

# Chipping away at **ARUNDO**

Richard Zembal – Orange  
County Water District

The widespread Arundo invasion in the Santa Ana River of Southern California has led millions of people to suddenly support environmental restoration. The alien that catalyzed such a reaction took over half the floodplain, forming impenetrable thickets 30 feet tall and covering 8,000 to 10,000 acres. The alien is a tall grass called giant reed or *Arundo donax*. It resembles skinny bamboo and became so pervasive so quickly that it roused people to action. It single-handedly was responsible for very unusual partnerships to control the invasion; there seems to be something for everyone to hate about Arundo.

Arundo is pervasive, provides no redeeming wildlife value, and carries fire. It obstructs flood flows and causes

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*Arundo consumes an estimated 56,200 acre-feet of water annually from the Santa Ana River alone.*

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expensive beach clean-ups. Compared to native habitat, it consumes nearly three times the water and provides poor stream shading, impacting water quality. Arundo consumes an estimated 56,200 acre-feet of water annually from the Santa Ana River alone.

### ***Purposely Introduced***

Arundo is a genus of tall perennial grasses that includes six species native to the warmer regions of Europe. Giant reed is the largest member of the genus and one of the largest living grasses. Native to the Mediterranean region, it was purposely introduced to California in the 1820s when it was planted along the banks of drainage canals in the Los Angeles area for erosion control. The plant was also used as thatching for roofs and fodder for domestic animals. It came to California without the natural controls such as insects and fungi found in its native land and

took over many streams and other areas where water is abundant near the surface. Arundo reproduces vegetatively, with new stalks sprouting from roots and pieces of stalk that break under high flows and replant themselves downstream. Arundo is reported to grow up to 3 inches per day under optimal conditions.

### ***The Santa Ana Watershed***

The Santa Ana River drains the largest coastal watershed in Southern California, approximately 3,200 square miles. The waterways course 100 miles from the San Bernardino, San Gabriel, and San Jacinto mountains to the Pacific Ocean, supporting a great diversity and abundance of wildlife. However, more than 4 million people live along the river, affecting the functionality of this river system and the sustainability of its wetlands and riparian forests. One of the most significant threats today is the alien plant invasion. The resultant habitat reduction and continued degradation has caused seven of the species most dependent upon these floodplains to be listed under the Endangered Species Act.

### ***Joining Forces***

Local agencies and organizations with interests in the river recognized the urgent need for Arundo control. Support for its eradication has come from every sector. However, the level and consistency of funding needed to effectively tackle the Arundo issue made it difficult to get significant results prior to the passage of State Proposition 13 in 2002, when \$9 million was made available for these important efforts. Arundo grew largely unchallenged on the Santa Ana River for so long that it became the dominant species. By the 1990s, the cost of ridding this watershed of one weedy species was growing by millions of dollars annually.

The Santa Ana River Watershed Program is attempting to counter-balance human-induced changes on the river through

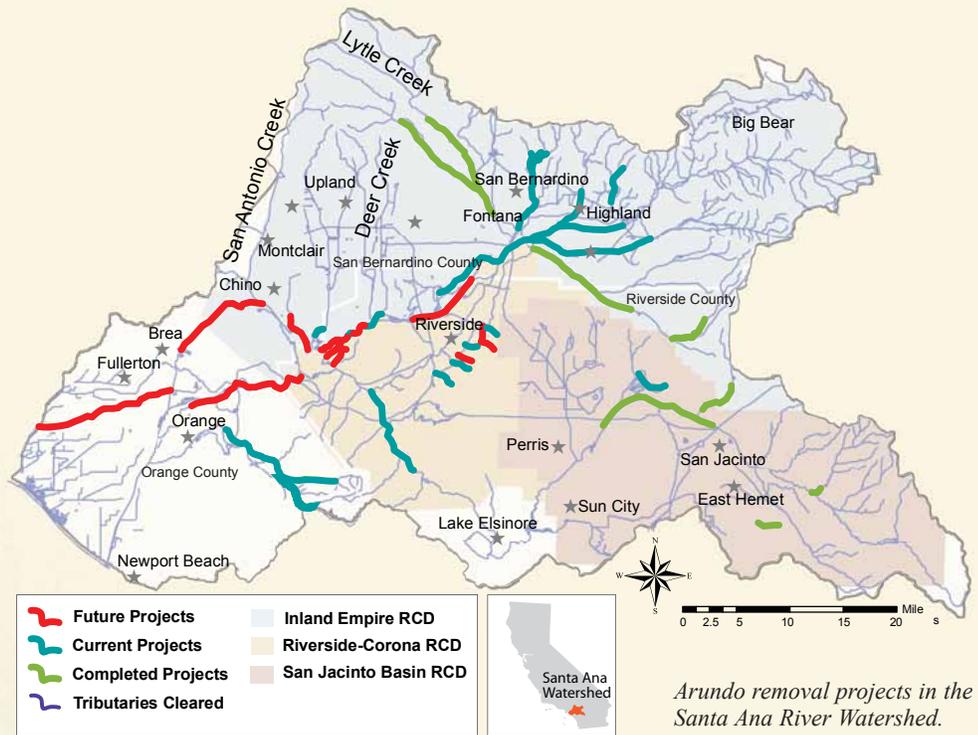
*Arundo thickets become impenetrable.*

control of invasive species, habitat restoration, wildlife management emphasizing endangered species, and public education and involvement. The nonprofit Santa Ana Watershed Association (SAWA) implements the program in partnership with federal, state, county, and city agencies, many organizations, and private interests. SAWA's governing board is comprised of one voting member each from: the Orange County Water District, Inland Empire Resource Conservation District (RCD), Riverside-Corona RCD, San Jacinto RCD, and the U.S. Army Corps of Engineers. Work accomplished on the ground through SAWA is done by the partnering agencies, mostly the RCDs, or under contract with SAWA oversight. Funding for Arundo control and the associated activities has come from grants and mitigation funds.

