Aspen Ecology in the United States: recent advances and future needs

Paul C. Rogers

Outline:
- Current Issues
- Recent developments
  - Genetics & phytochemistry
  - Silviculture & management
  - Aspen as wildlife habitat
  - Monitoring extent & health
- Adaptive strategies for aspen futures
Current Issues

- Trophic cascades
- Natural Range of Variation
  - Keystone species
- SAD (short-term)
- Climate change & disturbance
- Wildlife browsing
- "Oldest/largest living organism"
- Historical human impacts
- Aspen decline (long-term)
- Ecological role of seedlings
Recent Developments

Genetics & phytochemistry

• Role of seeding?
• Stand structure/function
• Tradeoffs: growth & defense
• Genetics and/or climate in deteriorating stands

Mock et al., 2008; Wooley et al., 2008; Osier & Lindroth, 2006
Recent Developments

Silviculture & management

• All aspen are not alike

• Manage the system; not the species
  Dependent species
  Landscape mosaics
  Wildlife interactions

• Research needs:
  1. How low can you go?
  2. Large landscapes, wildfire, & wildlife
  3. Options for functional types
  4. Special situations: WUI, rec. areas, multi-owners

Rogers & Ryel, 2008; Kashian et al., 2007; Kurzel et al., 2007; Rogers et al., 2007; Shepperd et al., 2006
Recent Developments

Aspen as wildlife habitat

- Trophic interactions
- Disturbance & herbivory
- Interdisciplinary management
- Fencing & alts.
- Non-game species
- Behavioral Management?
- Economics vs. Ecosystems

Ripple et al., 2001; Hessl & Graumlich, 2002; Suzuki et al., 1999; Griffis-Kyle & Beier, 2003; Ripple & Beschta, 2007; Kota, 2005; Baker et al., 1999
Recent Developments
Monitoring extent & health

• Natural Range of Variation
  Settlement, climate, management
  Historical sources & methods

• Climate warming/historical analogues

• Measuring Change
  SAD & Long-term decline
  (current) Aspen present vs. aspen dominant
  Functional types, regional variation

• Application of existing monitoring
  Forest Inventory & Analysis
  USFS aerial & ground surveys
  USFS remote sensing service center
  NPS Monitoring

Rogers et al., 2007; Zier & Baker, 2006; Kaye et al., et al., 2004; Bartos & Campbell, 1998
Adaptive strategies for aspen futures

Critical Questions:

• Social science sensibilities?
  Economic & aesthetic uses
  Historical perspectives
  Land use and manager values

• Standardize definitions?
  Aspen cover
  Functional types
  Sustainable communities

• Life history
  Role of seeding/climate interactions
  Age of clones
  Growth & defense

• Biodiversity/system understanding
  Historic & current beaver role
  Hydrological systems & tradeoffs
  Floral /faunal changes with succession
Adaptive strategies for aspen futures

Strategies:

• Preserve ecological functionality
• Engender flexible management approaches
• Promote experimentation or “learning as we go”
• Not one size fits all (limiting options)
• Strategic “systems” thinking: functional structure; local adaptation

Holling & Meffe, 1996; Gunderson & Holling, 2002
Adaptive strategies for aspen futures

Closing Thoughts:

1. Not only ecology; integrate human systems

2. A network of managers/scientists
   - Make resources/knowledge widely available
   - Utilize expertise & two-way communication
   - Open dialogue
   - Avoid “turfiness”
   - Consider alternatives; critically evaluate applications

3. Do we know all there is to know about aspen?