

## (Outline for course)

- I. Introduction (1 lecture)
  - A. History on attitudes toward fire
  - B. Present outlook by Park Service, Forest Service, and BLM
  - C. Objectives of the course
  - D. Outline of the course
- II. Grasslands (3 lectures)
  - A. Historical role of fire
    - 1. Interaction between fire; drouth, insects, and competition from grasses in controlling shrubs
    - 2. Documentation of existence of mesquite in the Rolling Plains
    - 3. Existence of fires and their extensiveness in relation to terrain
  - B. Shortgrass Prairie
    - 1. Response of shrubs and grasses to fire
    - 2. Burning during drouth years VS. wet years
  - C. Mixed Prairie
    - 1. Response of grasses to fire
    - 2. Effect of fire on production and utilization during wet years
    - 3. Necessity of burning on a manageable unit basis
    - 4. Effect of fire on mesquite
    - 5. Effect of fire on ashe juniper
    - 6. Response of cool season VS. warm season weeds
  - D. True Prairie
    - 1. Historical reasons for burning in the True Prairie
    - 2. Grass species - cool season and warm season plants
    - 3. Response from annual burns VS. occasional fires
    - 4. Shrubs
    - 5. Seed production in response to fire
  - E. California Prairie
  - F. Palouse Prairie
  - G. Slide presentation of all grasslands
- III. Southern Desert Shrub - Grassland (1 lecture)
  - A. History of shrub encroachment on grasslands in the early 1900's that resulted from the absence of fires
  - B. Grasses - Generally no long-term benefits from fire
  - C. Cactus species
  - D. Shrubs
    - 1. Mesquite
    - 2. Burroweed
    - 3. Miscellaneous shrubs
- IV. Desert Blackbrush Community (10 min)
- V. Salt Desert Shrub (5 min)

VI. Northern Desert Shrub (1 lecture)

- A. Frequency of natural fires
- B. Shrubs
  - 1. Big sagebrush
  - 2. Bitterbrush
  - 3. Horsebrush
  - 4. Rabbitbrush
- C. Bunchgrasses VS. rhizomatous grasses
- D. Forbs
- E. Slide presentation

VII. California and Arizona Chaparral (1 1/2 lectures)

- A. Mediterranean climate
- B. Autogenic succession
- C. Adaptation to fire
- D. Necessity of fire for vigor of shrubs
- E. Undesirable effects of frequent fires
- F. Shrubs
- G. Grasses
- H. Forbs
- I. Shrub to grass conversions
- J. Game management

VIII. Oak-Brush (1/2 lecture)

- A. General Description and minimal value of fire
- B. Shrubs and their response to fire
- C. Grasses
- D. Forbs
- E. Herbage yields
- F. Values of oak
  - 1. Retard snowmelt
  - 2. Stabilize soil
  - 3. Browse and cover for big game

IX. Pinyon-Juniper (1 lecture)

- A. General Description
- B. Sprouting and non-sprouting tree species - mortality
- C. Grasses
- D. Shrubs
- E. Role of drought, competition, and fire to slow invasion of trees into grasslands
  - 1. Domestic livestock
- F. Fire as a useful tool
  - 1. Grasslands VS. rough breaks
  - 2. Succession
  - 3. Herbage yield
  - 4. Need for 2 successive treatments

X. Ponderosa Pine (2 lectures)

- A. Distribution and variation in climates
  - 1. Rocky Mountains
  - 2. California
  - 3. Black Hills
- B. Description of communities in relation to fire frequency
- C. Natural succession
- D. Management for all renewable resources
- E. State of the art
- F. Slide presentation on the previous four communities

XI. Douglas-fir (2 lectures)

- A. West Coast Douglas-fir
  - 1. Climate
  - 2. Succession; seral species
  - 3. Role of fire
  - 4. Slash removal and reseedling
- B. Rocky Mountain Douglas-fir
  - 1. Climate
  - 2. Succession; climax species
  - 3. Importance of seral stages to wildlife
- C. Lodgepole pine community
- D. Aspen community
- E. Larch community
- F. Climax Western Hemlock, Western Red Cedar, and Grand fir

XII. Spruce (1 lecture)

- A. West Coast
  - 1. Conifer seral forests
  - 2. Red alder seral stands
- B. Rocky Mountain Region
  - 1. Succession and associated species
  - 2. Regeneration
- C. Appalachian Region
  - 1. Succession after fire
  - 2. Vegetation of climax stands

XIII. Redwoods (1 lecture)

- A. Giant sequoia (Central Sierras)
  - 1. Necessity of fire
  - 2. Characteristics of trees
  - 3. Specific role of fire
- B. Redwood (Northern California)

