ELEMENT DISTRIBUTION**

**Range:** This association occurs along the Mid- and North Atlantic Coast from the Canadian maritime provinces south to North Carolina and possibly South Carolina and Georgia.

**Subnations:** CT, DE, GA?, MA, MD, ME, NB, NC, NH, NJ, NS, NY, QC, RI, SC?, VA

**TNC Ecoregions:** 56:P, 57:C, 58:C, 62:C, 63:C

**USFS Ecoregions:** 212C:PP, 212D:PP, 221Aa:CCC, 221Ab:CCC, 221Ac:CCC, 221Ad:CCC, 221Ak:CCC, 232Aa:CCC, 232Ab:CCC, 232Ac:CCC, 232Ad:CC?, 232Bx:CCC, 232Bz:CCC, 232Ce:CCP, 232Ci:CCC

**Federal Lands:** NPS (Assateague Island, Boston Harbor Islands, Cape Cod, Cape Lookout, Fire Island, Fort Frederica?, Gateway); USFWS (Cape May, E.B. Forsythe, Monomoy, Parker River, Prime Hook)

**ELEMENT SOURCES**

**References:** Bartgis 1986, Baumann 1978b, Bell et al. 2002, Berdine 1998, Bertness et al. 1992, Bowman 2000, Breden 1989, Breden et al. 2001, Clancy 1993b, Clancy 1996, Clovis 1968, Conard 1935, Dowhan and Rozsa 1989, Eastern Ecology Working Group n.d., Edinger et al. 2002, Enser 1999, Fleming 2001a, Fleming and Coulling 2001, Fleming et al. 2001, Gawler 2001, Gawler 2002, Godfrey et al. 1978, Good 1965, Harrison 2004, Harvill 1965, Higgins et al. 1971, Hill 1986, Klotz 1986, Metzler and Barrett 1992, Metzler and Barrett 2001, Miller and Egler 1950, NRCS 2001b, Nichols 1920, Niering and Warren 1980, Peet et al. unpubl. data, Rawinski 1984, Redfield 1972, Reschke 1990, Schafale 2000, Schafale and Weakley 1990, Sperduto 2000b, Swain and Kearsley 2001, VDNH 2003, Webber 1967

**SALICORNIA BIGELOVII - TRIGLOCHIN MARITIMA HERBACEOUS VEGETATION (CEGL006369)**

Dwarf Saltwort - Seaside Arrow-grass Herbaceous Vegetation

Salt Flat

**ELEMENT CONCEPT**

**Summary:** This sandy tidal flat is characterized by *Salicornia bigelovii*, *Triglochin maritima*, *Plantago maritima*, *Agalinis maritima*. Other associates include *Salicornia virginica* (= *Salicornia europaea*), *Limonium carolinianum* (= *Limonium nashii*), *Juncus gerardii*, *Spartina patens*, *Argentina anserina* (= *Potentilla anserina*). Peat is drier and more shallow than that of other salt marsh panne vegetation types, and vegetation cover averages 50%.

**CONSERVATION RANKING****GRank:** GNR (1998-4-14) **Reasons:****ELEMENT DISTRIBUTION****Subnations:** MA, NH**TNC Ecoregions:** 62:C**USFS Ecoregions:** 221Ab:CCC, 221Ak:CCC**Federal Lands:** USFWS (Monomoy)**ELEMENT SOURCES****References:** Breeding et al. 1974, Eastern Ecology Working Group n.d., Gawler 2002**V.C.2.N.A. PERMANENTLY FLOODED TEMPERATE OR SUBPOLAR HYDROMORPHIC-ROOTED VEGETATION****NYPHAEA ODORATA - NUPHAR SPP. PERMANENTLY FLOODED TEMPERATE HERBACEOUS ALLIANCE (A.1984)****AMERICAN WHITE WATER-LILY - YELLOW POND-LILY SPECIES PERMANENTLY FLOODED TEMPERATE HERBACEOUS ALLIANCE**

**Alliance Summary:** This alliance, common throughout most of the eastern and central United States and adjacent Canadian provinces, contains vegetation which may occur in a variety of slow-moving water bodies, including rivers, millponds, blackwater rivers, streams, shallow ponds or lakes, or on shores of deeper water bodies including freshwater tidal areas. Stands of this alliance are permanently to semipermanently flooded, and water depth is generally greater than 0.5 m and up to 2 m. Stands are dominated by hydromorphic-rooted aquatic plants, typically *Nuphar* sp. (any of the North American taxa), with or without *Nymphaea odorata*. Emergent vegetation is less than 25%, and typically plant species diversity is low. Other species present may include *Utricularia* spp., *Potamogeton* spp., and others. In the north, *Brasenia schreberi* may be locally dominant. Other characteristic northern species include *Nymphaea tetragona* and *Potamogeton amplifolius*. Associates found in the Midwest include *Polygonum amphibium*. In the Southeast, examples may include the floating or emergent “pad-leaved” species *Nelumbo lutea* or *Nymphoides aquatica*. Submerged aquatic species which may be present include *Cabomba caroliniana*, *Ceratophyllum demersum*, and *Heteranthera dubia*.

