

Management or Eradication? Strategies for Protecting Delta Fisheries from Non-native Aquatic Plants

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Economic and ecological impacts of non-native flowering aquatic plants have increased dramatically over the past 25 years in California. Demands on the state's water resources have exacerbated these impacts which include: (1) irrigation water delivery; (2) recreational and domestic (drinking) uses; and (3) fisheries and waterfowl habitats. Taken together, *Hydrilla verticillata* (Hydrilla), *Eichhornia crassipes* (Water Hyacinth), *Egeria densa* (Egeria), *Myriophyllum spicatum* (Eurasian Watermilfoil), *Potamogeton crispus* (Curlyleaf Pondweed) and *Myriophyllum aquaticum* (Parrotfeather) create nearly all of the negative impacts. Recent introductions and spread of *Lythrum salicaria* (Purple Loosestrife) also threaten the state's riparian systems. These aggressive invaders utilize low light levels (in the case of submersed plants) and their rapid, prolific, and varied reproductive abilities to out-compete native vegetation. However, of these plants, only Hydrilla has a pest rating of "A" by the state, which requires it to be eradicated.

Costs for Hydrilla eradication have averaged about \$1.2 million annually over the past 20 years, but this program has prevented the introduction of Hydrilla into the Sacramento-San Joaquin Delta. The long-term savings from Hydrilla eradication is enormous when one considers that without this program, Hydrilla would have become established in the Delta and a multitude of other large California waters. In contrast, two invaders from South America, Water

Hyacinth and Egeria, now infest several thousand acres in the Delta. Water Hyacinth has been under management for 15 years, and a bill authorizing the management of Egeria was passed by the state legislature last year. Costs of these efforts to control Water Hyacinth and Egeria may equal or exceed the Hydrilla eradication expenditures within a few years. Management of Water Hyacinth and Egeria via biological control agents should be the long-term goal, yet effective herbicides and selective mechanical control need to be used now to prevent further spread of these weeds. Although there are strict statutory prohibitions against possessing, selling or transporting Hydrilla in California, these restrictions apply to neither Water Hyacinth nor Egeria, nor to other noxious members of the Hydrilla family. Thus, "management" of these species may have moderate success, but their continued spread cannot be contained without more stringent constraints on their movement and use. Ironically, Egeria should be more easily eradicated than Hydrilla since it does not produce seeds or tubers. Finally, the continued presence and movement of these species, particularly Egeria and other "submersed" types, increases the opportunities for introductions of the Zebra Mussel (*Dreissena polymorpha*). This non-native freshwater mussel is often attached to aquatic plants and may thereby become a "hitchhiker" on boats and trailers, or be transported via commercial shipments of these unregulated plants.