

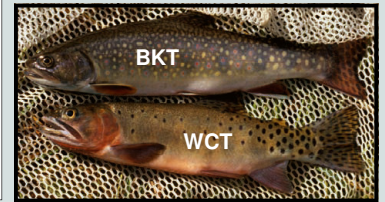


Air, Water and Aquatic Environments Science Program

Rocky Mountain Research Station



Focus: Invasive Species Managing for Native Trout



Research

Technology Transfer

Science Application

Key Findings:

- Brook trout, brown trout, and rainbow trout are among the most pervasive nonnative fishes in the west.
- Vulnerability to invasion depends on environmental gradients and habitat condition, the source of invaders, and the status of the native population.
- Isolation threatens native populations through small population effects, the loss of migratory life histories, and the loss of connectivity among populations.
- The tradeoffs between invasion and isolation depend on ecological, evolutionary, and economic conservation values.
- Context matters. There are strong gradients in the decision space, so a careful, consistent decision process can help managers support their actions.

Challenge

Invasive species are one of the most important threats to the integrity of stream ecosystems. Although widely distributed, invasions and the disruption of native communities are not universal. Understanding where invasion threats are most important and what can be done about them will be key to prioritization of limited management resources.

Context

Fishes and aquatic communities represent some of the most imperiled ecological systems in the world. Invasive species are one of two most common threats because they can displace native species and disrupt ecological functions through predation, competition, hybridization, alteration of habitat, and transmission of parasites or diseases. Managers often use intentional fish migration barriers to preempt invasions, but those barriers also isolate the native species which can lead to loss of a population through the effects of habitat fragmentation. Understanding tradeoffs between intentional isolation and invasion is a central problem for managers of native salmonids throughout the Interior West.

Actions

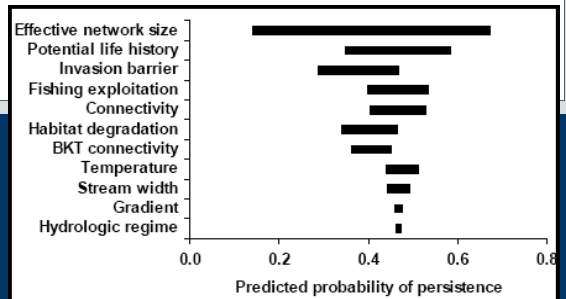
RMRS aquatic scientists initiated and led a major research program on this problem in collaboration with U.S. Forest Service Region 1, Colorado State University, the U.S. Fish and Wildlife Service, and the U.S. Geological Survey. Research focused on four elements: 1) a synthesis of current knowledge and a framework for evaluation of the tradeoffs; 2) development of a formal decision model with supporting software and guidance; 3) summary of existing data across the West to test key hypotheses about environmental constraints on invasion and displacement of natives; and 4) new field work and analyses to refine predictions of where intentional isolation most threatens native species.

Results

The first two elements have been completed and published. Workshops on the framework and decision tool have been conducted with biologists in several Western States, including the interagency management teams for Westslope Cutthroat Trout in Montana, and the recovery team for Colorado cutthroat in Wyoming and Colorado. Summaries of the work have been invited at two regional professional meetings and as contributions to an upcoming text on fisheries management. Biologists working on local districts have begun requesting the materials and further support.

