A scenic view of a river in a forested area. In the foreground, there is a large pile of cut logs and branches. The river flows through a lush green forest. In the background, a large, light-colored rock formation or cliff face is visible under a blue sky with some clouds.

Mechanical Removal of Brook Trout in the Upper Malheur River, Oregon: A Feasibility Study

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Brook Trout in the Upper Malheur

- Introduced in the 1930s by agencies and unauthorized stocking in high mountain lakes and headwater streams for sport fishing.
- Outcompete native species for space and resources across most temperature regimes.
- Produce viable hybrids with ESA listed Bull Trout beyond the F1 generation.

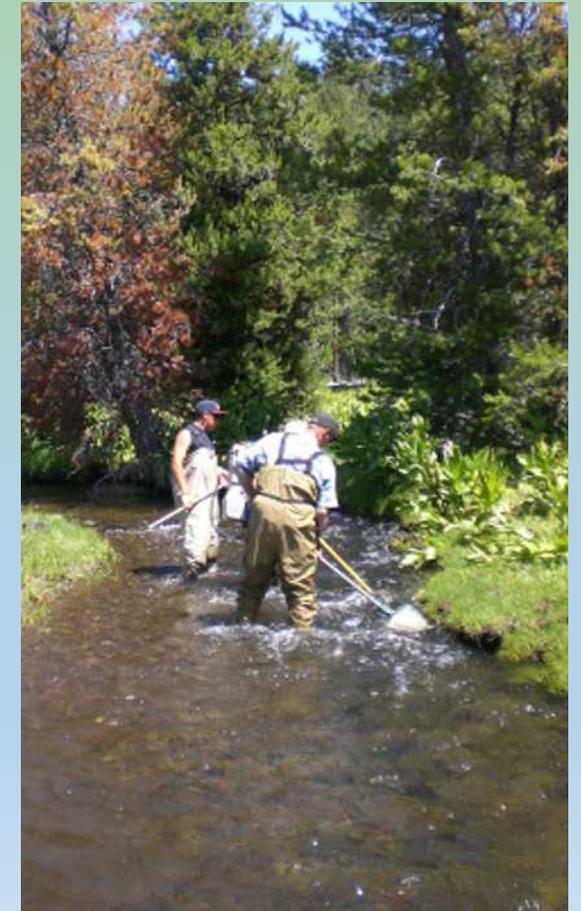
From Top Left to Bottom- Bull Trout, Brook Trout, Hybrid



The Fix?