**NUPHAR ADVENA - NYPHAEA ODORATA HERBACEOUS VEGETATION (CEGL002386)**

Broadleaf Pond-lily - American White Water-lily Herbaceous Vegetation

Water-lily Aquatic Wetland

**ELEMENT CONCEPT**

**Summary:** This rooted aquatic or open marsh community occupies shallow-water depressions, oxbow ponds, backwater sloughs of river floodplains, slow-moving streams, ponds, and small lakes throughout the central and eastern United States. It is dominated by rooted, floating-leaved aquatic species, with both submergent and emergent aquatics also present. *Nuphar advena* (= *Nuphar lutea* ssp. *advena*) and *Nymphaea odorata* are dominants, either in combination together, or each singly. Other species present include *Brasenia schreberi*, various *Potamogeton* and *Stuckenia* spp., *Eleocharis robbinsii* and other *Eleocharis* spp., *Polygonum amphibium*, *Polygonum amphibium* var. *emersum* (= *Polygonum coccineum*), *Sparganium americanum*, *Lemna* spp., *Spirodela polyrrhiza*, *Typha latifolia*, and *Saururus cernuus*. Submerged aquatics more common in the southern part of the range include *Cabomba caroliniana*, *Ceratophyllum demersum*, and *Heteranthera dubia*.

**Environment:** This community occupies shallow-water depressions, oxbow ponds, sluggish streams, and backwater sloughs of river floodplains, ponds (natural and artificial), and small lakes. In pools and slow-flowing stretches of river, at Obed River (TN), *Nuphar lutea ssp. advena* is rooted in sandy substrate (Schmalzer and DeSelm 1982).

**Vegetation:** This community is dominated by rooted, floating-leaved aquatic species, with both submergent and emergent aquatics also present. *Nuphar advena* (= *Nuphar lutea ssp. advena*) and *Nymphaea odorata* are dominants, either in combination together, or each singly. Other species present include *Brasenia schreberi*, various *Potamogeton* and *Stuckenia* spp., *Eleocharis robbinsii* and other *Eleocharis* spp., *Polygonum amphibium*, *Polygonum amphibium* var. *emersum* (= *Polygonum coccineum*), *Sparganium americanum*, *Lemna* spp., *Spirodela polyrrhiza*, *Typha latifolia*, and *Saururus cernuus* (Anderson 1982, G. Fleming pers. comm.). Submerged aquatic species more common in the southern part of the range include *Cabomba caroliniana*, *Ceratophyllum demersum*, and *Heteranthera dubia*. This broadly conceived type may include ponds, or zones of ponds, dominated by *Nymphaea odorata*, with or without *Nuphar advena*.

**Similar Associations:**

- *Equisetum fluviatile* - (*Eleocharis palustris*) Herbaceous Vegetation (CEGL005258)
- *Nuphar advena* Tidal Herbaceous Vegetation (CEGL004472)
- *Nuphar polysepala* Herbaceous Vegetation (CEGL002001)
- Semipermanent Impoundment (CEGL006581)

**Related Concepts:**

- *Nuphar advena* - *Nymphaea odorata* Herbaceous Vegetation (Clancy 1996) =
- Delmarva Bay (Harrison 2004) B
- Floodplain Pond / Pool (Fleming and Coulling 2001) B
- Freshwater Marsh (Nelson 1985) B
- Inland Emergent Marsh (Chapman et al. 1989) B
- L5D2a11a. *Nuphar lutea* (Foti et al. 1994) ?
- New England coastal plain pondshore (Rawinski 1984) ?
- Open Water/Aquatic Bed Veg., Natural Impoundment Pond (Ambrose 1990a) B
- Open water marsh with floating-leaved plants (NAP pers. comm. 1998) ?
- Small Depression Pond (Schafale and Weakley 1990) B
- Water-lily - Macrophyte Aquatic Bed (Gawler 2002) B

**Classification Comments:** Can occur in mostly natural ponded wetlands as well as artifactual ones such as borrow pits. On the Conecuh National Forest (Alabama), vegetation of this association occurs in Gum Pond and Open Pond as a mix of *Nymphaea odorata* and *Nuphar advena*.

