Wood Adds Sustainability To Ecosystems

Beyond sawlogs: challenges and opportunities
October 6 2019
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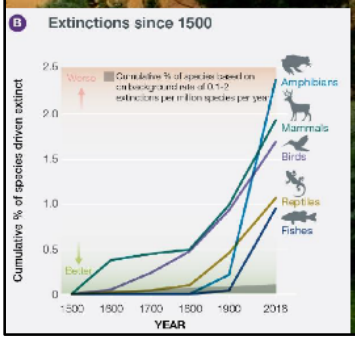
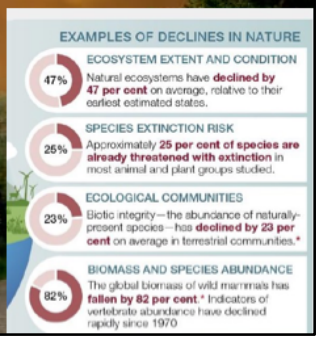
Wood Adds Sustainability To Ecosystems

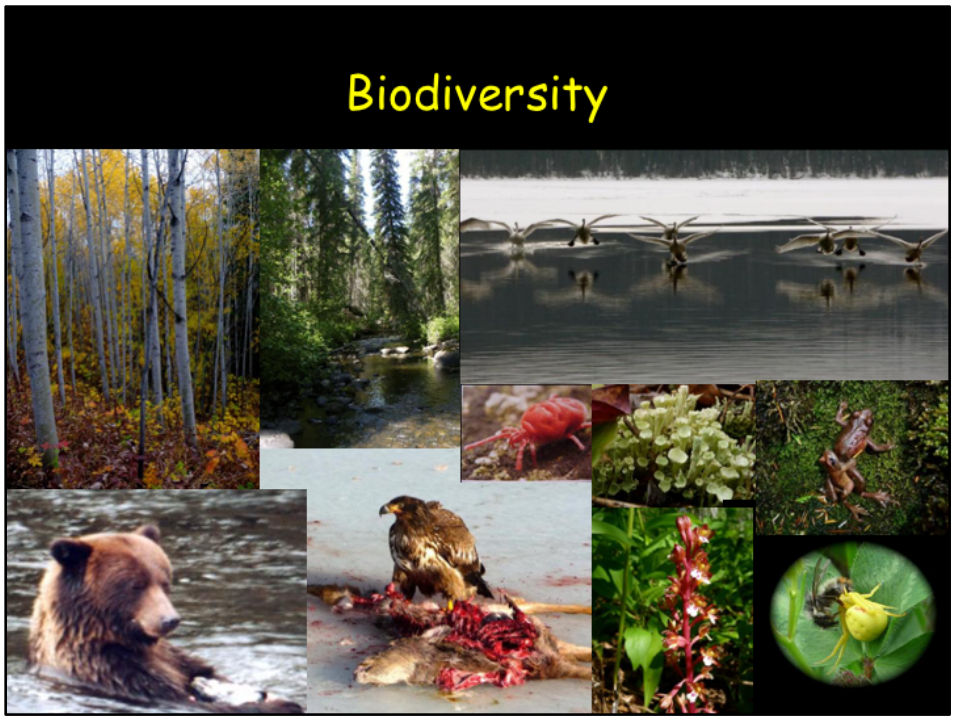
- The big challenges
  - Declining biodiversity
  - Climate change
- Values you may want to consider
  - Forest biodiversity
  - Carbon
  - Resilience to disturbance
- Myths
- Actions
  - how managing wood can influence each value

Biodiversity Decline

- *"Nature and its vital contributions to people, which together embody biodiversity and ecosystem functions and services, are deteriorating worldwide"* (IPBES 2019)