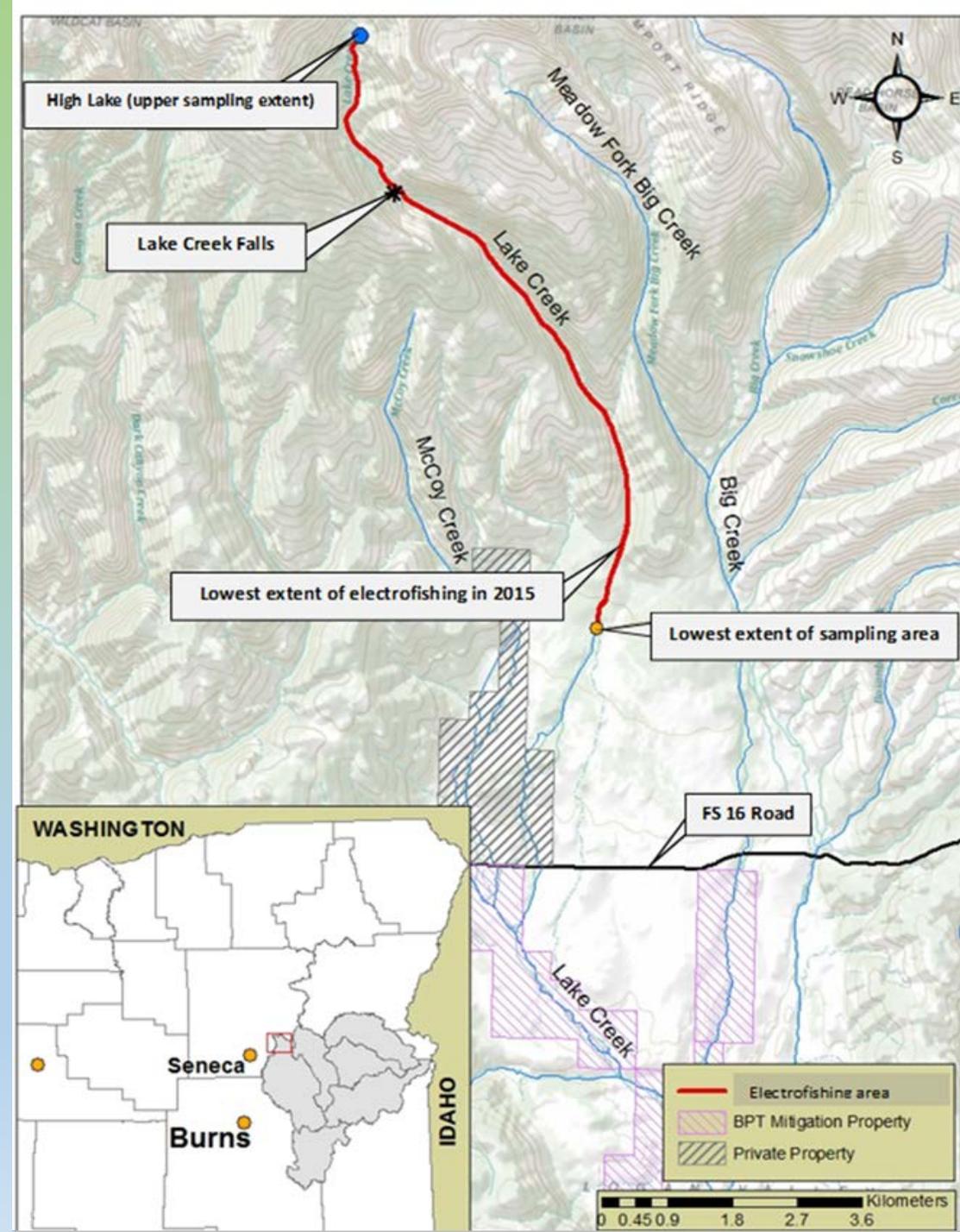
Mechanical Removal

- Best meets requirements for maintaining wilderness qualities
- Three Pronged Methodology- Gill netting, electrofishing, and weir operation. Concurrent removal of Lake and Stream Brook Trout.



Project Area

- Barriers
 - Lake Creek Falls, Upper extent of native fish
 - Private Property- perceived temperature barrier to migration
- High Lake
 - Seed source for Upper Malheur Brook Trout
- Lake Creek
 - Bull Trout Critical Habitat
 - Only a small part of the basin, but considered the brook trout stronghold for recruitment.
 - Wilderness



High Lake

2010- Pilot Year

- **Test gear and methodology**
 - Angling and Gillnetting
 - Mesh size?
- **Establish baseline population estimate**
- **Remove brook trout**
 - Coinciding with mechanical removal efforts in Lake Creek.
- **$\frac{3}{4}$ inch mesh size caught 93% of all fish.**
- **Population Estimate: 6621**
- **95% CI: 5544-8403**
- **2206 brook trout removed**

High Lake 2011

- 2 day angling period to mark and release fish.
 - 210 brook trout
- 13 day gill netting/angling period to recapture/remove brook trout.
 - 807 brook trout; 42 recaptures
- Population Estimate: 3965
- 95% Confidence: 3002-5447
- Total brook trout removed: 807

High Lake 2012

- 1 day angling to mark fish
 - 80 Brook Trout
- Gill Netting and Angling to recapture/remove brook trout
 - 711 Brook Trout; 31 recaptures
- Population Estimate: 1802
- 95% CI: 1282-2621
- Total brook trout removed: 711

High Lake 2013

- **No sampling occurred because of wildfire at High Lake in August.**



High Lake 2014

- 2 days Angling to mark fish
 - 85 brook trout
- Gill netting/Angling 6 days to recapture/remove brook trout
 - 1778 brook trout; 43 recaptures

- Population Estimate: 3477
- 95% CI: 2598-4766
- Total brook trout removed: 1782



High Lake 2015

- No sampling occurred because of wildfire at High Lake in August.
- Current population????

High Lake 2016

- Truncated Effort moved to mid June in order to avoid wildfire.
- 4 Sampling Days
- No Population Estimate

- Total brook trout removed:
1103



Lake Creek Electrofishing 2011

- Testing different methodology
- 266 total Brook Trout removed
- 3 bull trout captured
- 3200 total meters of stream sampled

Lake Creek Electrofishing 2012

- Multiple pass depletions using block nets to achieve population estimate of Brook Trout.
- 1386 total Brook Trout removed
- 57 bull trout captured
- 34 hybrids captured
- 2500 Total meters of stream sampled.
- Estimated Population: 11,797 (95% CI= 9,362-14,232) (GRTS Sampling Design)

Lake Creek Electrofishing 2013

- Multiple pass depletions using block nets for some sites.
- 2640 total brook trout removed
- 77 bull trout captured
- 10,000 Total meters of stream sampled.

