Big Spring Hatchery

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The fishery above the Thomas hatchery persisted until the 1970's when the Big Spring Hatchery was constructed on the headwaters in 1972. With the operation of this hatchery, the remaining wild trout fishery declined to the point where it is unlikely that any of the original strain of wild brook trout remain. The focal point of a former world class fishery was reduced to angling for large, hatchery-reared trout in an area known as 'The Ditch'. The Ditch refers to the upper 0.13 miles of Big Spring Creek in an area that long ago was dammed to create the McCracken Mill pond, and was later drained and filled in during hatchery construction to create a long narrow run. While the fish population in The Ditch was impressive, it hardly compared to the wild fishery that once existed.

PFBC biologists may have suspected the hatchery was causing problems with brook trout reproduction soon after the hatchery went on line. In 1977, PFC biologist Robert Hesser conducted experiments to determine the survival of brook trout eggs above and below the hatchery outfall. The study was inconclusive and Hesser recommended that it be repeated. There were no other references to any of the recommended follow up work in the material that we could obtain. Fishery managers reported that they observed brook trout spawning activity in the Ditch in numerous years (Greene, 2003).

The collapse of the stream fishery has been attributed to many factors. Some claim that the hatchery effluent caused all of the problems; others claim that it was habitat deterioration, and others point to vastly reduced flows from the spring. Some even point to the stocking history and question how important the wild fishery was. The "smoking gun" has not been identified, despite numerous scientific studies. There is little doubt that nearly everyone who is familiar with Big Spring Creek agrees that this was at one time a world class fishery and that it collapsed sequentially as the hatcheries were put into service. Reports prepared by the Pennsylvania Fish and Boat Commission staff indicate that they were concerned by the collapse of the fishery. Statements from a1989 report include: *"significant changes have occurred in the Big Spring Creek fishery since the annual assessments were initiated. The present management was developed when the trout populations were vastly different from those observed in 1988." "In one sense, Big Spring Creek, in light of habitat deterioration could be viewed as an embarrassment to the Pennsylvania Fish Commission. It is my sincere opinion that this agency is not at fault for the loss of habitat, nor the decline in trout population. However, for a stream of national prominence to literally fall apart except for a couple hundred feet of the special reg area, this agency, as the owner, bears responsibility especially in light of the "Resource First" theme."* (Macri and Black, 1997). From these and other reports it appears that the PFBC staff believed that all of the deterioration in the fishery was related to the loss of habitat. While the habitat does not meet the established model for trout habitat, we can find no significant physical changes, except for the vegetation die off and the added habitat structures. The lack of habitat does not explain the nearly total lack of fish in the stream downstream of the hatchery, even after stocking.

Chemical discharges from the Big Spring Creek hatchery are reported to be within permitted limits by the PFBC in information papers provided by the PFBC. While this may be true, there is one chemical discharge that is not discussed anywhere in any of these PFBC releases. That chemical is diquat. In 1985, Dr. Robert Carline, of the Pennsylvania Cooperative Fish and Wildlife Research Unit, was asked by the PFBC to investigate the die-off of aquatic vegetation in Big Spring Creek. Dr. Carline learned that the aquatic herbicide Diquat had been used at Big Spring Hatchery to control bacterial gill disease since 1978. While Diquat is only moderately toxic to mammals and fish, it is a highly toxic herbicide and is reported to be very toxic to aquatic invertebrates. The number of treatments ranged from 1 to 32 per year, with each treatment using enough Diquat to produce a concentration of at least 0.2 mg/l in Big Spring Creek. Calculated concentrations in the stream ranged up to 1.6 mg/l. These calculations assumed high flow conditions in the spring. At lower flows, the concentration could have been up to 200% higher. A single treatment of 0.5 to 1.0 mg/l is an effective herbicide control for watercress in static (lake) water. Under lotic (stream) conditions concentrations of 2.5 to 5.0 mg/l would be recommended to control watercress. Dr. Carline did not find any references to examples in streams where repeated applications of Diquat were used under lotic conditions, such as was occurring at the Big Spring Hatchery. Dr. Robert Carline wrote in 1985 *"There is reason for serious concern that the use of Diquat at Big Spring Hatchery may be affecting the watercress population of Big Spring Creek."* in a memo to the PFC (Carline, 1985). The use of Diquat continued at the Big Spring Hatchery until at least 1986.

Why would the use of Diquat at Big Spring Hatchery be more serious than other hatcheries? At Big Spring, nearly all of the stream flow passed through the hatchery, resulting in a much higher in-stream concentration of Diquat and all other chemicals used in hatchery production. Much of the discussion on the lack of vegetation in the upper reaches of Big Spring Creek has focused on watercress, but, prior to the hatchery, there was a diverse vegetation cover on the stream with at least seven species present in great abundance. The watercress could have been subject to disease or other factors, but this would not explain the loss of most of the other six species, **including the alder** in the Ditch.

While it is possible that some herbicide runoff from adjacent farming operations may have entered the creek through the spring flow, none was ever detected at concentrations that would have had the effect of the Diquat. PA DEP did conduct at least one study evaluating the concentration of herbicides entering the stream from agricultural sources.

It is our conclusion that the use of Diquat in the hatchery was responsible for the die-off of vegetation in the Ditch and upper stream area. The herbicide almost certainly had a serious adverse impact on aquatic invertebrates in the upper stream area as well. Since vegetation provided the most significant habitat for both fish and invertebrates this would have had a serious adverse impact on both of these faunal groups. However, because the failure of the wild brook trout population had already occurred, we do not believe that the Diquat use was the primary cause of the destruction of the wild trout fishery. It was the most important adverse impact on the aquatic habitat that occurred since the clay mining operation was closed. The loss of the in-stream vegetation was cited by many as the

problem with the decline of the fishery, but the decline had already occurred when the Diquat was used. Diquat dissipates in the stream over time and is not expected to be a continuing adverse impact, unless releases continue to occur.

The PFBC hatchery ceased operation in the fall of 2001.