**CONSERVATION RANKING**

**GRank:** G4G5 (2002-10-15) **Reasons:** The dominant species in stands of this vegetation are widespread across the eastern and central United States and adjacent Canada. This is not a rare or imperiled vegetation type, even though its occurrence is poorly documented. Stands may occur in natural lakes and ponds or in artificial impoundments.

**ELEMENT DISTRIBUTION**

**Range:** This rooted aquatic community occupies shallow, quiet waters throughout the central and eastern United States, extending from Maine to Ontario and Minnesota, south to Oklahoma and east to Georgia.

**Subnations:** AL, AR, CT, DE, FL, GA, IA, IL, IN, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, NH, NJ, NY, OH, OK, ON, PA, RI, SC, TN, TX, VA, VT, WI, WV

**TNC Ecoregions:** 31:C, 32:P, 36:C, 37:C, 39:C, 40:P, 41:C, 42:C, 43:C, 44:C, 45:C, 46:C, 47:C, 48:C, 49:C, 50:C, 51:C, 52:C, 53:C, 55:P, 56:C, 57:C, 58:C, 59:C, 60:C, 61:C, 62:C, 63:C

**USFS Ecoregions:** 212Aa:CCC, 212Ba:CCC, 212Bb:CCC, 212Ca:CCC, 212Cb:CCC, 212Da:CCC, 212Db:CCP, 212Dc:CCC, 212Fa:CCP, 212Fb:CCP, 212Fc:CCP, 212Fd:CCP, 212Ga:CCP, 212Gb:CCP, 212Hb:CCP, 212Ja:CCP, 212Jb:CCP, 212Jc:CCP, 212Je:CCP, 212Jf:CCP, 212Jj:CCP, 212Jl:CCP, 212Jm:CCC, 212Ka:CCP, 221Aa:CCP, 221Ab:CCC, 221Ah:CCC, 221Ai:CCC, 221Al:CCC, 221Am:CCC, 221Bd:CCP, 221Da:CCC, 221Db:CCC, 221Ea:CCC, 221Ed:CC?, 221Ef:CCC, 221Fa:CCC, 221Hc:CCC, 221He:CCC, 222Ch:CCC, 222Db:CCC, 222Gc:C??, 222Ha:CCC, 222Ja:CCC, 222Jb:CCC, 222Ji:CCC, 222Jj:CCC, 222Kf:CCC, 222Kg:CCC, 222Kh:CCC, 222Kj:CCC, 222L:CC, 231Bc:CCC, 231Bd:CCC, 231Ga:CCC, 231Gb:CCC, 231Gc:CCC, 232Bf:CCC, 232C:CC, 232D:CC, 234Aa:CCC, 234Ac:CCC, 234Ad:CCC, 234Af:CCC, 234Ag:CCC, 234Ai:CCC, 234Al:CCC, 234Am:CCC, 234An:CCC, 251Cf:CCC, 251Dd:CCC, 251Dg:CCC, 251Eb:CCC, M212Af:CCC, M212Bb:CCC, M212Bc:CCC, M212Bd:CCC, M212Cb:CCC, M212Cc:CCC, M212Ea:CCP, M212Eb:CCP, M221Aa:CCC, M221Ab:CCC, M221Ac:CCC, M221Ad:CCC, M221Ba:CCC, M221Bb:CCC, M221Bc:CCC, M221Bd:CCC, M221Be:CCC, M221Bf:CCC, M221Da:CCC, M221Dc:CCC

**Federal Lands:** DOD (Fort Benning); NPS (Acadia, C&O Canal, Carl Sandburg Home, Effigy Mounds, George Washington Parkway, Indiana Dunes, Minute Man, Natchez Trace, Obed River, Ozark Riverways, Saint Croix, Saint-Gaudens, Shiloh); USFS (Angelina, Chequamegon, Chequamegon-Nicolet, Conecuh, Davy Crockett, Kisatchie, Nicolet, Ocala, Ozark, Sabine, Sam Houston?, Talladega, Talladega (Oakmulgee), Talladega (Talladega)); USFWS (Back Bay, Erie, Great Swamp, Monomoy, Reelfoot)

#### ELEMENT SOURCES

**References:** Ambrose 1990a, Anderson 1982, Breden et al. 2001, Chapman et al. 1989, Clancy 1996, FNAI 1990, Fike 1999, Fleming and Coulling 2001, Fleming et al. 2001, Foti et al. 1994, Gawler 2002, Harrison 2004, Hoagland 2000, Hop et al. 2005, INAI unpubl. data, Midwestern Ecology Working Group n.d., NAP pers. comm. 1998, NatureServe Ecology - Southeastern U.S. unpubl. data, Nelson 1985, Peet et al. unpubl. data, Penfound 1953, Rawinski 1984, Schafale and Weakley 1990, Schmalzer and DeSelm 1982, Schotz pers. comm., Sperduto and Nichols 2004, Swain and Kearsley 2001, TDNH unpubl. data, Thompson and Jenkins 1992, WNHIP unpubl. data, Zaroni et al. 1979