The full variety of organisms at all scales—and the interactions amongst them

Ecological function

Convert energy

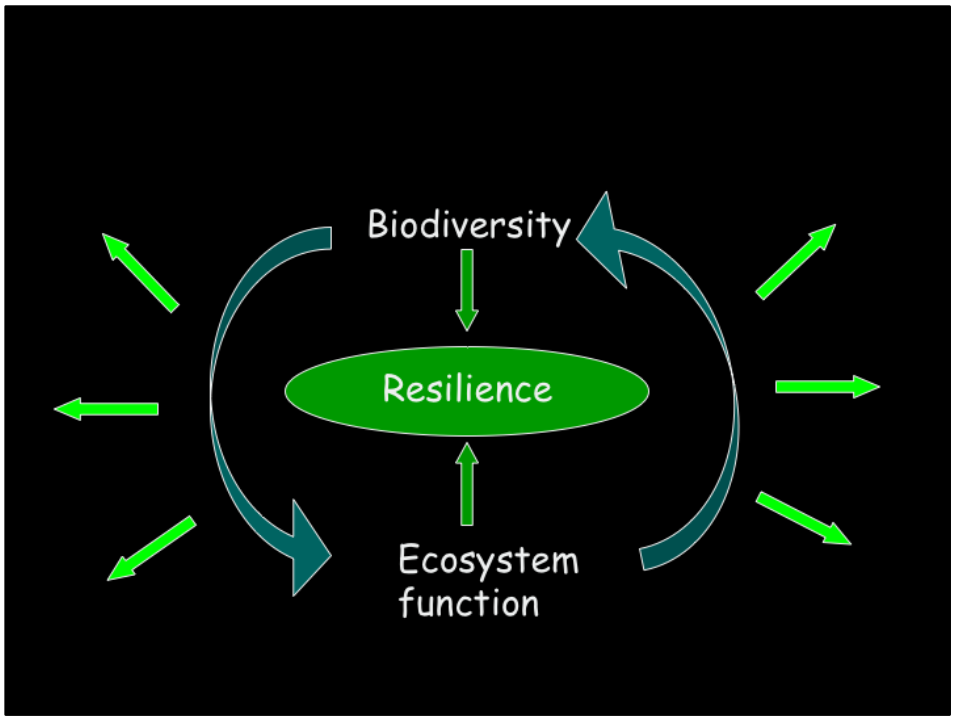
Gather nutrients

Store carbon; regulate climate

Store and transport water and nutrients

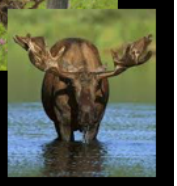
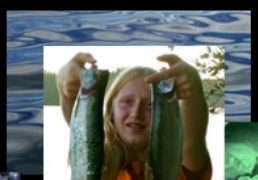
Filter water

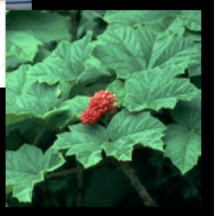
Decompose, recycle nutrients, build soil


