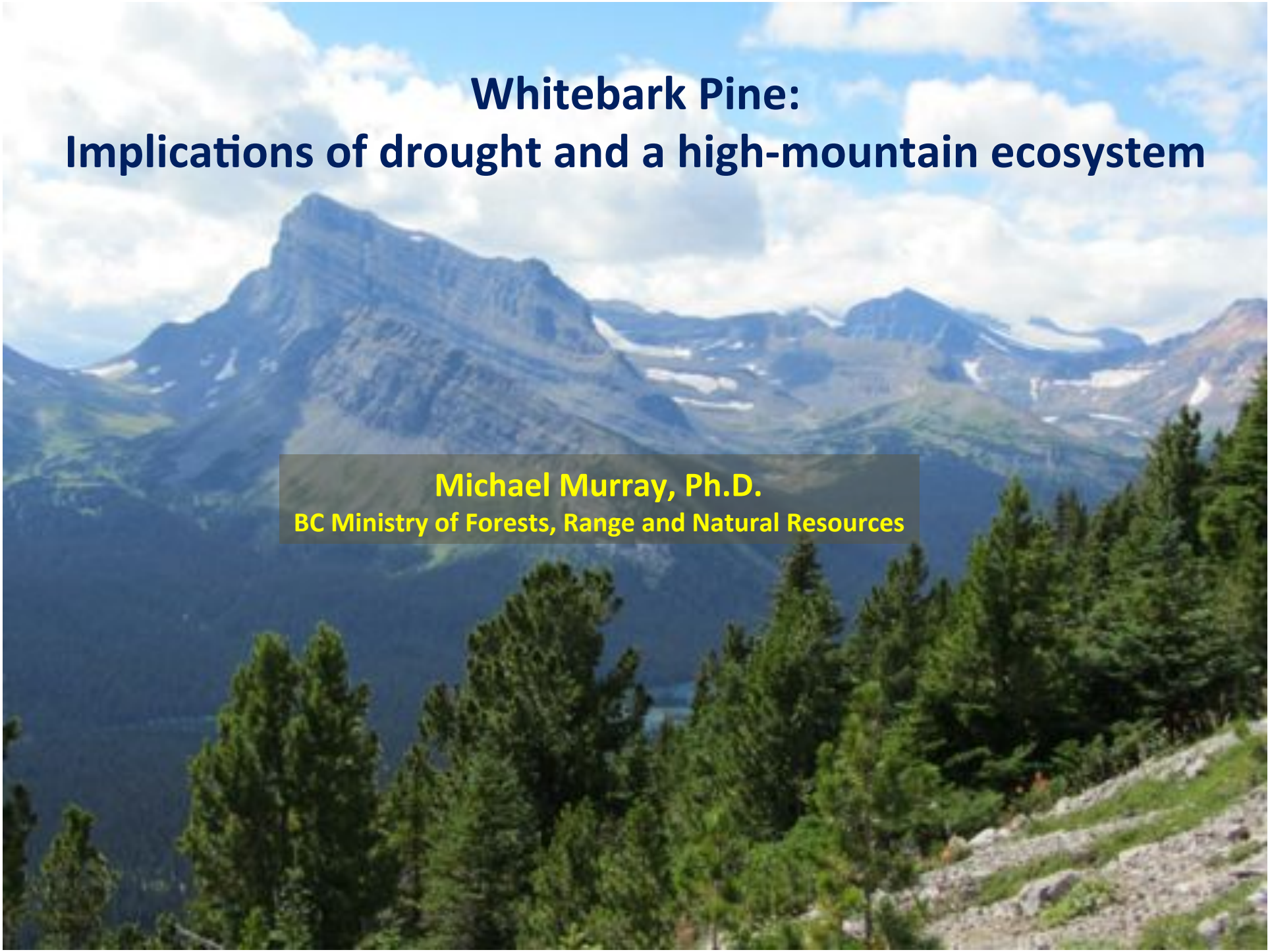


Whitebark Pine:
Implications of drought and a high-mountain ecosystem

Michael Murray, Ph.D.
BC Ministry of Forests, Range and Natural Resources

Seed Shell
(whitebark pine)

Valuable Foodsource

MAMMALS

- Black Bear
- Grizzly Bear
- Red Fox
- Chipmunks
- Golden-mantled Squirrel
- Douglas Squirrel
- Red Squirrel

BIRDS

- Williamson's Sapsucker
- Hairy Woodpecker
- Three-toed Woodpecker
- White-headed Woodpecker
- Stellar's Jay
- Raven
- Mountain Chickadee
- White-breasted Nuthatch
- Pine Grosbeak
- Cassin's Finch
- Red Crossbill
- Clark's Nutcracker

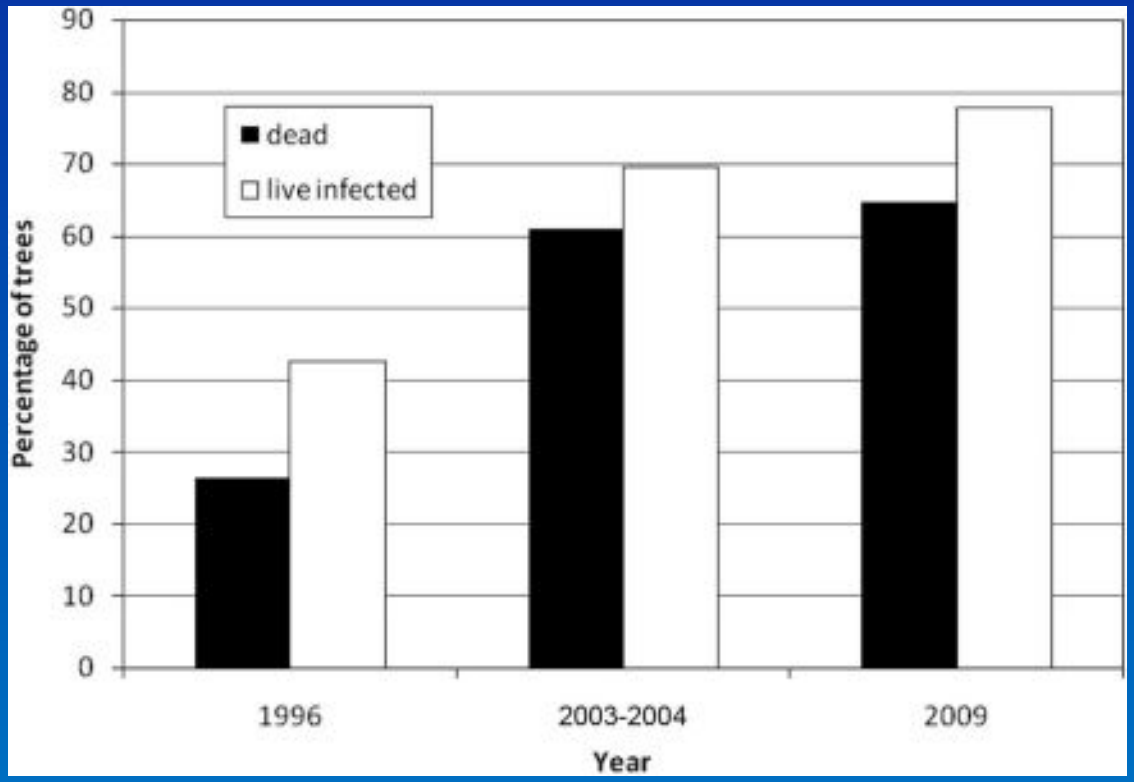
Ecosystem services: Community development and stability; protects our "water towers"

- Regulates snow melt and downstream flow.
- Reduces soil erosion; stabilizes snow---avalanche control.
- Nurse tree on harsh sites.
- Tree island initiator and component.
- Because nutcrackers cache above treeline, whitebark pine may respond quickly to climate change.

Tomback

Damaging Agents

- **Airborne Fungus**
- **Non-native**
- **Very Low Natural Resistance**
- **No Known Cure**



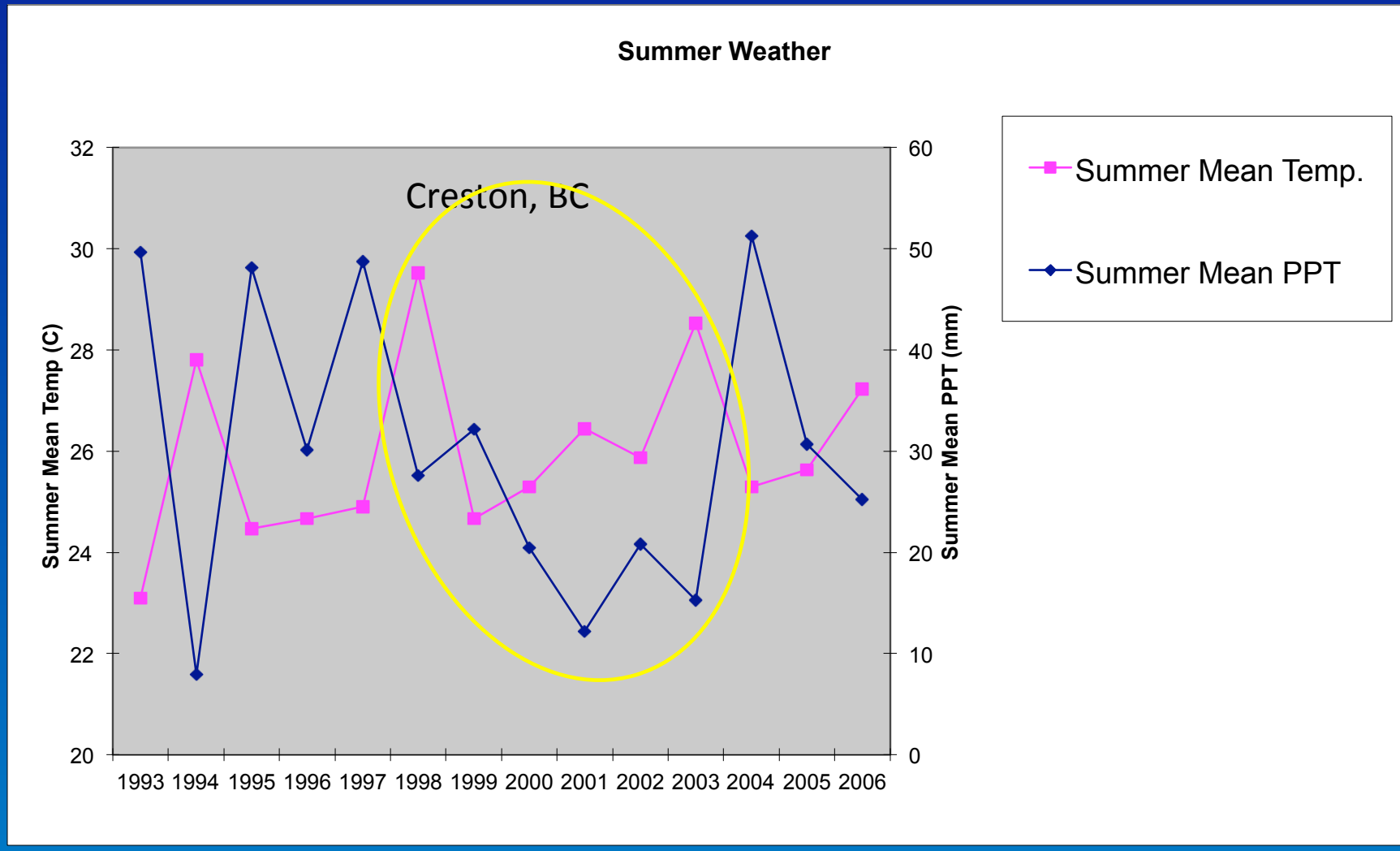
Smith and others (20086)

Canada: Endangered 2012

USA: ‘Warranted but precluded’ 2011

BC Snow Basin Indices – March 1, 2017

Basin	% of Normal
West Kootenay	91
East Kootenay	99
Boundary	59



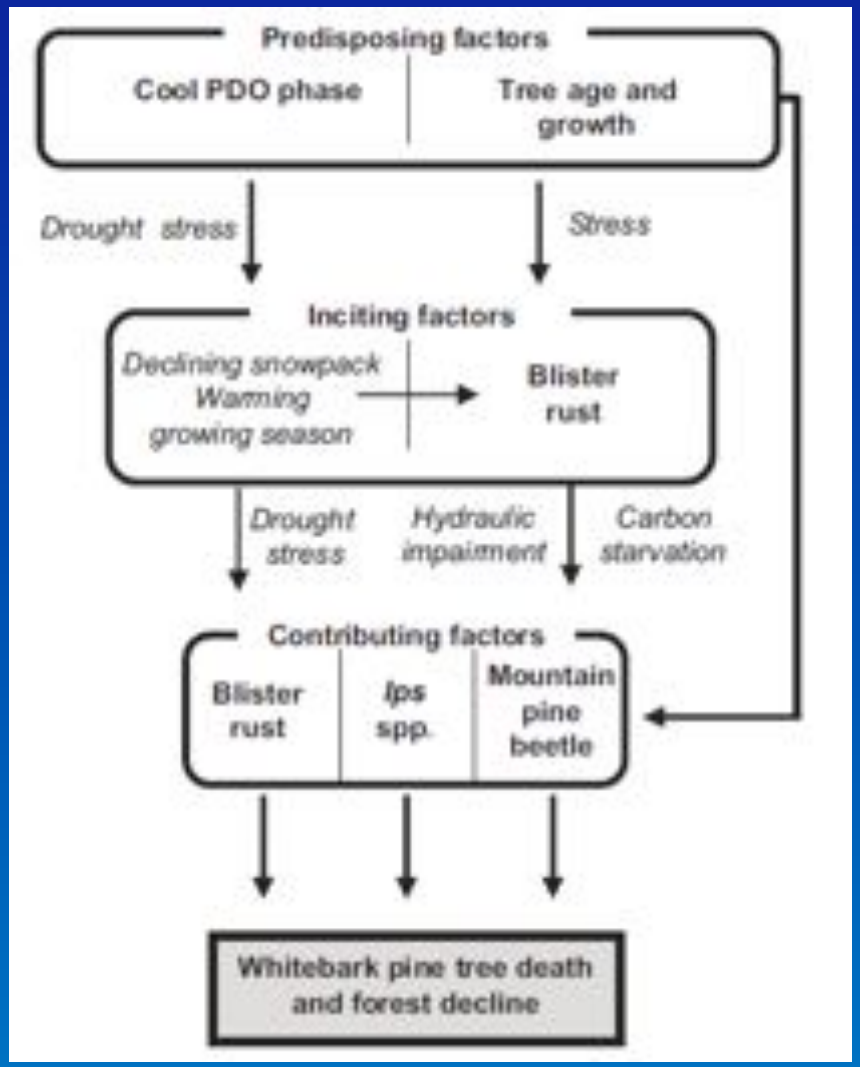
Source: Environment Canada

"Unprecedented reductions in the snowpack in recent decades in the Rocky Mountains coupled with earlier spring melt and longer summer drought…" (Wong and Daniels 2016)