### V.C.2.N.B. PERMANENTLY FLOODED - TIDAL TEMPERATE OR SUBPOLAR HYDROMORPHIC-ROOTED VEGETATION

#### *RUPPIA MARITIMA* PERMANENTLY FLOODED - TIDAL TEMPERATE HERBACEOUS ALLIANCE (A.1769)

##### BEAKED DITCH-GRASS PERMANENTLY FLOODED - TIDAL TEMPERATE HERBACEOUS ALLIANCE

**Alliance Summary:** This alliance includes communities of submerged, rooted aquatic vegetation occurring in tidal creeks, pools, and coves with brackish waters. The substrate is often mud-bottomed but may also include sand. Characteristic species include *Ruppia maritima*, *Vallisneria americana*, and *Stuckenia pectinata* (= *Potamogeton pectinatus*). This is the most widely distributed seagrass alliance in eastern North America. It ranges around the entire Atlantic and Gulf coasts, from New England to Texas. This vegetation is patchily distributed along the Texas coast, where *Ruppia maritima* often occurs mixed with *Halodule wrightii*. *Ruppia maritima* is the only seagrass capable of growing in freshwater and is therefore often found in the oligohaline to mesohaline upper reaches of estuaries and lower reaches of tidal creeks, bayous and rivers. Because it often behaves as an annual, the distribution and abundance of *Ruppia maritima* is often shifting both spatially and temporally.

#### *RUPPIA MARITIMA* ACADIAN/VIRGINIAN ZONE TEMPERATE HERBACEOUS VEGETATION (CEGL006167)

Beaked Ditch-grass Acadian/Virginian Zone Temperate Herbaceous Vegetation

Northern Atlantic Coast Beaked Ditch-grass Bed

#### ELEMENT CONCEPT

**Summary:** This brackish/saline tidal community of the central and northern Atlantic coast is dominated by *Ruppia maritima*. It occurs in large beds in estuarine bays as well as small patches within brackish tidal creeks. Substrates are sand or muck, and salinity is generally brackish. *Ruppia maritima* has a wide range of salinity tolerance and overlaps with other species, although generally not in the same locations. Common associates include *Zannichellia palustris*, *Stuckenia pectinata* (= *Potamogeton pectinatus*), and *Potamogeton perfoliatus* in brackish/fresh areas or *Zostera marina* as waters get deeper and more saline. There can also be a diverse array of macroalgae.

**Environment:** This association occurs in habitats that are continuously flooded by brackish water; it occurs in subtidal situations, deepwater pools and pannes, tidal creeks, and flats within salt marshes, or along tidal rivers. It also occurs in coastal salt ponds with polyhaline to mesohaline salinity levels. Except in pannes or pools, which are more irregularly flooded, water levels fluctuate with diurnal tides and are generally less than 2 m deep at low tide, although certain areas may be exposed at extremely low tides. Substrate varies from sand to mud.

**Vegetation:** *Ruppia maritima* is strongly dominant in this association. It has a wide range of salinity tolerance and overlaps with other species, although generally not in the same locations. Common associates include *Zannichellia palustris*, *Stuckenia pectinata* (= *Potamogeton pectinatus*), and *Potamogeton perfoliatus* in brackish to fresh areas and *Zostera marina* as waters get deeper and more saline. There can also be a diverse array of macroalgae. This association grades into eelgrass beds as salinity increases. As salinity decreases, *Ruppia maritima* becomes less prominent, and the community grades into fresh/brackish subtidal associations.

**Dynamics:** In several habitats, this association occurs where water levels and salinity can fluctuate with daily tides.

**Similar Associations:**

- *Ruppia maritima* - *Stuckenia pectinata* Herbaceous Vegetation (CEGL006370)
- *Schoenoplectus pungens* - *Eleocharis parvula* Herbaceous Vegetation (CEGL006398)
- *Stuckenia pectinata* - *Potamogeton perfoliatus* - (*Zannichellia palustris*) Tidal Herbaceous Vegetation (CEGL006027)
- *Zostera marina* Herbaceous Vegetation (CEGL004336)