Biodiversity
Resilience
Ecosystem function

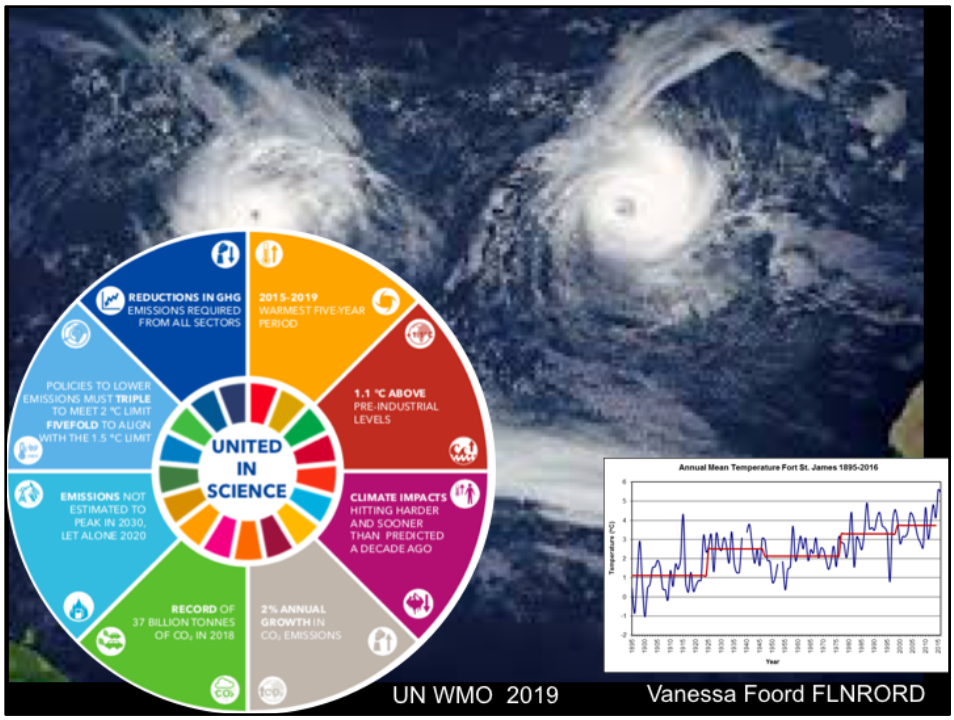
Values and Services

- Timber
- Old forest biodiversity
- Young natural forest
- Moose
- Water and fish
- Non-timber forest products (berries, fungi, medicinal plants)
- Marten
- Grizzly
- Goshawks
- Landscape connectivity
- Carbon
- Range

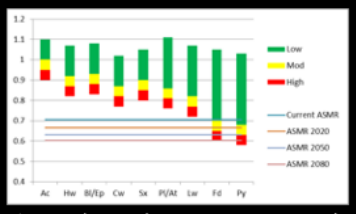


mycorrhizae no mycorrhizae
Mike Amaranthus
Stephen Sharnoff
Michegan University



UN World Meteorological Organisation

Warmer summers



Drought risk assessment tool

BC Gov: Wildfire management

Increased wildfire disturbance

Warmer water

Warmer winters

Increased parasites

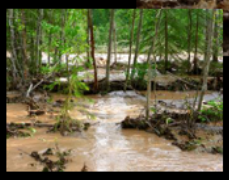
Decreased snowpack

Counter-intuitively, warming can lead to freezing

Wetter springs

Changed flow level and timing

Increased flooding and mass wasting



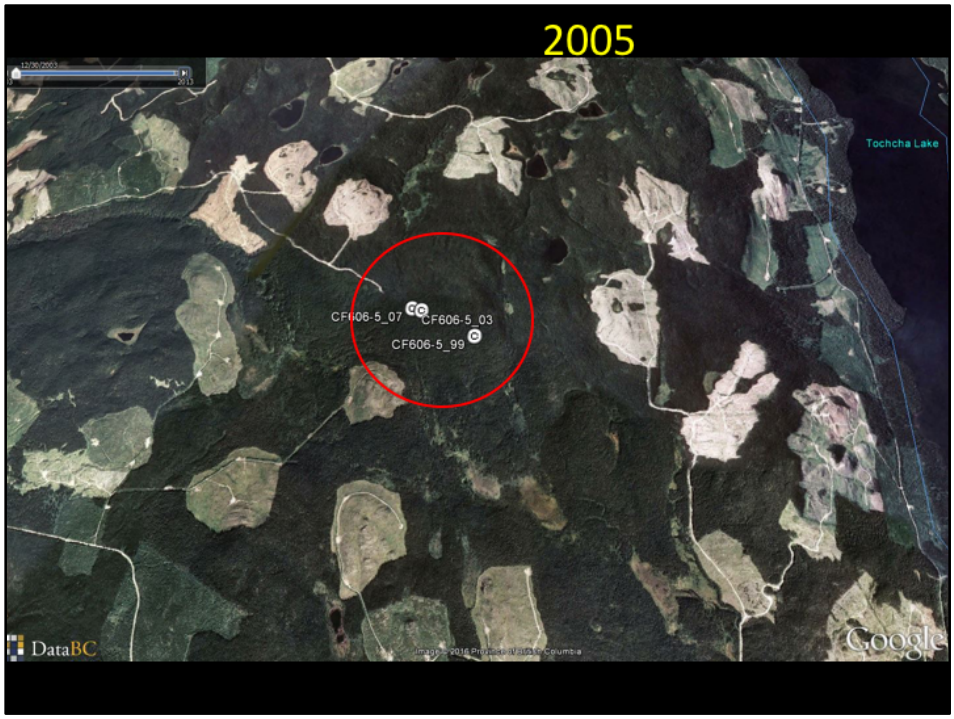
As a caring woodlot manager, what can you do?

