

Water Review

A Perspective on Western Water Issues Prepared by the Family Farm Alliance and Its Members

ARIZONA

A Natural Way to Attack Aquatic Weeds

Aquatic weed control is a serious business for Western water managers.

If irrigation delivery systems become choked with aquatic growth, they are subject to catastrophic failure caused by water backing up and overflowing or breaching canals. Breaches can damage large expanses of property and pose a risk to public safety.

In the past, Western irrigation district managers controlled weed growth with costly and labor-intensive methods, such as scraping canal beds with heavy chains to uproot plants, scoop-

Pat Ann Church, owner of PK Gills in Tempe, has assisted irrigation districts, and managers of lakes, ponds and wetlands to control water quality using natural methods, which can save money compared to using chemical treatment programs. Her main tools are live fish.

So, why fish?

“Fish are a safe, natural and cost-effective means to control aquatic weeds, insects or mollusks”, says Church. “I think they present a better long-term solution, and they are definitely more fun than using chemicals. Plus, you can eat them, fish them out, or sell them when they are finished cleaning up the water.”

With the right expertise, says Church, fish are a cost-effective way to manage many of the nuisance problems associated with lakes, ponds, and canals. Arizona’s 225-acre Tempe Town Lake and 160-acre Ocotillo residential lake community are both examples where fish are being used successfully to combat algae, aquatic weeds and various problems like midge fly and mosquitoes.

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Figure 1: *Weeds and algae along the edge of an Arizona irrigation canal, “before” introduction of fish.*

ing out vegetation with backhoes, or applying herbicides, such as acrolein. However, increased scrutiny from environmental activists and stringent regulations on chemical use in water ways has led some water managers to pursue more progressive and environmentally sound approaches to aquatic weed control.

The owner of an Arizona water management company is using her 30-year track record to help irrigation districts in the Southwest naturally and economically control water quality challenges, including those posed by aquatic weeds.



Figure 2: *Tempe Town Lake (ARIZONA) is an example where fish are being used to successfully combat aquatic*

Arizona Company Uses Weed-Eating Fish to Clean Canals

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Three Decades of Experience

Before starting PK Gills, Church spent 24 years heading up Aquatic Dynamics, Inc (ADI), one of the Southwest's most respected lake management companies. During that time, as the environment became a more critical public issue and chemical applicators were less likely to obtain liability insurance, Church began to focus on using fish, organic dye and aeration as more natural methods of keeping aquatic systems healthy.

"In the early days, chemical treatments were the preferred method of dealing with algae, aquatic weeds, and insect infestations," says Ms. Church. "I was dismayed when lakes, repetitively treated with algacides and herbicides, developed chemically-resistant algae."

She believed the situation was similar to medical profes-

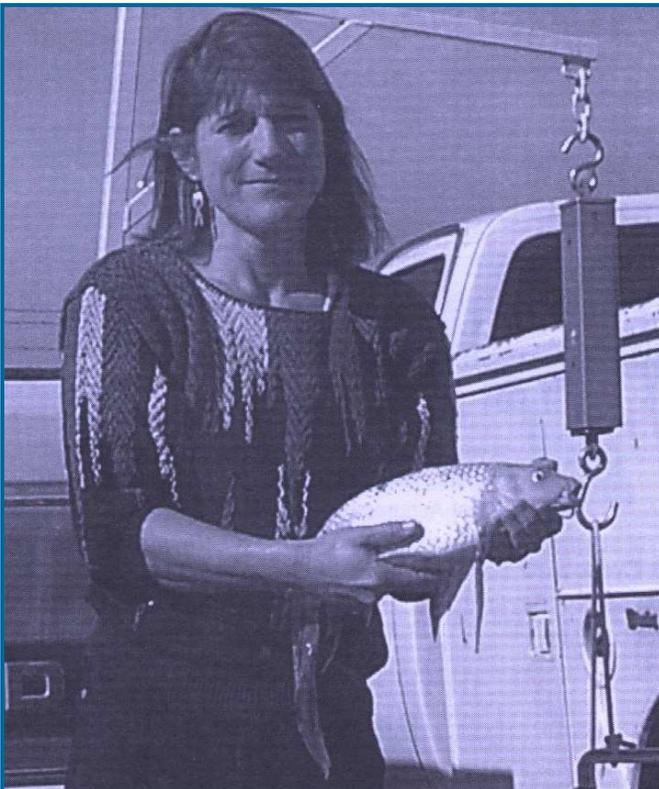


Figure 3: Pat Ann Church holds a koi fish.

sionals over-prescribing antibiotics, or the difficulty of eradicating boll weevils with DDT. She established a number of

protocols relying on the natural food chain present in biological systems. Working with top limnologists and fisheries biologists, ADI contracted to manage thousands of acres of water throughout Arizona and the southwestern United States. While ADI was acquired by Aquagenix in 1998, her time at ADI gave Pat Church the opportunity to gather data through twenty four years of conducting routine observations.

After ADI was sold in 1998, Ms. Church's passion for promoting fish led her to establish Fresh Catch Fish and PK Gills in 1999. These new companies build on her experience and provide services to those seeking stocking recommendations, natural water quality management programs, or establishment of healthy sport fisheries in lakes.

These services have proven to be effective in irrigation canals, too.

Districts Find that Fish Are Cheaper Than Chemicals

Roosevelt Irrigation District (RID) has been serving west Phoenix since the 1920's via 50 miles of main canals and 185 miles of laterals. The district supplies a mix of reclaimed water and groundwater to agricultural and other users, and for many years, used the aquatic herbicide acrolein to control aquatic weeds. Safety and mechanical concerns associated with the "wand and pressure" system used to apply the herbicide, as well as high chemical costs, convinced initially skeptical district managers to make the leap to fish in 1992.

Chemical treatments were completely disbanded and RID stocked a mixture of live fish worth \$70,000, considerably less than the \$600,000 previously spent on the acrolein program. To the surprise of RID managers, after the fish were added, the water quality met or exceeded their expectations. While a few pockets of sago pondweed did remain after the first year of the fish program, the pondweed challenge was dealt with by adjusting stocking densities.

"Biological control demands ongoing observation and review, which forms a crucial part of our management plans," says Church.

RID have been using fish ever since, which has freed up budget spending for priorities like upgraded facilities and new trucks.

Each year, RID conducts a "dryup" of its canal and lateral systems to perform necessary repairs and maintenance. Most of the fish are lost during that time. Still, Pat Church maintains that replacing the fish annually makes better economic sense than managing aquatic weeds with chemicals.

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“The District is way ahead with a fish budget that is only 12% of their prior chemical expenditure,” says Church. “Employees are no longer at risk and their insurance savings creates an added bonus.”

Church also established a fish program for Roosevelt Water Conservation District (RWCD), which conducts its annual maintenance by lowering the water level, as opposed to the full dryup utilized by RID. This method retains the existing fish population, reducing the need for annual stocking.

“Either way, these irrigation districts are happy they have found an alternative to chemical treatment,” says Church.

Salt River Project Uses Chinese Fish to Control Weeds

Church has also provided fish to the two largest water projects in Arizona – the Salt River Project (SRP) and the Central Arizona Project. As Arizona’s largest water supplier, SRP delivers approximately 326 billion gallons of water to metropolitan Phoenix each year through its 131-mile canal system. Aquatic weeds pose a constant challenge. SRP launched an innovative experiment in the mid 1980s that involved the use of white amur fish to clear the canals of weeds. According to SRP, the white amur, a type of carp native to China, was selected for its ability to control filamentous algae and weeds at a wider range of temperatures than most other fish. Once in the canals, the fish become accustomed to significant temperature variations and abrupt water chemistry alterations resulting from source water changes and storm water runoff. A seven pound white amur can eat nearly three-quarters of its weight in weeds every day.

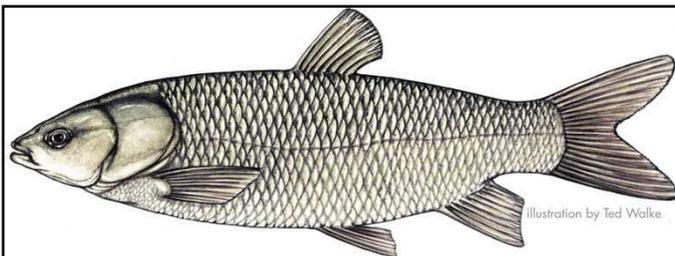


Figure 4: White Amur. Illustration by Ted Walke.

Because of its significant weed-eating value, the white amur receives special treatment. Each winter when SRP drains portions of its canals for maintenance, the white amur are carefully herded and relocated to “wet” canal areas. Also, fish grates were installed to keep the amur in the canal system.

The White Amur Fish Program saves SRP hundreds of thousands of dollars in annual operating costs and promotes innovative and environmentally friendly water management practices, according to the Salt River Project website dedi-

cated to this unique program.

Special Permitting Requirements

The use of fish in an irrigation system requires compliance with state regulations, and Church’s firm walks clients through the various stages of permitting. These requirements vary in each state but generally include an assessment of flooding impacts and the installation of control grates (see *Figure 6, Page 4*). The grates need to be properly sized to contain species that pose problems if allowed into natural waterways. Although grates represent an additional cost, once they have been fabricated and installed there is no recurring expense. Other requirements include health certificates, transport licenses and permits for species like white amur.



Figure 5: Quagga Mussel. Source: U.S.G.S.

Mussel-Eating Fish Also Available

In the past two years, water managers in the Western United States have encountered yet another challenge in their efforts to deliver reliable water supplies to agricultural and urban customers. A tiny mollusk called the quagga mussel – and its cousin, the zebra mussel – have suddenly appeared and spread rapidly in Western water bodies, particularly in the Colorado River Basin. Water agencies are scrambling to find ways to control further migration of the pesky critters, which are clogging waterways and infrastructure, and robbing native aquatic species of crucial food supply (See the October 2008 edition of the Family Farm “Water Review”, which further addresses this growing problem). Church is also using a fish that eats fresh water mussels and her company has stocked them where quagga mussels pose a threat.

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More Opportunities for Fish-Based Weed Programs?

In recent months, Western irrigation districts have received letters notifying them of the recent decision by Baker Petrolite to discontinue after this growing season supplying MAG-NACIDE H Herbicide, a product used by many districts to control aquatic weeds. While Baker Petrolite is discussing its decision with concerned water users and future action is uncertain at this time, irrigation districts in the Southwest and elsewhere may be soon taking a hard look at alternative weed control options like those provided by PK Gills.

“Whether it is algae, weeds, insects or mussels, we have found solutions using the natural food chain,” says Church.

“We offer up a pretty simple philosophy - eat or be eaten!”



Figure 7: Clean canal reach within Roosevelt Water Conservation District “after” introduction of amurs.



Figure 6: Grates like these are used to isolate 14-inch amurs, which cannot pass between the 1-3/4” openings.

To learn more about PK Gills, contact Pat Ann Church at 480-456-0744 or Email pchurch@contact.net.nz.

For more on the Salt River Project’s White Amur Fish Program, a representative from Salt River Project’s Groundwater Department can provide additional information. To request details, please call SRP at (602) 236-5304 or (602)236-2416.

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