A 20 year reassessment of the health and status of whitebark pine forests in the Bob Marshall Wilderness Complex, Montana, USA

Using citizen science to assess whitebark pine decline

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Outline

- About
- Running an effective WBP Citizen Science project
- 1990 vs. 2014 comparative study
- Health of WBP in the Bob
- Implications of using citizen science

BOB MARSHALL WILDERNESS FOUNDATION

2015 ANNUAL REPORT

BOB MARSHALL WILDERNESS FOUNDATION

302 volunteers

COMPLETED 35 PROJECTS

working 12,408 hours

133 miles of trails worked

2,229 trees cleared

1 wetland protected

315 drainages cleaned

14 sites monitored for wilderness solitude

VOLUNTEERS

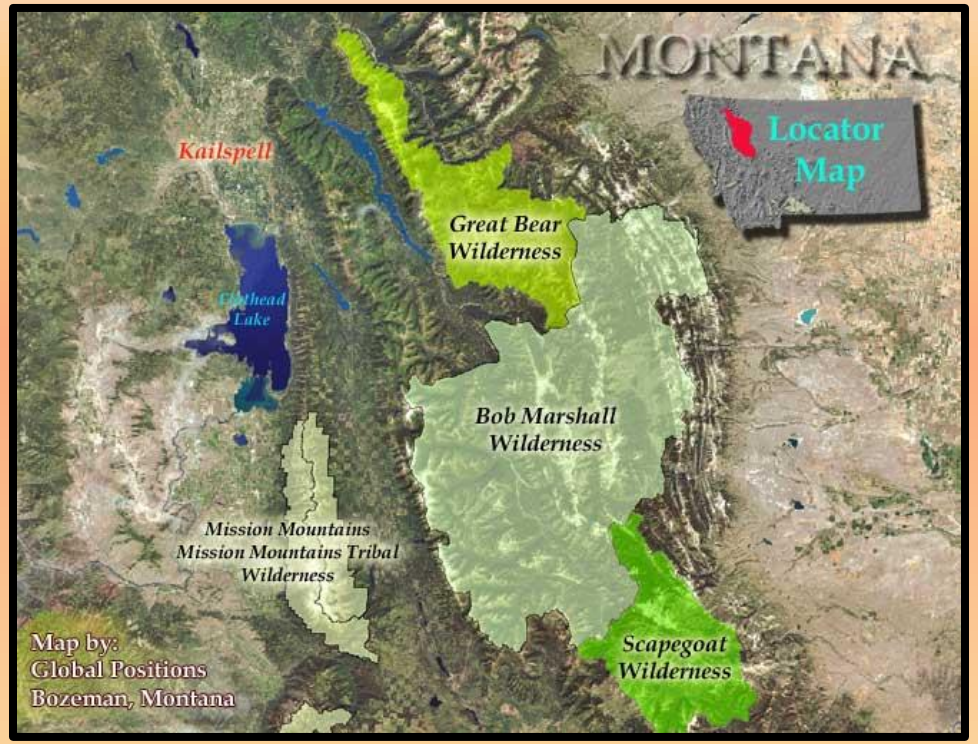
ate 4,653 backcountry meals + hiked 800 miles

donating $400,894 in wilderness stewardship

The Bob Marshall Wilderness Complex and surrounding wildlands were devastated by fires in 2015. Due to fires and smoke, 6 projects had to be cancelled in 2015. In coming years BMWF will work to help reopen trails and areas affected by these fires.