1. Maintain biodiversity and ecological function
2. Reduce carbon emissions
3. Increase resilience to disturbance

1. Maintain forest biodiversity

Myth 1a: Following legislated targets for landscape-level retention maintains biodiversity

- No it won't
  - science supports "nature needs half"
  - <30% is high risk
  - old growth is at risk across BC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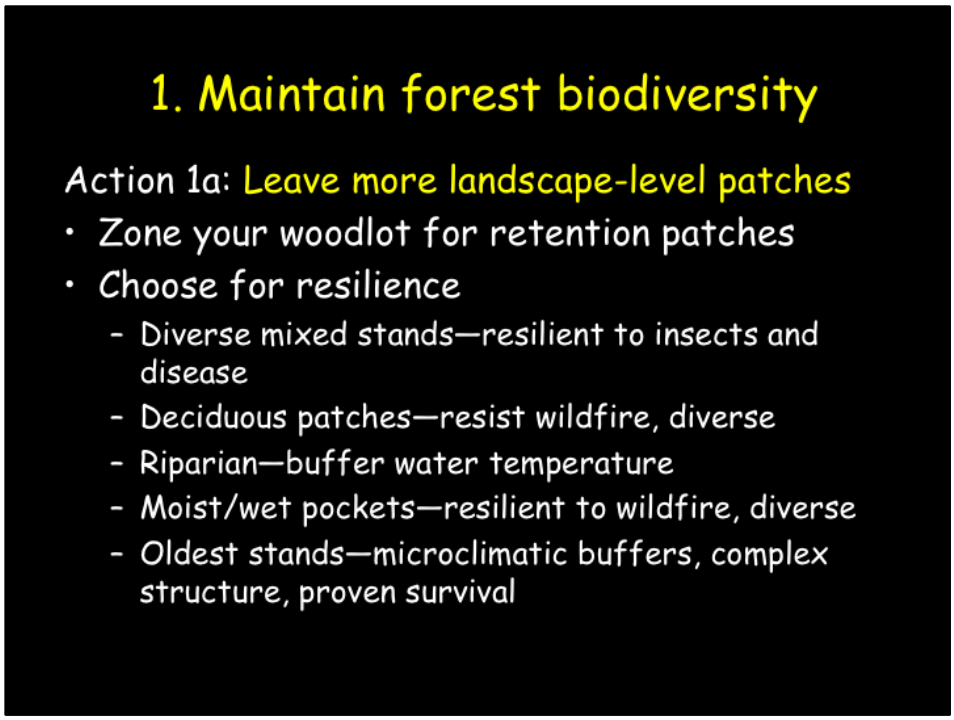
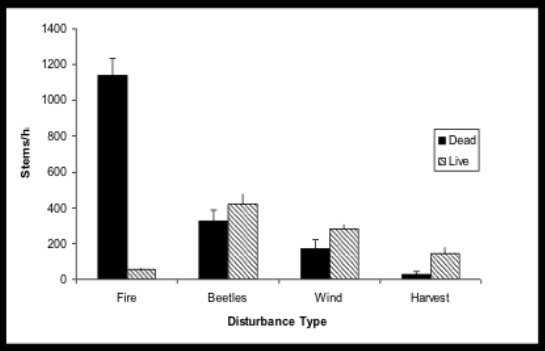


