

ABSTRACT

EVALUATION OF JUVENILE BROWN TROUT AND STEELHEAD
COMPETITION IN GREAT LAKES TRIBUTARIES

by

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The importance of competition between steelhead (Oncorhynchus mykiss) and brown trout (Salmo trutta) was determined in a three part project. Field and laboratory experiments assessed the effects of introducing steelhead fry on brown trout growth, survival, and habitat use. I examined brown trout abundance, survival, size, growth, and condition in allopatry and in sympatry with steelhead in Gilchrist Creek, Michigan and in an artificial stream. In the field, I established a test and control section on the stream. I measured the abundance and vital statistics of salmonines at these stations during 1989. In 1990 and 1991, steelhead fry were scatter-stocked in the test section. From 1990 to 1992, I continued population assessments. Laboratory trials assessed the impact of age-0 steelhead upon age-0 brown trout in a completely randomized design. Four replicate cells contained 14 allopatric brown trout and 4 cells contained 7 sympatric brown trout with 7 steelhead. In field and laboratory studies, the impact of steelhead was negligible. Steelhead had no impact on brown trout abundance or survival. Steelhead had a minor impact on brown trout growth in Gilchrist Creek. However, the impact had little effect on brown trout size, relative to

intraspecific and abiotic factors. In the artificial stream, I observed no impact on growth. The earlier emergence times of brown trout gives them a size advantage over steelhead. This size advantage decreases over time since steelhead grow faster. At the post-emergence stage, these species appear to interact to the detriment of steelhead. However, if emergence times become closer, the advantage of brown trout over steelhead may be lost. These studies indicated that steelhead superimposition of brown trout redds and factors narrowing the emergence gap between these species may adversely impact brown trout. Habitat use of these species was similar. Water depth, cover, and substrate used during the age-0 growing season was not significantly different. Steelhead did use slower mean column velocities. Steelhead were suspended in the water column whereas brown trout were benthic. Despite overlap in habitat use, no difference in brown trout habitat occurred between sympatry or allopatry. Vertical stratification of these species may reduce interactions during the age-0 growth period.