**Related Concepts:**

- *Ruppia maritima* Acadian-Virginian Zone Temperate Herbaceous Vegetation (Bartgis 1986) =
- *Ruppia maritima* Herbaceous Vegetation (Bowman 2000) =
- *Ruppia maritima* Semipermanently Flooded - Tidal Herbaceous Vegetation (Fleming et al. 2006) =
- *Ruppia* Community (Moore et al. 2000) ?
- Polyhaline subtidal aquatic bed (Breden 1989) ?
- Southern New England & Gulf of Maine Saline/ Brackish Subtidal Estuarine Community (Rawinski 1984) ?
- *Spartina* Saltmarsh (Gawler 2002) B
- Tidal Mesohaline - Polyhaline Aquatic Bed (Harrison 2004) B
- Tidal Mesohaline / Polyhaline Aquatic Bed (Fleming and Coulling 2001) B

**Classification Comments:** *Ruppia maritima* tends to occur in shallower and slightly less saline waters than *Zostera marina* (Orth and Moore 1988). The range of this type is consistent with the “Virginia Province” and “Acadian Province” of Cowardin et al. (1979).

**CONSERVATION RANKING**

**GRank:** GNR (1997-12-1) **Reasons:**

**ELEMENT DISTRIBUTION**

**Range:** This association occurs along the mid- and north Atlantic coast from Maine to North Carolina.

**Subnations:** CT, DE, MA, MD, ME, NC?, NH, NJ, NY, RI, VA

**TNC Ecoregions:** 57:?, 58:C, 62:C, 63:C

**USFS Ecoregions:** 212Db:CCP, 221Aa:CCC, 221Ab:CCC, 221Ac:CCC, 221Ad:CCC, 221Ae:CCP, 221Af:CCC, 221Ak:CCC, 221Ba:CCP, 232Aa:CCC, 232Ab:CCC, 232Ac:CCC, 232Br:CCC, 232Bx:CCC, 232Bz:CCC, 232Ch:CCC, 232Ci:CC?

**Federal Lands:** NPS (Assateague Island, Cape Cod); USFWS (Back Bay?, Cape May, Monomoy?, Parker River?)

**ELEMENT SOURCES**

**References:** Bartgis 1986, Bowman 2000, Breden 1989, Breden et al. 2001, Cowardin et al. 1979, Eastern Ecology Working Group n.d., Edinger et al. 2002, Enser 1999, Fleming 2001a, Fleming and Coulling 2001, Fleming et al. 2001, Fleming et al. 2006, Gawler 2002, Harrison 2004, Metzler and Barrett 2001, Metzler and Barrett 2004, Moore et al. 2000, Orth and Moore 1988, Rawinski 1984, Reschke 1990, Schafale and Weakley 1990, Sperduto 2000a, Sperduto 2000b, Swain and Kearsley 2001, Thayer et al. 1984

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**ZOSTERA MARINA PERMANENTLY FLOODED - TIDAL HERBACEOUS ALLIANCE (A.1766)**

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**SEAWRACK PERMANENTLY FLOODED - TIDAL HERBACEOUS ALLIANCE**

**Alliance Summary:** This alliance includes subtidal aquatic beds characterized by *Zostera marina*. These communities usually occur in quiet waters below the lowest tide level and where fluctuations in salinity are minor. Substrate ranges from soft mud to coarse sand. Light availability is the primary limiting factor in occurrences of this alliance, within the geographic, temperature, and salinity range (10-30 ppt) of *Zostera marina*. The long leaves of *Zostera marina* provide substrate for epiphytic organisms such as macroalgae, bay scallops, and other marine invertebrates, as well as nursery and/or adult habitat for fin fish. Characteristic associate nonvascular plants (algae) include *Ulva lactuca*, *Enteromorpha* spp., and *Polysiphonia* spp.

**ZOSTERA MARINA HERBACEOUS VEGETATION (CEGL004336)**

Seawrack Herbaceous Vegetation

North Atlantic Eel-grass Bed

**ELEMENT CONCEPT**

**Summary:** These aquatic beds occur in the subtidal zone along the north Atlantic coast, south to North Carolina. *Zostera marina* is dominant and occurs most often in nearly pure stands. *Ruppia maritima* can occur sporadically in this association, especially as waters become less saline. Additional associated species include macroalgae, especially *Ulva lactuca*, *Enteromorpha* spp., *Cladophora* spp., and *Polysiphonia* spp. Where water is less saline, *Enteromorpha*, *Chaetomorpha*, *Gracilaria*, *Agardhiella*, *Ectocarpus*, and *Pilayella* 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.

**Environment:** These aquatic beds occur in the subtidal zone of coastal habitats on substrate ranging from soft mud to coarse sand. 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, and salinity levels are in the mid to high range (Thayer et al. 1984).

**Vegetation:** *Zostera marina* is dominant and occurs in nearly pure stands. *Ruppia maritima* can occur sporadically in this association, especially as waters become less saline. Additional associated species are macroalgae, especially *Ulva lactuca*, *Enteromorpha* spp., *Cladophora* spp., and *Polysiphonia* spp. Where water is less saline, *Enteromorpha*, *Chaetomorpha*, *Gracilaria*, *Agardhiella*, *Ectocarpus*, and *Pilayella* can occur.