**XIV. Southeastern Forests (2 lectures)**

**A. Description of communities and site requirements**

1. Longleaf pine
2. Slash pine
3. Loblolly pine
4. Shortleaf pine
5. Other pines
6. Hammock vegetation
7. Canebrakes
8. Coastal prairies and marshes
9. Everglades

**B. History of fire in the Southeast**

**C. Role of fire in each plant community and succession of species**

**D. Management of major tree species**

**E. Slides on the previous four communities**

**XV. Northeastern U.S. (1 lecture)**

**A. Red Pine**

1. Fire dependent properties
2. Succession and desired frequency of fire
3. Necessity of a variety of fire intensities

**B. White Pine**

**C. Jack Pine**

1. Seral tree with serotinous cones
2. Associated species
3. Regeneration and management

**XVI. Boreal Forest (2 lectures)**

**A. Description of communities**

1. White spruce
2. Black spruce
3. Balsam poplar
4. Jack pine
5. Tamarach
6. Balsam fir
7. Aspen
8. Other communities

**B. Understories**

1. Lichens
2. Tundra
3. Grasses and shrubs

**C. Role of permafrost**

**D. Natural fire frequency and its effects**

**E. Slides**

**XVII. Effect of Fire on Litter and Soil Properties (2 lectures)**

**A. Litter and Soil Organic Matter**

1. Grasslands
  - a. Excessive litter
  - b. Role of litter
  - c. Litter cycles after burning

- 2. Forests
    - a. Accumulation of litter
    - b. Benefits of litter
    - c. Undesirable effects of litter
  - B. Soil Chemistry
    - 1. N & S are volatilized by fire; all other elements remain in ash
    - 2. Effect of fire on soil nitrogen
    - 3. Major mineral elements
    - 4. Leaching
    - 5. Soil pH
  - C. Soil Moisture
    - 1. Effects of plant growth
    - 2. Infiltration and percolation
    - 3. Soil wettability
  - D. Erosion and Runoff
    - 1. Soil movement as affected by cover
    - 2. Tolerable erosion limits
    - 3. Runoff
  - E. Soil fauna
    - 1. Bacteria
    - 2. Insects
- XVIII. Temperature and Heat Effects (1 lecture)
- A. Grasslands
    - 1. Soil surface temperatures
      - a. Maximum in relation to quantity of fine fuel
      - b. In bunchgrasses
      - c. Duration of temperatures
    - 2. Below the soil surface
    - 3. Above the soil surface
  - B. Heavy Brush
  - C. Tree Trunk Temperatures
    - 1. Windward and Leeward sides
    - 2. Cambial temperatures in relation to bark properties
  - D. Ignition Temperature
  - E. Backfires VS. Headfires
  - F. Heat Effects
    - 1. Seeds
    - 2. Vascular plant tissue
- XIX. Prescribed Burning (3 lectures)
- A. General prescriptions
    - 1. Weather and fuel data
    - 2. Firebrands
  - B. Low-volatile fuels
  - C. High-volatile fuels
  - D. Fire Behavior

E. Burning in specific vegetation types

1. Mesquite-tobosa
2. Dozed juniper
3. Aspen parkland
4. Sagebrush grass
5. Chaparral
6. Pinyon-juniper
7. Ponderosa pine
8. Slash
9. Southeast pine
10. Marsh burns

F. Need for patience

XX. Wildlife (2 lectures)

A. General reasons for burning

1. Edge
2. Cover
3. Feeding areas

B. Birds

1. Kirtland's warbler
2. Quail
3. Dove
4. Grouse
  - a. Prairie chickens
  - b. Sharptail grouse
  - c. Ruffed grouse
  - d. Blue grouse
  - e. Sage grouse
5. Turkeys
6. California Condor
7. Song birds in general

C. Marsh species

D. Deer

E. Elk

F. Caribou VS. Moose

G. Other large mammals

H. Rodents

I. Microfauna

## Laboratory

- I. Equipment for Conducting Fires (1 lab)
  - A. Operation of pumper
  - B. Drip torches
  - C. Propane equipment
  - D. Weather instruments
  - E. Use of Wajax hand pumpers
  - F. Use of flapper, mcleods, and other miscellaneous equipment
- II. Fire Behavior (1 lab)
  - A. Backfire VS. Headfire
  - B. Firebrands and ignition properties on cow chips, punky wood, and grass
- III. Weather and Its Effect on Fire Behavior (1 lab)
- IV. Instruments to Record Temperatures in Fires and How to use them (1 lab)
  - A. Multipoint recorder
  - B. Tempils
  - C. How to make a thermocouple
- V. Plan and Conduct a Fire in Juniper (4 labs)
- VI. Plan and Conduct a Fire in Mesquite-Tobosa (3 labs)
- VII. Plan and Conduct a Grass Fire (3 labs)