

Potential influences of climate change on population dynamics of nonnative brook trout and native Yellowstone cutthroat trout in headwater stream networks



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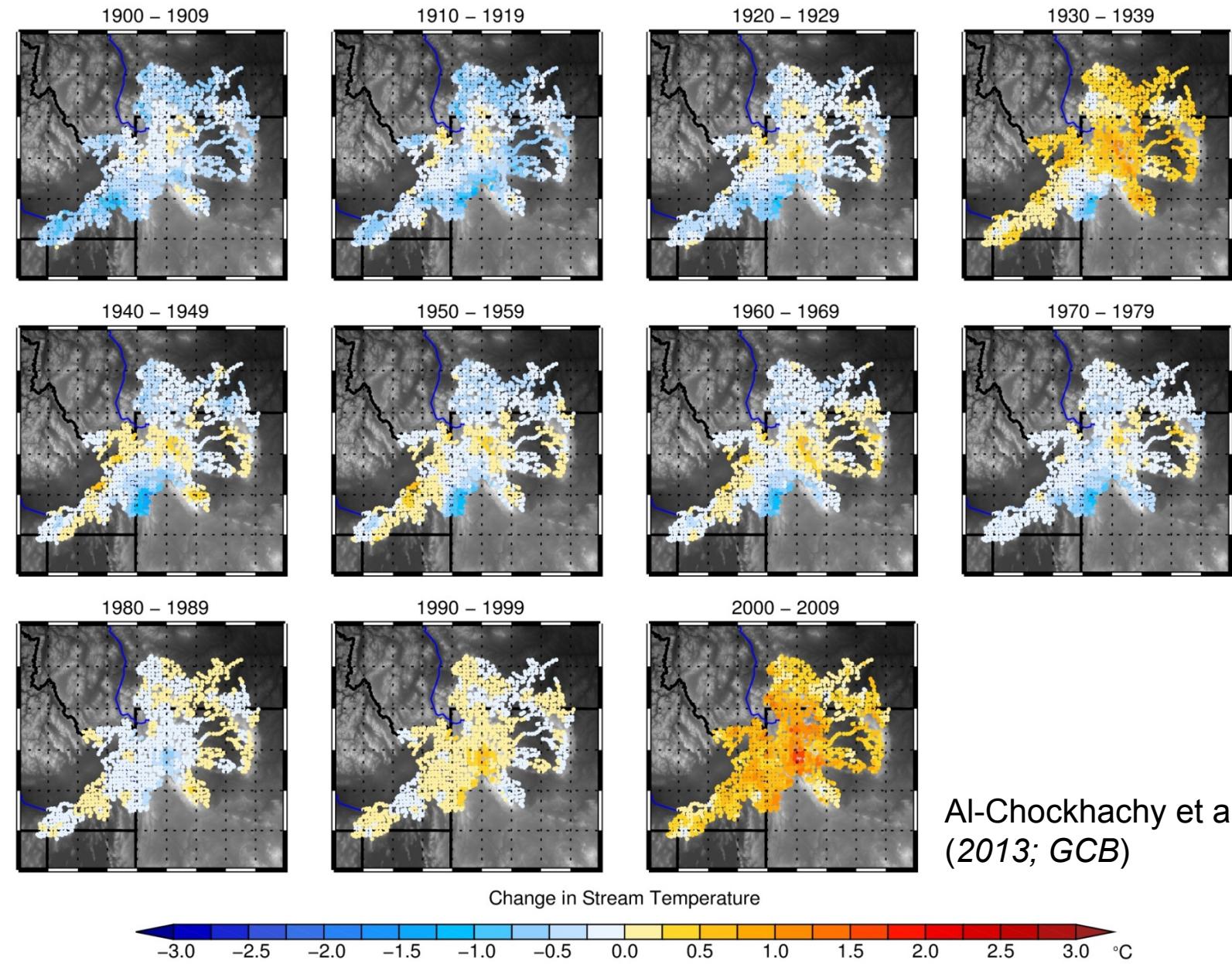
**Al Zale – USGS and
MSU**



