

Experimental tests of genetic rescue in westslope cutthroat trout

Donovan Bell, Ryan Kovach, and Andrew Whiteley



Genetic Rescue – the increase in population growth rate due to the migration of new alleles

Benefits

Alleviation of inbreeding depression

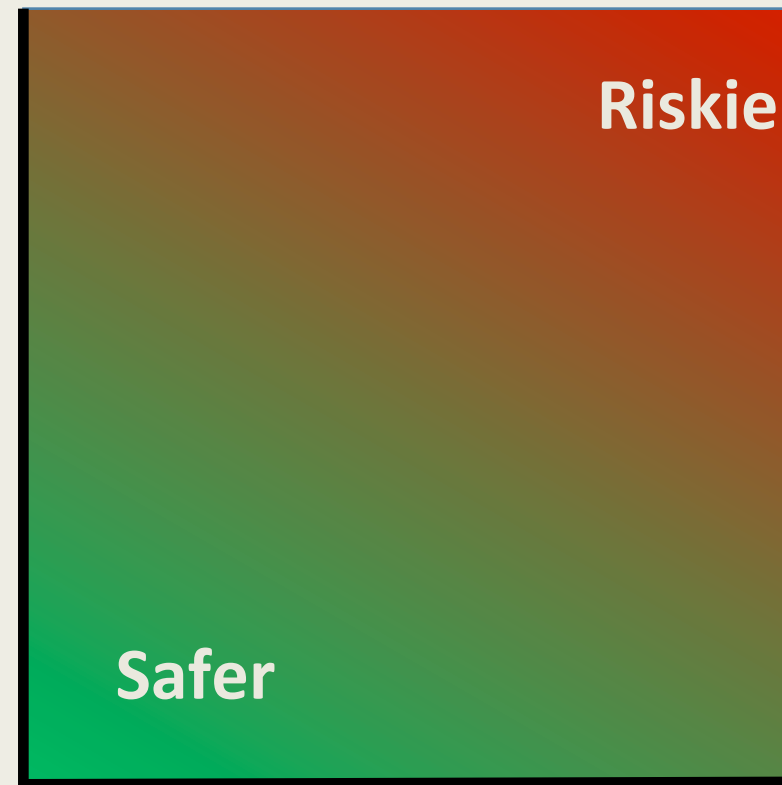
Increased persistence probability

Concerns

Outbreeding depression

Loss of genetic distinctiveness

Ecological divergence



Genetic divergence



Emerging Patterns

Evidence strongly suggests re-establishing gene flow among relatively recently connected populations will increase fitness

Risks occur with strong genetic divergence or when life-history differences large

Review

CellPress

Genetic rescue to the rescue

Andrew R. Whiteley^{1*}, Sarah W. Fitzpatrick^{2*}, W. Chris Funk^{2,3*}, and David A. Tallmon^{4*}

¹ Department of Environmental Conservation, University of Massachusetts Amherst, Amherst, MA 01003, USA

² Department of Biology, Colorado State University, Fort Collins, CO 80523, USA

³ Graduate Degree Program in Ecology, Colorado State University, Fort Collins, CO 80523, USA

⁴ Department of Biology and Marine Biology, University of Alaska Southeast, Juneau, AK 99801, USA