### Fighting Back...and Winning

Several techniques and tools have been used to remove Arundo, including removal by hand or using loppers, chainsaws, brush cutters, tractor-mounted mulching mowers, arm-mounted tractor/cutters and other approved power equipment. Care is taken to minimize impacts to native habitat that could result from the transport of personnel and equipment and from removal activities.

The methods used for treating Arundo depend on the makeup of the stands. Pure stands of invasive, non-native plants can be tackled with heavy equipment, but



Arundo removal projects in the Santa Ana River Watershed.

hand removal is the only method allowed in mixed stands or if sensitive species are in the area. Where removal is by hand, stockpile areas are established in order to chip the stalks after surgical, biologist-supervised removal from sensitive habitats. Where access is poor, small piles of cane no higher than three feet can be left to dry above the high-water line. In most areas the material is chipped and scattered on site or removed to be used as mulch elsewhere.

For stands of invasive plants mixed with willows, cottonwoods (*Populus fremontii*), and mule fat (*Baccharis*

*salicifolius*), no removal or spraying of native vegetation is allowed. All native plants and animals are protected from damage by equipment, personnel, and all other Arundo control activities. Native shrubs and trees may be trimmed to provide access and to protect them from incidental spraying with herbicide, but only under close supervision by a qualified field biologist. The field biologist for each removal site approves the equipment to be used and meets at least daily with the work crew to coordinate avoidance of sensitive

See Arundo, page 33

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*Aquatic Plants, continued from page 23*

Biological management of hydrilla and giant salvinia has been successful in some cases. Hydrilla is very susceptible to grass carp (*Ctenopharyngodon idella*, another non-native species from Asia), but the fish can eliminate *all* submerged vegetation if stocked at too high a rate. Other biological agents attempted for hydrilla have included a non-native but species-specific fly (adults are introduced, lay eggs, and the larvae bore into the plants), a weevil, and a fungus that feeds on the plant. Similarly, a species-specific weevil has been used on giant salvinia and a few types of weevils on water hyacinth. These have not proved especially successful in most U.S. habitats and rarely achieve the densities needed to elicit control.

Chemical methods such as herbicides registered for aquatic use have been used successfully on all these plants. The problems inherent with herbicides are cost, public perception, and water



Photo: Michael Masser

*Dissolved oxygen levels under giant salvinia mats often do not support aquatic organisms.*

use restrictions, primarily related to human and livestock consumption and irrigation. Civic resistance to using herbicides to control aquatic plants in public waters is usually due to misconceptions of their toxicity to non-target species, ecological fate, or persistence in the environment. When properly selected and correctly applied, these registered herbicides are environmentally safe and effective.

Regardless of the methods used, these non-native aquatic plants must be



Photo: Michael Masser

*Hydrilla is a submerged plant that forms dense surface mats.*

managed to mitigate their impacts on our aquatic environments. Based on past history, we will never eradicate any of them, but with integrated management using a combination of chemical, biological, mechanical, and nutrient manipulation, we can lessen their impacts and maintain an ecological balance with native species. However, much more research is needed to refine these means of controlling the pests.

*For help in identifying and managing these and other aquatic plants, visit [aquaplant.tamu.edu](http://aquaplant.tamu.edu). Contact Michael Masser at [m-masser@tamu.edu](mailto:m-masser@tamu.edu).*

*Arundo, continued from page 25*

species. Endangered nesting birds are not approached closer than 100 meters; their territories are revisited for *Arundo* removal after nesting is completed.

On the Santa Ana River, *Arundo* control starts with biomass reduction and removal. Where possible, the canes are chipped in place to pieces smaller than six inches. The roots are left in place to avoid the major excavation required to remove them. New growth is allowed to reach four to six feet tall and then sprayed with the systemic herbicide “Rodeo” (glycol is the active ingredient), which is taken in through the herbage to the roots. Over sufficient years of retreatment, the huge root masses eventually dry out and become unable to support new plant growth. Any unabsorbed herbicide degrades to water and other harmless ingredients within 48 hours. As resprouting diminishes and *Arundo* eradication approaches in an area, the need for riparian revegetation is assessed, but the forest usually reclaims treated areas naturally over

time. Achieving total eradication of *Arundo* in some parts of the Santa Ana River Watershed will take decades.

As of July 2007, SAWA has raised nearly \$30 million and has more than 3,000 acres of *Arundo* treated and under management (see map, page 25). Native riparian forests once again dominate

most of those acres and at least 11,250 acre-feet of water is back in the river annually. The alien invasion was once so expansive that the most widely held belief was that *Arundo* eradication on the Santa Ana was not possible. We are in the process of disproving that belief.

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Photo: Richard Zembal

*Floods stacked broken *Arundo* stalks against the River Road Bridge, giving flood waters the purchase to push the bridge off its foundation in 2004.*