**Dynamics:** Eel-grass beds tend to stabilize and enrich substrate and provide habitat for epiphytes and other marine organisms.

**Similar Associations:**

- *Ruppia maritima* Acadian/Virginian Zone Temperate Herbaceous Vegetation (CEGL006167)--may co-occur in some regions of the Atlantic coast, but grows almost exclusively in brackish water.

**Related Concepts:**

- *Zostera* Community (Moore et al. 2000) ?
- Coastal Salt Pond (Rawinski 1984) ?
- Polyhaline subtidal aquatic bed (Breden 1989) ?
- Southern New England & Gulf of Maine Saline/ Brackish Subtidal Estuarine Community (Rawinski 1984) ?
- Tidal Mesohaline - Polyhaline Aquatic Bed (Harrison 2004) B
- Tidal Mesohaline / Polyhaline Aquatic Bed (Fleming and Coulling 2001) B

**Classification Comments:** According to Thayer et al. (1984) *Zostera marina* has a range of approximately 3090 km along the North American Atlantic coast which may be represented as 4 smaller subregions. The bulk of the southern range corresponds with the Virginian Zone of Cowardin et al. (1979). *Zostera marina* is extirpated from Delaware.

**CONSERVATION RANKING**

**GRank:** G4G5 (2006-1-19) **Reasons:** This vegetation has a wide distribution, in coastal waters from Maine to North Carolina. It occurs in large patches in sheltered near-shore estuarine waters. This vegetation is vulnerable to pollution from coastal run-off as well as oil spills off the coast.

**ELEMENT DISTRIBUTION**

**Range:** This community occurs in subtidal habitat along the north and mid-Atlantic coast.

**Subnations:** CT, MA, MD, ME, NC, NH, NJ, NY, RI, VA

**TNC Ecoregions:** 57:C, 58:C, 62:C, 63:C

**USFS Ecoregions:** 212Db:CCC, 212Dc:CCC, 221Aa:CCC, 221Ab:CCC, 221Ac:CCC, 221Ad:CCC, 221Ak:CCC, 221Ba:CCP, 232Aa:CCC, 232Ab:CCC, 232Ad:CCP, 232Af:CCC, 232Br:CCC, 232Bx:CCC, 232Bz:CCC, 232Ci:CCC, 232Cj:CCC

**Federal Lands:** NPS (Assateague Island); USFWS (Monomoy)

**ELEMENT SOURCES**

**References:** Berdine 1998, Bowman 2000, Breden 1989, Breden et al. 2001, Cowardin et al. 1979, Eastern Ecology Working Group n.d., Edinger et al. 2002, Enser 1999, Fleming 2001a, Fleming and Coulling 2001, Fleming et al. 2001, Harrison 2004, Harrison and Stango 2003, Metzler and Barrett 2001, Metzler and Barrett 2004, Moore et al. 2000, Orth and Moore 1988, Rawinski 1984, Reschke 1990, Sperduto 2000a, Sperduto 2000b, Swain and Kearsley 2001, Thayer et al. 1984

## VII. Sparse Vegetation

### VII.C.1.N.A. DUNES WITH SPARSE HERBACEOUS VEGETATION

#### HERBACEOUS DUNES SPARSELY VEGETATED ALLIANCE (A.1855)

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#### HERBACEOUS DUNES SPARSELY VEGETATED ALLIANCE

**Alliance Summary:** This is technically not an alliance. It is a placeholder for a group of sparsely vegetated associations that do not have adequate vegetation descriptions, but do share certain substrate characteristics.

