Factors related to the abundance of brook trout (*Salvelinus fontinalis*) and non – native salmonids in Lake Superior tributaries

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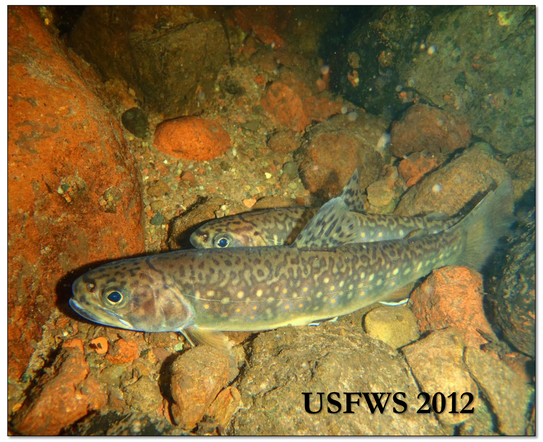
INTRODUCTION

- Brook trout (BKT) are native to Lake Superior tributaries
- The current fish communities in Lake Superior tributaries are dominated by naturalized non-native rainbow trout (RBT), brown trout (BNT) and coho salmon
- Past studies have shown detrimental impacts on the sustainability of native brook trout populations from interspecific competition of naturalized non-native salmonids



OBJECTIVE

- Determine factors related to the relative abundance, size structure, and condition of BKT in Lake Superior tributaries

METHODS

- Fish Creek, Flag River, and Sioux River were sampled in Summer, 2012 with backpack electrofishing
- Distance upstream from the mouth was recorded for each sampling location
- Total length (± 1 mm) for all salmonids and weight (± 1 g) for BKT was recorded
- Catch per unit effort (CPUE) for all fish and stock-size fish, and relative stock density (RSD) of harvestable-sized fish were computed for each species
- Stock & harvestable sizes: BKT - 130/203 mm, BNT - 150/254 mm, and RBT - 250/305 mm
- Relative weight (Wr) was computed for BKT

RESULTS -- Analytical

Table 1. Number and CPUE of stock-size fish and harvestable RSD.

Species	Measure	Fish Creek	Flag River	Sioux River	Overall
BKT	n_{stock}	1	19	18	38
	$CPUE_{stock}$	*	0.0041	0.0029	0.0024
	RSD_{203}	*	47.5	22.4	31.6
BNT	n_{stock}	298	161	205	664
	$CPUE_{stock}$	0.0591	0.0347	0.0335	0.0425
	RSD_{254}	63.4	13.0	37.1	43.1
RBT	n_{stock}	41	5	22	68
	$CPUE_{stock}$	0.0084	0.0011	0.0040	0.0043
	RSD_{305}	43.9	40.0	18.2	35.3

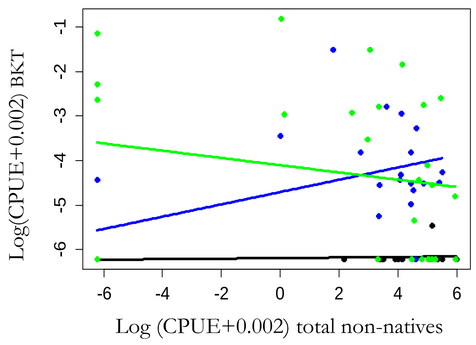


Figure 1. Regression of brook trout CPUE versus non-native salmonid CPUE in Fish Creek (black), Flag River (blue), and Sioux River (green).

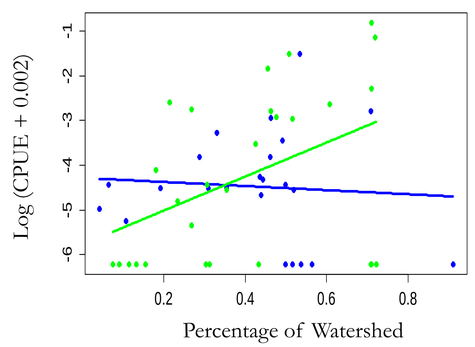


Figure 2. Regression of non-native salmonid CPUE on percentage distance upstream of watershed length for the Flag (blue) and Sioux Rivers (green).

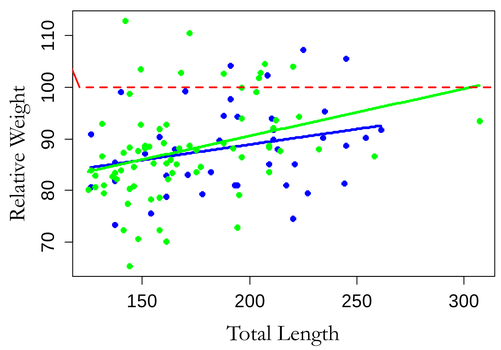


Figure 3. Regression of brook trout relative weight (W_r) on total length (TL) for the Flag (blue) and Sioux (green) Rivers.

RESULTS -- Summary

- BKT CPUE was negatively related to non-native salmonid CPUE in the Sioux River, positively related in the Flag River (Figure 1)
- Non-native salmonid CPUE was positively related to distance upstream on the Sioux River, but not the Flag River (Figure 2)
- Brook trout RSD generally decreased as rainbow trout CPUE and RSD increased and brown trout CPUE increased (Table 1)
- Relative weight of brook trout is less than an above-average standard (Wr=100) in both the Flag and Sioux Rivers (Figure 3)

CONCLUSIONS

- Brook trout are more prevalent in headwaters, likely either in search of preferred habitats, or avoidance of competition with non-native salmonids
- There is some evidence that brook trout condition is relatively poor in these streams
- Extreme variability in catches make inferences difficult
- More work should be conducted to better understand these sensitive populations