*Montana Fish,
Wildlife & Parks*

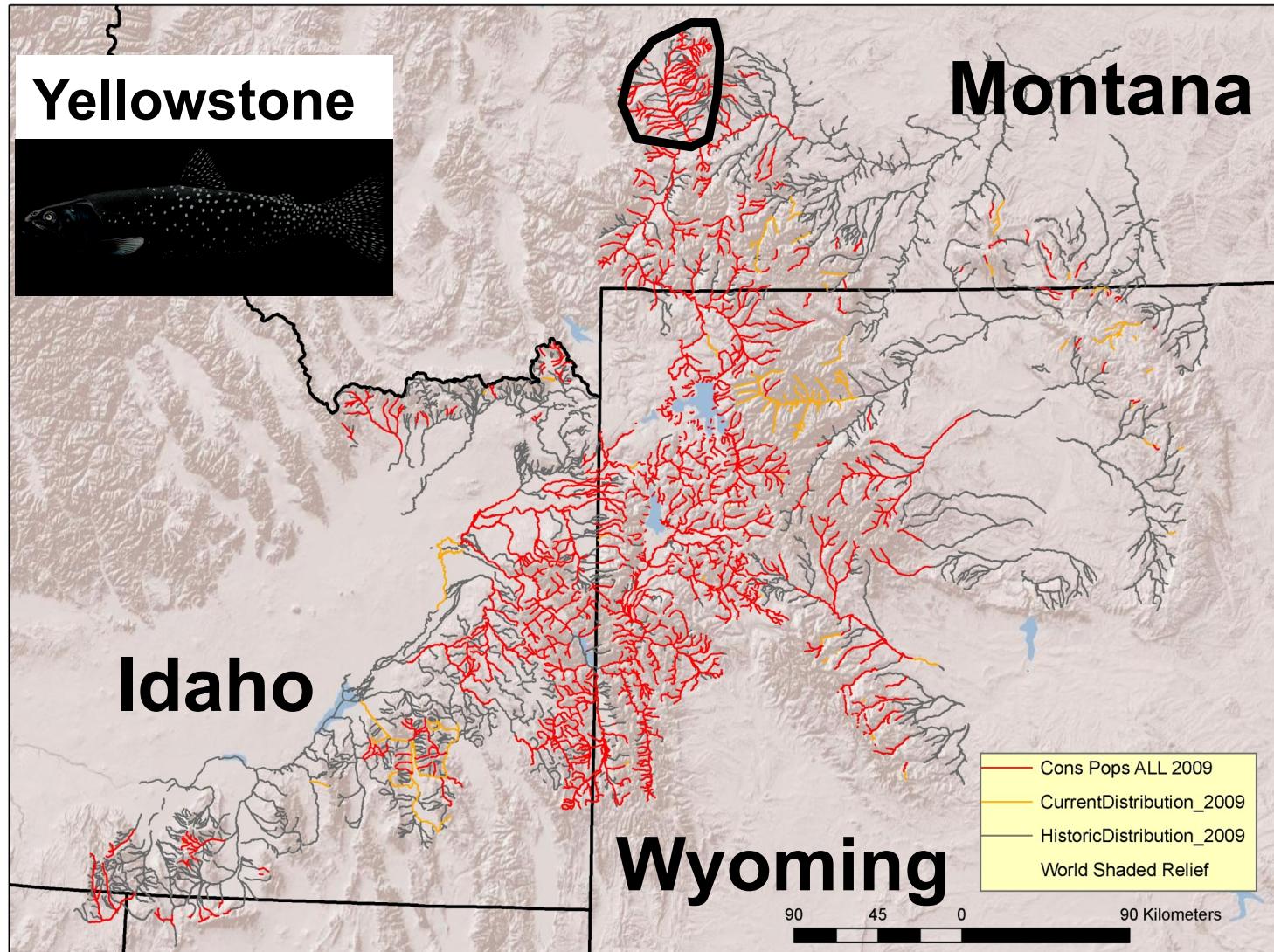
Fish illustrations: J. Tomelleri

