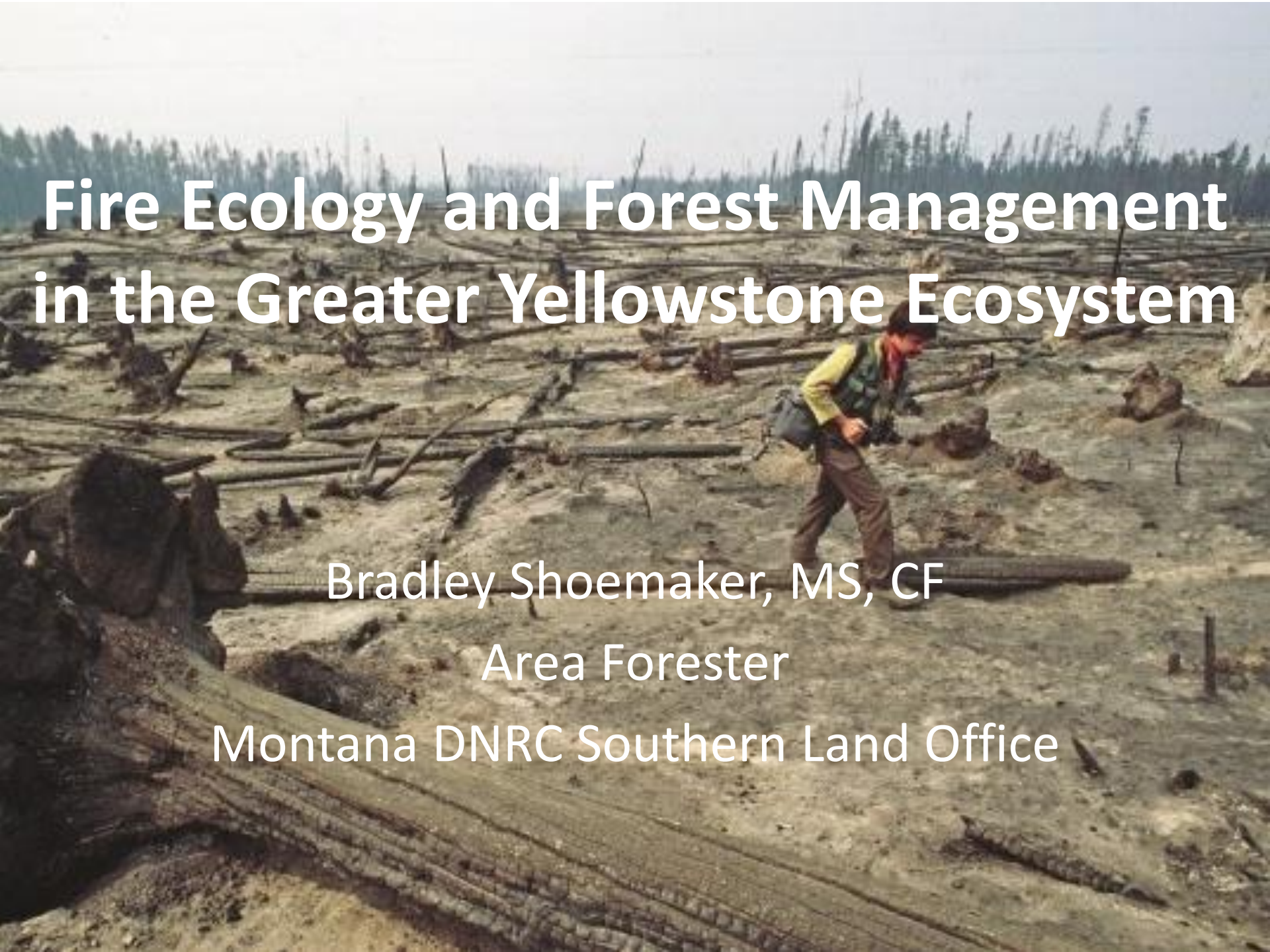


Fire Ecology and Forest Management in the Greater Yellowstone Ecosystem

Bradley Shoemaker, MS, CF

Area Forester

Montana DNRC Southern Land Office

Fire History/Ecology

Fire is the most active disturbance mechanism in a lodgepole pine forest

- Widely distributed in North America
- Long acknowledged adaptations to severe, stand-replacement fire
- Also burn in low- to mixed-severity fire, resulting in patchy and variable patterns across the landscape.
- Recognition of the extent of the mixed-severity fire regime in lodgepole pine has led to increased efforts toward more ecologically based management of lodgepole pine.

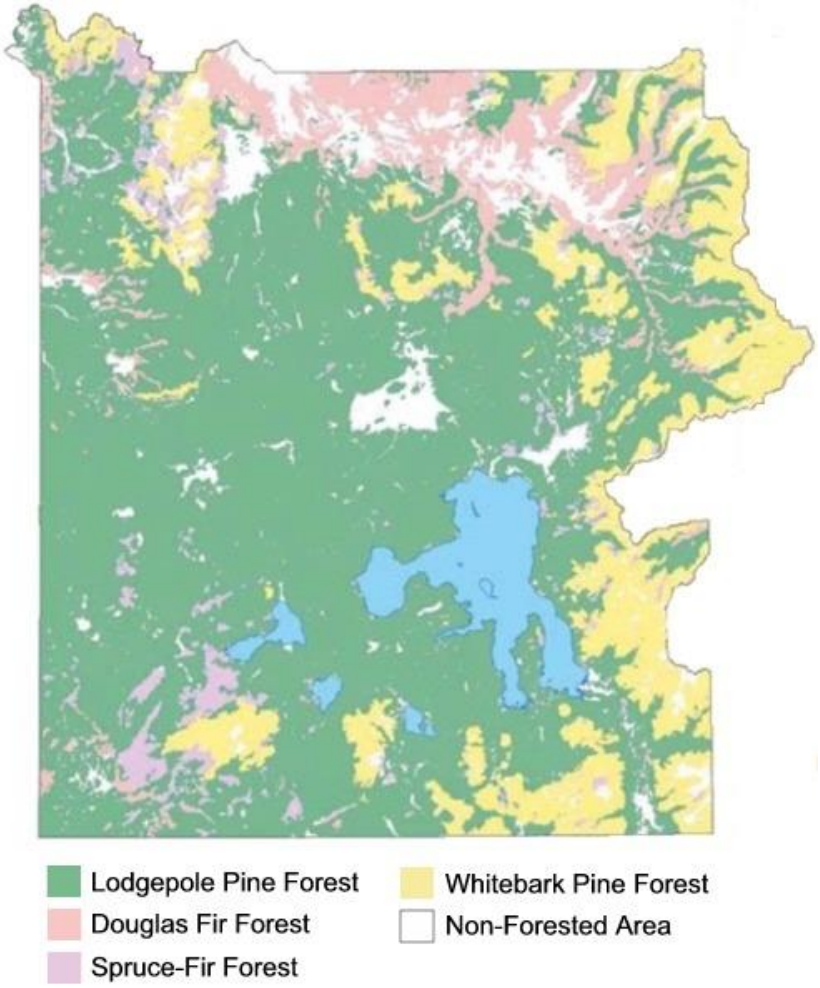
Above: A mixed severity burn through lodgepole pine

Right: A prescribed burn in Lodgepole pine in Jasper NP, Canada. Photo: Dave Smith

Above: Seedling regeneration in a lodgepole stand post fire

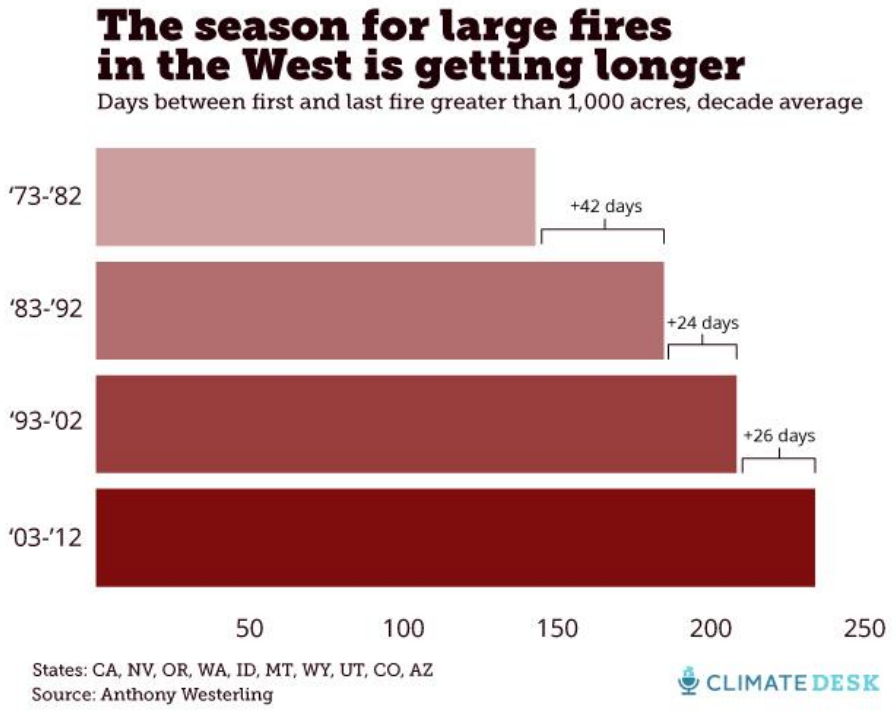
Forest Types of the Yellowstone Ecosystem