Temporally dynamic units

1. Maintain Forest Biodiversity

Myth 1b: Logging mimics natural disturbance

- Not really

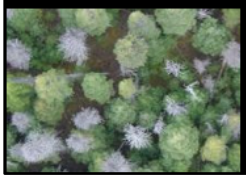


1. Maintain Forest Biodiversity

Action 1b: Leave more in-stand retention

- Maintain legacies typical of natural disturbance
  - Large live trees
  - Large dead snags
  - Long downed wood

- *A major shift to retention can help resolve some global forest sustainability issues* (Lindenmayer, Franklin, Lohmus and 14 others 2012)



How much to leave?

- More than 15 – 20% (or else little value)
- Good option is to choose some blocks for >30% and some for very little
  - Even a couple of nice-sized snags will help woodpeckers

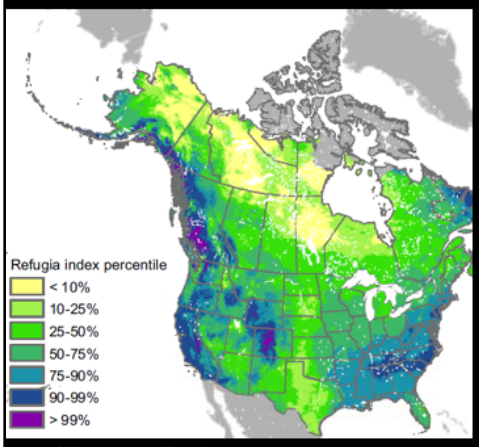
<15-20% similar to clearcut

40% good for many

70% ~ old for most

Retention improves resilience

Maintain forest biodiversity: climate refugia



Strahlberg et al 2018

- BC hosts climate refugia for trees and birds
- Opportunities to increase resilience and likelihood of maintaining biodiversity and ecosystem function into the long-term

2. Reduce carbon emissions

Myth 2a: replacing old forest with young mitigates climate change

- Ignores carbon storage in old forests
- Overestimates the growth in young stands
- Ignores carbon spent logging
  - Forestry is BC's largest source of carbon emissions

WANTED FOR CARBON
BIG TREES: DEAD OR ALIVE!

n lodgepole pine forests in general, as well as those in the WUI, occurrence of large fires was determined primarily by current and antecedent high temperatures and low precipitation but was unaffected by preceding outbreaks. Trends of increasing co-occurrence of wildfires and outbreaks are due to a common climatic driver rather than interactions between these disturbances.

Limit cumulative effects

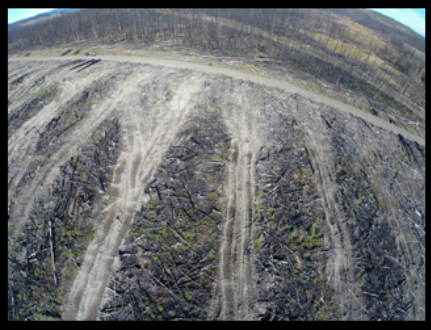


Photo credit: Matt Sakals, BC Gov

Disturbance + salvage can damage ecosystem function and reduces resilience

2. Reduce carbon emissions

Myth 2b: burning biomass will reduce CO_2

- True for mill waste
- Only true on block if emissions from harvesting, processing and burning are offset by future carbon stores
  - in BC, 70 – 400+ years!
- Wood produces less energy than hydrocarbons; same heat = more CO_2
- No time to recoup the carbon debt by 2050

2. Reduce carbon emissions

Action 2b: Don't harvest trees for pellets

- Separate big pieces and fines
- Big pieces have value for carbon and biodiversity
- Deciduous have value for resilience and biodiversity
- Pellets may be an acceptable use for fines
  - but avoid perverse subsidy for excessive logging debris

