MANAGEMENT IMPLICATIONS

From 1964 to 1979, sedimentation was added to winter floods and freezing water temperatures as another enemy of developing trout eggs in the stream gravel. Sedimentation intensified after the FRS was constructed in 1964. The heaviest deposits of sediment were in the dry floodwater-retarding basin of the FRS, which extends 1,050 m upstream from the FRS, a reach of stream that before 1964 was the best trout spawning area in Trout Creek. Sedimentation occurred also on trout spawning grounds from station 13 (below the FRS) up to the FRS, apparently, because of the stable water flow that decreased flushing of the stream channel by spring freshets and summer floods.

Because water flow is now considerably more stable below the FRS on Trout Creek, destruction of trout redds by flowing water is minimal. Perhaps stream deflectors, by narrowing the stream channel and thus increasing water velocity over areas with suitable spawning gravel, would keep sediment from settling on and within the gravel in this stream reach. Past failures to retain man-made spawning grounds for brown trout in Wisconsin streams resulted from floodwater washing the gravel downstream after a couple of years and destroying the spawning area constructed by man. Gravel placed below the FRS in potential trout spawning sites would probably be more stable and serve as brown trout spawning grounds for many (yet unknown) years.

The destruction of trout spawning grounds in the dry basin of the FRS due to sedimentation or to standing water cannot be easily alleviated. Creation of such conditions is the function of a FRS, i.e., to catch and hold water and to settle out at least the coarse sediment as the retarded floodwater behind the FRS is slowly released downstream. It would be questionable management of the wild trout resource to install stream deflectors in the stream channel in the dry basin of the FRS to remove and prevent deposition of sediment on trout spawning gravel. If that were indeed done, spawning trout would be attracted to these spawning grounds, only to have their progeny suffocate in the developing egg and sac-fry stages by silt-laden water from winter floods. It would be wiser to encourage these trout to continue upstream to spawn above the dry basin of the FRS where some of the spawning gravel is inferior but where winter water temperatures and sedimentation are moderate.

Because suitable gravel substrate did exist upstream, the FRS built on Trout Creek did not lower the overall reproduction of trout in the stream. This condition — alternative spawning grounds — may not exist in other streams proposed for FRS construction. For this reason, we strongly advise that whenever a dry floodwater-retarding structure is constructed on a trout stream, it should be located above or below trout spawning grounds or on nontrout producing tributaries that drain into the main trout stream. The cost:benefit ratio resulting from early 1960 calculations would probably then be less favorable if it had been so located, but when the wild trout resource and sport fishery are given their proper values in the formula, as they are today, the ratio could become more favorable.

Positive factors of the FRS on Trout Creek are: (1) the controlled water flow below the FRS during winter floods has been a stabilizing influence on the limited trout reproduction below the FRS; and (2) because the FRS blocks the upstream movement of competing and predatory fishes, the wild trout population above the FRS has benefited and should continue to benefit.

SUMMARY

The main objective for investigating the wild brown trout populations in Trout Creek was to determine the characteristics of such populations in a Wisconsin coulee stream. After construction of a dry floodwater-retarding structure (FRS) on Trout Creek in 1964, emphasis was placed on effects of the FRS on wild brown trout ecology.

Trout reproductive success was determined by the relationship of the calculated number of eggs deposited in the redds during a given November and the estimated number of wild trout fingerlings present in the study area the following September. During the trout population estimates with electrofishing gear, all trout age II and older were sexed and estimates of their number were calculated. Data on density, distribution, survival, growth, and production of trout were obtained during April and September trout population estimates conducted over a span of 20 years (1960-79).

During some winters, floods and freezing water temperatures decreased normal survival of developing trout eggs and sac-fry. Spawning gravel in the stream channel within the dry basin of the FRS was covered by sediment after the FRS was completed in 1964.

Production of wild brown trout in Trout Creek was similar to that in a neighboring coulee stream whenever numerical density of wild brown trout in the 2 streams was similar. Production of wild brown trout in both streams increased with an increase in numerical density. Numerical density of wild brown trout varied during the 20 years of study because various year classes were severely reduced by winter floods.

In 1964, the 30-cm waterfall from the tube in the dike of the FRS and/or the high water velocity through the tube was a barrier to upstream movement of all fishes except wild rainbow trout over 13 cm and wild brown trout over 20 cm in total length. When the waterfall had increased to 66 cm in height by 1973, it was not a barrier to wild brown trout age II and older (28-48 cm in total length) on their way to spawning grounds above the FRS.

Of benefit to the wild brown trout population above the FRS, was that the FRS blocked competing and predatory fishes below the FRS access to the reach of stream above the FRS. The FRS controlled stream flow below its outlet and thus stabilized the limited trout reproduction below the structure.