- Dominated by Lodgepole Pine, Douglas Fir and other conifer species
- Lodgepole is a highly fire dependent species that requires disturbance as part of its life cycle
- Fire in West Yellowstone is like an earthquake in California



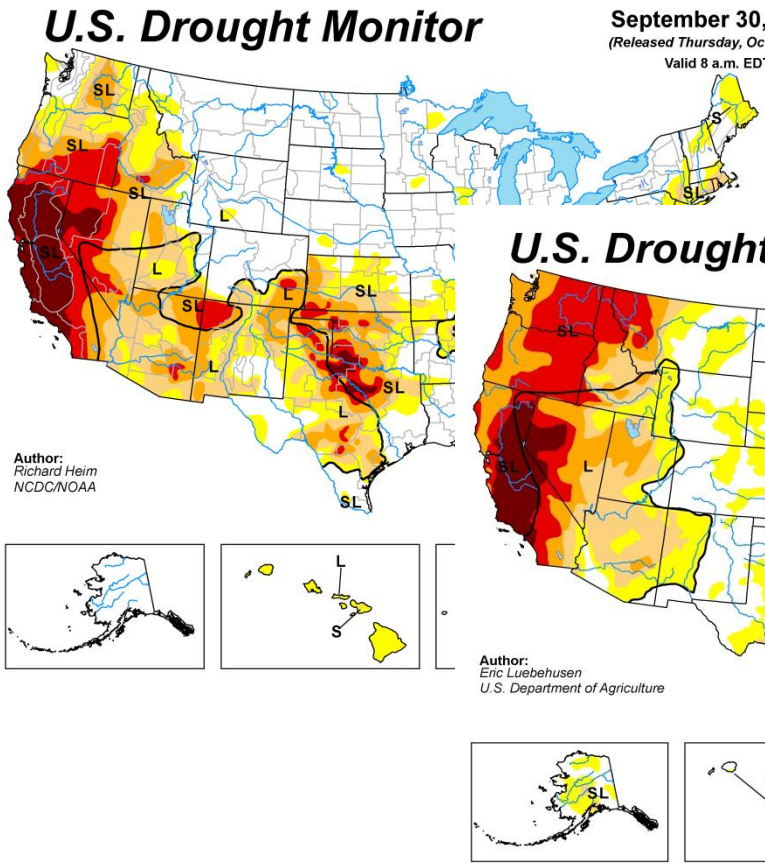
A Changing Fire Season

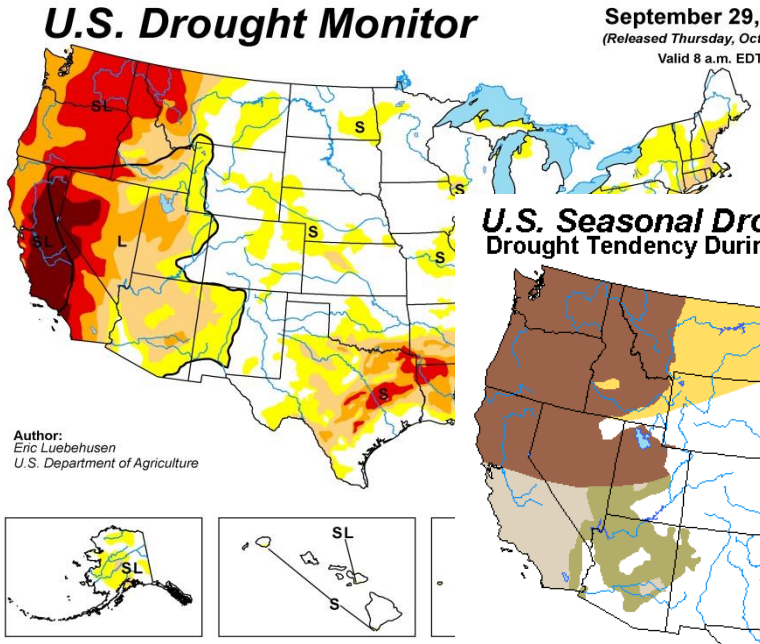
- Data shows that the length of the fire season has lengthened in recent years
- Effects of long term drought include greater fuel availability due to decreased fuel moisture, stressed trees, higher Energy Release Component (ERC) and thereby more intense fires

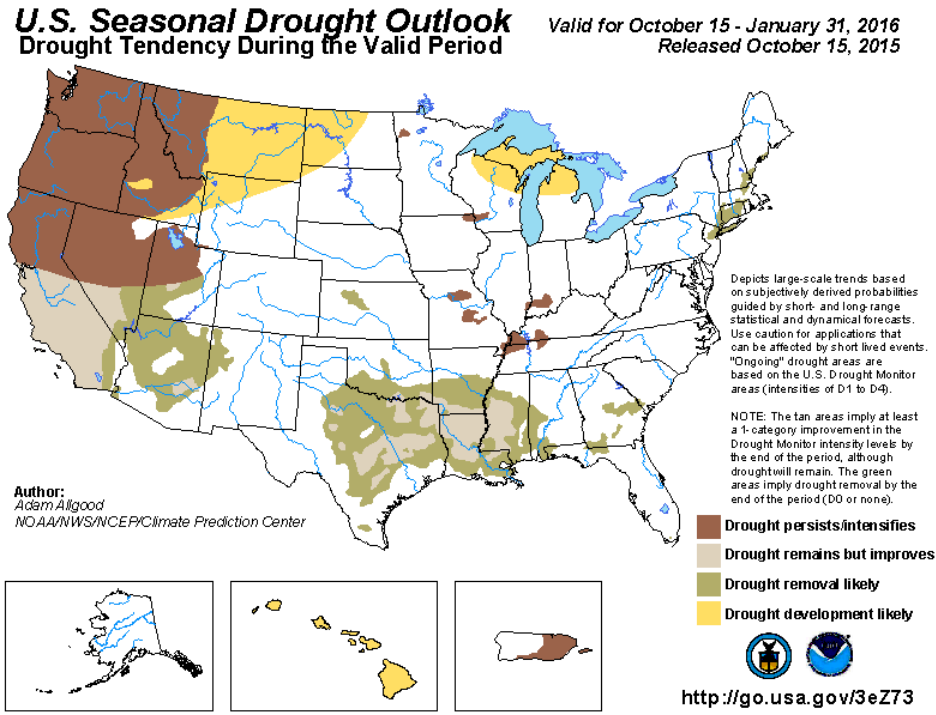


Drought Conditions & Outlook

2015 El Nino will soak the southwest United States but create a dry, mild winter in the northwest



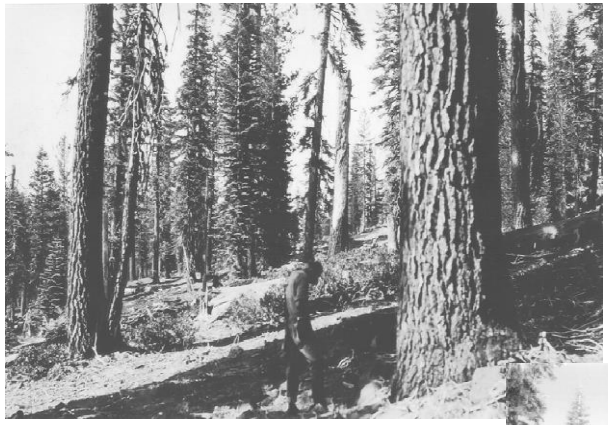




Drought conditions across the region have worsened in the last year and are likely continue to persist and intensify in current areas or develop across much of eastern Montana

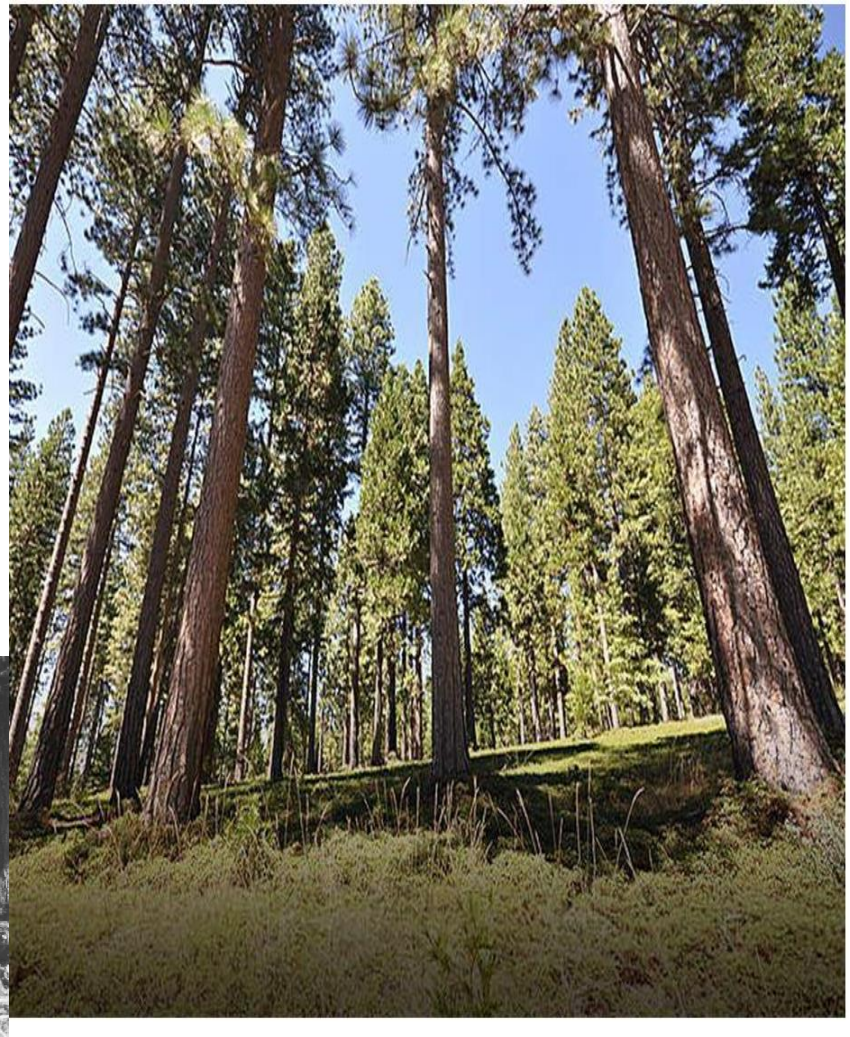
Changing Stand Composition

The last 100 years Forest Management has altered the forest from its natural state to the state preferred by human