Climate: a historical perspective





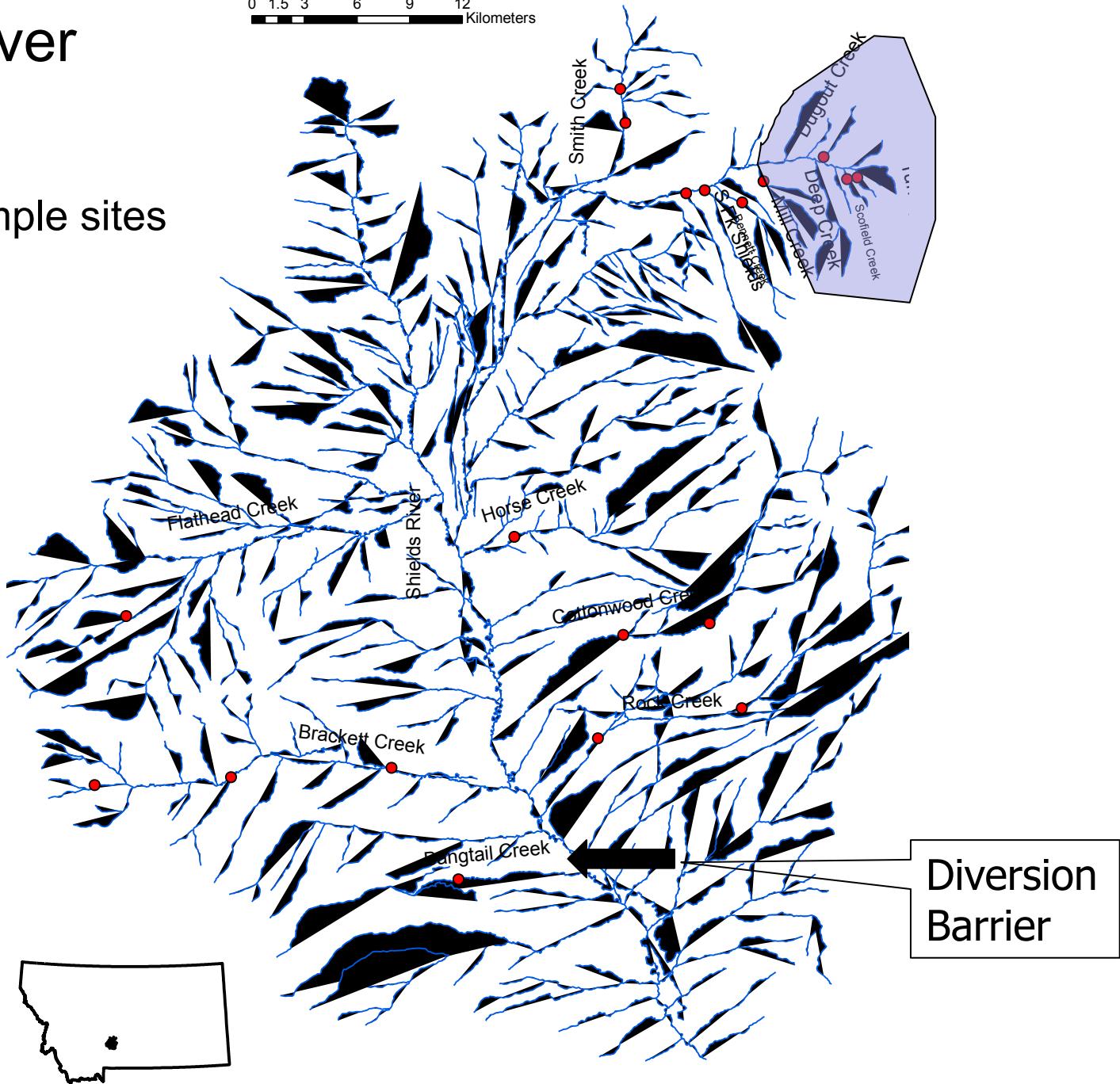
Yellowstone Cutthroat Decline



