

ABSTRACT

An experimental introduction of sand sediment into Hunt Creek in the northern Lower Peninsula of Michigan that increased the bed load four to five times resulted in a significant reduction of brook trout (*Salvelinus fontinalis*) numbers and loss of habitat. The brook trout population declined to less than half its normal abundance. After the experimental treatment was stopped the stream was allowed to cleanse itself of sand naturally for a 5-year period, followed by another 5-year period when sediment basins were constructed to accelerate sand clean out. The gross channel morphometry, bed type, water velocities, and trout cover recovered in about 6 years. However, to date, some sand is still in deposition along the stream edge and within gravel riffles and still adversely effects trout spawning, nursery habitat, and production of invertebrate trout foods. Little improvement in the numbers of young-of-the-year brook trout has occurred 10 years after experimental sand additions were discontinued. In spite of this reduced recruitment the population of older brook trout has nearly completely recovered. This has come about through increased survival of age-I and older trout, presumably because the habitat has been restored for these larger fish. The growth rate of individual trout showed little change over the course of the study. The decline in habitat quality induced by increased sand bed load caused a decrease in brook trout survival rates which reduced trout numbers. When there was less food, there were fewer fish. Thus, daily ration and growth did not change substantially. When sand bed load was reduced and habitat improved there were increases in trout survival, trout numbers, and food abundance, but little change in trout growth. This study has demonstrated that a relatively small sand bed load concentration of only 80 ppm had a profound negative effect on brook trout and their habitat. Moreover, it demonstrates that reduction of bed load can improve trout populations and trout habitat considerably. However, full recovery from the effects of elevated sand bed load levels will take a longtime in low gradient streams with relatively stable flow regimes.