### VII.C.2.N.A. SAND FLATS

#### CAKILE EDENTULA SPARSELY VEGETATED ALLIANCE (A.1861)

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#### AMERICAN SEAROCKET SPARSELY VEGETATED ALLIANCE

**Alliance Summary:** Annual-dominated sand flats on island end flats and upper ocean beaches, within the reach of storm tides and extreme lunar tides. This alliance has less perennial species than the related *Cakile constricta* Sparsely Vegetated Alliance (A.1860), since the Atlantic Coast shoreline is a higher-energy system, and the alliance is more dynamic and more frequently disturbed. Vegetative cover is variable, depending on the amount of exposure to wave and wind action, but on average is sparse; no species can be considered dominant. Annual or biennial species more or less restricted to beach habitats are characteristic of this alliance, including *Cakile edentula ssp. edentula*, as well as *Salsola kali ssp. kali* (= *Salsola caroliniana*), *Chamaesyce polygonifolia*, *Honckenia peploides*, *Cenchrus tribuloides*, *Amaranthus retroflexus*, *Chenopodium album*, *Erechtites hieraciifolia*, and *Atriplex cristata* (= *Atriplex arenaria*). Associated species include *Ammophila breviligulata*, *Chamaesyce polygonifolia*, *Salsola kali ssp. kali*, and *Triplasis purpurea*. At Assateague Island National Seashore, this alliance is sparsely vegetated with *Cakile edentula ssp. edentula*, covering approximately 1% of the area. Other associated species in this alliance are just as sparse and generally adapted to a low growth form, given the exposed windy conditions of their environment. The South Atlantic Coast phase of this alliance occupies the upper portion of ocean beaches in the southern part (Cape Hatteras, North Carolina, to Cape Romain, South Carolina) of the microtidal region (barrier islands with coastal geomorphology dominated by hurricane overwash rather than tidal energy). Other characteristic species include mostly annual herbs, such as *Chamaesyce polygonifolia*, *Chamaesyce bombensis*, *Sesuvium portulacastrum*, *Salsola kali ssp. kali*, and the rare *Amaranthus pumilus*. In addition to the two associations in the Southeast, there is also an association in the Great Lakes; in this association the dominant plant is *Cakile edentula var. lacustris*.

#### CAKILE EDENTULA SSP. EDENTULA - CHAMAESYCE POLYGONIFOLIA SPARSE VEGETATION (CEGL004400)

American Searocket - Northern Seaside Spurge Sparse Vegetation

North Atlantic Upper Ocean Beach

#### ELEMENT CONCEPT

**Summary:** This is a sparsely vegetated upper beach community occurring on unstable sands and often gravels and cobbles just above mean high tide on maritime beaches and foredunes along the middle and northern Atlantic coast. This association occurs at the wrack line; there is regular deposition of wave-deposited flotsam. They are irregularly flooded by spring or storm tides. Vegetation cover is variable, depending on the amount of exposure to wave and wind action, but is generally sparse and characterized by annuals and biennials. Species composition can change dramatically from year to year but frequently includes *Cakile edentula ssp. edentula*, as well as *Salsola kali ssp. kali* (= *Salsola caroliniana*), *Chamaesyce polygonifolia*, *Honckenia peploides*, *Cenchrus tribuloides*, *Amaranthus retroflexus*, *Chenopodium album*, *Erechtites hieraciifolia*, *Xanthium strumarium*, and *Atriplex cristata* (= *Atriplex arenaria*). Globally rare species such as *Polygonum glaucum* and *Amaranthus pumilus* occur in this habitat. Sparse *Ammophila breviligulata* can occur sporadically as a common associate, colonizing from the adjacent beachgrass community. Diagnostic species are *Cakile edentula ssp. edentula*, *Salsola kali ssp. kali*, *Atriplex cristata* (= *Atriplex pentandra*), and *Chamaesyce polygonifolia*. This community occurs in maritime coastal areas from southern Maine to Cape Hatteras, North Carolina.

**Environment:** This association occurs on unstable sands and often gravels and cobbles just above mean high tide on beaches and foredunes washed over by spring and storm tides and impacted by wind erosion.

**Vegetation:** This is a sparsely vegetated association characterized by annuals and biennials. Species composition is variable, but frequently includes *Cakile edentula* ssp. *edentula*, *Honckenya peploides*, *Salsola kali* (= *Salsola caroliniana*), *Atriplex patula*, *Cenchrus tribuloides*, *Chamaesyce polygonifolia*, *Atriplex cristata* (= *Atriplex arenaria*, = *Atriplex pentandra*), *Xanthium strumarium*, and *Chenopodium* spp. Globally rare species such as *Polygonum glaucum* and *Amaranthus pumilus* occur in this habitat. *Ammophila breviligulata* can occur sporadically, colonizing from the adjacent beachgrass community. Additional infrequent species can include *Chenopodium rubrum*, *Chenopodium album*, *Chenopodium berlandieri* var. *macrocalycium*, *Cyperus filicinus*, *Triplasis purpurea*, and *Sesuvium maritimum*. Bare substrate can comprise greater than 95% cover in this association.

**Dynamics:** This association occurs at the wrack line; there is regular deposition of wave-deposited flotsam. It is irregularly flooded by very high tides, scoured by storm tides, and is constantly reworked by wind. Species composition is dominated by annuals and biennials and can change dramatically from year to year. If the habitat is protected from regular disturbance, perennial-dominated dune grass communities tend to develop.