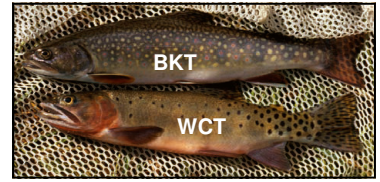
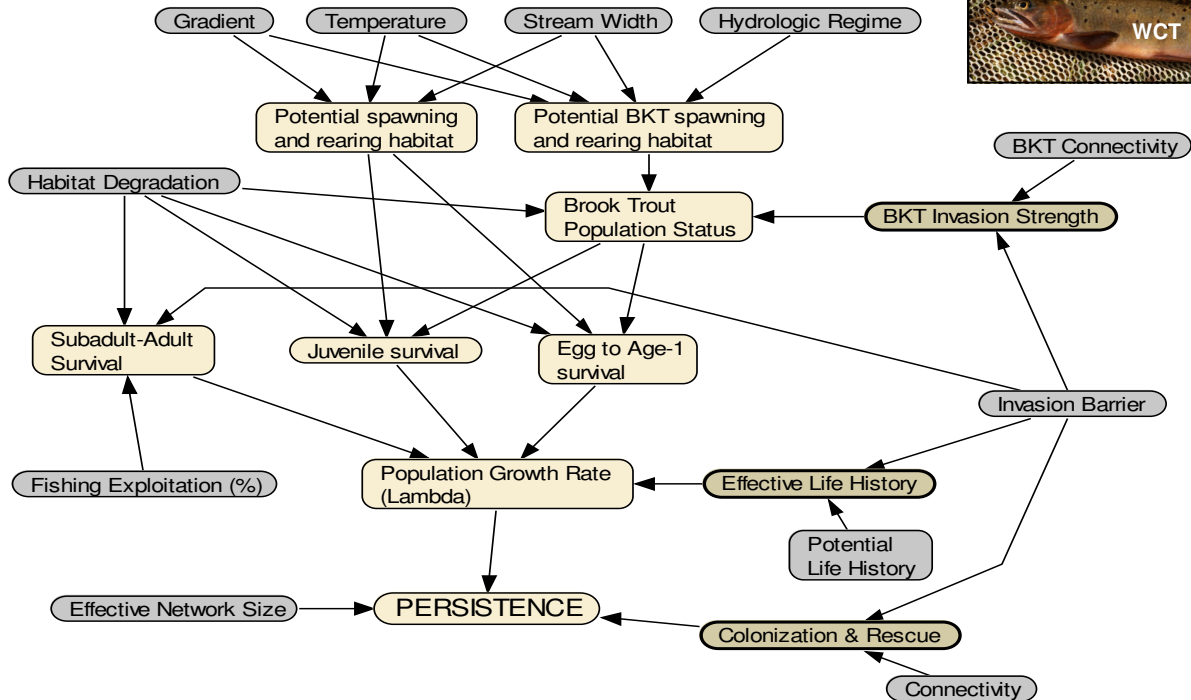


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Products: Bayesian Belief Network for Predicting WCT Persistence in the Presence of Brook Trout

Conceptual diagram illustrating the biological and environmental variables affecting WCT & Brook Trout



Project Publications

Peterson, D. P., Rieman, B. E., Dunham, J. B., Fausch, K. D., and M. K. Young. 2008. [Analysis of trade-offs between the threat of invasion by nonnative brook trout \(*Salvelinus fontinalis*\) and intentional isolation for native westslope cutthroat trout \(*Oncorhynchus clarkii lewisii*\)](#). Canadian Journal of Fisheries and Aquatic Sciences, 65(4):557–573.

Related Publications

Fausch, C., B. Rieman, J. Dunham, and M. Young. 2006. [Strategies for conserving native salmonid populations at risk from nonnative invasions: tradeoffs in using barriers to upstream movement](#). USDA Forest Service, Rocky Mountain Research Station, GTR-RMRS-174, Fort Collins, CO.

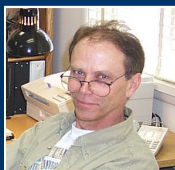
Fausch, K.D., Rieman, B.E., Dunham, J.B., Young, M.K. and Peterson, D.P. 2009. [The invasion versus isolation dilemma: tradeoffs in managing native salmonids with barriers to upstream movement](#). Conservation Biology 00:000-000 Published Online: February 6, 2009. DOI:10.1111/j.1523-1739.2008.01159.x

Peterson, D.P., Rieman, B.E., Dunham, J.B., Fausch, K.D., and Young, M.K. 2007 [Analyzing tradeoffs between the threat of invasion by brook trout and effects of intentional isolation for native westslope cutthroat trout](#). Pages 51–57 In Carline, R.F.; LoSapio, C., eds. 2007. Sustaining wild trout in a changing world; proceedings of Wild Trout IX symposium; 2007 October 9-12; West Yellowstone, Montana. 308pages.

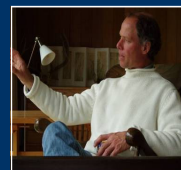
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