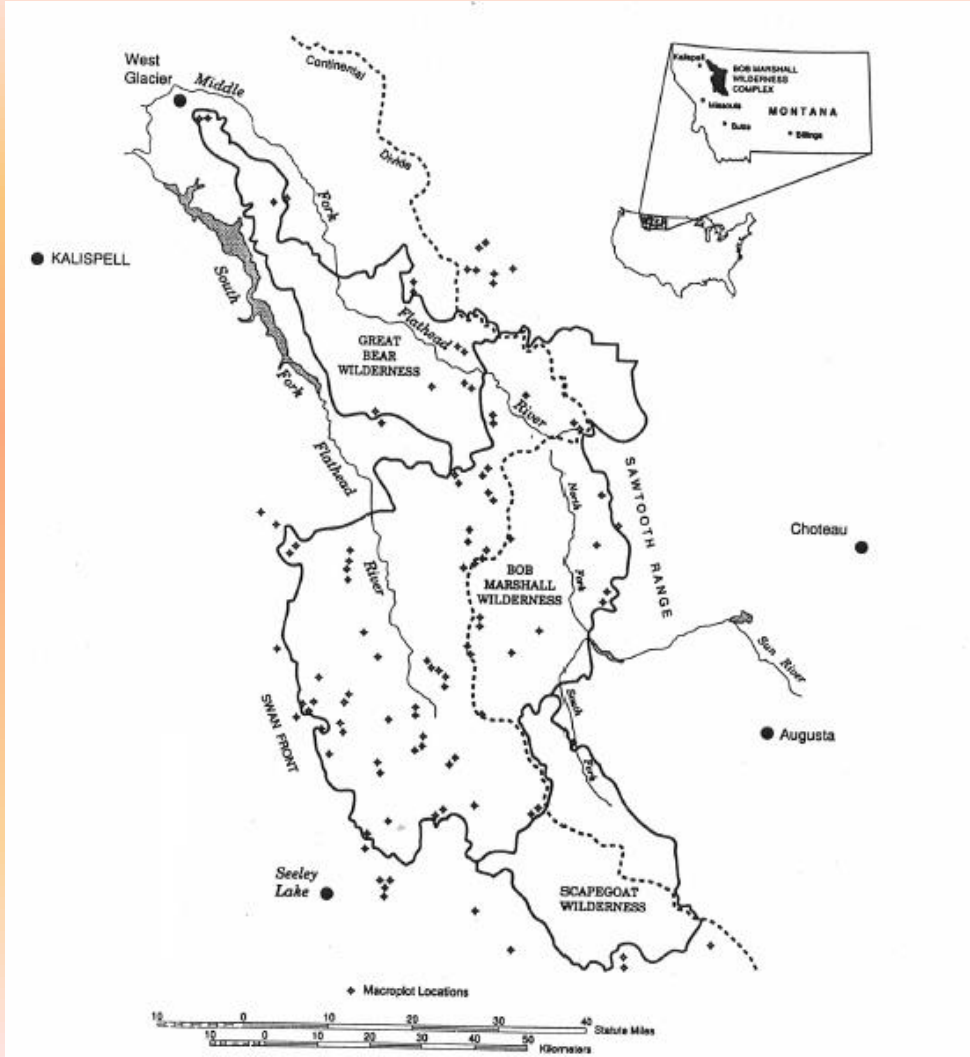
Whitebark Pine in the BMWC

- Bob Marshall Wilderness Complex (BMWC) comprised of Great Bear, Bob Marshall and Scapegoat Wilderness Areas
- Nearly 1.5 million acres
- Wide variation in plant communities and climate
- 44% BMWC has potential to support Whitebark pine



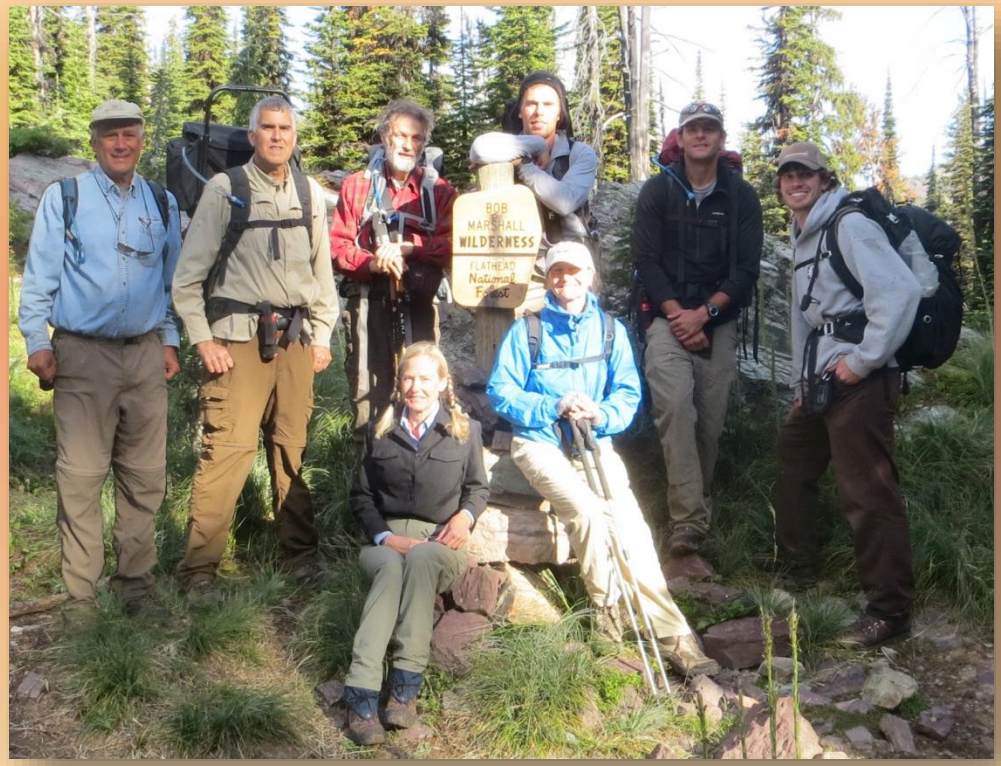
Whitebark Pine Heath Previous studies in BMWC

