Invasive Aquatic Weeds:

Implications for Mosquito and Vector Management Activities

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Introduction

The adverse effects of invasive aquatic and riparian weeds on water quality; hydrology, native plant communities, and wildlife habitat and their consequences for mosquito control efforts, public health and nuisance problems, while implied, could be better articulated.

This poster will present some of these relationships and highlight collaborative activities between vector and weed control agencies.

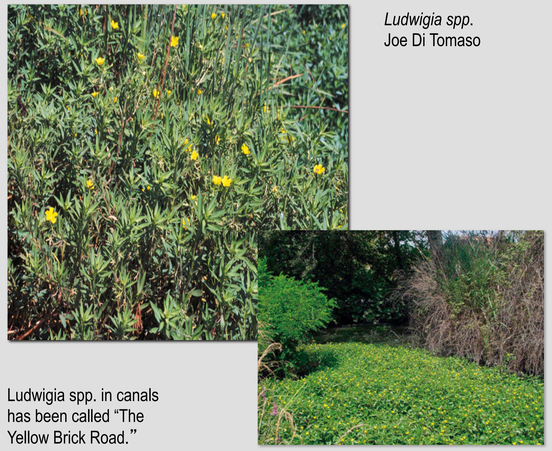
Findings

Integrated Pest Management in Relation to Mosquito Control:

Successful control of larvae and pupae is the primary emphasis, reducing the need for aerial spraying. Predators – native species in natural habitats and introduced predators, (Mosquito Fish, *Gambusia affinis*) in artificial ones – are important. Biorational larvicides, such as toxins from *Bacillus thuringiensis* ssp. *israelensis* (Bti), *Bacillus sphaericus* (Bsp), and maturation inhibitors such as IGR/JHA –Methoprene distributed as granules or briquettes, serve to reduce larval populations, supplementing the effectiveness of predators. Waterways degraded by invasive weeds tend to promote mosquito breeding and interfere with predator activity. Control of invasive aquatic plants improves water quality, discourages mosquito breeding, encourages return of natives, and enhances predator effectiveness.

Freshwater Invasives:

Invasives reduce circulation and inhibit predators. Two studies presented at the 2008 MVCAC Conference showed reduction of predation by both introduced native fish (1) and mosquito fish (2).Water Evening-primrose, *Ludwigia spp*. is one of the principal problem plants and can be very difficult to control. It can thrive in six feet of water and be dense enough to walk on. Infestations can be so dense that granules and briquettes cannot reach the water. In canals it has been called "The Yellow Brick Road." An intense multi-agency control effort in the Laguna de Santa Rosa Project had little impact, but important lessons were learned. (3) One successful control project was on Kumeyaay Lake, at Mission Trails Regional Park in San Diego. (4)



Ludwigia spp.
Joe Di Tomaso

Ludwigia spp. in canals has been called "The Yellow Brick Road."

www.plantes-rizieres-camargue.cirad.fr

Saltmarsh Invasives:

In estuarine habitats, Smooth Cordgrass, Spartina spp., especially the hybrid *S. densiflora x foliosa* (5) invade near-shore salt marshes displacing native species, invade deeper waters, and inhibit tidal fluctuation leaving slack-water areas where Saltmarsh Mosquitoes, *Aedes* spp., far-flying, aggressive day biters, proliferate.

The San Francisco Estuary Invasive Spartina Project; A Successful Collaboration:

Bair Island July 2006 before treatment

Bair Island July 2008 after treatment

The Invasive Spartina Project is a coordinated regional effort among local, state and federal organizations dedicated to preserving California's extraordinary coastal biological resources through the elimination of invasive species of *Spartina* (cordgrass). The highly effective synergy between the San Mateo County Mosquito Abatement District (SMCMAD) and regional Weed Management Areas can serve as a model for similar efforts elsewhere. (6&7) Several thousand acres of *Spartina alterniflora x foliosa* were successfully eliminated, from Candlestick Park to the San Mateo – Santa Clara County line. Currently, remaining small stands throughout S.F. Bay are managed by spot spraying.

There is significant re-growth of salt marsh natives, including Pickleweed, Frankelia, and native cordgrasses (8). Imaprazyr was recently approved for aquatic use in California. It is much more effective than glyphosate (Rodeo) on Spartina. (9) Activities were timed to avoid nesting Clapper Rails and other wildlife. Projects were done in a mosaic pattern allowing wildlife to find suitable nesting sites, and encourage re-growth of native vegetation. (10) These efforts have greatly improved the wildlife habitat, enhanced the aesthetic qualities, facilitated control of mosquitoes with less pesticide use, and had good public acceptance.

Summary and Conclusions

1. Invasive aquatic and riparian weeds are a major threat to waterways, displacing the native vegetation that supports wildlife. They also degrade water quality and availability and increase the risk of disease-carrying and nuisance mosquitoes. They also interfere with mosquito control efforts.

2. Control of these invasive plants enhances wildlife, water quality, and aesthetic values as well as assisting mosquito control efforts.

3. Collaboration among agency and non-governmental weed control and vector control organizations can result in satisfactory and cost-effective outcomes.

References

1. Jennifer Henke 2008: Effects of Vegetation on the Efficacy of Larval Mosquito (Diptera: *Culicidae*) Control by Native Larvivorous Fish: Presented at the 2008 MVCAC Conference
2. David A. Popko 2008: The influence of water quality and vegetation on Mosquito Fish (*Gambusia affinis*) in mosquito control programs in wastewater wetlands: Presented at the 2008 MCCAC Conference
3.http://www.lagunafoundation.org/knowledgebase/?=user/reset/135/1249374723/9fdc833ecb74974442dc94a59978b11d 2008)
4. Mike Kelly, Kelly & Associates. Personal Communication (2010)
5. Debra R. Ayres, et al. 2007: Hybridization between invasive Spartina densiflora (Poaceae) and native S. foliosa in San Francisco Bay, California, USA
6. The San Francisco Estuary Invasive Spartina Project; http://www.spartina.org/
7. Peggy R. Olofson, Editor 2000: Baylands Ecosystem; Species and Community Profiles.
8. Invasive Spartina Control Plans for the San Francisco Estuary, June 2008 California 2002-2010 Control Sessions Coastal Commission Invasive Spartina Control Project, pp 92-142
9. K.M. Kilbride & F.L. Paveglio 2001; Long-term fate of glyphosate associated with repeated Rodeo applications to control Smooth Cordgrass, Spartina alterniflora, in Willapa Bay, Washington. Arch. Einviron. Contam. Toxocol 40: 179-183
10. James Counts , SMCMAD 2008: Personal Communication

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