Shields River Basin

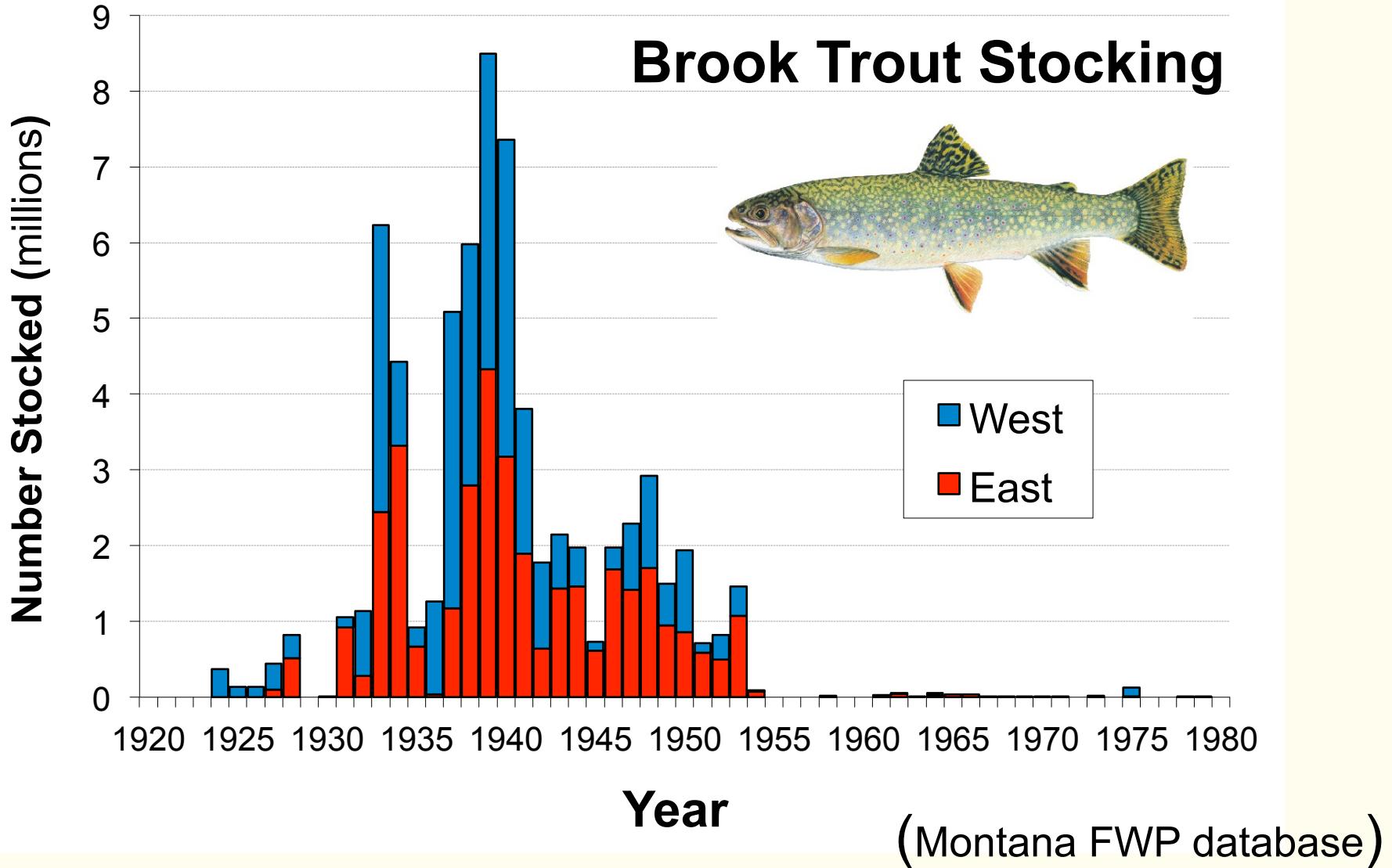
Long-term sample sites