- Between 1990 -1994, 116 plots were established throughout the BMWC
- Examined health and status of whitebark pine



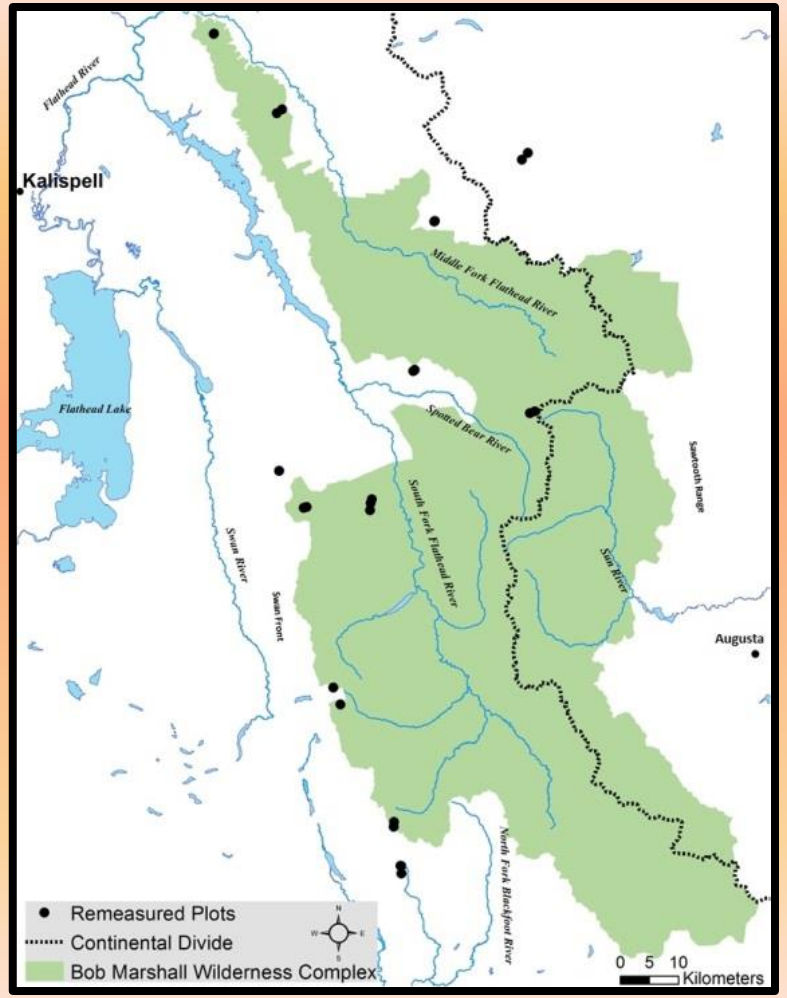
Whitebark Pine Citizen Science Project 2013-2014

- Goal: to relocate and remeasure 20% of the plots from the '90-94 study
- Use citizen scientists to collect data that would assess change in health and status over the past 20 years.



Whitebark Pine BMWF Study Area

- Black dots represent plots re-visited in 2013-2014
- 20% (25) of the original 116 plots were revisited
- Sites were selected to cover from across the landscape
- Some time and access challenges



Method

- Recruit and train hardy volunteers that wanted to climb to the top of peaks and ridges in the Bob
- Relocate the plots from 1990 study
- Measure 0.1 acre plots using standard Forestry methods

Conducting an Effective Citizen Science Project

Train the Crew Leader to train the volunteers.

