Aspen Ecology

Why have a whole lecture for a single species?

*Populus tremuloides* is the most widespread tree in N. America and 2nd most widely distributed tree species in the world

Why aspen (con’t)?

- Important role in ecosystem succession, wildlife habitat, biodiversity and landscape ecology
- Aspen roots may live for thousands of years, but hard to date
- Aspen clones can be as large as 40 ha (one single genet with many stems, or ramets)
- Aspen is declining, according to some accounts

Emblem of the West Is Dying, and No One Can Figure Out Why

- Insects, disease, grazing by elk and cattle, drought, climate stress, fire suppression
- Mature stands hit harder than young stands

Dr. Wayne Shepperd in North Park Valley, Colo., NY Times, Sept. 26, 2006

http://www.fs.fed.us/wildflowers/communities/aspen/decline.shtml
Aspen habitats

- Broad ecological amplitude; occurs from treeline to grasslands and sagebrush steppe
- Cool, wet conditions required for seedling establishment, but mature trees use less water than lodgepole, spruce or fir
- Aspen may be an extension of the boreal forest (like RM coniferous forests), and perhaps a relict from last ice age

Aspen habitats (2)

- Upper line: aspen present; lower line: aspen absent
- The two lines together represent climate for all of N. America
- Why is aspen both absent and present in a given climate condition?
Aspen habitats (3)

Aspen succession

• Early seral type where conifers are climax, in many different types of conifer forest types

Aspen/subalpine fir type is successional to a climax conifer forest. As conifer canopy closes, herbs in the understory will be shaded out and biodiversity will decline.
Aspen succession (2)

- **Climax** species in some areas
- **Suckers sprout rapidly** from roots following fires
- Establishment from seed is **infrequent**
Some important community types

Aspen/serviceberry/snowberry/meadow rue type is structurally diverse: trees, tall and low shrubs, herbs. High biodiversity especially in herb layer. Important in NW WY.

Aspen/big sagebrush is common on dry sites in Nevada; aspen is a climax species forming an open stand
Aspen/bracken fern type is broadly distributed but occurs in small patches. Aspen is regenerating in the understory here too.

Aspen/bluegrass type has reduced biodiversity in the herb layer because of a long history of overgrazing.
Aspen/tall forb type degraded by grazing has an herb layer dominated by annuals such as bedstraw and buckwheat. Also note the bent stems from snow-loading on the slope.

Aspen ecosystem management

- Human institutions and ecological processes operate at different temporal and spatial scales
- Eventually this results in ineffective policies and ecological surprises
- A better understanding of aspen ecosystems is needed, from a historical perspective, to evaluate and establish sound management policies
- Dendrochronology can be used to establish aspen population dynamics over time
Fig. 4, Hessl, 2002. **Aspen regeneration** (a) on a relative scale determined from tree-ring studies in Rocky Mtn NP (RMNP), Jackson Hole area (JH), and Yellowstone NP (YNP) compared with (b) estimated elk populations, (c) fire history and (d) a drought index, PDSI, where negative values are dry and positive values are wet.

Aspen ecosystems and management

Hessl, 2002
Some things to think about

• Policies tend to be developed and implemented in response to unusual, short-term events
• A lack of long-term perspective is prevalent among most management agencies
• How long do aspen clones live?
• Frequency and spatial scale of recruitment from seed is poorly understood
• Spatial variability at landscape scales is often unrecognized, leading to policies that are less effective in some areas than others
• On western slope of Rockies, aspen extent has actually been increasing at the expense of range cover types such as meadows, over the last 80-100 yrs
References: