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.

As a life-long general naturalist, MVMDSBC trustee, and member of the SCVCET, I have become increasingly aware of these relationships. 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, greatly reducing the need for aerial spraying. Predators - native species in natural habitats and introduced predators, (especially Mosquito Fish, Gambusia affinis) in artificial ones – are important. Biorational larvicides, such as 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, and enhances predator effectiveness.

Freshwater Invasives:

Water Hyacinth, *Eichhornia crassipes*, Water Evening-primrose, *Ludwigia spp.* are among the principal problem plants. These invasives reduce circulation and inhibit predators. Water Evening-primrose infestations can be so dense that granules and briquettes cannot reach the water. Two studies presented at the 2008 MVCAC Conference showed reduction of predation by both introduced native fish (1) and mosquito fish (2).

Water Hyacinth *Eichhornia crassipes*
Robert Potts California of Sciences

Ludwigia spp. Joe Di Tomaso

Saltmarsh Invasives:

In estuarine habitats, Smooth Cordgrass, *Spartina spp.*, especially the hybrid *S. densiflora x foliosa* (3) invade near-shore salt marshes displacing native species, invade deeper waters, and inhibit tidal fluctuation leaving slack-water areas where Saltmarsh Mosquitoes, *Aedes spp.* proliferate.

These are far-flying, aggressive day biters, some of which can carry pathogens, such as West Nile Virus.

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

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. (4 & 5)

Spartina spp. Joe DiTomaso

Right: Taller, more robust clone of introduced *S. alterniflora* surrounded by native cordgrass, *S. foliosa*.
From S.F. Bay Spartina Project.

Several thousand acres of *Spartina alterniflora x foliosa* were successfully eliminated, chiefly from abandoned salt evaporation ponds as well as open bay waters from Candlestick Park to the San Mateo – Santa Clara County line. There is significant re-growth of salt marsh natives, including Pickleweed, Frankelia, and native cordgrasses (6). Imazapyr was recently approved for aquatic use in California. It is much more effective than glyphosate (Rodeo) on Spartina. (7) 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. (8) 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

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