Volunteer practice.

Relocating the plots

1994

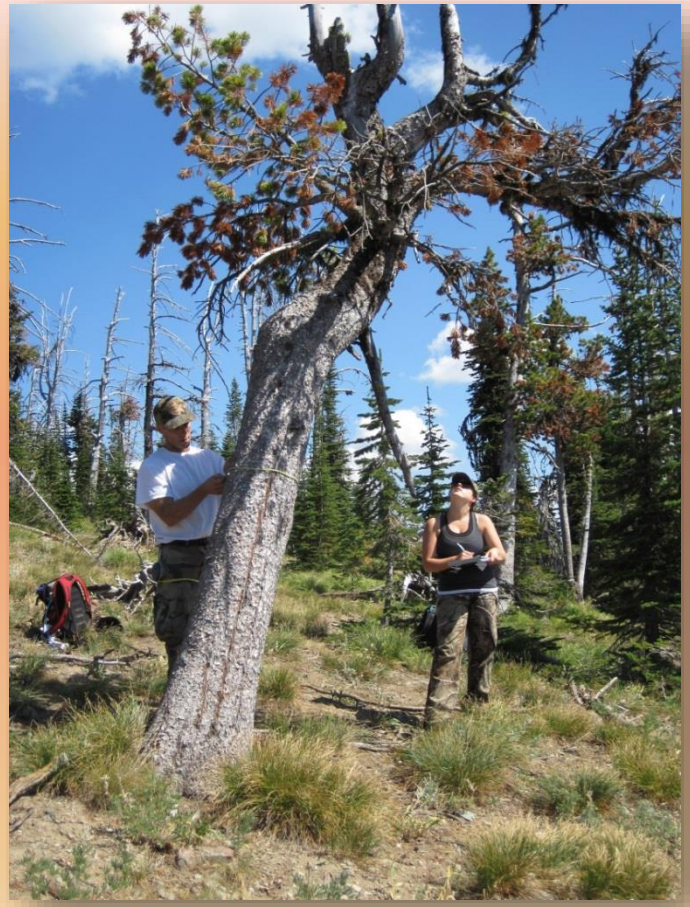
- The original plots were not permanently marked (Wilderness)
- Convert NAD 27 to WGS 84, navigate to plot center
- Use photographs to refine plot center

2013

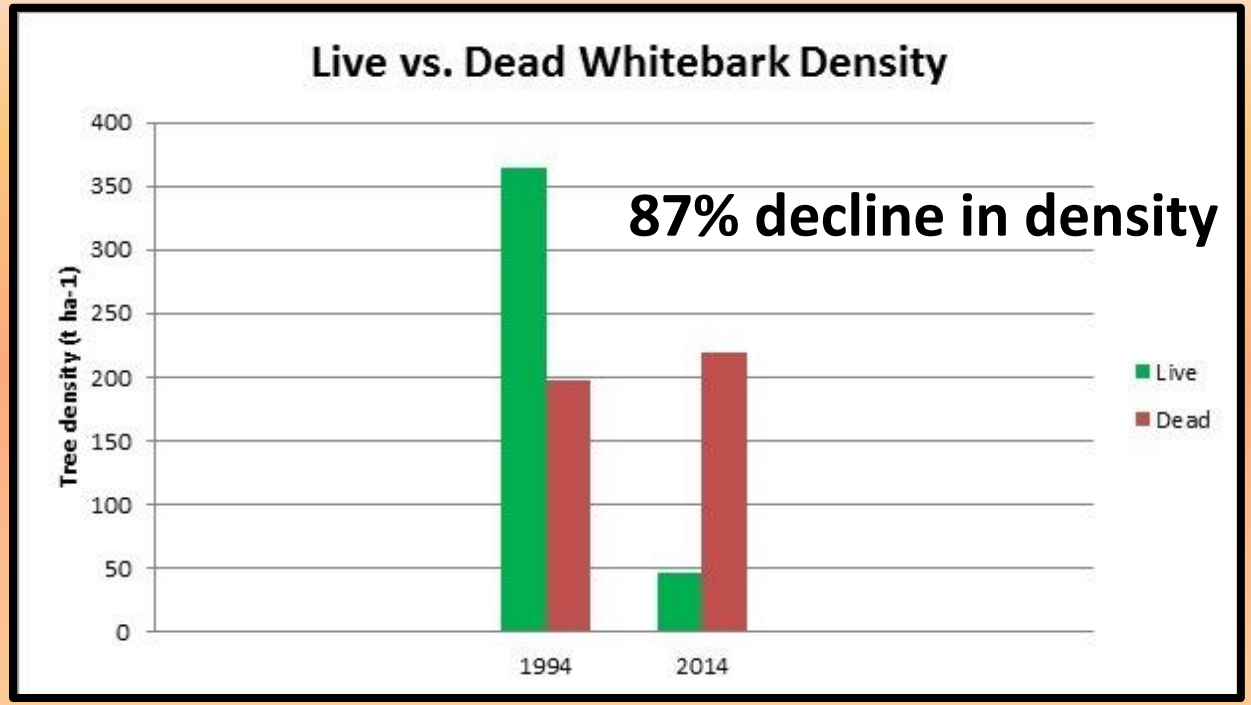
Whitebark Pine
BMWF Remeasurement Methods

