FIRE MANAGEMENT PLANNING

- Planning concepts
  - Fire management is part of land, water, & atmosphere management
  - Philosophical decisions (policy) determine goals
    - Maximize influence of natural processes on environment
    - Maximize man's influence on environment
    - Intermediate strategies
  - Recognize cultural biases that influence judgements
    - Preference for objects over processes
    - Preference for predictable human-directed change over unpredictableness of nature
    - Preference for "constructive" over "destructive" events
    - Judgements about good and bad
  - Management objectives derived from philosophy
    - Directly reintroduce natural fire to maximum extent possible
    - Maximize natural fire in areas where unnatural change is minimal and use prescribed fire to simulate natural fire in order to restore "natural" conditions in other areas before allowing natural fire
    - Simulate natural fire to restore and maintain "natural" conditions
    - Restore "natural" conditions without fire; then maintain this condition with natural or simulated natural fire
    - Manipulate environment with or without fire for specific objectives
      - Maximize tree production
      - Improve rangeland
      - Improve wildlife habitat
      - Reduce insect and disease infestations
      - Recreate historic scene
      - Reduce fire hazard

Prevent water pollution

Maximize visibility and air quality

Control exotics

First 4 alternatives are natural process oriented

Fifth alternative is object oriented

Define natural or unnatural condition desired for all alternatives

Difficulty of defining natural conditions or processes

Definition will determine whether to simulate natural fire or use it directly

Once philosophical decisions have been made, managers need to understand ecological role of fire before developing operational plan for achieving specific objectives

Ecological role of fire

Stability of many vegetative communities is dependent on dynamic equilibrium created by fire

Event which disturbs equilibrium and creates instability is unnatural lack of fire

Base program on fire ecology of plant communities and of main plant and animal species as well as fire history

Fire history alone may be misleading

Adaptations to fire

Interactions between plant communities

Shifts in species composition

Fuel assessment

Supplement current knowledge with new findings

Fire history

Scars

Charcoal layers

Historical fire records

General historical accounts and photographs

Age class distributions - vegetative mosaics

Knowledge from similar areas

Problems with fire scar chronology

Recent past may be anomalous

Difficult to secure large enough sample

Location of fire scarred trees may not be unbiased

Later intense fires may obliterate record of earlier fires

Mild fires may leave no record

Some vegetation types may produce no scars

Some tree species record fires better than others

Fire regime - systematic interaction of fire with environment (usually linked to specific vegetation type) - includes:

Timing of fires

Number of fires

Spatial distribution of fires

Size of fires

Duration of fires

Fire behavior

Fire cycle

Fire effects

Timing

Season

Clustering in season

Number

By management unit

By vegetation type

Indicates some potential problems

Spatial distribution

# of lightning strikes varies directly with elevation in Yosemite

Probability of ignition varies inversely with elevation

Fires are clustered spatially

Certain areas more fire prone than others

Depends on: storm tracts

flammability of vegetation

topographic prominence

Size

Determined by: vegetation type

weather

fire duration

previous fires

natural or man-made barriers

Expected fire size useful for establishing management unit boundaries and for contingency planning for suppression, visitor safety, smoke management

Input for projecting area that would have burned under natural conditions

Duration

Depends on precipitation distribution, amount, duration

Persistence of snowpack

Related to smoke management problems

Behavior

Intensity

Related to flame length

Prediction of highest intensities most important

Depends on: fire direction
headfire
backing fire

weather

fuel loadings
- size class
- amount
- arrangement
- live or dead
- recovery rate
- by vegetation type
- fuel models

fuel moisture

Rate of spread

Linear or spatial

Predictable from fire models or observations

Related to size and intensity

Variations in fire behavior related to:

Vegetation type

Weather

Fuel moisture

Duration of burning

Pattern of behavior more important than average

Fire cycle

Depends on size of area

Linked to vegetative community or part of community within a given area

Different fuel recovery rates influence cycle

Potential cycle different from actual

Depends on:
- ignition source
- weather
- vegetation type
- intensity and fuel consumption of last fire

Cyclical fires will vary in intensity

Variation may be more important than mean fire interval

Infrequent intense fire may be more important ecosystem stabilyzing event than frequent mild fires

- Fire effects
  - Linked to fire behavior
  - Scorch heights
  - Vegetative succession
  - Fuel removal and creation
  - Depth of burn
  - Erosion
  - Smoke production
  - Effects of fire exclusion
- Role of aboriginal burning
  - Policy is ambiguous about whether Indian burning is natural
  - Natural process vs. object preservation
  - Vegetation types may be human artifacts
  - Need to know regime of Indian fires to simulate them

Management constraints

- Absolute or goals balancing
- Insecure boundaries
- Visitor use and safety
- Smoke management
  - Clean air act - compliance with federal, state, interstate, & local requirements
  - Impact on Air Quality Related Values & National Ambient Air Quality Standards
  - Monitoring systems
- Water quality
- Cultural and archeological resources

Endangered species

Politics

Economics

Time - continued unnatural vegetative succession

Is preferred program presently feasible or is interim program necessary

Operational plan alternative strategies

Full suppression

Modified suppression

Natural fire management

Restrictive prescription

Time of year

Weather

Fuel moisture

Fire behavior

Fire effects

Fire size

Fire intensity

Liberal prescription - only constraints of Park Service policy

Prescribed burning

Simulate natural fire regime

Reduce wildfire hazard

Improve wildlife habitat

Restore historic scene

Improve rangeland

Clean up debris

Reduce insect and disease infestations

Control exotics

Recycle nutrients and prepare seedbed

Time fire occurrence for optimum periods to protect air and water quality

Combination of alternatives

Evolving program

Clearly defined prescriptions

Clearly defined responsibilities

Planning

Execution

Monitoring

Crisis management