LANDFIRE Biophysical Setting Model

Biophysical Setting 7516680 Temperate Pacific Tidal Salt and Brackish Marsh

☑ *This BPS is lumped with: Temperate Pacific Intertidal Flat*

☐ *This BPS is split into multiple models: Intertidal Flats are modeled with the Tidal Salt and Brackish Marsh because of their successional relationship and because Intertidal Flats may be barren and therefore not mappable as BpS.*

General Information

Contributors (also see the Comments field **Date** 4/1/2008

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Modeler 2			**Reviewer**		
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Vegetation Type
Wetlands/Riparian

Map Zone
75

Model Zone
☑ Alaska ☐ N-Cent.Rockies
☐ California ☐ Pacific Northwest
☐ Great Basin ☐ South Central
☐ Great Lakes ☐ Southeast
☐ Northeast ☐ S. Appalachians
☐ Northern Plains ☐ Southwest

Dominant Species*
CALY3 PUCCI
POEM SALIC
AREG TRMA4
DECA18 CARA4

General Model Sources
☑ Literature
☐ Local Data
☑ Expert Estimate

Geographic Range
This system is found along the North Pacific coastline from Prince William Sound through southeast AK.

Biophysical Site Description
The following paragraph was taken from the draft Boreal Ecological Systems description (NatureServe 2008a):
Tidal marshes often have sediment inputs from a freshwater source. The surface gradients are flat. Progradation of the tidal marsh front will occur if sedimentation exceeds erosion. Tidal marshes represent the area of transition from maritime to freshwater terrestrial systems and encompass a complex range of plant communities and ecotones including marshes and herbaceous or barren mudflats. They also feature a range of salinity conditions from saline to nearly fresh. (Tidal marshes in large bays with a high volume of freshwater input, such as Nushagak Bay or Turnagain Arm, may be entirely fresh.) Soils are silts and clays and are periodically inundated by tidal fluctuation. The frequency of flooding may vary from twice daily (lower salt marsh) to once per growing season (upper coastal marsh). Tidal marshes have a limited distribution along the Gulf of AK and BC coastline due to the topography and geomorphology of the coast, which features steep slopes and deep fjords and offers limited protection from wave action (National Wetland Working Group 1988).

Tidal flats form a narrow band along oceanic inlets, and are more extensive at the mouths of larger rivers. Algae are the dominant vegetation on mudflats where little vascular vegetation is present due to the twice daily tidal flooding of salt or brackish water. The dominant processes are tectonic uplift or subsidence,

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isostatic rebound and sediment deposition.

Vegetation Description

The following information was taken from the draft Maritime Ecological Systems description (NatureServe 2008b):
Coastal marshes are often dominated by a near monotypic stand of Carex lyngbyaei. These sites often form an ecotone with freshwater wetlands (Viereck et al. 1992). Higher salt marshes often feature Carex ramenskii, Poa eminens, Argentina egedii and Deschampsia caespitosa. Frequently inundated lower salt marshes may feature any of the following species: Puccinellia spp., Salicornia spp., Triglochin maritimum, Plantago maritima, Cochlearia officinalis, Spergularia canadensis, Honckenya peploides or Glaux maritima (Viereck et al. 1992).

Disturbance Description

Common disturbances in the marsh and mudflat system can include freshwater and tidal flooding, storm surge and ice shove.

The following was taken from the draft Ecological Systems Description (NatureServe 2008a) for this type: Primary succession on the tidal marsh will progress through a series of stages leading from pioneer species establishing on the newly exposed tide flats to a marsh with creeks, levees and ponds. Pioneer species such as Cochlearia spp., Triglochin maritimum, Plantago maritima, Puccinellia pumila and Carex lyngbyaei first establish on the tide flats. The newly established vegetation slows the water, allowing for sediment deposition. Water slowed at the edges of swards causes high rates of deposition, typically of coarser sediments. Less sediment is available for deposition in the middle of the sward or marsh further removed from the channel. These differential accretion rates, and stabilization by the vegetation, leads to the formation of levees (on the edge of the swards and channels) and ponds. The soil surface will continue to increase relative to the mean high tide because of accretion. Because soil surface height is a function of water height, it eventually equilibrates at or above mean high tide or the height of the backed up river channels.

Tidal creeks are formed through a combination of previously established drainage patterns and to the coalescing of adjacent swards of vegetation (Steers 1977), primarily Carex lyngbyaei, for regions of the northern Pacific coast. The creeks become more entrenched as the surface height increases.

The progradation of the marsh front will be partially limited by water depth. As stated by Batten and others (1978) "precise leveling done by NOS (National Oceanic Survey) at three study sites (in the Gulf of Alaska) shows that the marshes do not extend far seaward of mean higher high water (MHHW). Generally, only a few tufts of Puccinellia nutkaensis and other halophytes are present at MHHW and transition to the luxuriant stands of Carex lyngbyaei that constitute the bulk of most marshes occurs substantially above this mark."

Adjacency or Identification Concerns

Native Uncharacteristic Conditions

Cotula coronopifolia, an invasive plant that infests tidal flats, is found in large areas of southeast AK. It is suspected to be carried by birds, will likely never be eradicated and has the potential to invade across the region in time.

Scale Description

Small patch

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Issues/Problems

It is unclear what the proportion of the landscape in each class and the disturbance probabilities should be.

Comments

This system was created for the maritime region and did not receive review for other regions in the state.