- Live tree > 12 cm DBH:
  - Measured tree height, crown base height, DBH, canopy position , health
  - Percent crown kill for WBP
- Snags > 12 cm DBH:
  - recorded height, DBH, decay class
  - Recorded cause of death when evidence existed
- Count of saplings and seedlings

Engaging Volunteers with the Science

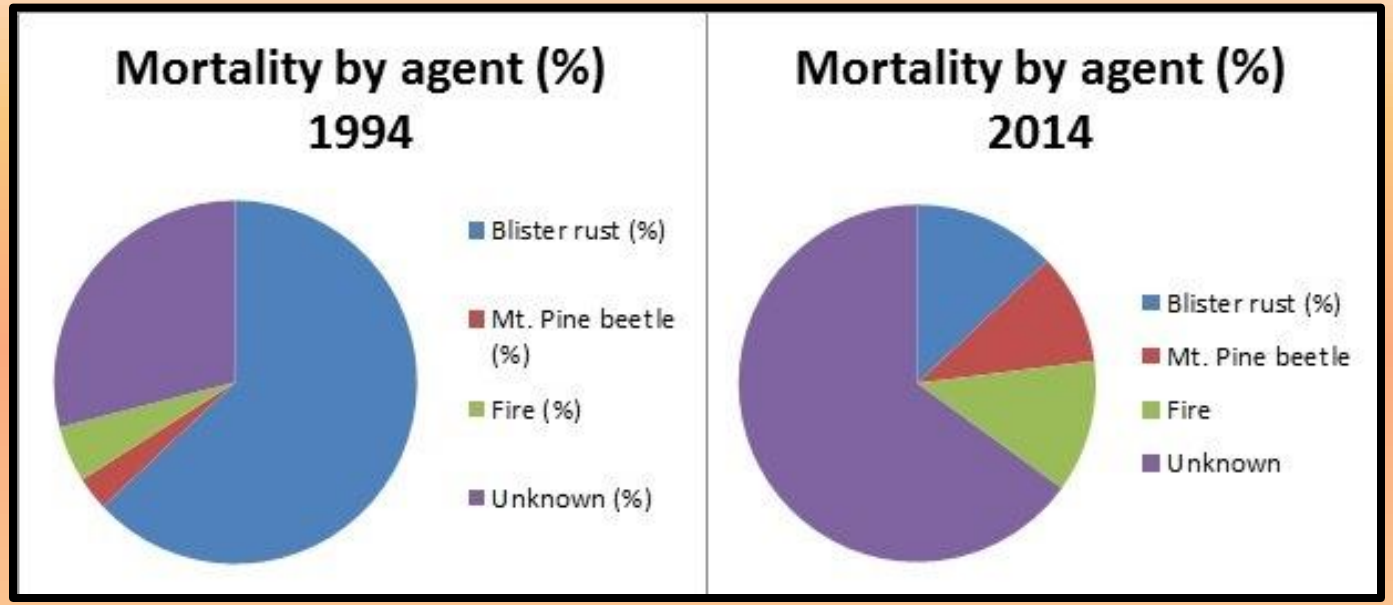


Whitebark Pine
BMWF Study Findings



Live (green) and dead (red) whitebark pine tree density (t ha^{-1}) in 1994 and 2014.