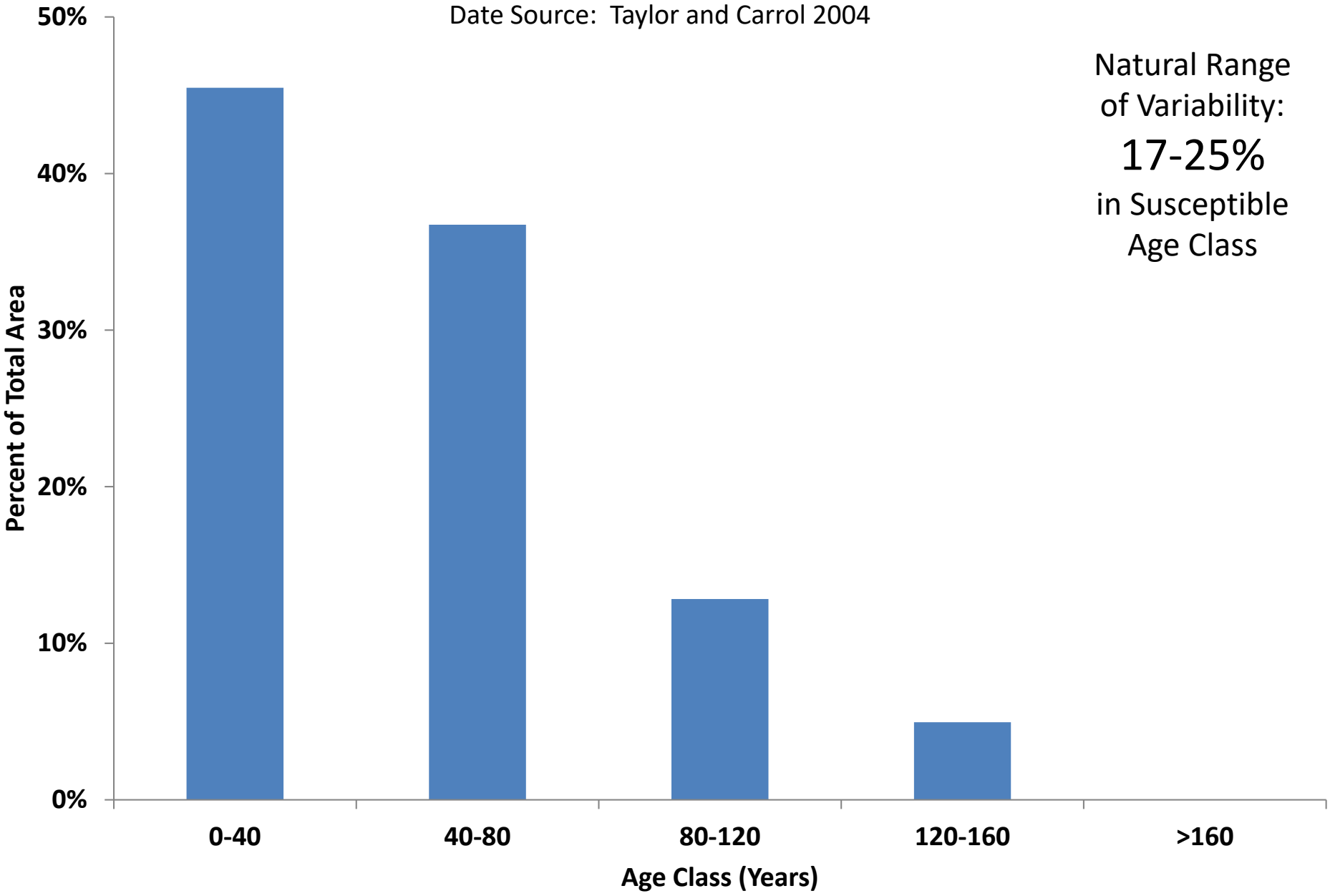
1920's

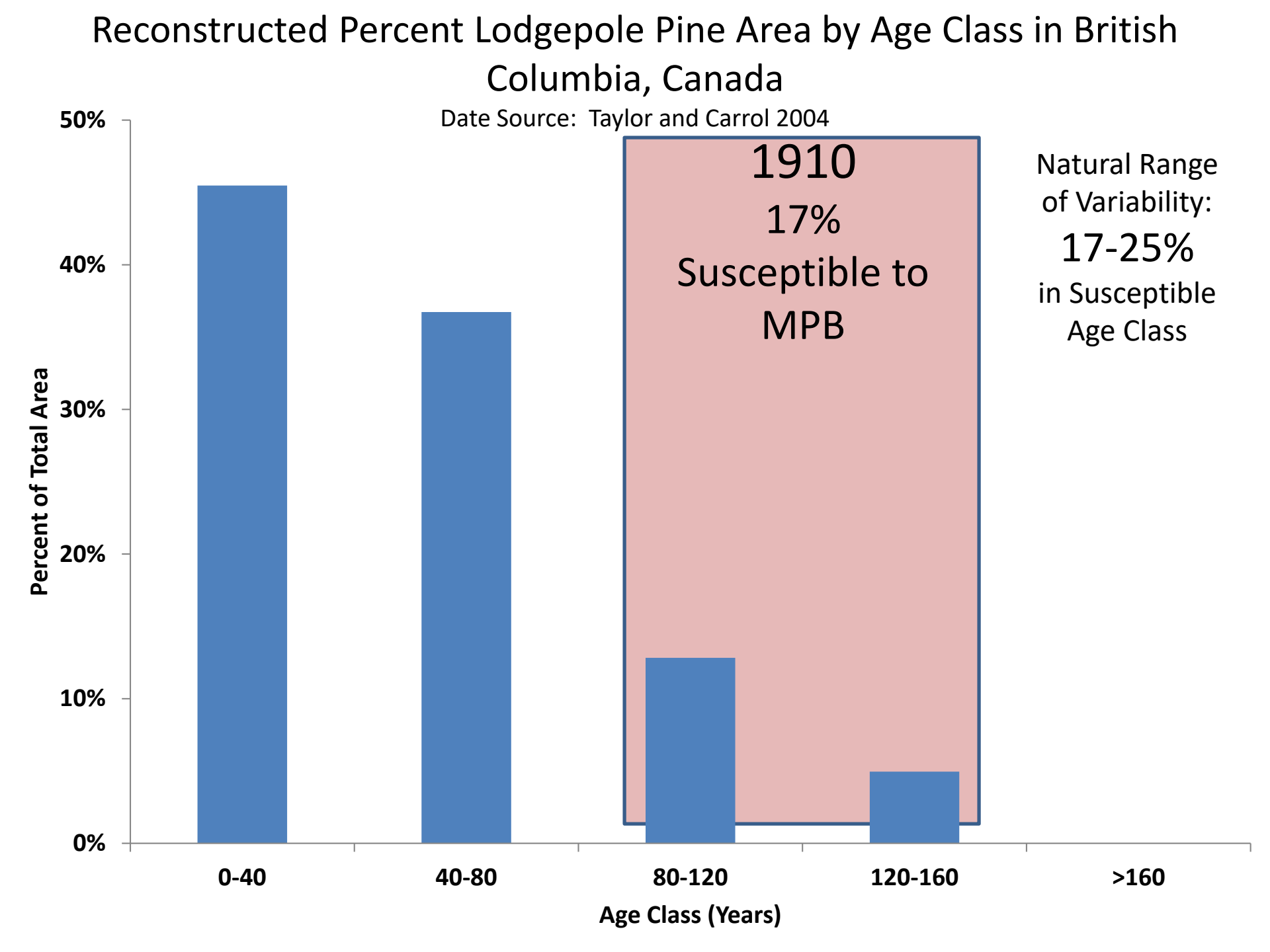
1990's

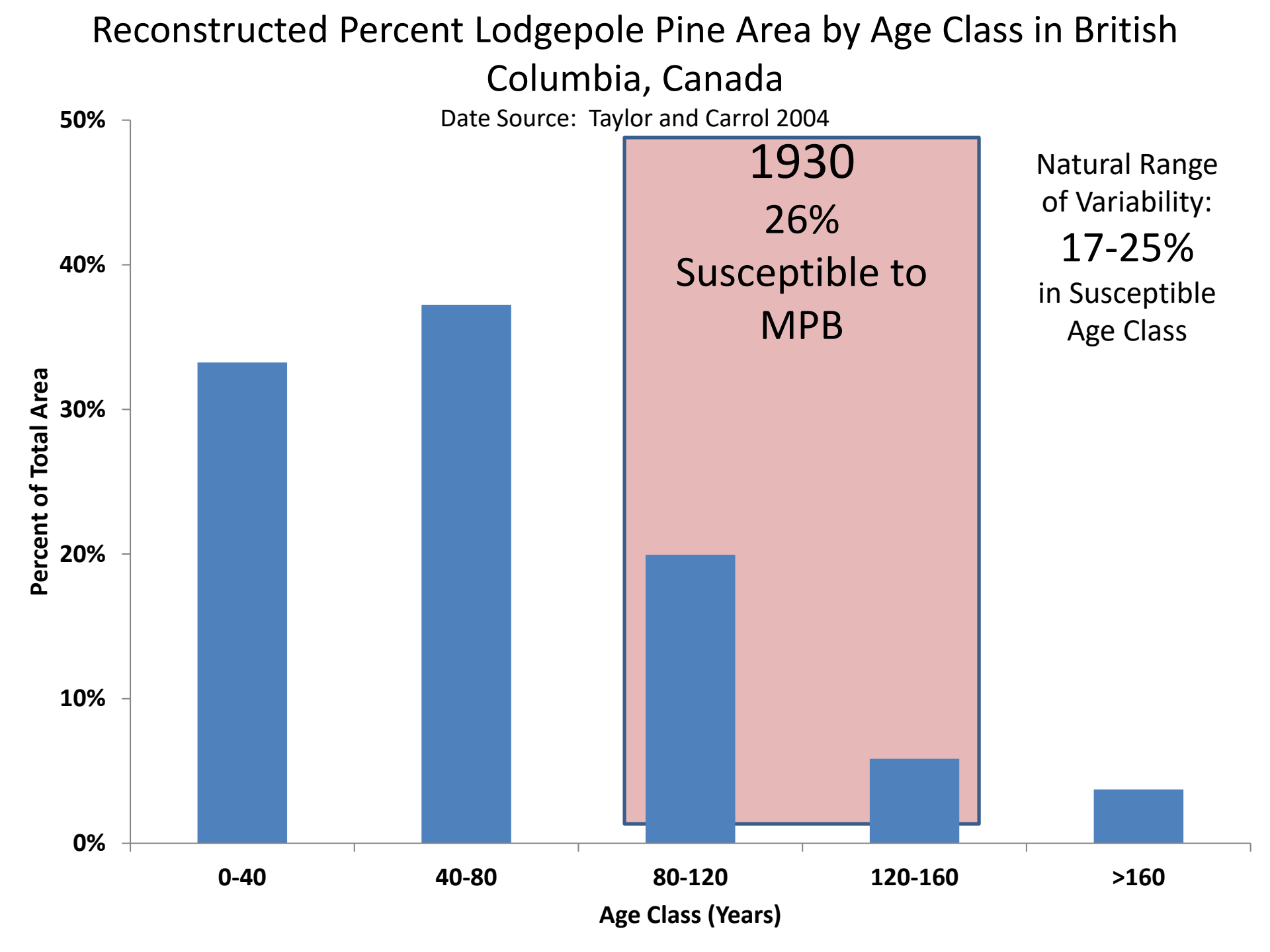


