

STUDY PERFORMANCE REPORT

State: Michigan

Project No.: F-80-R-7

Study No.: 230519

Title: Colonization of a brook trout stream by introduced brown trout.

Period Covered: October 1, 2005 to September 30, 2006

Study Objectives: To establish a stable, naturally reproducing population of brown trout in the headwaters of Hunt Creek to use as an experimental population for future management experiments and evaluations. A long term goal is to build a brown trout population that can be used to study interactions with potamodromous salmonid species found in the Great Lakes. To monitor population dynamics of all trout species as brown trout colonize reaches of Hunt Creek presently occupied primarily by brook trout.

Summary: A total of 90 adult brown trout *Salmo trutta* obtained from naturalized stocks were stocked into a headwater reach of Hunt Creek over a 4-year period (2001-04). Brook trout *Salvelinus fontinalis* in this reach were previously the only salmonid species present in significant numbers. Brown trout reproduced successfully each year from 2002-06 and progeny of the stocked adults are surviving to older ages. In 2006 densities of yearling-and-older (YAO) brown trout and brook trout were each approximately 587/acre. Progeny of the brown trout stocked as adults are now the dominant salmonid species in terms of total biomass although total brook trout densities remain over twice as high.

Findings: Jobs 1, 2, 3, and 6 were scheduled for 2005-06, and progress is reported below.

Job 1. Title: Estimate trout populations.—A total of 90 adult brown trout were transferred into Hunt Creek upstream of a low-head barrier between 2001 and 2004 to provide a spawning stock. Thirty adults were collected during late summer in 2001, 2003, and 2004 from unstocked Michigan trout streams containing naturalized brown trout populations. Before 2002 only a few brown trout that successfully leaped the low-head barrier were captured each year during annual spring and fall electrofishing surveys that have been conducted since 1949. Before the present study, brown trout captured during electrofishing surveys were removed from the study area so that virtually all the salmonids in the 3.4-km study reach of Hunt Creek were brook trout prior to fall 2001. I monitored colonization of the study reach by brown trout by making mark-and-recapture estimates of brown and brook trout populations during May and August from 2002-06 in a 3.4 km reach of Hunt Creek upstream of the low-head barrier. Estimates were computed using the Chapman variation of the Petersen formulas (Ricker 1975). I stratified population estimates by 25-mm length groups. Separate population estimates were calculated for four contiguous sections of the 3.4 km study reach (Table 1). Young-of-year (YOY) were differentiated from yearling-and-older (YAO) fish based on total length frequency histograms. Only August population data are presented in this performance report.

Mean density of brown trout YOY in reaches 1-3 combined has ranged from 267-950 fish/ha while brook trout YOY density ranged from 1,745-2,292 fish/ha (Table 1). Density of YAO brown trout increased steadily from 2002 to 2006 as progeny of the stocked adults survived to older ages. The percentage of the total salmonid standing stock composed of brown trout in reaches 1-3 combined has increased from 19% in 2002 to 66% in 2006. Virtually all of the

stocked adult brown trout, which could be identified from fin clips, had either died or emigrated downstream over the low-head barrier by August 2006. Thus, progeny of the brown trout stocked as adults are now the dominant salmonid species in terms of total biomass although total brook trout densities are higher (Table 1).

Job 2. Title: Estimate growth and survival.—Scale samples were collected from a large subsample of fish collected during the August surveys. Data on growth rates and survival will be presented in future progress reports after scale samples are read.

Job 3. Title: Monitor temperature and discharge.—We recorded water temperatures hourly at four locations in the study reach using StowAway® XTI (Onset Computer Corporation) electronic thermometers. Temperature data were archived for use in future analyses. Stream stage was recorded hourly at the downstream end of the study reach by a Sutron 8400 digital data recorder (Sutron Corporation). Stream stage was converted to stream discharge based on the regression relationship between stage height and estimated stream discharge. Discharge data were archived for use in future analyses.

Job 6: Title: Write annual performance report.—This performance report was completed as scheduled.

Literature Cited:

Ricker, W. E. 1975. Computation and interpretation of biological statistics of fish populations. Fisheries Research Board of Canada, Bulletin 191.

Table 1.—August density of young-of-year (YOY) and yearling-and-older (YAO) brook trout and brown trout in four contiguous reaches of Hunt Creek, MI, 2002-06. Stream reaches are numbered consecutively from downstream to upstream. Brown trout have been excluded from reach 4 by a barrier.

Year	YOY (fish/ha)		YAO(fish/ha)		Kg/ha	
	Brook	Brown	Brook	Brown	Brook	Brown
Reach 1						
2002	2,362	90	850	50	48	20
2003	2,013	150	533	73	35	32
2004	1,168	227	861	205	51	19
2005	1,784	366	629	349	36	41
2006	1,589	455	555	403	33	57
Reach 2						
2002	2,561	295	963	44	50	10
2003	2,878	711	713	69	46	24
2004	2,418	468	1,123	258	62	43
2005	2,041	1,261	801	275	44	47
2006	2,016	542	618	566	42	77
Reach 3						
2002	1,940	417	1,193	64	42	5
2003	1,984	1,069	825	356	33	35
2004	1,688	1,363	1,069	577	40	28
2005	2,026	1,223	985	680	39	47
2006	1,631	876	569	810	25	63
Reach 4						
2002	3,271	0	1,515	0	67	0
2003	3,447	0	1,135	0	60	0
2004	2,939	0	1,580	0	66	0
2005	3,303	0	1,760	0	69	0
2006	2,905	0	1,222	0	57	0
Mean density for reaches 1–3						
2002	2,288	267	1,002	53	47	12
2003	2,292	643	690	166	38	30
2004	1,758	686	1,018	347	51	30
2005	1,950	950	805	435	39	45
2006	1,745	624	581	593	33	66