Coastal Prairie
Composition, Structure, and Ecology

What is the Conventional Coastal Prairie?
• A.k.a. Fescue-Oatgrass, coastal perennial grassland, bald-hills prairie, part of North Coastal Grassland
• Has affinities to the grasslands of central and eastern Oregon and the Palouse Prairie of eastern Washington (cool season, moist)
• Species richness and the amount of cover still provided by natives are higher along the coast than in the Central Valley
• Ranchers as early as the 1820s also recognized that forage productivity was higher than in the Central Valley

Is it a Prairie?
• An extensive area of flat or rolling, predominantly treeless grassland, especially the large tract or plain of central North America
• French, from Old French prairie, from Vulgar Latin *prâtâria*, from Latin prâta, meadow.
• Level or rolling grassland, especially that found in central North America. Decreasing amounts of rainfall, from 40 in. (100 cm) at the forested eastern edge to less than 12 in. (30 cm) at the desertlike western edge, affect the species composition of the prairie grassland. The vegetation is composed primarily of perennial grasses, with many species of flowering plants of the pea and composite families. The three main types of prairie are the tallgrass prairie, midgrass, or mixed-grass, prairie; and shortgrass prairie, or shortgrass plains. Coastal prairie, Pacific or California prairie, Palouse prairie, and desert plains grassland are covered primarily with combinations of mixed-grass and shortgrass species.*

Issues of Clarification
• How do we individuate it from other native CA grasslands?
• How do we individuate it from non-native coastal grassland (annual and perennial)?
• How do we tease out seral relationships with woody vegetation such as coastal scrub and coniferous forest?
• How do we think about its conservation?

Different Perspectives on Coastal Prairie Provide Different Answers
• Broad regional perspectives
• Sub-regional perspectives
• Local perspectives

Todd Keeler-Wolf, presenter
Elkhorn Slough Coastal Training Program
West to East gradient of wet-dry underscores more moisture availability throughout growing season (Pt. Reyes to Petaluma; NAIP June 2005)

Why Grassland along the California Coast?
A Paradox?
- Moist temperate climate
- Sufficient rainfall for trees and shrubs
- Predominant surrounding vegetation is woody

Why Grassland along the California Coast?

Many stands are the result of clearing and long-term grazing

Salt Spray is a Factor
- Salt-laden on-shore breezes most of year
- Salt causes embolism in plant cells
- Results in flagging and reduction of stature of woody plants
- Insufficient moisture year round to remove salts from foliage
- Grasses tolerate foliar salt relatively well

Succession Happens
- Baccharis pilularis, Lupinus arboreus, and other coastal shrubs are relatively short-lived
- A natural cycle of small patch dynamics, individual shrubs die, herbs colonize
- Grazing and browsing is important for maintaining many stands, but how much or how little?
Natural and human-caused fire maintains coastal prairie.

Calamagostis nutkaensis will not persist in areas where forest is the natural lifeform.

Where do stable, “old growth” coastal grasslands exist?

How can quantitative classification help understand coastal prairie?

• Determine the rules of membership of general types, e.g., grassland vs. shrubland
• Determine rules of membership of specific types, e.g., alliances and associations.
• Understand environmental factors which distinguish different types
• Establish rules for change detection and site quality

What is a Grassland or “Herbland”?

• Vegetation averages < 10% uniform cover of woody plants and at least 10% of grass, grass-like, or other herbaceous plants.
• Vegetation dominated by grasses or grass-like plants, and/or forbs.
• Species may be annual, and/or perennial.
• Vegetation is not permanently wet during the growing season (not a marsh).
Sub-regional Perspective on California oatgrass alliance from releve analysis

Hierarchy of classification: a broad perspective

Coastal prairie comes from several parts of the classification

Some coastal grasslands are Mediterranean

Group - Naturalized acidophytic Mediterranean
  - Dactylis glomerata

Group - Mediterranean coastal grasslands and others
  - Dactylis glomerata

Group - Northern California coastal grasslands
  - Dactylis glomerata

Group - Danthonia californica grows deeper, moist soils
  - Dactylis glomerata

Group - Nassella pulchra grows shallower, droughty soils
  - Dactylis glomerata

But they can be sympatric

Nassella pulchra, shallow, droughty soils

Danthonia californica, deeper, moist soils
Where and how do you draw the line?

- Wetland/marsh types
- Moist grasslands
- Salt meadows
- Are these part of coastal prairie?