The model description was developed based on information from the Ecological Systems description (NatureServe 2008a, NatureServe 2008b). Amy Miller provided input on the description and the VDDT model and Karen Dillman reviewed the model.

Vegetation Classes

Class A 60 %

Early Development 1 All Structures

Upper Layer Lifeform

- [x] Herbaceous
- [ ] Shrub
- [ ] Tree

Indicator Species* and Canopy Position

COCHL4 Upper
TRMA4 Upper
PLMA3 Upper
PUPU3 Upper

Structure Data (for upper layer lifeform)

	Min	Max
Cover	Herbaceous	Herbaceous
Height	Herbaceous	Herbaceous
Tree Size Class	None	

☐ Upper layer lifeform differs from dominant lifeform.

Class A should be distinguished from class B based on existing vegetation type.

Description

0-49yrs

Herbaceous Mudflat. This class includes barren or vegetated mudflats. Common species include Cochlearia spp., Triglochin maritimum, Plantago maritima, Puccinellia pumila and Carex lyngbyei.

Succession to class B. Tidal flooding that removes vegetation (probability = 0.0067), represented by Option 1 in the model, resets the age of this class. Annual flooding maintains this class but was not modeled.

Class B 40 %

Late Development 1 All Structures

Upper Layer Lifeform

- [x] Herbaceous
- [ ] Shrub
- [ ] Tree

Indicator Species* and Canopy Position

CALY3 Upper
POEM Upper
PUCCI Upper
SALIC Upper

Structure Data (for upper layer lifeform)

	Min	Max
Cover	Herbaceous	Herbaceous
Height	Herbaceous	Herbaceous
Tree Size Class	None	

☐ Upper layer lifeform differs from dominant lifeform.

Class B should be distinguished from class A based on existing vegetation type.

Description

50yrs+

Tidal Marsh. Tidal marshes are often dominated by Carex lyngbyei. Higher salt marsh vegetation may include Carex ramenskii, Poa eminens, Argentina egedii and Deschampsia caespitosa. Frequently inundated lower salt marshes may include any of the following species: Puccinellia spp., Salicornia spp., Triglochin

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maritimum, Plantago maritima, Cochlearia officinalis, Spergularia canadensis, Honckenya peploides or Glaux maritima (Viereck et al. 1992).

This class can persist in the absence of disturbance. Tidal flooding that removes vegetation (probability = 0.0033), represented by Option 1 in the model, resets the age of this class. Annual flooding maintains this class but was not modeled.

Class C **0 %**

[Not Used] [Not Used]

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Indicator Species* and Canopy Position

Structure Data (for upper layer lifeform)

	Min	Max
Cover		
Height		
Tree Size Class		

☐ Upper layer lifeform differs from dominant lifeform.

Description

Class D **0 %**

[Not Used] [Not Used]

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Indicator Species* and Canopy Position

Structure Data (for upper layer lifeform)

	Min	Max
Cover		
Height		
Tree Size Class		

☐ Upper layer lifeform differs from dominant lifeform.

Description

Class E **0 %**

[Not Used] [Not Used]

Upper Layer Lifeform

☐ Herbaceous
☐ Shrub
☐ Tree

Indicator Species* and Canopy Position

Structure Data (for upper layer lifeform)

	Min	Max
Cover		
Height		
Tree Size Class		

☐ Upper layer lifeform differs from dominant lifeform.

Description

Disturbances

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Fire Regime Group:** NA

Historical Fire Size (acres)

Avg 0
Min 0
Max 0

Sources of Fire Regime Data

- ☐ Literature
- ☐ Local Data
- ☑ Expert Estimate

Fire Intervals	Avg FI	Min FI	Max FI	Probability	Percent of All Fires
Replacement					
Mixed					
Surface					
All Fires					

Fire Intervals (FI):

Fire interval is expressed in years for each fire severity class and for all types of fir combined (All Fires). Average FI is central tendency modeled. Minimum and maximum show the relative range of fire intervals, if known. Probability is the inver of fire interval in years and is used in reference condition modeling. Percent of all fires is the percent of all fires in that severity class.

Additional Disturbances Modeled

- ☐ Insects/Disease
- ☐ Native Grazing
- ☑ Other (optional 1) tidal flooding
- ☐ Wind/Weather/Stress
- ☐ Competition
- ☐ Other (optional 2)

References

Batten, A.R., S Murphy and D.F. Murray. 1978. Definition of coastal wetlands by floristic criteria. USEPA no. 804965-01. US Environmental Protection Agency, Corvalis Environmental Research Laboratory, Corvalis, OR. 490 pp.

National Wetlands Working Group. 1988. Wetlands of Canada. Ecological Land Classification Series No. 24. Sustainable Development Brach, Environment Canada, Ottawa, Ontario, and Polyscience Publications Inc., Montreal, Quebec. 452 pp.

NatureServe. 2008a. International Ecological Classification Standard: Terrestrial Ecological Classifications. Draft Ecological Systems Description for Alaska Boreal and Sub-boreal Regions.

NatureServe. 2008b. International Ecological Classification Standard: Terrestrial Ecological Classifications. Draft Ecological Systems Description for the Alaska Maritime Region.

Steers, J.A. 1977. Physiography. In: Chapman, V.J. ed. Wet coastal ecosystems. Amsterdam, NY. Elsevier: 31-60.

Viereck et al. 1992. The Alaska vegetation classification. Pacific Northwest Research Station, USDA Forest Service, Portland, OR. Gen. Tech. Rep. PNW-GTR286. 278 pp.

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