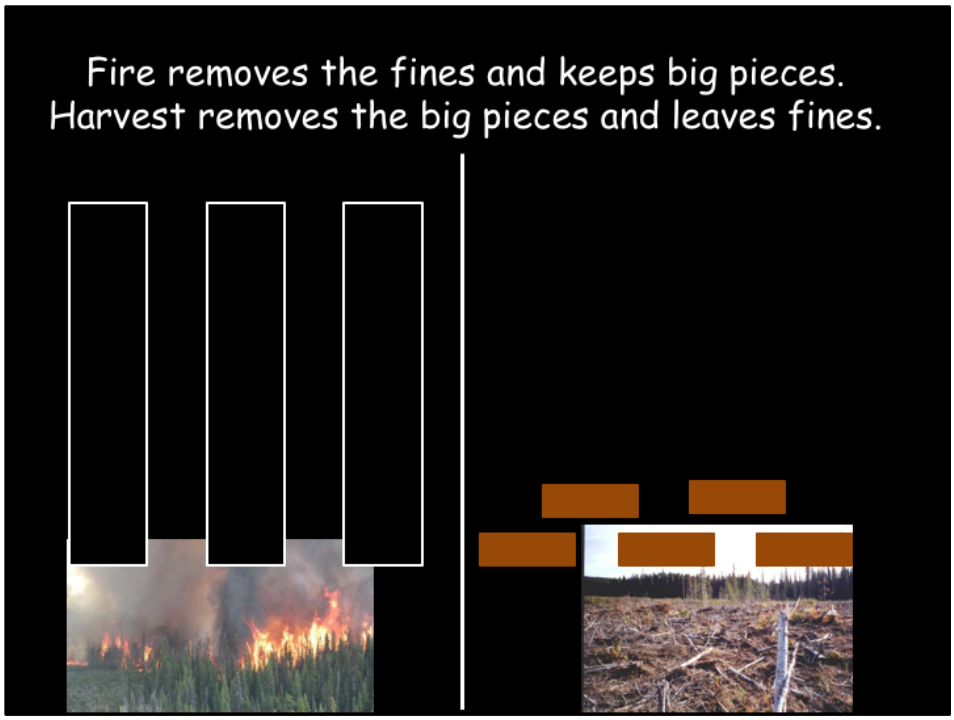
- Avoid damage and breakage
- Experiment with biochar

