Better Fishing Means

Less Carping

At Bowman-Haley Reservoir

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Although the word origins of the fish called carp and the word carping (to complain in a peevish manner) are different, as far as sport fishermen are concerned, carp and carping often go hand in hand.

In North Dakota's midsized reservoirs, overpopulation of undesirable or "rough" fishes, can reduce numbers and diversity of more popular fishes and harm sport fishing.

First introduced into the United States as a potentially important food fish, the carp was stocked throughout much of the country in the 1880s and 1890s. The species spread rapidly, so that by early this century a fish still highly esteemed throughout much of Europe was considered a pest in the United States, a reputation that, with few exceptions, it retains to this day.

Carp are primarily bottom (benthic) feeders, eating a variety of animal and plant life (although it is not uncommon to see carp feeding at the surface on hot, stagnant summer days). Overabundant carp can severely deplete lake bottom food sources needed by species such as yellow perch, bluegills, and channel catfish.

Rooting activities of foraging carp stir up sediment and increase water turbidity. Turbid water makes it difficult for sightfeeding game fish such as walleye, sauger, and northern pike to see their food, as well as an angler's bait. Carp impede growth and establishment of submerged aquatic plants by directly uprooting plants, and hindering growth as turbid water blocks sunlight needed for photosynthesis.

Elimination of submerged plants can diminish water quality, because submerged plants reduce windcaused turbidity and help cycle nutrients. Submerged plants also tie up nutrients, which helps control algae blooms in nutrient rich waters. Besides aiding water quality, fish food organisms live on or near aquatic plants. Some fish species, like northern pike and perch, need aquatic plants for spawning. Underwater plants also provide cover for small fish to escape from predators.

How Carp Dominate Waters?

In many nutrient-rich reservoirs, carp may at first reproduce successfully, resulting in one or two strong year classes in succession. Their long lifespan (up to 15 years or more) and potential to reach a large size (up to 20 pounds or more) allow fish from strong year classes to grow steadily, rapidly at first, but more slowly later on as they become large and exceed natural limits of their food supply.

Eventually the reservoir is full of large, old carp whose reproductive success is poor, because the reservoir's carrying capacity for carp is reached. Growth and survival rates of young-of-the-year are low. Although few young carp are added to the population, the damage was done when the strong year classes were produced.

The Old Carp Syndrome may persist for years until a die off reduces the dominant year classes. If the die off is sudden, the entire process can start over. This cycle explains why biologists have often removed large numbers of carp from waters, only to see survivors reproduce successfully and recreate the Old Carp Syndrome 10 years later.

With fewer old carp, food for younger carp may be abundant. They can grow rapidly, and quickly reach a size too large for predation. This rapid growth permits a carp to live most of its 15 or more years without risk of predation. The carp's high fecundity (reproductive capacity) up to 2 million eggs in a 20-pound female and its adaptability to spawn in different situations gives it an edge over many native or preferred species.

In addition, poor landuse practices in a watershed can result in excessive sediment input and nutrient enrichment in a lake, conditions which often favor rough fish over other species. Good land use practices become especially important in reservoirs draining large watersheds, a common situation on the Great Plains.

Because carp can alter their own aquatic habitats to the detriment of other species, and because they can quickly outgrow predation, fishery managers must often intervene in carp-dominated waters to reduce their numbers. Contracts with commercial fishermen for harvesting them have often been used, but economic returns of harvesting and marketing carp are marginal.

In ponds and small reservoirs (less than 300 acres), a common approach to restoring a desirable fish community is complete eradication of the fish community with rotenone. Rotenone, a natural fish toxicant, biochemically inhibits oxygen use by fish. After the eradications, the waters are typically stocked with more desirable species.

Midsized reservoirs with carp create special problems because eradication is usually too expensive. Other methods must be developed to manipulate a fish community, improve water quality, and rehabilitate the sport fishery. For this reason, the North Dakota Game and Fish Department has begun a three-year project on Bowman-Haley Reservoir to evaluate methods for controlling undesirable species in "problem" midsized reservoirs.

The intent of the project is to develop an effective approach for sustaining a quality fishery, and incorporate the approach into a long-term management plan for this and similar-sized reservoirs with carp problems.

Bowman-Haley Reservoir is a 1,750 acre impoundment on the North Fork of the Grand River located 20 miles south of Bowman.

Despite repeated stockings of game fish, fishing success has gradually declined as rough fish thrived. In 1993, the fish community in Bowman-Haley was dominated by an estimated 1.5 million pounds of carp, nearly all of which weighed at least five pounds and were at least 12 years old.

Submerged aquatic plants were nearly absent throughout the reservoir despite large areas of shallow water apparently suitable for them. Without aquatic plants, the reservoir became turbid when wind riled sediments below shallow water. When the wind remained sufficiently calm for the lake to clear, high nutrient levels in the clear water quickly gave rise to blooms of bluegreen algae.

Such blooms act much like sediment caused turbidity, preventing light from penetrating the water and hindering growth of submerged plants. Fishing, boating, and other recreational uses of the reservoir were suffering. Predators such as northern pike and walleye have had little effect in reducing the multitudes of large carp, and disappointed boaters and anglers increasingly voiced their concerns.

Turning Bowman-Haley Around

As a first step, in summer 1993 trapnets and gillnets were set throughout the reservoir to capture, mark, and release as many fish as possible. Sufficient numbers of recaptured, marked fish would allow us to estimate the population of each species. Fish were marked by clipping a fin.