Headwater Trout

Many inbred and isolated populations

Managing for isolation

But, we also know salmonids are often locally adapted

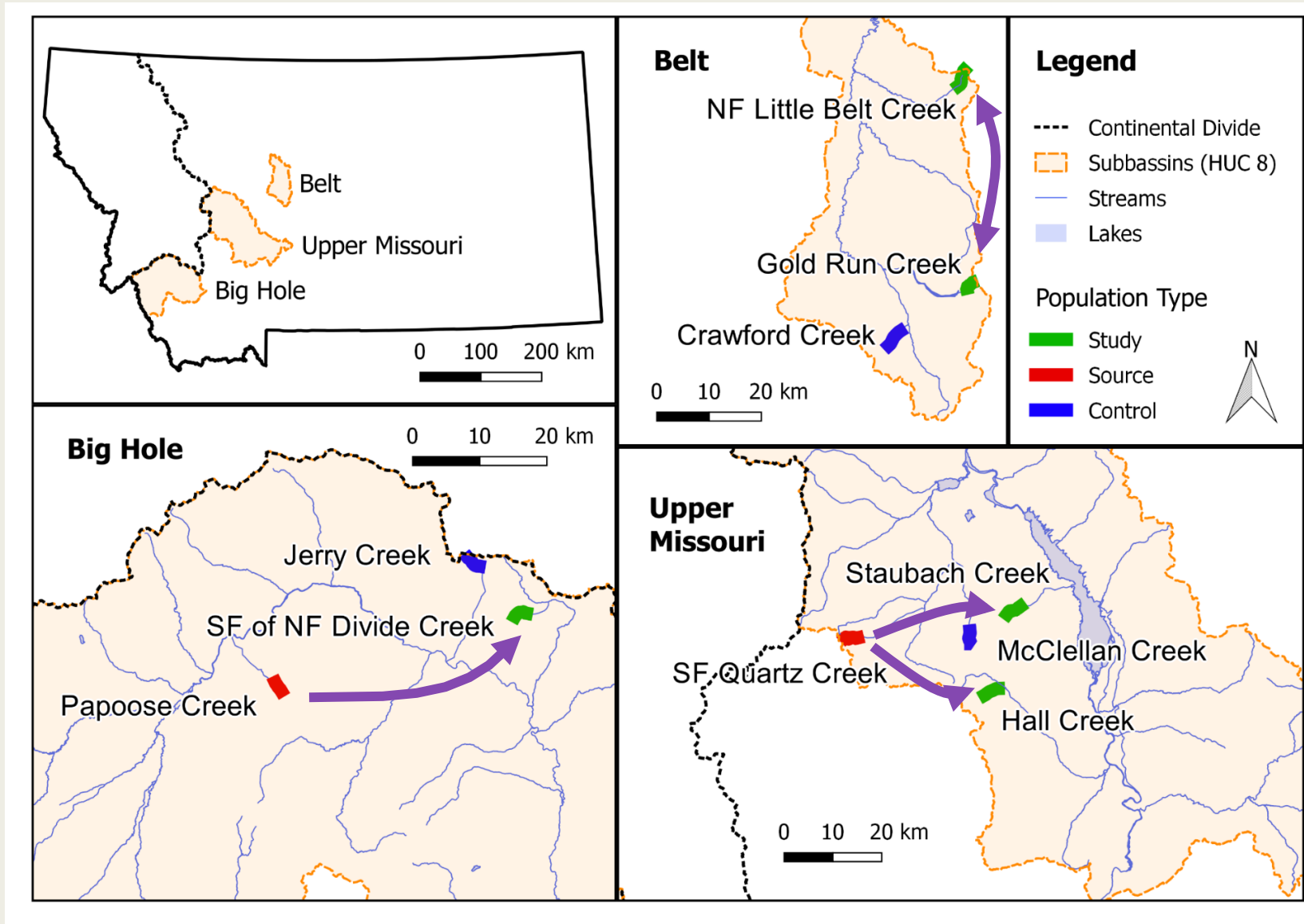
Westslope Cutthroat Trout

Ideal candidate for rescue, especially east of the continental divide

But experimental approach needed



Study streams and translocations