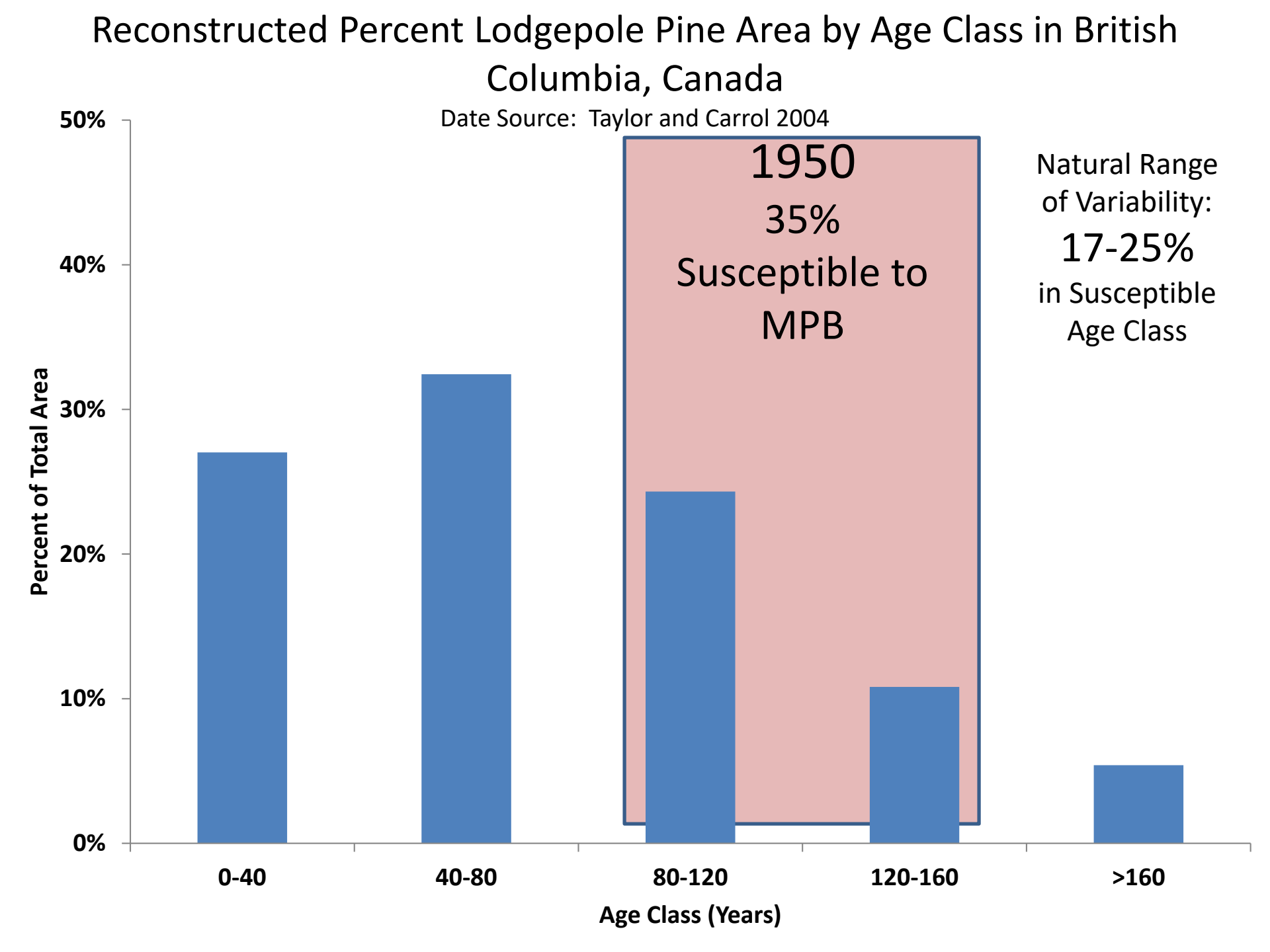
Reconstructed Percent Lodgepole Pine Area by Age Class in British Columbia, Canada