Whitebark Pine
BMWF Study Findings



The majority of mortality was from blister rust, but more mountain pine beetle

Whitebark Pine BMWF Study Summary

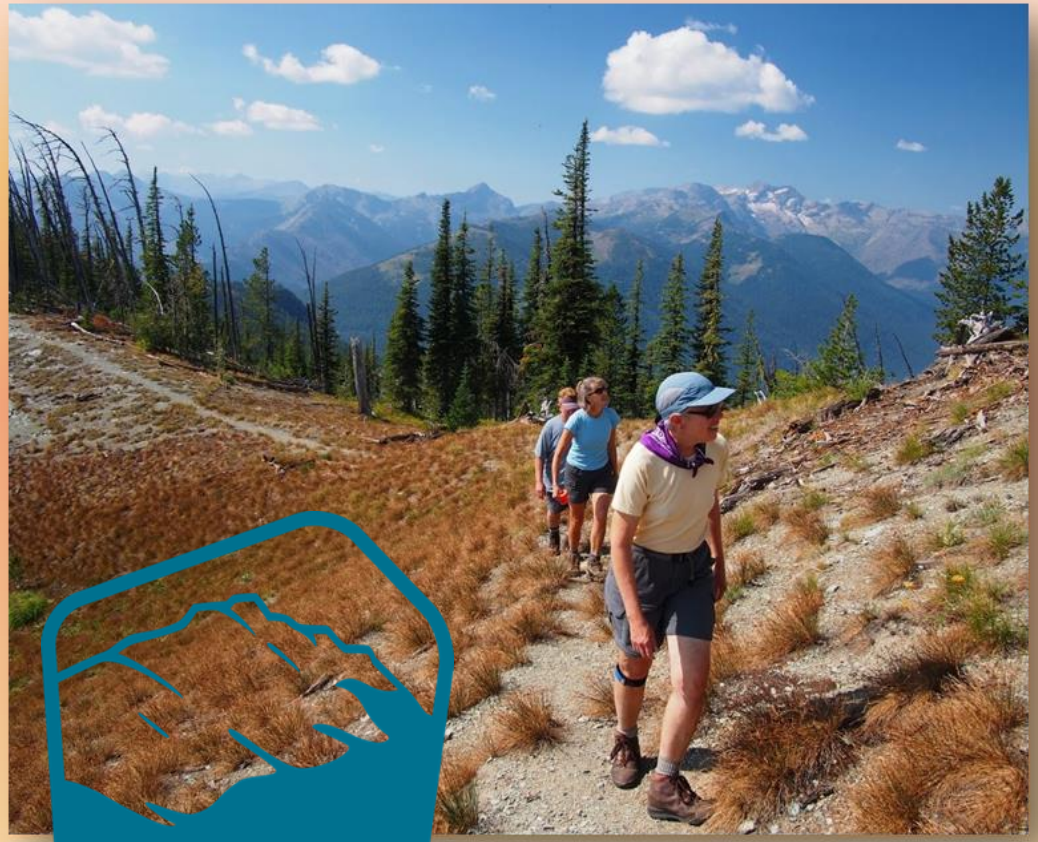
Whitebark pine attribute	1994	2014	% change
Live tree density (t ha^{-1})	365	46	-87*
Dead tree density (t ha^{-1})	197	219	+11
Percent mortality (%)	35	83	+137*
Healthy trees (t ha^{-1})	22	7	-68
Live but damaged trees (t ha^{-1})	343	39	-89*
Mortality by agent (%)			
Whitepine blister rust (t ha^{-1})	63	13	-79*
Mountain pine beetle (t ha^{-1})	3	10	+233**
Wildland fire (t ha^{-1})	5	12	+140**
Unknown (t ha^{-1})	29	65	+124*

A 137% increase in tree mortality

- *Indicates significance ($p \leq 0.05$),
- **Indicates too few trees to calculate statistical significance

Whitebark Pine Citizen Science Conclusions

- Data is only as good as the training given to the volunteers.
- The public loves to be involved in the science behind the decision making.
- Engaging volunteers gives them an invested interest in the importance of public lands.



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Thank you!

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