Parameters monitored

Population parameters

Population growth rate/population size

Genetic variation

Life History Rates

Growth rate

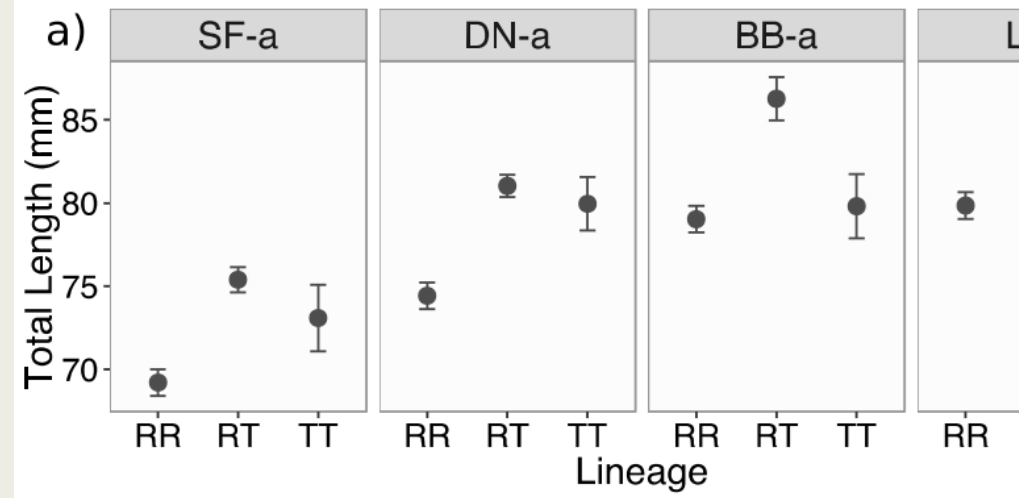
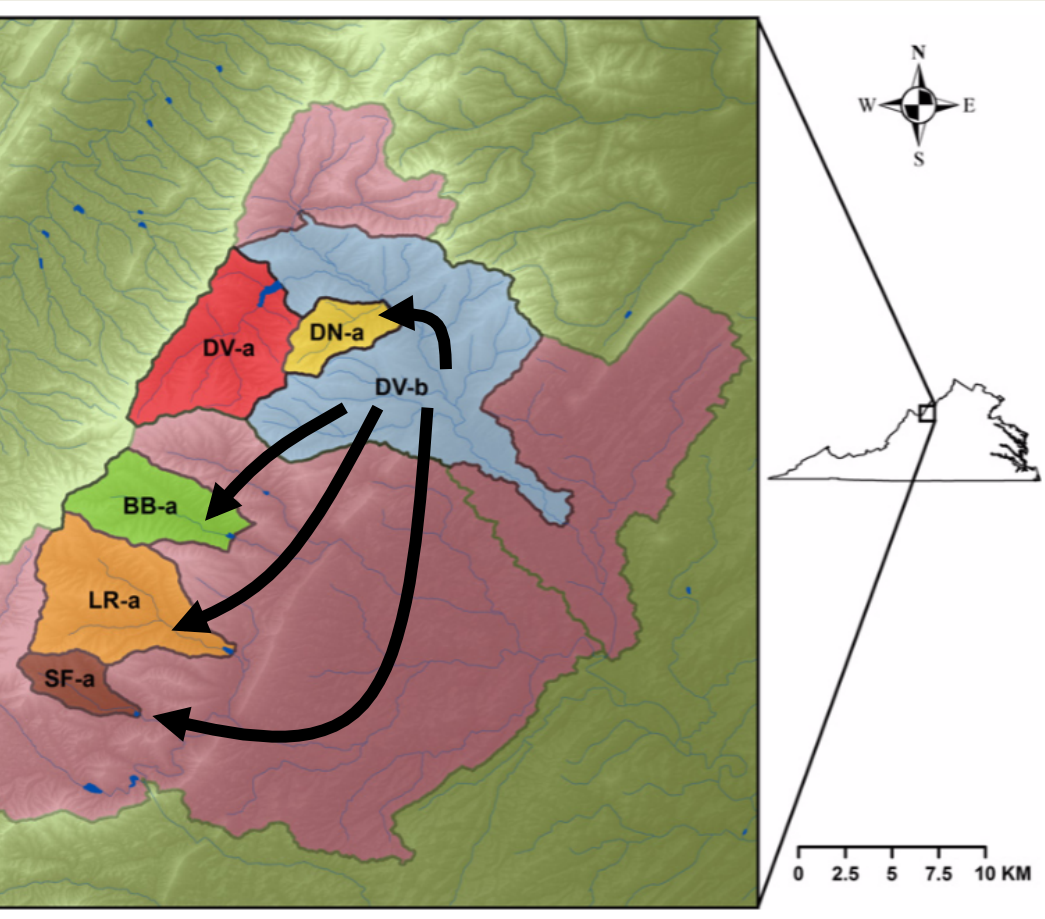
Survival

Lifetime reproductive success



Genetic Rescue – the increase in population growth rate due to the immigration of new alleles