0 1.5 3 6 9 12 Kilometers



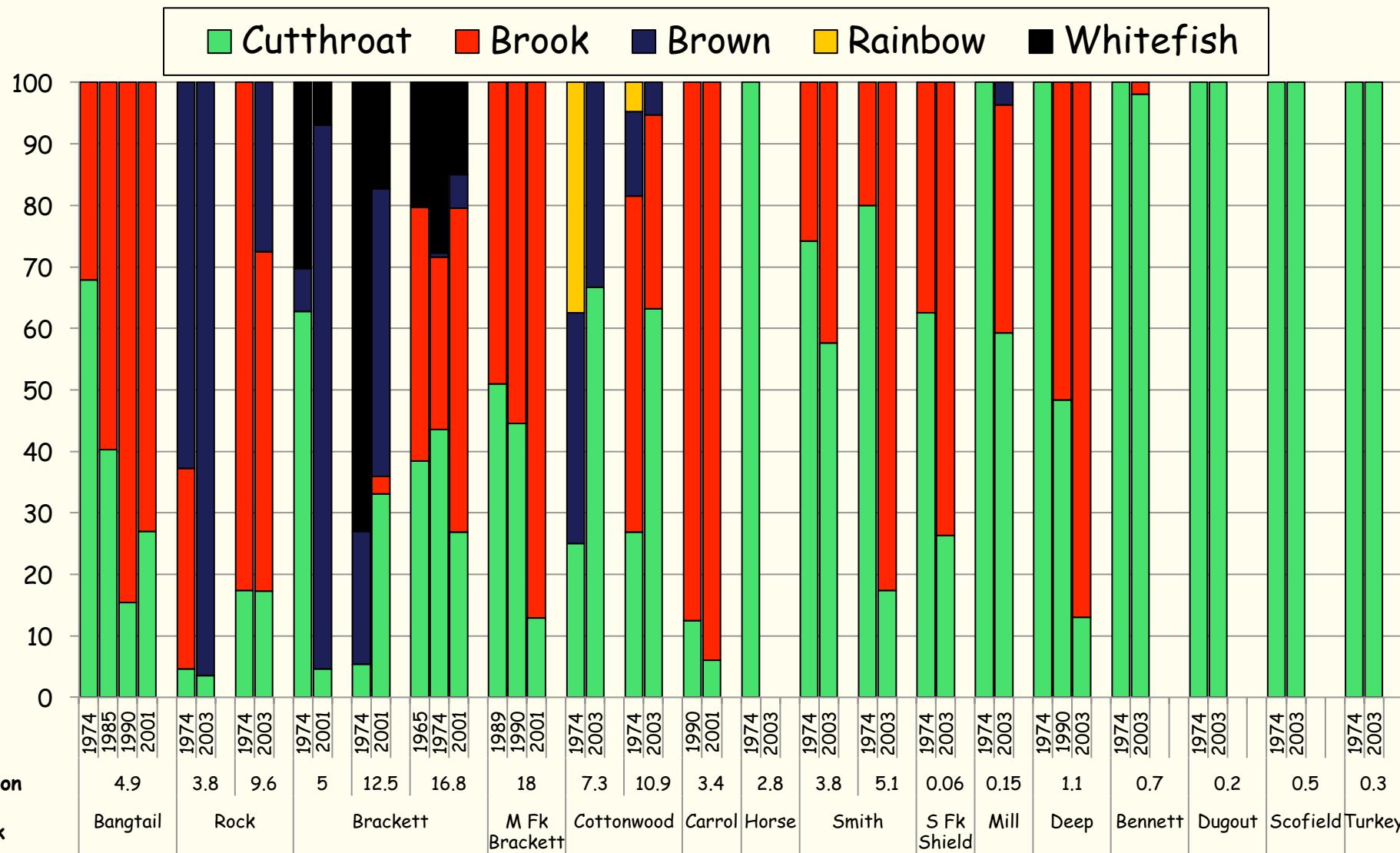


Brook Trout Stocking in Montana