**Similar Associations:**

- *Cakile edentula* Great Lakes Shore Sparse Vegetation (CEGL005162)
- *Cakile edentula* ssp. *edentula* - *Mertensia maritima* Sparse Vegetation (CEGL006106)
- *Cakile edentula* ssp. *harperi* Sparse Vegetation (CEGL004401)

**Related Concepts:**

- *Cakile edentula* - *Chenopodium album* community (Metzler and Barrett 1992) =
- *Cakile edentula* ssp. *edentula* Sparse Vegetation (Clancy 1996) ?
- *Cakile edentula* ssp. *edentula* - *Salsola caroliniana* Sparse Vegetation (Bartgis 1986) =
- *Cakiletum edentula* (Conard 1935) =
- Beach (Higgins et al. 1971) =
- Beach (McDonnell 1979) =
- Beach (Fender 1937) =
- Beach Strand (Gawler 2002) B
- Beach community (Baumann 1978b) =
- Beach community (Johnson 1985b) ?
- Beach community (Hill 1986) =
- Beach strand community (MENHP 1991) =
- Beach vegetation (Moul 1973) =
- Coastal Beach and Overwash Flat (Harrison 2004) B
- Coastal beach strand (Sperduto 1994) =
- Coastal beach strand community (Rawinski 1984) ?
- Dune and swale community (Stalter 1990) B
- Dune community (Jenkins 1974) =
- Dune-strand area (Clovis 1968) =
- Embryo dune (Klotz 1986) =
- Marine intertidal gravel/sand beach community (Breden 1989) =
- Marine sandy beach (Clancy 1993b) =
- Maritime beach (Reschke 1990) =
- Middle beach (Shreve et al. 1910) =
- Middle beach (Nichols 1920) =
- Pioneer beach community (Boule 1979) =
- Sea-strand vegetation, beach formation (Harshberger 1900) =
- Upper Beach (Schafale and Weakley 1990) B
- Upper Beach / Overwash Flat (Fleming and Coulling 2001) B

**Classification Comments:** This community is common on maritime dunes of the Northeast but is vulnerable to development and shifting wave action due to jetties. J. Harrison (pers. comm. 2006): “In the Chesapeake Marshlands, in Maryland, a small patch of this vegetation was observed on South Marsh Island [see Observation Point CM-15]. Please note many of the associated “maritime” species are not present in the refuge. Although not as well-developed in estuarine environments, consider expanding concept to include narrow sandy shorelines on bay islands.”

**CONSERVATION RANKING**

**GRank:** G4G5 (1997-12-1) **Reasons:**

**ELEMENT DISTRIBUTION**

**Range:** This association ranges from southern Maine to North Carolina.

**Subnations:** CT, DE, MA, MD, ME, NC, NH, NJ, NY, RI, VA

**TNC Ecoregions:** 57:C, 58:C, 62:C

**USFS Ecoregions:** 221Ab:CCC, 221Ac:CCC, 221Ak:CCC, 232Aa:CCC, 232Ab:CCC, 232Ac:CCC, 232Bz:CCC, 232Ch:CCC, 232Ci:CCC

**Federal Lands:** NPS (Assateague Island, Boston Harbor Islands, Cape Cod, Cape Hatteras, Fire Island, Gateway, Sagamore Hill); USFWS (Back Bay, Cape May, Chesapeake Marshlands, E.B. Forsythe, Monomoy, Muskeget Island, Parker River)

**Element Sources**

**References:** Bartgis 1986, Baumann 1978b, Berdine 1998, Boule 1979, Bowman 2000, Breden 1989, Breden et al. 2001, Clancy 1993b, Clancy 1996, Clovis 1968, Conard 1935, Dowhan and Rozsa 1989, Eastern Ecology Working Group n.d., Edinger et al. 2002, Enser 1999, Fender 1937, Fleming and Coulling 2001, Fleming et al. 2001, Gawler 2001, Gawler 2002, Godfrey et al. 1978, Harrison 2004, Harshberger 1900, Higgins et al. 1971, Hill 1986, J. Harrison pers. comm., Jenkins 1974, Johnson 1985b, Klotz 1986, MENHP 1991, McDonnell 1979, Metzler and Barrett 1992, Metzler and Barrett 2001, Moul 1973, Nichols 1920, Rawinski 1984, Reschke 1990, Schafale and Weakley 1990, Shreve et al. 1910, Sperduto 1994, Sperduto 2000a, Sperduto 2000b, Stalter 1990, Swain and Kearsley 2001

## **Dune Blowout**

**ELEMENT CONCEPT**

**Summary:** Dune blowouts are unvegetated depressions on active coastal sand dunes where high winds have removed significant portions of sand. They can be ephemeral landscape features that become revegetated, but can also persist and even grow in size if exposure to high winds persists.

**Environment:** This feature occurs on unstable sands of foredunes or backdunes.

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