Experimental test of genetic rescue in brook trout in Virginia



Acknowledgements

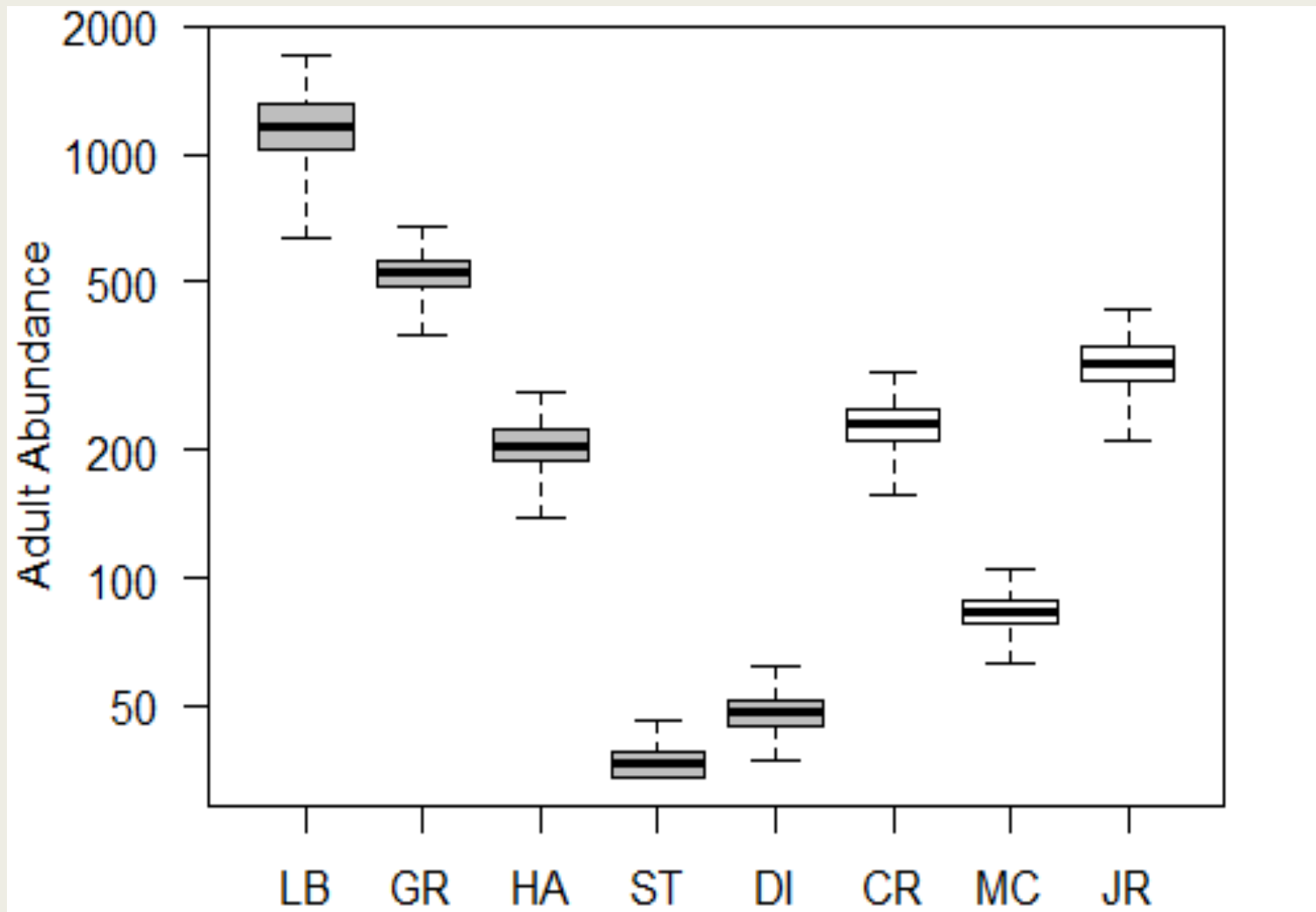


Montana Department of Fish, Wildlife and Parks: Lee Nelson, David Moser, Travis Horton, Eileen Ryce, Jason Mullen, Joseph Hupka, Allison Pardis, Jim Olsen, Ron Spoon, Ken Staigmiller, Sally Painter, and Angel Lodmell