Date Source: Taylor and Carrol 2004



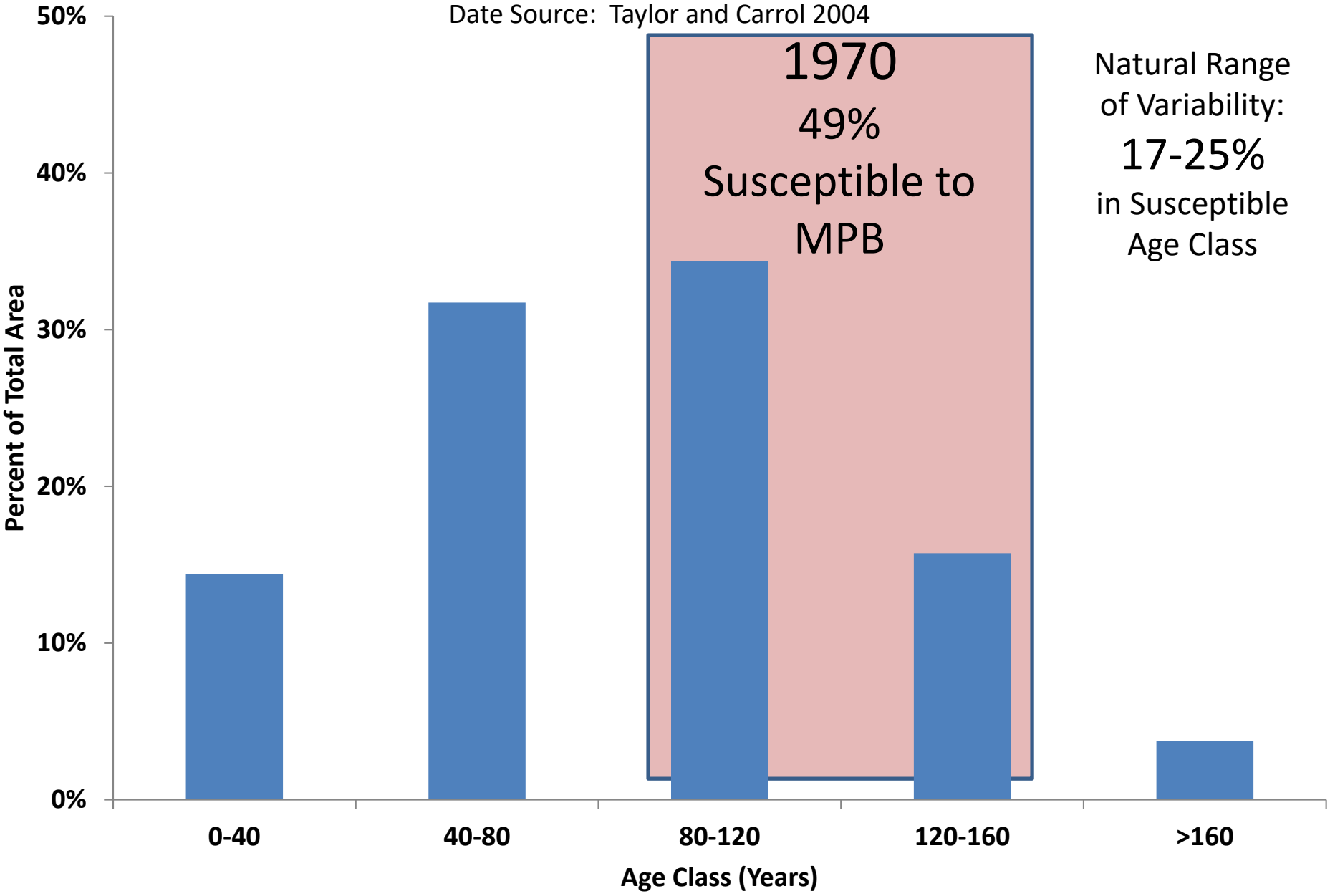

Reconstructed Percent Lodgepole Pine Area by Age Class in British Columbia, Canada
Date Source: Taylor and Carrol 2004
1910
17%
Susceptible to MPB
Natural Range of Variability:
17-25%
in Susceptible Age Class
50%
40%
30%
20%
10%
0%
Percent of Total Area
0-40
40-80
80-120
120-160
>160
Age Class (Years)

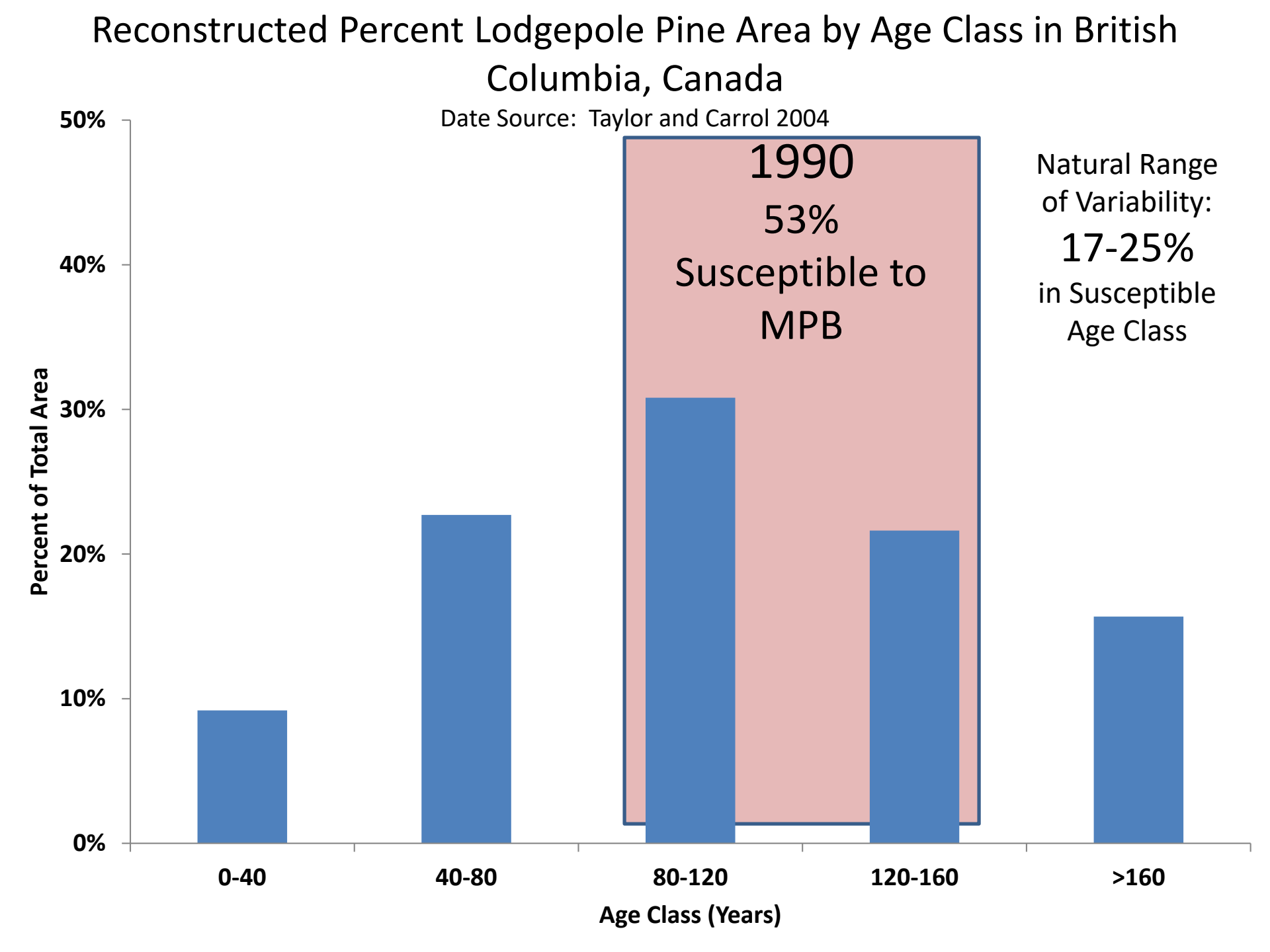

Reconstructed Percent Lodgepole Pine Area by Age Class in British Columbia, Canada
Date Source: Taylor and Carrol 2004
1930
26%
Susceptible to MPB
Natural Range of Variability:
17-25%
in Susceptible Age Class
50%
40%
30%
20%
10%
0%
Percent of Total Area
0-40
40-80
80-120
120-160
>160
Age Class (Years)


Reconstructed Percent Lodgepole Pine Area by Age Class in British Columbia, Canada
Date Source: Taylor and Carrol 2004
1950
35%
Susceptible to MPB
Natural Range of Variability:
17-25%
in Susceptible Age Class
50%
40%
30%
20%
10%
0%
Percent of Total Area
0-40
40-80
80-120
120-160
>160
Age Class (Years)

Reconstructed Percent Lodgepole Pine Area by Age Class in British Columbia, Canada