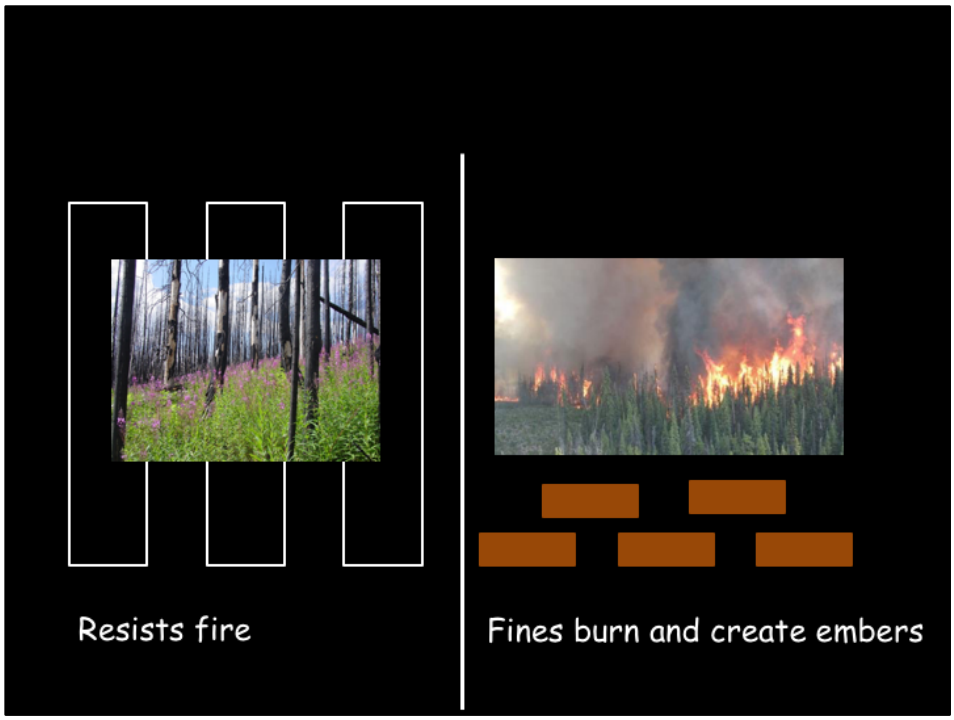
3. Build resilience

Myth 3a: logging increases resilience to wildfire

- Generally, logging reduces resilience by simplifying structure at stand and landscape scales
- Logging can increase wildfire risk by leaving fine fuel
- Harvesting serves economics not resilience

Logging is the opposite of wildfire


Fire removes the fines and keeps big pieces.
Harvest removes the big pieces and leaves fines.


Resists fire
Fines burn and create embers

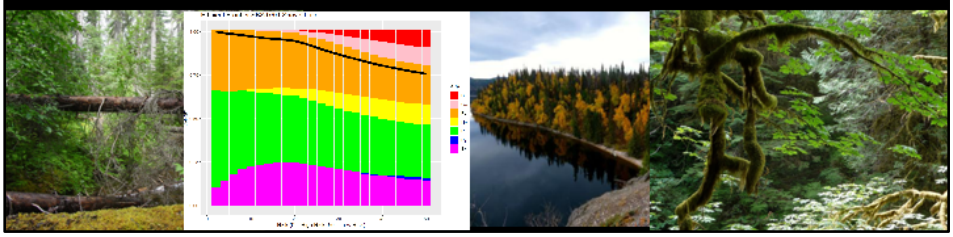
Simplified structure perpetuates low resilience

- Dense planting = low resilience
- Focus on fast-growing species = low resilience
- Lack of deciduous = low resilience

3. Build resilience

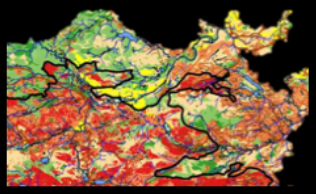
Action 3a. Increase stand diversity

- Ensure diversity in species and structure at all scales
- Keep deciduous trees, shrubs, snags and downed wood
- Plant climatically-suited species and stock at variable densities



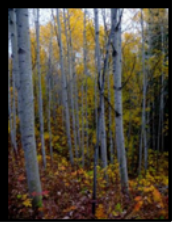
3. Build resilience

Action 3a: Maintain deciduous trees and shrubs



Shovel Lake Wildfire

Island Lake Wildfire



3. Build resilience

Myth 3b: fuel management reduces wildfire risk

- Depends on type and scale
  - True near structures and communities
  - Fuel breaks work
  - Prescribed burning works

- But across the landscape, fuel is not the driving factor
  - *"Time and time again..., I find that fuel is one of the least important factors..." A. Syphard*
- Climate, weather and topography drive fires
- Landscape complexity reduces spread
- Fires burn more in managed forest

3. Build resilience

Action 3b: Know what to leave and what to take

- Consider removing fine fuels, jackstrawed pine
- Consider prescribed burns where appropriate
- Leave big wood lying on the ground

- Recognise the benefits of natural disturbance!

What a woodlot manager can do for biodiversity, carbon and resilience

- Leave more landscape-level patches
- Leave more in-stand retention
  - Leave big trees, dead or alive
  - Limit salvage of big trees
- Don't harvest trees for pellets
- Increase stand diversity
  - Maintain deciduous trees and shrubs
- Know what to leave and what to take

What a woodlot manager can do for biodiversity, carbon and resilience

- Choose your location
  - Leave big structure in diverse, productive and wetter stands
  - Remove fines and consider prescribed burn in less diverse stands

Or more simply…

Leave trees
Dead or alive
Bigger is better
Deciduous too

Don't do the same everywhere
You can't control wildfire