Michigan Department of Natural Resources
Fisheries Research Report 2074

Long-term effects of sedimentation and other factors on the brook trout population in Hunt Creek

Andrew J. Nuhfer

Michigan Department of Natural Resources
Hunt Creek Fisheries Research Station
1581 Halberg Rd.
Lewiston, Michigan 49756

Abstract.–I assessed the long-term effects of an experimental addition of sand sediment and subsequent restoration efforts on brook trout *Salvelinus fontinalis* habitat and abundance in Hunt Creek, in Michigan's northern Lower Peninsula. Alexander and Hansen (1988) previously reported on effects of experimental sediment additions during the early 1970s and habitat restoration accomplished through use of sediment traps from 1982 to 1986. In this follow-up study, I compared brook trout abundance, survival, and growth among six periods between 1952 and 2001 (1952–64, open to angling; 1967–71, pretreatment and beginning of permanent closure to angling; 1972–75, transition as sand added to treatment zone [TZ]; 1976–81, post- treatment; 1982–90, sediment basins maintained; and 1991–2001, sediment basins retired). Data were not previously reported for a 9-year sediment basin maintenance period, or an 11-year period after sediment basins were retired. Fall abundance of age-0 trout in the TZ did not recover to pretreatment levels nearly 25 years after habitat was degraded by excess sand bedload. Gravel in the TZ remains heavily embedded with sand and, presumably, spawning habitat remains impaired. Annual survival of age-0 trout recovered to pretreatment levels after sediment traps were constructed and remained at this level during the period when traps were retired. Habitat for age-1 and older trout was apparently restored by sediment traps and natural erosion processes because their fall abundance was similar to their pretreatment level during periods after 1982. Recovery of fall populations of age-1 and older fish occurred within about 6 years after sediment basins were dug, primarily through increased survival of yearling-and-older fish and retention of yearling fish that immigrated into the TZ during spring and summer. This study demonstrated that an increase in sand bedload concentration from 20 ppm to 80 ppm in a small, low-gradient brook trout stream can result in a very large decline in habitat quality and abundance of all age groups of fish. The only partial recovery of age-0 trout to about 55% of pretreatment abundance 25 years after sediment additions ceased emphasizes the importance of erosion control because it is difficult to fully restore habitat damaged by sedimentation. The rapid recovery of age-1 and older trout in Hunt Creek after sand traps were constructed was possible, in part, because abundant juvenile fish in adjacent stream areas and tributaries immigrated into the treatment zone and survived better because deeper habitat (pool) and large woody debris (LWD) cover was restored.

Introduction

Trout streams flowing through Michigan watersheds with sandy geology are particularly vulnerable to sedimentation. Many of these streams have low gradients, and hence, low power to transport excess sand bedload that enters the channel from a variety of natural or