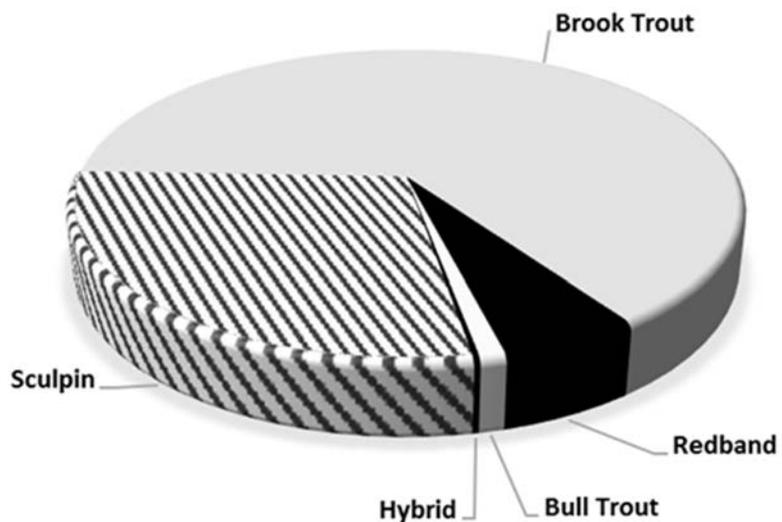
Lake Creek Electrofishing 2014

- Single upstream pass without block nets in an attempt to sample the entire sampling area.
- 901 brook trout removed
- 8 bull trout captured.
- 12 hybrids captured
- 8200 total meters of stream sampled.

Lake Creek Electrofishing

2015

- Single upstream pass without block nets.
- Low capture sites from 2014 were not resampled.
- 1606 Fish removed
- 25 bull trout captured
- 6 hybrids captured
- 9800 total meters of stream sampled.



Lake Creek Electrofishing 2016

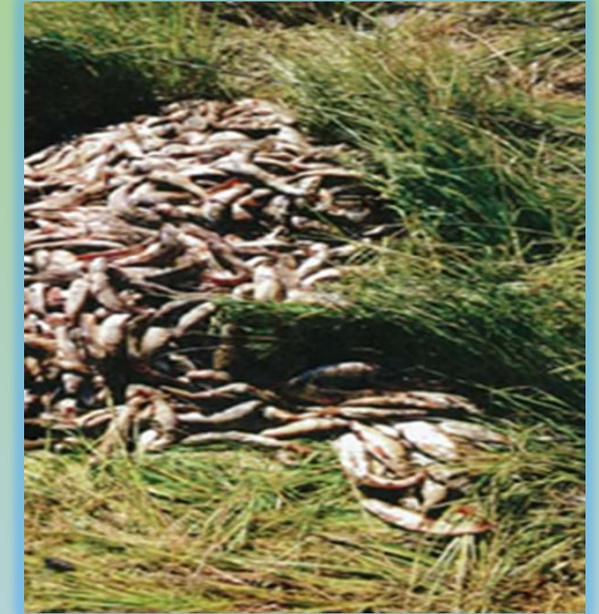
- Effort focused on high density brook trout areas based on previous years
- 793 total brook trout removed
- 14 bull trout captured
- 4500 meters of stream sampled.

Lake Creek Weir

	Brook Trout	Bull Trout	Bull x Brook Hybrid	Redband Trout
2011	322	13	9	16
2012	139	9	2	20
2013	56	2	1	4
Weir Operation Discontinued in 2014				

Summary: What worked and What didn't?

Year	Total Brook Trout Removed			Population Estimates	
	Weir	Shocking	Gillnetting	Lake Creek	High Lake
2010			2206		6621
2011	322	266	807		3965
2012	139	1386	711	11,797	1802
2013	56	2640	0		
2014		901	1782		3477
2015		1606	0		
Total	7316		5506		



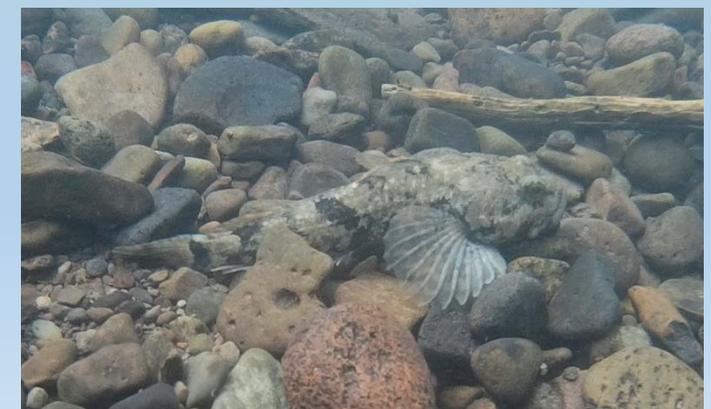
Next Steps?

Why Not Give Up?

- **Cold, Clean Water**- Largely a spring fed system with extremely cold water. Refugia will remain despite rising air temperatures.
- **Habitat improvements**- Many USFS and BPT projects planned and already underway to restore stream habitat and connectivity.

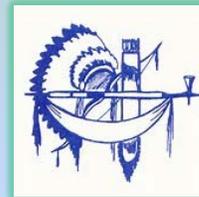
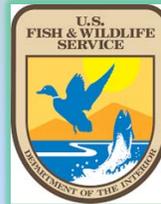


Brook Trout Removal Goes Beyond Bull Trout Recovery

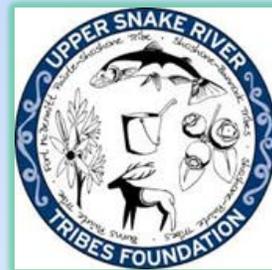


People Care

- Framework already in place for a large scale, multi-agency effort.
 - Technical Advisory Committee



- Education, Outreach, and Partnerships



Questions?

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