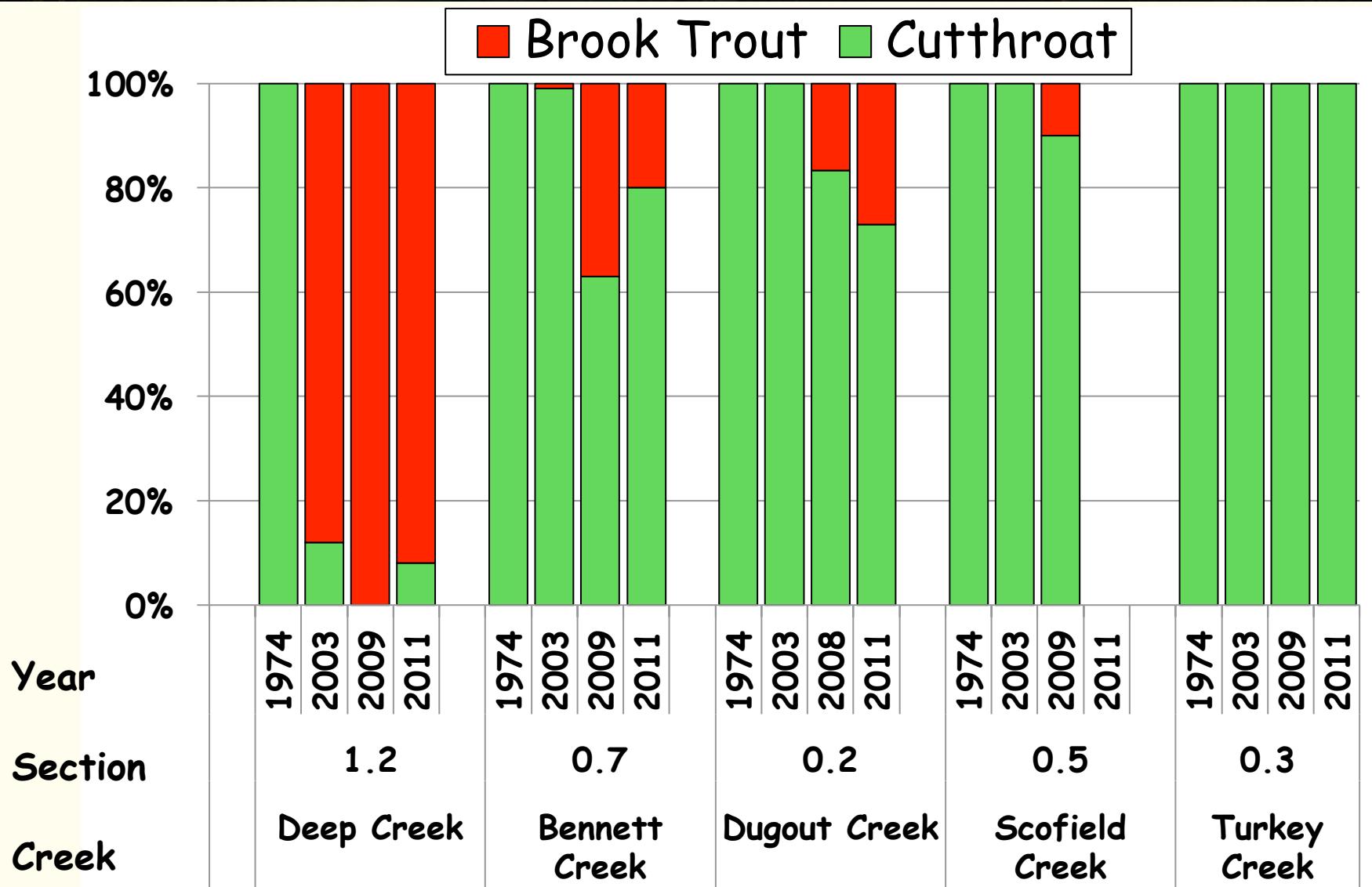


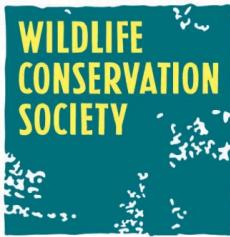
Species Composition – 1974 to 2003



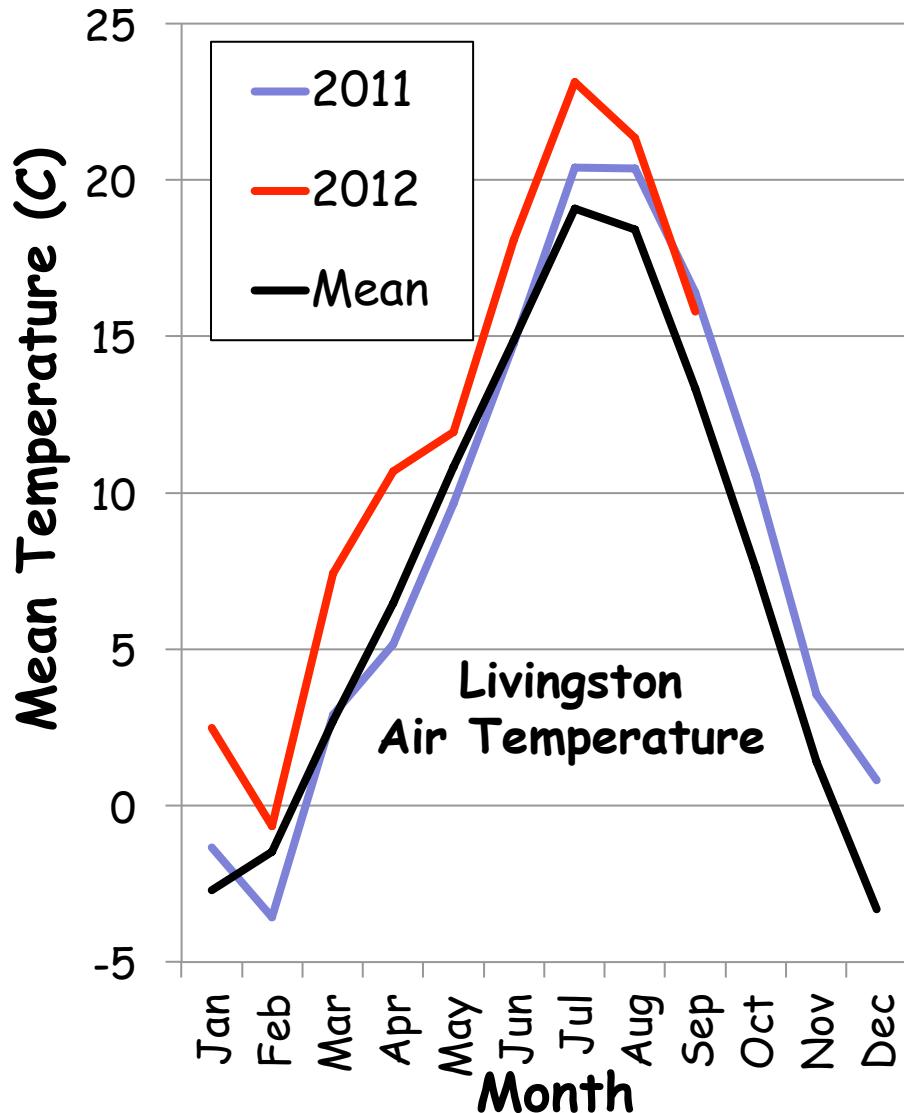
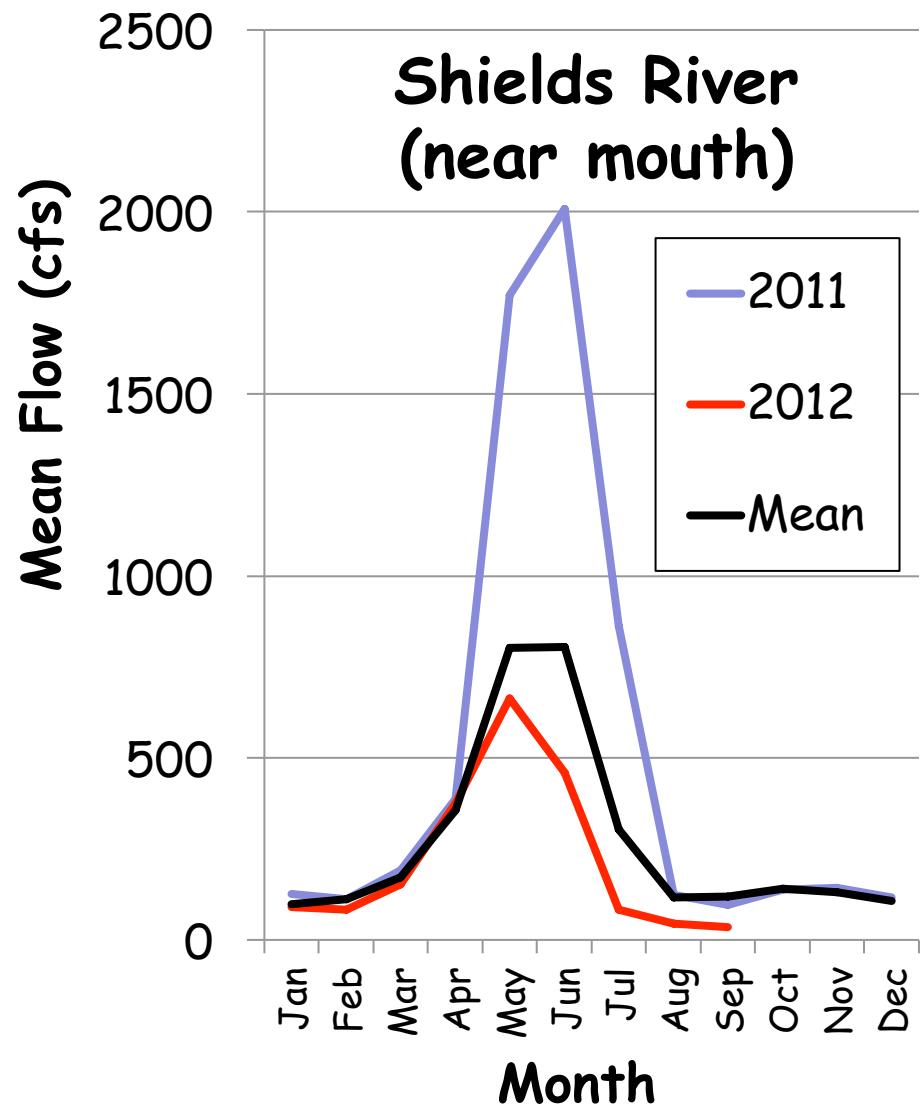