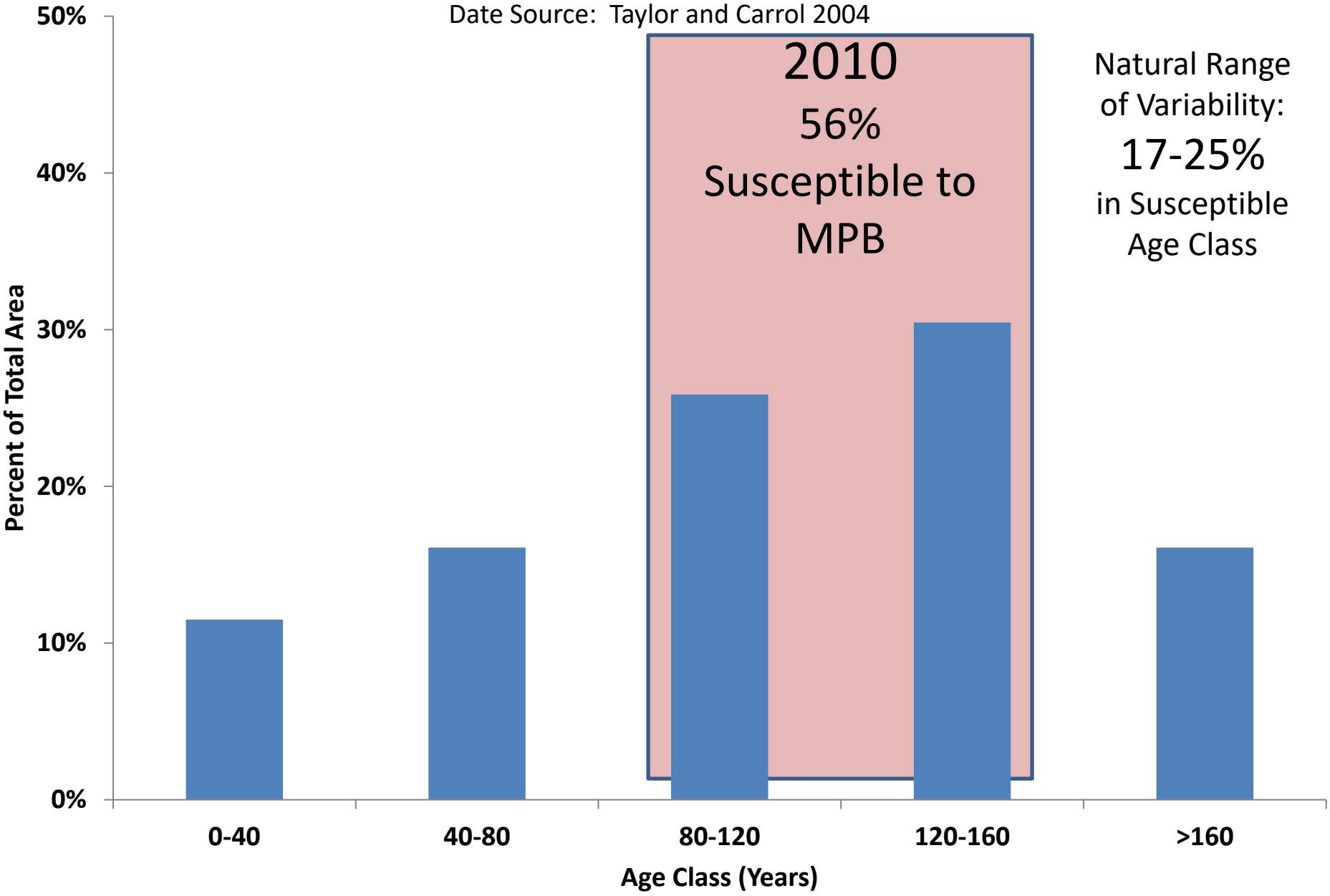
Date Source: Taylor and Carrol 2004




Reconstructed Percent Lodgepole Pine Area by Age Class in British Columbia, Canada
Date Source: Taylor and Carrol 2004
1990
53%
Susceptible to MPB
Natural Range of Variability:
17-25%
in Susceptible Age Class
50%
40%
30%
20%
10%
0%
Percent of Total Area
0-40
40-80
80-120
120-160
>160
Age Class (Years)

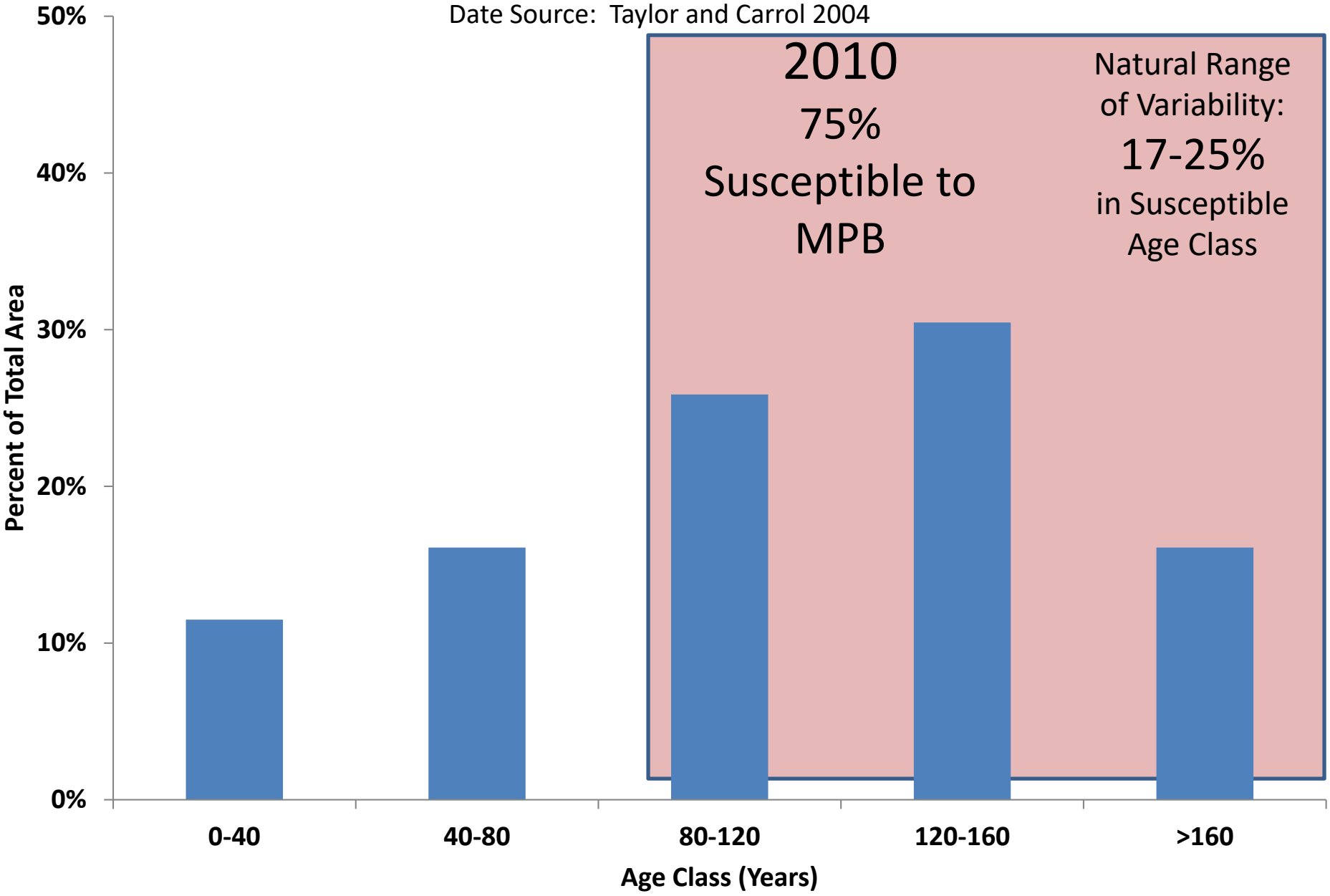
Reconstructed Percent Lodgepole Pine Area by Age Class in British Columbia, Canada

Date Source: Taylor and Carrol 2004



Reconstructed Percent Lodgepole Pine Area by Age Class in British Columbia, Canada

Date Source: Taylor and Carrol 2004



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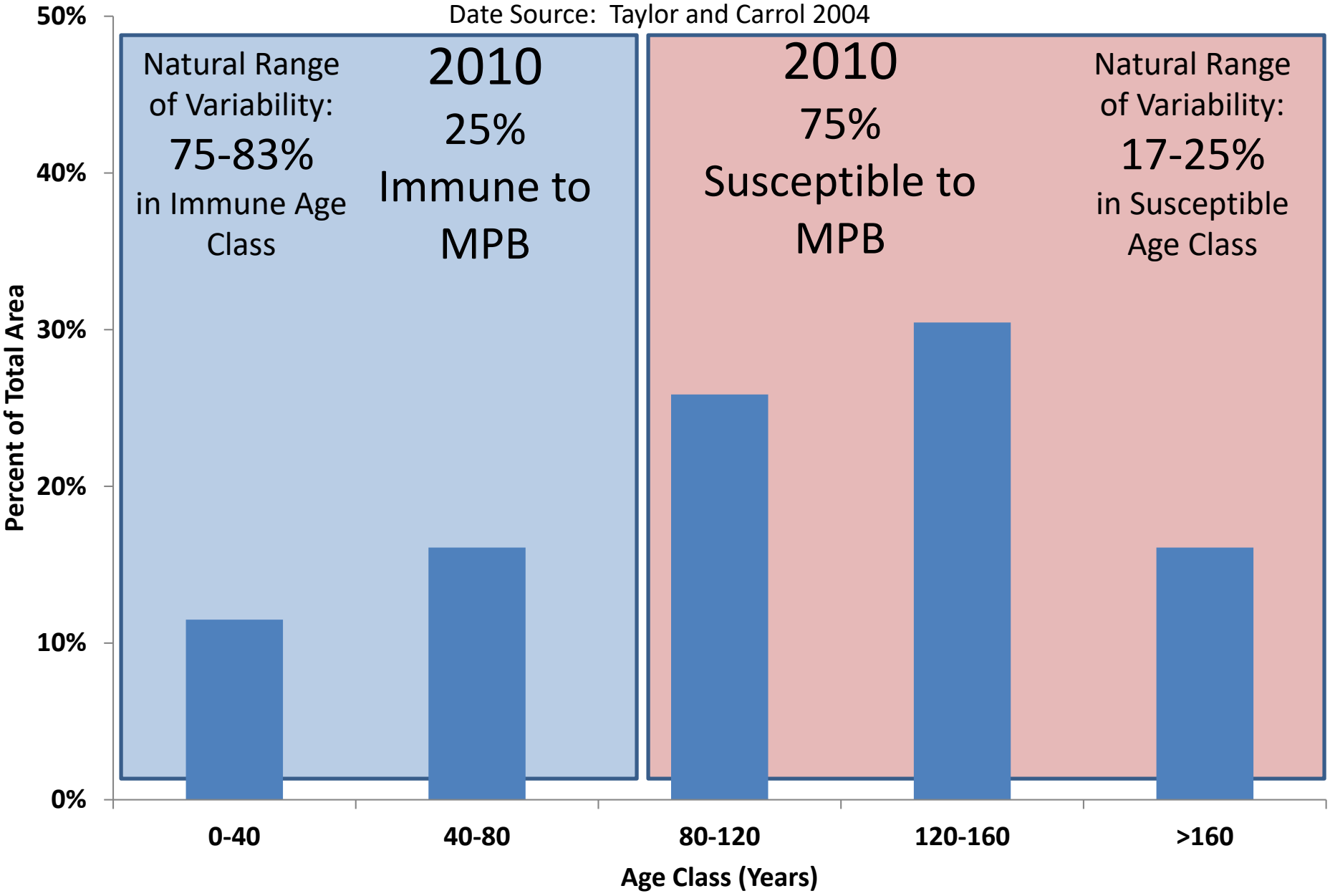


