Slide 1

Montane Vegetation Types

Lecture 28

Slide 2

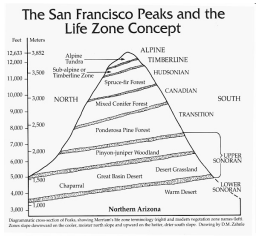
Learning Outcomes

- Montane Forests
- Subalpine Forests
- Montane Chaparral
- Montane Meadows
- Alpine Fell Fields

Slide 3

Life Zones

- C. Hart Merriam 1890s Arizona
- Recognized 6 different life zones
- Based upon temperature decrease with altitude
- Mirrored vegetation changes with latitude



Slide 4

Montane Forest

- Sierra Nevada
- Approximately 2,000 – 8,000 feet
- Lower limit set by lack of moisture upper
- Transition from woodland occurs at higher elevations further south
  - 5,000 feet to 11,000 feet

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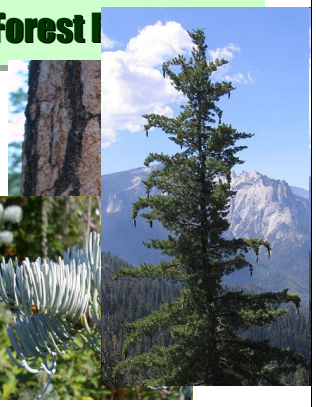
Montane Forest

- Ponderosa Pine *(Pinus ponderosa)*
  - Occurs when annual rainfall reaches 25 inches
- Incense Cedar *(Calocedrus decurrens)*
- White Fir *(Abies concolor)*
- Douglas-fir *(Pseudotsuga menziesii var. menziesii)*
- Sugar Pine *(P. lambertiana)*



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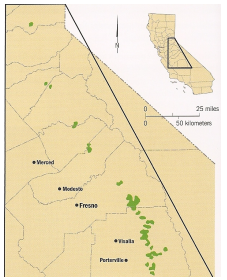
Giant Sequoia Groves

- During Pleistocene (ended 12,000 years ago) Sierra Nevada repeatedly glaciated
- Following retreat of glaciers Sequoias have not been able to recolonize former range
- Change in conditions
- Competition from other species
- Present discontinuous distribution represent Pleistocene refuges not glaciated



Slide 7

Species Composition and Altitude

- As altitude increases towards 8,000 feet transition to Subalpine Forest species
- Red Fir *(Abies magnifica)*
- Jeffrey Pine *(Pinus jeffreyii),*
- Lodgepole Pine *(P. contorta var. murrayana)*

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Non-Conifers of Montane Forest

- 1,200 herbaceous species
- 200 shrub species
- Sierra Gooseberry (*Ribes roezlii)*
- Mountain Misery *(Chamaebatia foliosa)*
- Pine Drops *(Pterospora andromedea)*

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Sugar Pine

- Old Sugar Pines are world's tallest pines
- Up to 250 feet
- Longest pine cone in world 12-18 inches
- 'Sugar' resin crystallizes around wounds
- Resin is sweet containing pinitol sugar-alcohol
- Regenerates following fire
- Numbers in decline as habitat colonized by shade tolerant Incense Cedar and White Fir

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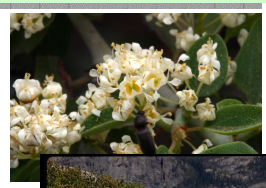
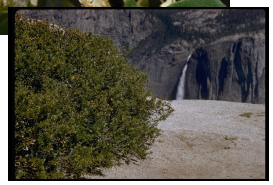
Montane Chaparral

- Occupies same altitude as montane forest but
- Vegetatively similar to 'chaparral' but floristically distinct
- Snowbush *(Ceanothus cordulatus)*
- Huckleberry Oak (Quercus vacciniifolia)





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Subalpine Forest

- Higher altitude and colder/harsher climate than Montane
- Upper limit by low temperature and short growing season
- Actual altitude ranges
- Western White Pine *(P. monticola)*
- Mountain Hemlock *(Tsuga mertensiana)*
- At Timberline White-bark Pine *(P. albicaulis)*

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Adaptations of Subalpine Forest Trees

- Heavy winter snows
- Flexible drooping branches
- Shed snow

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Subalpine Forest Flora

- Limber Pine *(Pinus flexilis)*
  - Distributed across Great Basin to Rocky Mountains
- Foxtail Pine *(P. Balfouriana)*
  - Disjunct distribution Klamath Mountains and Southern Sierra
- Pinemat Manzanita (*Arctostaphylos nevadensis)*
- Mountain Gooseberry (*Ribes montigenum)*
- Dwarf Bilberry (*Vaccinium caespitosum)*

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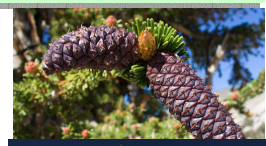
Bristlecone Pine

- *Pinus longaeva*
- 1958 Edmund Schulman discovered a tree dated to over 4,000 years old
- Inyo National Forest
- Inyo-White Mountains
- Elevations 10,000 – 11,500 at the timberline
- Needles also long-lived 30-40 years
- Oldest felled in 1964, 4,862 years old



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Montane Meadows

- Vegetation grassland with perennial herbs
- Most species rich plant community of mountains
- Occur at variety of elevations where topography is flat and water table is shallow
- Wet meadows dominated by sedges and rushes *(Carex nebracensis,* and Juncus ssp.)
- Dry Meadows dominated by grasses *(Poa pratensis)*

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Successional Transition

- Hydrosere
- Mirror Lake Yosemite NP
- Montane Lake
- Lakes fill with sediment
- Most meadows in Sierra Nevada were once lakes

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Flora of Montane Meadows

- Corn Lily *(Veratrum californicum)*
- Shooting Stars *(Dodecatheon hendersonii)*
- *Viola ocellata*
- *Camassia quamash*

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Alpine Fell Fields

- Above the timberline
- Community of hardy low perennial plants
- > 9,500 feet in the Sierra Nevada
- Precipitation mostly as snow

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Alpine Fell Field Vegetation and Flora

- Alpine – European Alps
- Fell – from Gaelic for 'Rock'
- However, Sierra Nevada 'alpine' species descended from Great Basin Flora that colonized higher altitudes not related to European Alpine flora
- Mat forming species
- *Eriogonum ovalifolium*
- Coville's Phlox (*Phlox covillei)*
- Sky Pilot (*Polemonium eximium)*

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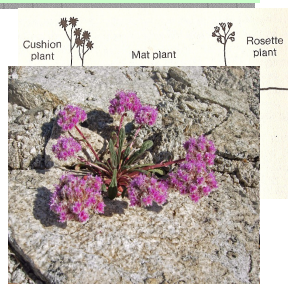
Alpine Climate

- Due to elevation air is cold and dry little capacity to hold water
- Most precipitation falls at lower elevations
- Shallow soils do not store much water
- Strong winds evaporate moisture from surfaces contribute to transpiration loss
- Alpine desert

Adaptations of Alpine Plants

- Perennial
- Deep tap root
- Cushion, mat, or rosette form
- Low stature
- Avoids winds
- Reduce evaporation and transpiration loss of moisture



Calyptridium umbellatum - Pussypaws