

STUDY PERFORMANCE REPORT

State: Michigan

Project No.: F-80-R-2

Study No.: 507

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

Period Covered: October 1, 2000 to September 30, 2001

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: During studies conducted from 1987-98 I observed suppressed recruitment of YOY in reach of Hunt Creek where habitat quality was degraded by sand sediment during the early 1970's. The present study was designed to determine if this long-term reduction in reproductive success could be linked to channel morphology characteristics. I attempted to duplicate measurements of channel morphology made during a study of sediment effects on brook trout populations and their habitat that was conducted during 1967-86. Preliminary analyses of channel morphology data collected in 2000-01 suggested that habitat remains degraded by sand sediment. The reduced abundance of brook trout YOY, compared to levels observed prior to 1972, may result from persistent high percentages of sand substrate. 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: I measured stream width and depth, and characterized dominant substrate types along transects spaced at 100-foot intervals along the study reaches. These data were summarized and reported during the previous segment. Briefly, stream width in the reach affected by excess sediment was wider in 2000 than in 1980 when mean width was last estimated (Alexander and Hansen 1986). Dominant streambed substrate was characterized at 1-foot intervals along each transect. These data were summarized and reported during the previous segment. 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.

The differences in channel morphology between 1980 and 2000 observations may be attributed, in part, to changes in transect locations. I was unable to locate most of the transect markers placed by Alexander and Hansen (1986) so I placed new markers at 100-foot intervals. I used a differentially-corrected GPS unit to document the locations of new transects established in 2000. These data will facilitate any future investigations of stream morphology if transect markers are lost.

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. These data will be more fully summarized and reported in the final report. Estimated numbers of brook trout per hectare by age for fall 1999 and 2000 are shown in Tables 1 and 2, respectively.

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, 2001

Table 1.—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.

Table 2.—Estimated^a number (± 2 SE) of brook trout per hectare by age for fall 2000 populations in four sections of Hunt Creek.

Study section	Age						
	0	1	2	3	4	5	6
Z	1980 (± 362)	447 (± 108)	229 (± 78)	111 (± 81)	0	0	0
A	1738 (± 301)	554 (± 102)	141 (± 52)	50 (± 23)	0	0	0
B	1797 (± 307)	968 (± 166)	236 (± 116)	39 (± 24)	12 (± 11)	0	0
C	3185 (± 393)	1193 (± 94)	289 (± 61)	55 (± 30)	18 (± 8)	0	0

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