Management of the Past

1971 “Terraced Clearcut”- Took Creek, MT

Fire-Forced Management

- Wildfires force management during suppression activities
- Due to constraints these impacts can be more drastic and costly then performing forest management before the fire
- Fire suppression does not allow for landscape level treatments such as thinning. The closest it comes is allowing for a well timed burnout if good weather conditions present themselves

Fireline cut during the 1988 Yellowstone Fires

Fireline cut on the 2013 Lodgepole Fire in Idaho

I & D Forced Management

- Insects and Disease also force management
  - Indecision is, in itself, a decision
  - Our management of forests resulted in the current MPB epidemic
    - DNRC manages this through intense forest mangement AKA Timber Sales

MPB Mortality outside Helena, MT

Management Choices

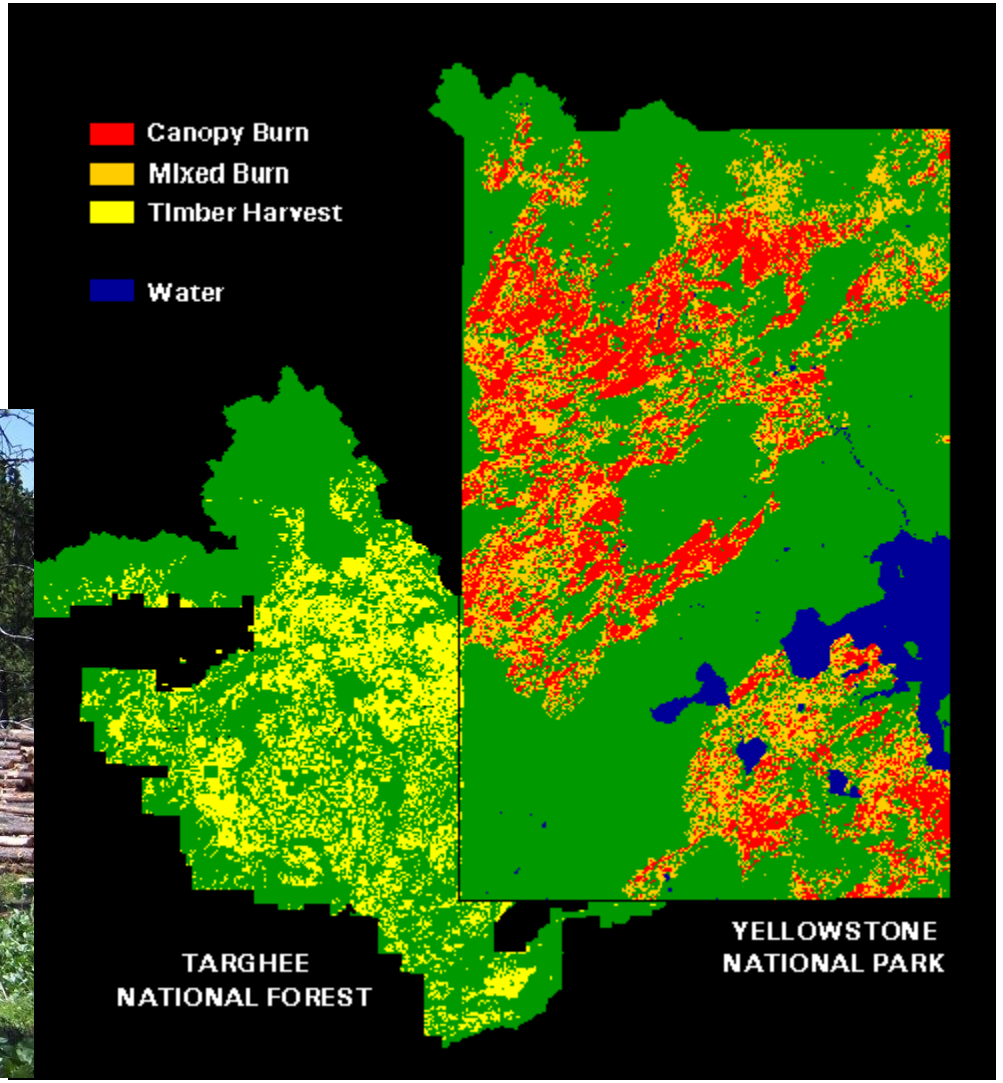
Education (think Smokey Bear) is the only management option which significantly limits the number of ignitions/ fire occurrence

Physical preparation for wildfires can be approached from various ways

- Landscape scale treatments
- Focused projects around infrastructure such as homes and other high-value sites
- Strategic firefighting projects

Wildfire & Timber Harvest Landscape Patterns

- To balance ecological goals with commercial needs harvests should model natural disturbances to work with a forest's natural ecology

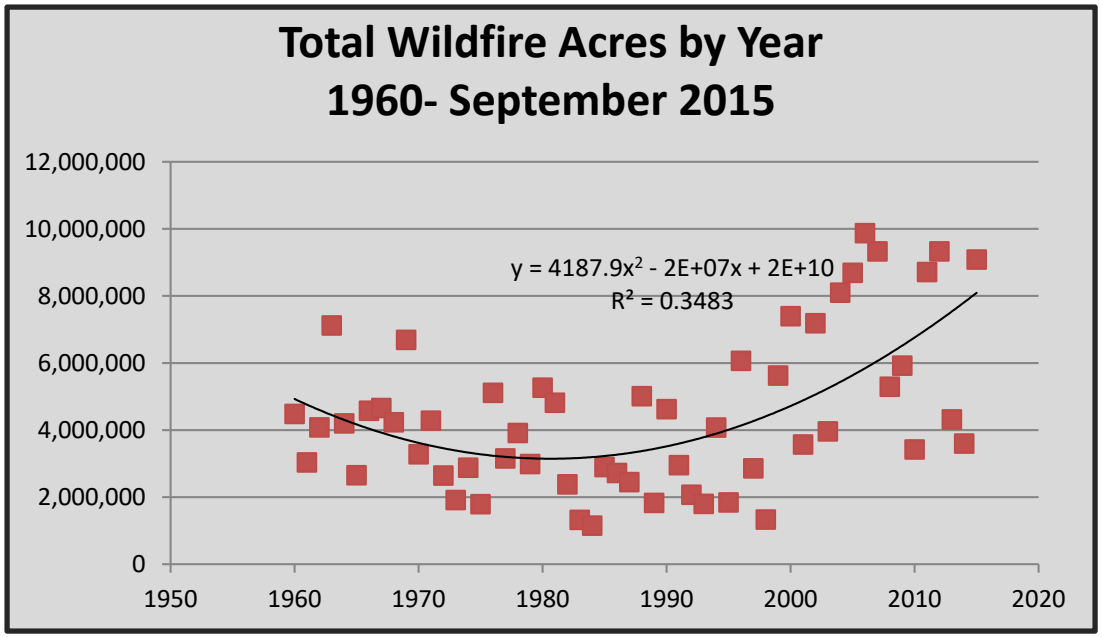


Active Management

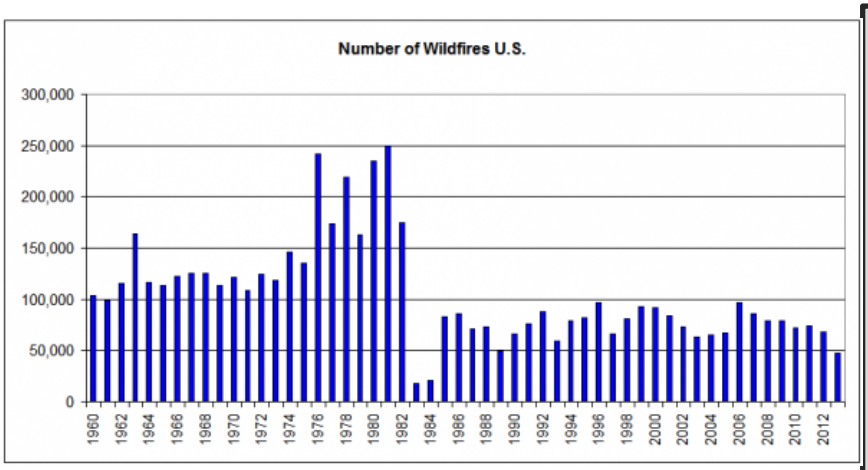
Conducting forest management that mimics natural forest processes is the best way to ensure a healthy forest

Patch clearcutting in lodgepole can mimic a mixed severity fire regime, promote forest resiliency and provide changes in fuel age classes