Record-high Temperatures

Water Deficit Stress

Blister rust, Beetles, Mistletoe, Pine Engraver

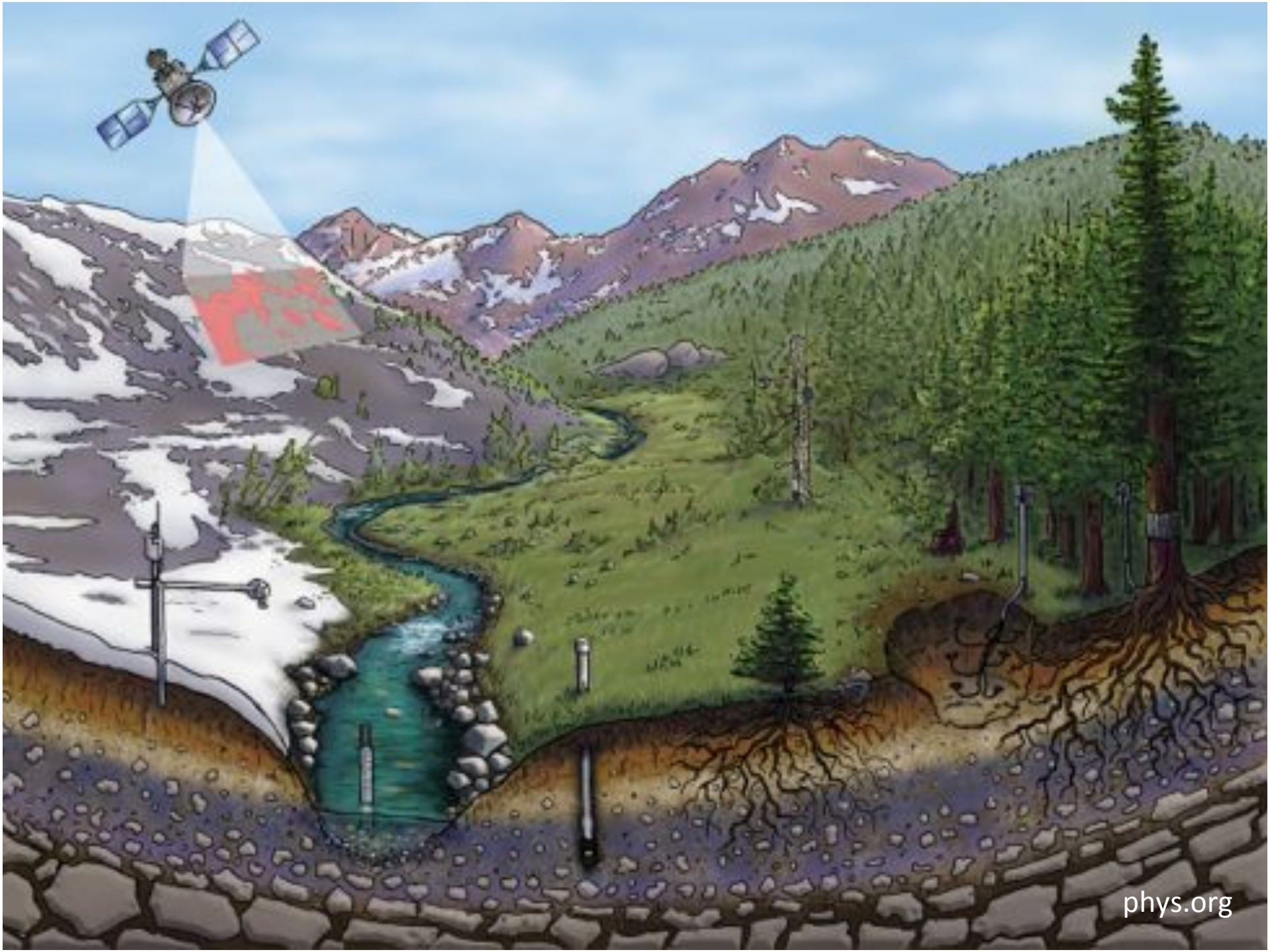


Wong and Daniels (2016)

Whitebark pine growth rates have been declining for almost 50 years in the Pioneer and Gravelly Ranges. "Drought may be an important driver" (Fajardo and McIntire 2012)

"Mortality in all [whitebark pine samples] was strongly associated with a multiyear drought that began in 2006 and continued through 2010." (Millar and others 2012)

- Interactions with mountain pine beetles


phys.org

Impact on Streamflow?

Impact	Inconsistent	No Impact
Potts (1984)	Stednick and Jenson (2007)	Biederman et al (2015)
Bethlahmy (1974)	Somor (2010)	

Impact on Snow Melt Timing?

Earlier Melt	Inconsistent
Pugh and Small (2012)	Slinski and others (2016)

Conclusions

Whitebark pine has persisted with drought and fire for millennia.

However, accelerated decline of whitebark pine populations is occurring due to tree-level stress induced by:

- More frequent and intense hot droughts.
- Blister rust, Beetles, Mistletoe, Pine Engraver
- Various combinations of the above


Larry Eifert


End