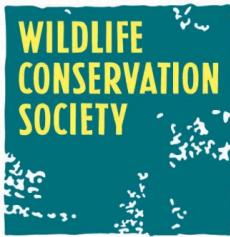
Species Composition – 1974 to 2011





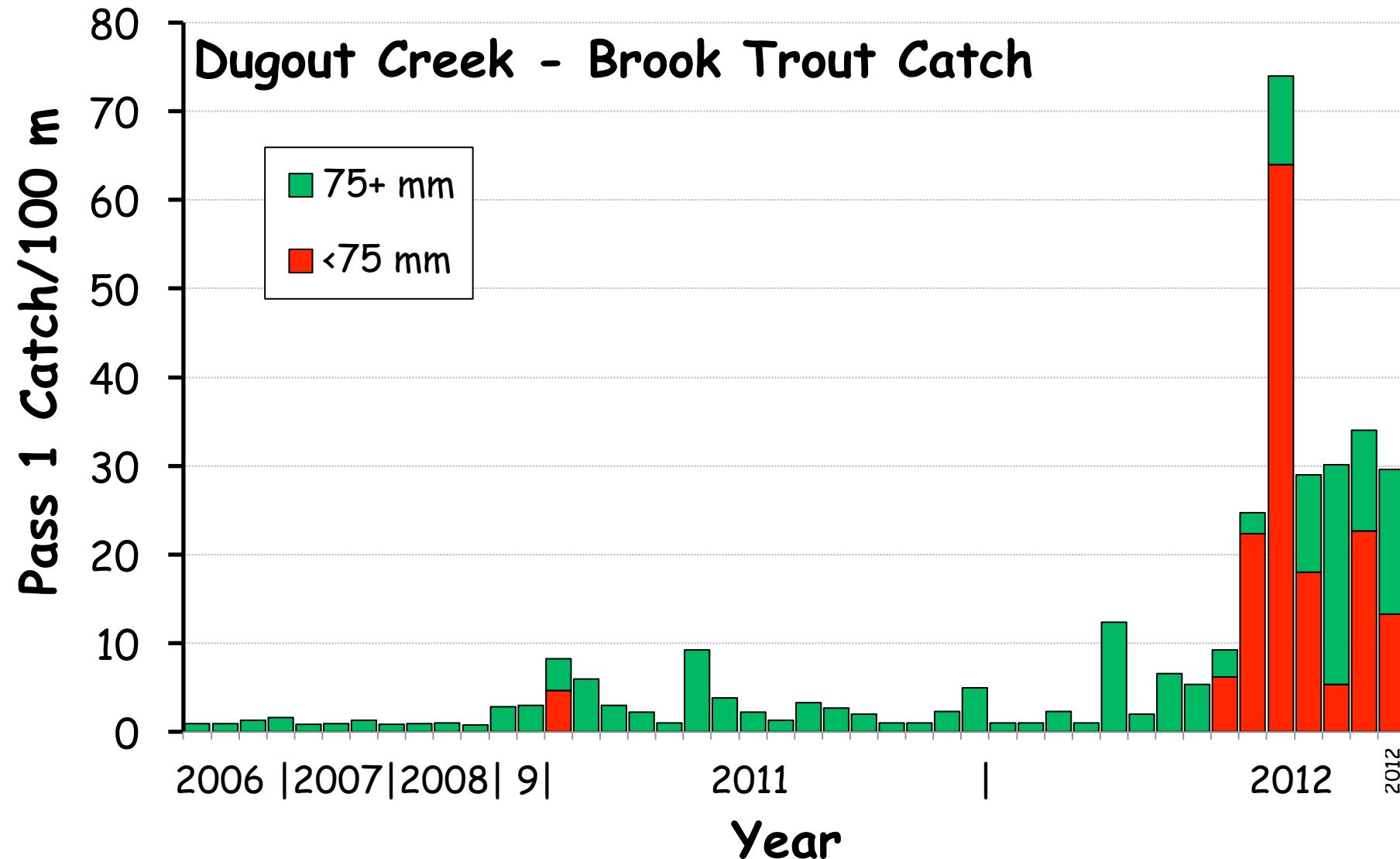
Flows and Temperatures different in 2011 and 2012





Brook Trout

Relative Contribution of Age-0





Conclusions

- 1. Brook trout are rapidly invading and displacing cutthroat – need to act NOW**
- 2. Climatic conditions may regulate invasion**