Scirpus californicus marsh is not CP

But Deschampsia caespitosa, a classic CP type, occurs on the outer edge of marsh in the Delta and other areas.

Saltgrass meadows: are they part of the CP matrix?

June vegetation includes several native grass-dominated types (Leymus mollis). Should they be considered coastal prairie?

Is this Juncus balticus-Argentina anserina stand a CP grassland?
Some Carex obnupta stands are wetlands.

Some are relatively dry.

Quantitative cluster analysis of 365 Point Reyes Vegetation sample plots:

- Carex vegetation (65)
- Most coastal grasslands (40)
- Freshwater wetland (6)
- Salt marsh (151)
- Elymus glaucus dominated by willow (80)
- Mosaic of salicornia, willows (65)

Bald-hills grassland (*Festuca idahoensis*) inner Mendocino Co.

Portion of sub-regional analysis of grasslands in Santa Cruz Mountains (Johnson 1994):

- *Elymus glaucus* forms small stands in woodland and scrub openings.
Ecology and Conservation of California's Coastal Prairie

June 25th, 2009

Unlike many California Vegetation Stands Coastal Prairie is not usually defined by sharp natural environmental breaks.

A Habitat, or a Community?

- Coastal Prairie is not just one thing
- It is an amalgamation of communities
  - Small patch size
  - Different successional histories
  - A combination of stands driven by hard variables
    - Soil moisture
    - Soil depth
    - Soil texture
    - Temperature
  - Model of small patch dynamics
    - Landslides
    - Canopy light gaps
    - Salt exposure
    - Fire history
    - Browsing and grazing history
    - Human clearing history

Most stands have internal heterogeneity

- Exotic invasives
- Baccharis pilularis
- Juncus patens
- Matrix of Danthonia
How mapping from air photos can help

- Identify locations of prairie
- Landscape level monitoring
- Identifying range of conditions within a coastal prairie matrix

Pomponio State Beach, B&W aerial photo Oct. 29, 1991

May 19, 2007
15.5 years later

Dec. 30, 2005

December 3, 2004
**Pteridium aquilinum** patches are common

Edges of old pastures are often blurred by shrub succession

*Nassella lepida* upper slope clay lenses, Santa Monica Mtns., Ventura Co.
Review of salient characteristics

- Not one vegetation, an assemblage of types
- Defined by relatively high moisture conditions
- Successional relationships to scrub and forest/woodland, the greatest acreage is seral, not stable
- Some types range in similarity from nearly salt and freshwater marsh to upland scrub and woodlands
- Diversity is due to patchy (seral) nature and intermediate moisture and temperature conditions
- Most stands are small
  - Narrow strips based on sharp gradients (e.g., moisture, salinity)
  - Stands limited by natural landscape (e.g., terraces, soil lenses, cliffs)
  - Stands based on small patch dynamics (e.g., clearing, fire, browsing/grazing intensity)

We only partially understand the vegetation of the coastal grasslands

No sampling and analysis of natural variation along the coast or middle North Coast Ranges north of Point Reyes

Alliances without good concepts:
- Festuca californica
- Festuca idahoensis
- Melica torreyana
- Melica californica
- Elymus glaucus
- Elymus multisetus
- Bromus carinatus
- Nassella lepida
- Hordeum brachyantherum

Native grassland:
It’s not about cover, but constancy

Non-native Grasslands

- Perennial (planted for pasture, sustained by higher average moisture than interior CA; diverse and pugnacious)
- Annual (some shared with the interior of the state, but some are more directly related to the coastal moist environment)
- Variable as threats to native biodiversity (some may be reservoirs of nativity)
- Need to understand them and know their ecologies

Some of the rarest native CTP types are among the least understood

Festuca rubra grassland, Pt. Tom, Marin Co.
Festuca rubra, stabilized sand stand, Humboldt Co.
Conclusions

- Sampling and description can greatly assist our understanding of CP
- Vegetation analysis has revised and refined its definition
- Mapping CP can benefit from a good understanding of the underlying ecology
- Definitions and mapping should be done locally and not rely on broad scale concepts

Conservation of coastal prairie should:

- Be based on an understanding of the transitional nature of much of the habitat
- Include understanding of local variation in stands and transitional nature of stands to others of scrub, woodland, and forest
- Not focus on maintaining large homogeneous patches of grassland, but more on fine scale matrix of stages and adjacent vegetation
- Worry less about native purity and more about sustaining and maintaining a naturally functioning matrix of scrub, grassland, and in some cases, forest in a small landscape context