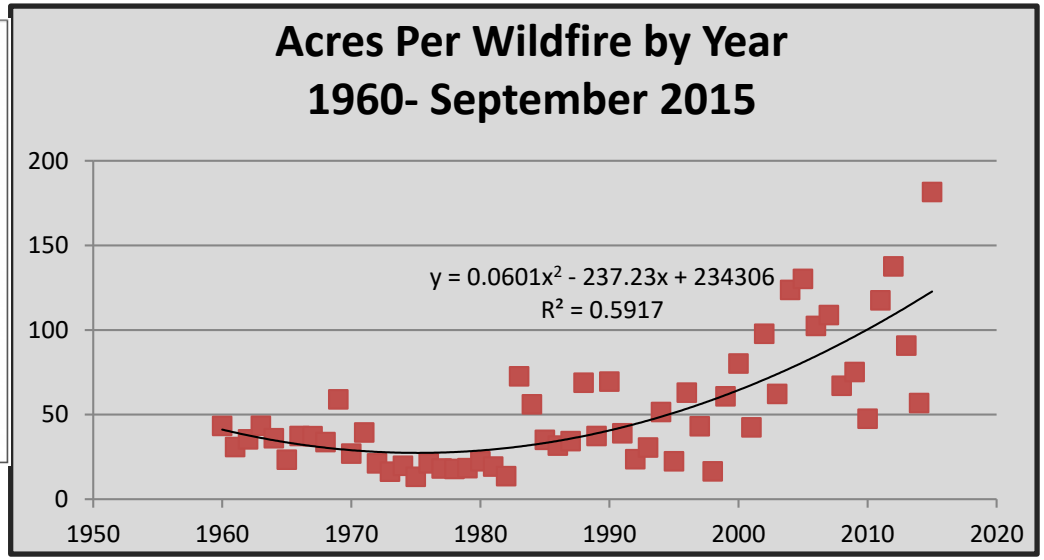
Fire by the Numbers



- Number of Fires/ year has clearly decreased
- Both total wildfire acres and acres/fire have increased
  - Ac/Fire has a much stronger R^2 value showing a much stronger statistical trend

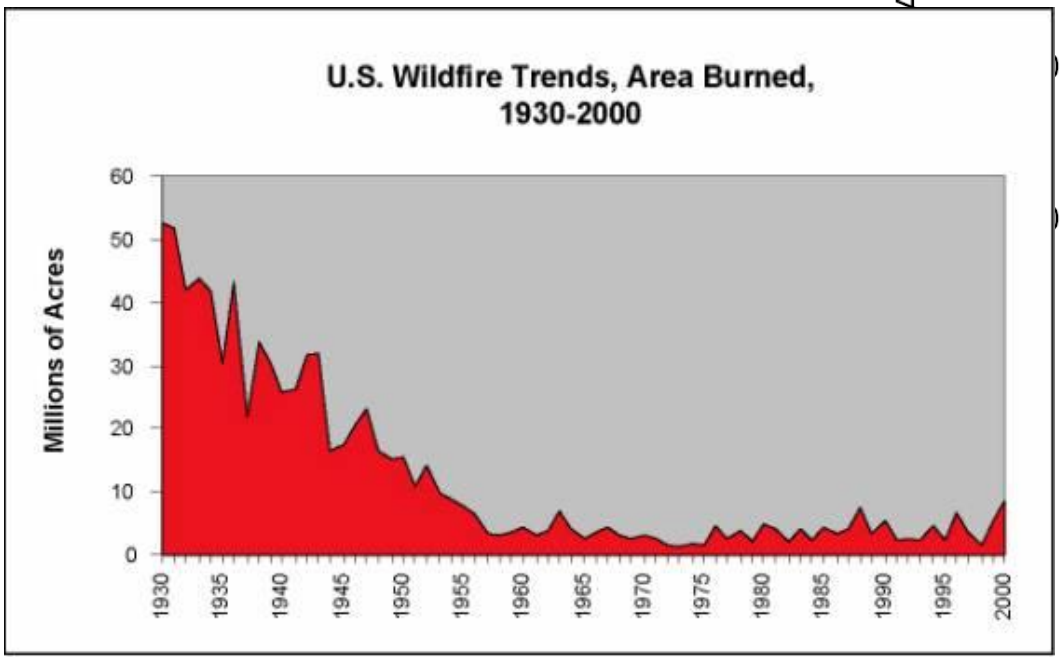


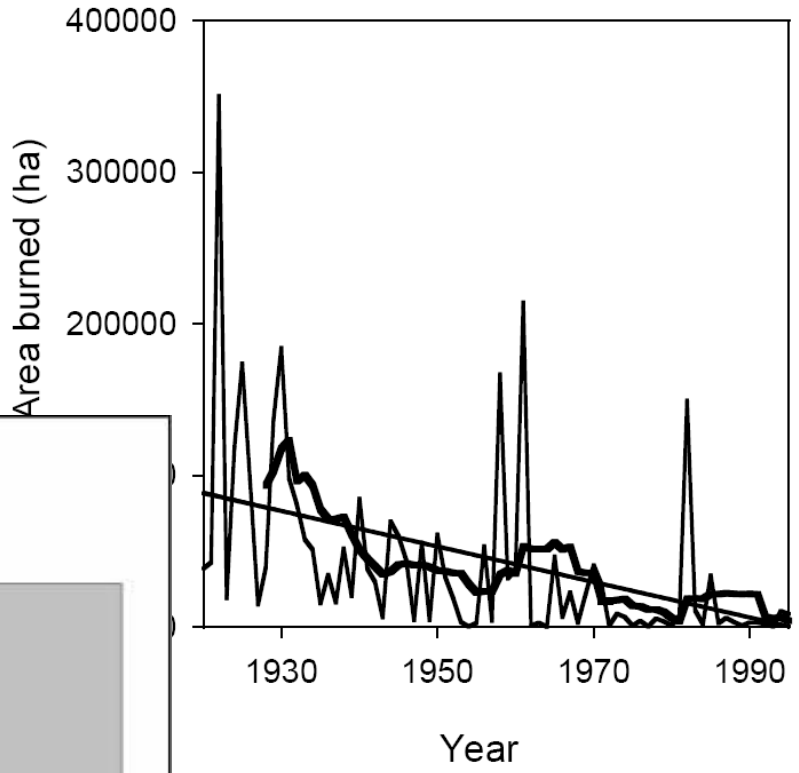
Data Source: NIFC, 2015



Older Numbers

- Part of the problem may be that we are looking at 20 years of data when we should be looking at 100-300 years to look for long term cycles





Source: Taylor and Carroll, 2004

Lessons Learned

When taking a bite…

Take a BIG BITE

- Too many projects start at 2,000 or 5,000 acres and are downsized to 1,000 or less
- All the money to do the environmental assessment on 5,000 acres was still spent
- Push decisions to the lowest level possible
- Develop personal relationships with involved parties and treat them as equals and individuals

Immediate Values at Risk

Primary objectives for wildland fire operations always begin with protecting (1) life and (2) property

- Increasing infrastructure in the wildland environment
- Most large scale wildfire fatality incidents occur in the initial attack phase when protection of these values is most difficult

A cabin in Madison Co., MT

Natural Resources are often overlooked in today's fast paced fire environment

- Natural resources are often overlooked as their value is less noticable to the average person

Delphia Fire: Musselshell Co., MT

Long-Term Values at Risk

Arguably many of these items such as watershed health should have been dealt with through proper forest management at an earlier date

- Denver Water (2013) following the 11,900-acre Buffalo Creek Fire (1996) and the 138,000-acre Hayman Fire (2002)
  - **$26 million impact**
- Invest in the future

The Buffalo Creek Fire in 1996 burned 11,900 acres southwest of Denver, Co. Sediment erosion was a major impact after the embers died out.

Cost and Benefit

Cost/ benefit of forest management is difficult to quantify as are any emergency preparedness programs

- Active forest management can arguably pay for itself, as it does in DNRC
  - Progressive programs such as the state Forest Improvement (FI) fees can help pay for project that do not generate income
  - Strategies such as thinning around homes and infrastructure has no impact on reducing the cost or size of a fire, they only reduce infrastructure lost
  - Landscape level work has potential cost/benefits but work must be performed at the landscape level

Aggressive Initial Attack

- Aggressive IA can still put fires out when small
  - Some agencies are using wildfires as management as their policies allow because it is the only way they can get management done
  - Aggressive IA still eliminates fire from the landscape and postpones the problem if no other actions are taken

Current cost/ risk reduction is clearly not working

- Thinning around homes
  - Number of homes lost
  - Cost/acre
  - Maintenance
  - Total Cost Statistics
- Average annual suppression costs (USFS & DOI)
    - 1985-1999- $426,000,000
    - 2000-2014-$1,482,733,000
      - Source: NIFC, 2015

Risk Reduction Strategies

- Goals are the most important aspect of measurement here
  - Is the measurement a risk reduction to infrastructure or to the environment
- Active forest management is most cost effective as it pays for itself
  - Prescribed fire has a low cost/acre but risk and liability are high
  - Non-commercial mechanical thinning
  - Hand thinning
- All of this is dependent on fuel type and the environmental review process

Strategies (cont.)

Clearly, the most ineffective risk reduction strategies is fighting large wildfires

- With an annual cost of nearly $1.5 billion something needs to change

Dozer, Transport, Operator and HEQ Boss- $3,000/day

Hotshot Crew- $11,500/day

Sky Crane- $4,200/ hour + $7,000/day availability

VLAT Air Tanker Drop- $57,000/load within 1 hour of flight time

Prescribed Fire

How can prescribed fire be used to reduce risk?

- Prescribed fire is a real tool that can burn the forest on our terms
  - Florida Forest Service hosts the most successful and active RX Burn Program
    - 2014 FLFS burned 248,000 acres
  - Prescribed burning, done in reoccurring interval can decrease fuel build up, fire severity and fire intensity promote a healthy forest, increase wildlife habitat RX burniung can be used to promote regeneration in stands desimated by MPB and other insects and disease

Questions/ Comments/ Discussion