University of Montana: Gordon Luikart

Field Crew: Marcella Cross, Michael Krummel, and Anthony Dangora

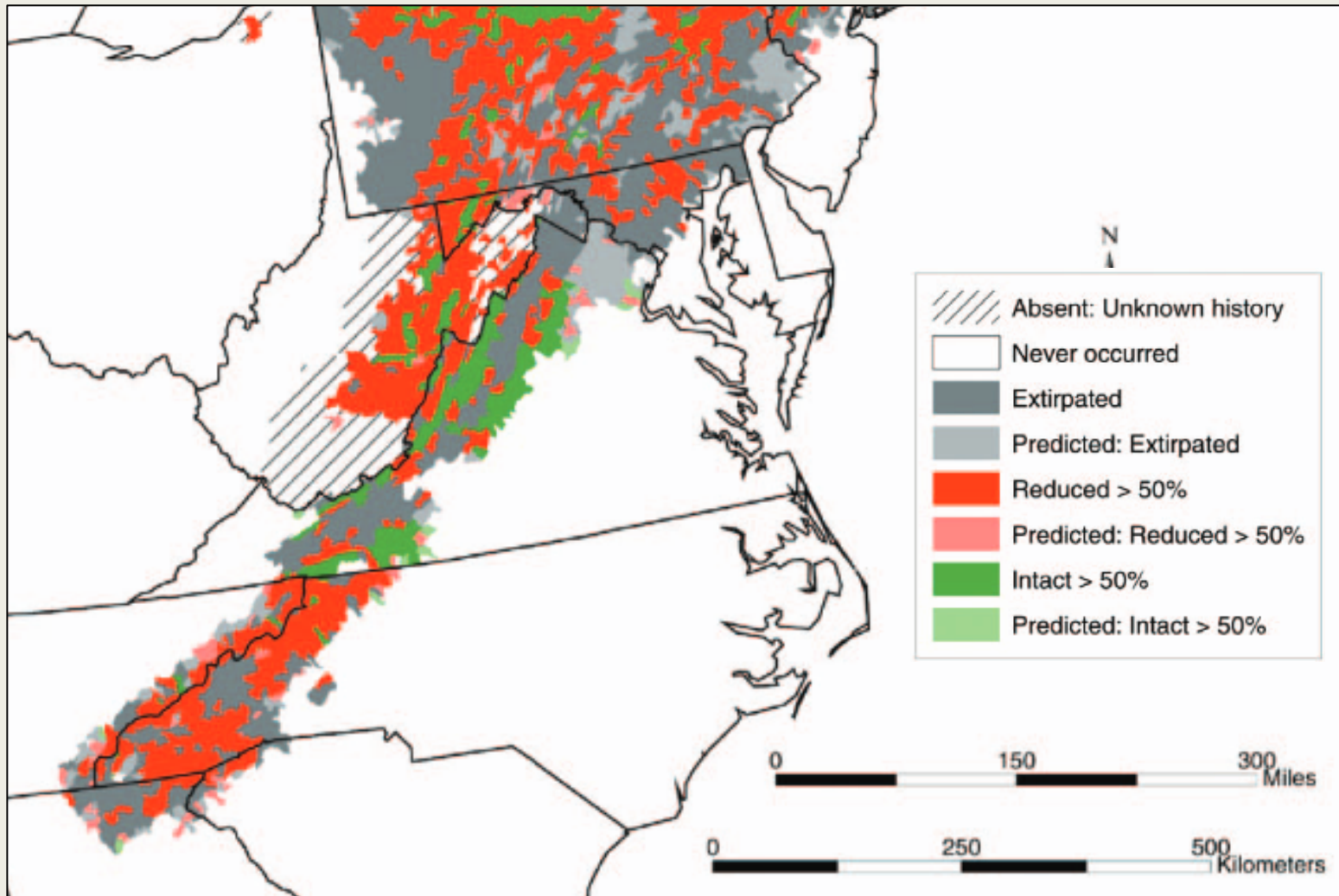
Baseline data collected in summer 2017



Summary of WCT Translocations

Subbasin (HUC8)	Creek	Population Type	Source Creek	# of Fish Introduced/ Removed
Belt	NF Little Belt	Study	Gold Run	8/8
Belt	Gold Run	Study	NF Little Belt	8/8
Upper Missouri	Hall	Study	Quartz	6/6
Upper Missouri	Staubach	Study	Quartz	6/6
Big Hole	SF of NF Divide	Study	Papoose	3/0
Belt	Crawford	Control	<i>NA</i>	0/0
Upper Missouri	McClellan	Control	<i>NA</i>	0/0
Big Hole	Jerry	Control	<i>NA</i>	0/0

brook trout southern range



Hudy et al. 2008. NA Journal of Fisheries Management