Slide 1

Coastal Communities

Lecture 26

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Learning Outcomes

- · The coastal strand
- Sand dunes
- · Coastal Prairie
- Coastal
 Saltmarshes



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Slide 3 Slide 4

Coastal Climate

- Mild temperatures
- · Little daily or seasonal variation
- Long Growing Season 350 days
- Wind
- Fog



Coastal Constraints

- Low water retention capacity of sand
 Shifting sands can expose roots
 High salt content
 Wind exposure
 Intense sunlight and heat

- Insolation
- Many parallels with desert ecosystems



Slide 5 Slide 5

Setting Down Roots

- · American Dune Grass
- · Leymus mollis
- · European Beach Grass
- · Ammophilla arenaria
- Send out creeping rhizomes
- Vegetative propagation
- · Hold sands in place





Plant Adaptations to Coastal Strand

- Perennials
- Not sufficient nutrients/water/energy to complete annual life cycle
- Prostate form
- Avoid wind exposure
- · Grey/hairy appearance
- Reduce water loss and reflect heat
- · Silky Beach Pea
- Succulent leaves
- · Powdery Dudleya





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Slide 7 Slide 8

Sand Dune Flora

- Adaptations to withstand
 - Heat
 - Salt
 - Insolation
 - Waterstress
 - Lack of nutrients
- Yellow Sand VerbenaAbronia latifolia
- Beach Sandwort
- beach Janawoi
- Artemesia pycnocephala



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Dune Slacks Dune Slack Grey Dune management Dune management Scrub

- · Areas between dunes
- · Wetter than dunes
- · Fluctuating water table
- Seasonal waterlogging
- · More rapid development of soil
- · Different microclimate supports unique plants

Slide 9 Slide 10

Vegetative Propagation

- · Harsh climate
- Lack of:
- · Soil nutrients
- Soil Water
- Difficult for annual plants to germinate and flower in one season
- Perennial plants
- Vegetative reproduction
- · Rhizomes/ stolons



Hottentot Fig

- Carpobrotus edulis
- Introduced from South Africa to stabilize soil along railway tracks 1900
- Spreads by seeds and fragmentation
- Crowds out native plants
 - Chorizanthe howellii
- Accumulates and concentrates salt



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Slide 11 Slide 12

Beach Strawberry

- Rosaceae
- Fragaria chiloensis
- Garden Strawberry
 a hybrid between F.
 chiloensis and F.
 virginica of US
 east coast



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Coastal Prairies

- Occurs along coast from Central California northwards
- Fertile deep soils well developed A and B horizons
- Vegetation
- Perennial grasses and annual/perennial wildflowers



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Slide 13 Slide 14

Coastal Prairie Flora

- hairgrass (Deschampsia holiciformis),
- · coyotebrush (Baccharis pilularis),
- bluedicks (Dichelostemma capitatum),
- Douglas iris (Iris douglasiana), California blue-eyed grass (Sisyrinchium bellum),
- · checkerbloom (Sidalcea),
- · goldfields (Lasthenia chrysotom
- footsteps-of-spring (Sanicula arctopoides)



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Loss of Coastal Prairies

- Large areas of coastal prairie have been developed:
- · Grazing- rangeland
- Introduction of annual grasses
- Conversion to cultivation
- Housing/ Recreational development

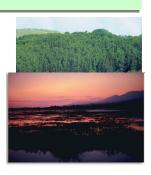


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Slide 15 Slide 16

Coastal Saltmarsh

- Occur on gently sloping bays and estuaries
- San Francisco Bay, Tomales Bay, Morro Bay, Elkhorn Slough, Carpinteria
- Tidal inundation



Saltmarsh Constraints

- · High levels of salt
- Inundation during high tides
- · Low soil oxygen levels
- Anaerobic bacteria create toxic forms of metals
- Manganese
- Iron (FE²⁺)

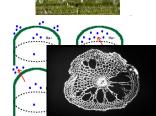


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Slide 17 Slide 18

Plant Adaptations to Saltmarshes

- Halophytes
- Accumulate salt
- Salt glands Distichlis spicata
- Tolerance to low soil Oxygen
- Lower rates of aerobic respiration internal transport of oxygen to roots
- Anaerobic respiration in roots
 - Spartina sp



Vegetation

- Grasses and perennial herbs and small shrubs
- Trees struggle to cope with salinity
- Mangroves are confined to tropics and sub-tropics
- Flora
- California Saltmarsh Cordgrass (Spartinia foliosa)
- Alkali Heath (Frankenia salina)
- Pickleweed (Salicornia virginica)

Saltmarsh



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Slide 19 Slide 20

Saltmarsh Dodder

- · Cuscuta salina
- Parasitic on Salnicornia, Jaumea, Frankenia and other saltmarsh plants
- haustoria
- · No chlorophyll



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Saltmarshes (and freshwater marshes)

- Highest productivity of any ecosystem
- Few primary consumers can tolerate saltiness
- Most of energy fuels detrital food chain
- Clams, Marine worms, decomposers
- Rapid recycling of nutrients
- · Little standing biomass

Saltmarsh Productivity

| | Gypope # The McGree # # Europ | perios, bot, Flor | ninier repite | e be reported | ns or display. | | |
|--------------|-----------------------------------|--|---------------|---------------|----------------|-------|-------|
| | estuaries, swamps, and marshas | | | | | | |
| No. (3) | tropical rain forests | | | | | | |
| The same | temperate deciduous forests | | | | | | |
| | agricultural land | | | | | | |
| | temperate grassland (prairie) | | | | | | |
| - 2 | lakes and streams | | | | | | |
| and the Tax | rocky beaches and sandy beaches | | | | | | |
| - un | tundrea | | | | | | |
| - X | open ocean | | | | | | |
| The state of | deserts | <u>. </u> | | | | | |
| | | 800 | | 4,000 | 5,600 | 7,200 | 8,800 |

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Ecological Importance of Saltmarshes

- High Productivity without many herbivores
- Lots of food in sediments for wading birds
- Important stopover along Pacific Flyway between Central America and Alaska



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