

FISH: AN ALTERNATIVE TO CANAL HERBICIDES

The proliferation of aquatic weeds and algae causes serious operational challenges, and headaches, for irrigation district managers. Weeds and filamentous algae impede flow and reduce canal capacity. Often, these impediments require districts to invest in costly aquatic herbicides and expend a good deal of man-hours applying chemicals and physically removing excess debris.

Natural biological systems can have a substantial impact on nuisance algae and weeds in canals and ditches. In fact, fish can serve as a cost-effective way for irrigation district managers to naturally control water quality while saving money and limiting employee exposure to chemical treatment regimes. P.K. Gills is an Arizona-based company that is successfully harnessing this unique value of fish. The company supplies live fish and creates water management programs to address debris in canals.

PAT CHURCH'S PASSION

Pat Ann Church, founder of P.K. Gills, brings more than 30 years of experience in water quality management to her work with irrigation districts. She began her career in lake management back in 1974. Three years later, she bought out her father's interest and became sole proprietor of a company that managed golf course ponds. The company grew and became Aquatic Dynamics Incorporated (ADI) in 1984. Over her 15 years at the helm of ADI, Ms. Church worked closely with biologists and limnologists to achieve natural and effective quality management programs for a variety of water bodies. According to Ms. Church, her inspiration for natural solutions "developed



Pat Church, owner of P.K. Gills, weighing a koi fish.

out of the inadequacies and issues we had using chemical treatments dating back to the 1970s." After selling her interest in ADI in 1998, Ms. Church continued promoting fish as an effective water quality management tool and established P.K. Gills.

HERBIVORES AT HOME IN A CANAL

For over 50 years, public and private water managers have employed White Amur as an agent to control and manage aquatic plants. These fish can grow as long as 3 feet. Generally, when they reach that size, their metabolism slows and they do not eat as much. At that point, the fish should be replaced in a canal system.

The White Amur is an herbivore that consumes a substantial amount of vegetation, but can also impact native aquatic communities. Because White Amur compete for food and space with native species and game fish, the species is highly regulated. Most states require that the species only be introduced if sterile. Triploid White Amur, a hybrid with three sets of chromosomes instead of two, are sterile.

Most states have strict regulatory requirements for stocking White Amur. For example, in Arizona, a White Amur stocking and holding license allows a business to stock and possess triploid White Amur in closed aquatic systems where a natural or man-made barrier prevents the fish's ingress or egress. In Texas, water-body owners, their agents, or controlling authorities must obtain a Triploid Grass Carp Permit from the Inland Fisheries Division of the Texas Parks and Wildlife Department to stock White Amur. As part of its water management services, P.K. Gills takes care of all the permits for its customers.

In addition to state restrictions, the U.S. Department of Agriculture's Animal Plant and Health Inspection Service (APHIS) certifies that the fish are sterile. For example, for a district that orders 3,000 head of fish for importation, APHIS comes out and does random blood tests on the fish prior to stocking to ensure that they are triploids.

WORK WITH ROOSEVELT

Back in 1994, Roosevelt Irrigation District (RID) reached out to ADI about the use of fish to treat aquatic weeds. RID had some significant safety and cost issues with the application of the herbicide Magnicide. The district chose to stop using chemicals cold turkey. RID leadership heard about the use of

fish from the Salt River Project and decided to give it a try.

To the surprise and pleasure of the district, improved water quality and increased cost savings soon followed the introduction of White Amur (grass carp) to the canal system. RID's weed treatment costs decreased from \$600,000 annually, not including the liability insurance premiums for storing and handling toxic materials, to between \$70,000 and \$100,000 annually for stocking the fish. That translates to an 83 percent savings, not including insurance savings, over the cost of the chemical regime.

The company has also been working with Roosevelt Water Conservation District (RWCD) since 2008. RWCD has 27 miles of concrete-lined canals broken up by weirs that prevent fish from moving downstream. When the district draws down for grate maintenance, the fish are isolated in wet areas created by hay bales. This method retains the existing fish population, reducing the need for annual stocking.

Given RWCD's system, P.K. Gills applied a more gradual approach to cleaning the system, stocking 2.5 miles of canal at a time. The end result has been fantastic; the canals are cleanest they have ever been. Although the district continues to apply sporadic copper treatments in some laterals, RWCD has completely eliminated its use of Magnicide. The total cost of the fish program was approximately \$52,000 over a two-year period. It has not required any additional expense for the four years hence. Ms. Church remarked, "I worked myself out of a job on that one."

MANAGEMENT AND SYSTEM FLEXIBILITY

In canals, P.K. Gills employs different stocking densities of White Amur depending on the particular weed and algae problem of the district. Multiple variables affect densities: flow rate, water temperature, construction, existing aquatic weeds and algae, local regulations, and placement of weirs or grates. These factors are unique to each district, and P.K. Gills assesses all factors before



Piping live fish into canal system.

determining how to manage water quality.

Districts generally will have to install grating to comply with state regulations. Fish growth is the deciding factor for the grate size. For example, RWCD uses barriers with 2-inch grates. P.K. Gills adjusted accordingly. "So we ordered fish of 2¼-inch head size, generally 14-inches or longer," Ms. Church explained.

Unlike RWCD, RID dries up its canal and laterals for repair and maintenance, which means the stocked fish must be removed. During the "dry-up," the fish are released into a wash in west Phoenix, and the coyotes and birds have a field day. [P.K. Gills has tried to get a pet-food manufacturer to take the fish, but the logistics thus far have proved too challenging.] With a few tweaks to the management program over the years, the cost and labor savings continue for

RID. P.K. Gills now stocks tilapia in the system to control algae growth.

SAVING TIME AND MONEY

Ms. Church notes that "if you are a canal district considering fish, it is an easy process to determine if you can use them." P.K. Gills provides its potential customers with a simple questionnaire. Upon completion, the company can quickly determine whether the district would be a good fit. This easy process can save a district hundreds of thousands of dollars. In canals and laterals, fish can serve as a natural solution to a costly problem.



Canals may impact residential areas. Sustainable water quality management is a key strategy for this urban canal system.