In early spring 1994 we trapped or gill-netted and removed as many other rough fish besides carp (carpsuckers, white suckers, and redhorses) as possible, on the assumption that their numbers were high. In all, more than 15,000 (nearly 73,000 pounds) of these fish were removed. Although we initially thought that numbers of one or more of these other species were as abundant as carp, we found they were not sufficiently numerous to present problems.

To remove large numbers of carp with minimal cost and effort, we took advantage of the carp's tendency to congregate each spring in large numbers in relatively warm tributaries prior to and during spawning. Bowman-Haley has three such inflowing tributaries Spring Creek, Alkali Creek, and the North Fork of the Grand River -- and all were full of carp in the spring of 1994.

During peak carp spawning activity, we positioned long seine nets completely across the mouths of the three tributaries to prevent carp from escaping back into the reservoir. The tributaries were then treated with rotenone. More than 700,000 pounds of adult carp were killed, nearly half the estimated 1.5 million pounds of adult carp in the reservoir.

Carp so dominated the tributary habitats that all game fish combined constituted less than one percent of the total fish killed by number and by weight. In essence, the effect of rotenone use on other species was minimal.

After the tributaries were cleared of carp, we placed fences across two of them to prevent carp from reentering, and monitored bottom food organisms, zooplankton, water clarity, and submerged aquatic plant abundance above and below the fences. A comparison of the two locations would help us identify the effects of carp. Water samples collected before and after the rotenone applications are being analyzed by the North Dakota State Department of Health to assess effects on water quality. Of special interest is how decaying carp affected nutrient levels of the tributaries.

Within 24 hours after the carp were removed, water clarity within the tributaries increased remarkably; from only a few inches with carp to more than two feet without carp. The increased visibility above the fences persisted the rest of the summer.

The clearer water above the fences enabled submerged aquatic plants to flourish, so that by the end of July, areas less than two feet deep were completely covered with submerged vegetation. Submerged vegetation abundance also increased in deeper areas of the tributaries, as well as in the main reservoir. In areas where submerged plants grew, seine catches of young-of-the-year game fish were five times higher than in areas without vegetation.

Above the fences, abundance and size of fish food items such as midge larvae also increased significantly. Along with clearer water, this should allow for increased growth rates of game fish. Walleye fry were stocked above the fences in 1994 in anticipation that their growth and survival might be higher above the fences than below. In 1995, both walleye and northern pike will be stocked above the fences as well as in the main reservoir. Growth of these groups of fish will be compared to determine if there is indeed an advantage in stocking fish in the carpfree sections of the tributaries.

Once carp numbers have been reduced, a second objective of the Bowman-Haley project is to evaluate methods of keeping carp numbers low. If carp cannot be reliably controlled, benefits of initial eradications will not last.

Eradication of carp from the tributaries in spring appears to be a cost-effective method. In 1994, nearly 50 percent of the carp in the reservoir were removed by treating less than 180 acres with rotenone at a cost of about $ 11,000. This spring we will again eradicate carp from the tributaries. Once carp numbers are low, eradications may only be needed every few years.

We will also evaluate the use of temporary weirs and traps to remove carp as they migrate upstream to spawn. This trap-and-haul method will permit the removal of live carp for disposal or potential shipment to markets. It is likely that improved stream habitat quality in carp-free areas above the weirs will benefit other fish species.

Rotenone baiting, a technique recently developed, is also being tested as a means of controlling carp. First, nontoxic food is dispensed from an automatic fish feeder three times a day for several days until carp congregate there at feeding time. Food with rotenone is then dispensed. We are experimenting with feeders in an attempt to attract large numbers of carp necessary for the method to be costeffective in reservoirs the size of Bowman-Haley. The best chance for success may lie in baiting carp in the tributaries in spring.

Nontoxic food is dispensed three times a day from automatic feeders. After several days when carp have concentrated in the area of the feeder, food containing rotenone is dispensed.

Another method of carp control, used in Bowman-Haley in 1994, is a spring drawdown of the reservoir. After female carp expel their eggs and fertilization occurs, the eggs either attach themselves to submerged grasses, weeds, and roots, or drift into shallow areas.

In 1994, a onefoot drawdown of Bowman-Haley during spawning left many shoreline areas covered with mats of dried-out carp eggs. The slight (1-2 feet) lowering of water levels for much of the year has an added benefit of reducing erosion of shorelines by Cleaves, thereby increasing water clarity. In addition to drawing down the water, North Dakota Game and Fish and the Corps of Engineers are also cooperating to install wave breaker structures near Spring and Alkali creeks to reduce wave action, bank erosion, and sedimentation.

Biologists would like to see several changes in BowmanHaley Reservoir as numbers of carp are reduced. The establishment of submerged aquatic plants is essential in providing habitat for young game fish, reducing windcaused turbidity, and decreasing the severity of algae blooms. Because carp and other undesirable species are sure to reproduce more successfully following reductions in carp numbers, stocking of predator species is essential to control numbers of young carp. If predator populations can be increased and maintained, biologists may not need to intervene as often to preserve a desirable fish community.

For BowmanHaley and North Dakota's other midsized reservoirs, sound management practices in the watersheds and a program of controlling and more effectively utilizing rough fishes, especially carp, are the keys to less carping and better fishing.

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