

STUDY PERFORMANCE REPORT

State: Michigan

Project No.: F-80-R-1

Study No.: 507

Title: Long-term suppression of brook trout reproductive success by sand bed load

Period Covered: October 1, 1999 to September 30, 2000

Study Objective: To determine and document the long-term impacts of a 1-time (period) elevation of sand bed load on brook trout populations in Hunt Creek, Michigan. To explore reasons why young-of-the-year (YOY) habitat remains degraded nearly a quarter century after experimental sand additions were discontinued.

Summary: Channel morphology characteristics were measured in a 2-mile reach of Hunt Creek where an experiment to test effects of sedimentation on trout populations was conducted during 1967-86. Preliminary analyses suggested that habitat remains degraded. Trout populations were estimated in spring and fall. In 1999, fall abundance of YOY brook trout in the stream section affected by excess sedimentation was lower than any previous estimate.

Job 1. Title: Characterize channel morphology.

Findings: We measured stream width and depth, and characterized dominant substrate types along transects spaced at 100-foot intervals along the study reaches. Study section dimensions are shown in Table 1. Sections Z and A were one foot wider than in 1980 when mean width was last estimated (Alexander and Hansen 1986). Mean width of sections B and C was 0.3 feet narrower than in 1980.

Dominant streambed substrate was characterized at 1-foot intervals along each transect. These data were converted to percentages (Table 2). The percentages of sand substrate in sections Z and A (treated section), which were subjected to elevated sand bed load from 1972-76, were similar to percent sand composition in 1975 (Alexander and Hansen 1986). Percentages of sand in sections B and C (control section) were approximately double the percentages estimated in 1975.

Job 2. Title: Estimate trout population characteristics.

Findings: We estimated brook trout populations each April and September in each of the study reaches. Scale samples collected from subsamples of trout were read to determine trout ages and used to derive age-specific population estimates. Scale samples collected in spring 1999 have not yet all been aged. Estimated numbers of brook trout per hectare by age for fall 1999 are shown in table 3. YOY brook trout abundance in September 1999 in the treated section was lower than during any previous year that estimates have been made (1949-98).

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Job 3: Title: Analyze data and write progress report

Findings: This progress report was prepared.

Literature Cited:

Alexander, G. R., and E. A. Hansen. 1986. Sand bed load in a brook trout stream. North American Journal of Fisheries Management 6:9-23.

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Date: September 30, 2000

Table 1.—Mean stream widths and depths, and dimensions (length and area) of four contiguous Hunt Creek study sections. Units are in feet and acres.

Study section	Length	Width	Area	Depth
Z	2,388	19.84	1.087	1.2
A	2,643	20.30	1.232	1.2
B	1,975	15.30	0.694	0.8
C	4,114	11.77	1.112	0.5

Table 2.—Hunt Creek streambed composition as percent of area in June 2000.

Study section	Substrate percentages							Wood
	Organic detritus	Clay	Sand	Fine Gravel (0.1-0.9 in)	Gravel (1.0-2.4 in)	Small Cobble (2.5-4.9 in)	Cobble (>5.0-10 in)	
Z	11.9	0.0	58.9	12.6	9.6	1.0	0.0	6.0
A	8.0	0.0	75.5	9.0	0.0	0.0	0.0	7.4
B	2.4	1.0	30.5	49.2	12.0	0.3	0.0	4.5
C	3.4	0.0	29.1	28.2	24.2	9.8	0.4	4.9

Table 3.—Estimated^a number (± 2 SE) of brook trout per hectare by age for fall 1999 populations in four sections of Hunt Creek.

Study section	Age						
	0	1	2	3	4	5	6
Z	803 (± 163)	916 (± 158)	433 (± 110)	75 (± 69)	10 (± 15)	7 (± 3)	0
A	1,184 (± 200)	852 (± 164)	185 (± 53)	58 (± 47)	4 (± 5)	9 (± 0)	0
B	1,979 (± 309)	1,400 (± 199)	139 (± 71)	42 (± 20)	6 (± 4)	0	0
C	3,101 (± 232)	1,516 (± 121)	383 (± 99)	80 (± 31)	0	0	0

^aPetersen (Bailey modification) single-census mark-and-recapture population estimate.