

## **Category II: Aquatic Ecosystems**

### **Determining Factors for Eurasian Watermilfoil (*Myriophyllum spicatum* L.) Spread in and around Lake Tahoe, CA-NV**

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#### **EXECUTIVE SUMMARY**

The introduction and spread of invasive plant species in aquatic ecosystems in the United States is common and increasing in frequency. These species can cause significant economic and ecological damage to freshwater systems (Carlton and Geller 1993, U.S. Congress Office of Technology Assessment 1993). Once they have established within a water body, aquatic invaders have high control costs and are nearly impossible to eradicate. The California Department of Boating and Waterways spends nearly \$7 million annually on reactionary aquatic plant control efforts such as herbicide application and mechanical harvesting in the Sacramento-San Joaquin Delta.

Eurasian watermilfoil (*Myriophyllum spicatum* L.) is estimated to have arrived in Lake Tahoe in the 1960's and is continuing to spread to multiple locations within the lake and in other nearby water bodies including small populations within the Sacramento-San Joaquin Delta. Eurasian watermilfoil is a submersed, perennial plant native to Europe, Asia, and Northern Africa and is among the most problematic aquatic weeds in North America (Anderson, 1990; Abernathy, 1996). In Lake Tahoe it contributes to increased algae growth, decreased water clarity, and competitive exclusion of native aquatic species in the lake. Its main vector of spread is via viable vegetative fragments and is transported between water bodies by recreational boaters. Whether a fragment can establish in a novel environment is ultimately dependent on habitat quality.

We propose to investigate the invasion of Eurasian watermilfoil in Lake Tahoe and surrounding lakes. We conducted surveys in summer of 2005 which quantified the frequency with which boaters traveled to destinations around the lake and noted that

invasions were not fully correlated with incidence of boat traffic to different sites. This observation leads to the question as to whether the establishment of Eurasian watermilfoil is dispersal or habitat-limited. To address this question, we focus on three major facets of the spread of Eurasian watermilfoil in the Californian landscape: **1)** the extent of boater, management, and (plant) self-induced vegetative fragment dispersal within Lake Tahoe, **2)** environmental conditions necessary for establishment within Lake Tahoe, and **3)** factors for establishment outside of Lake Tahoe given long distance dispersal via recreational boating as well as environmental conditions. These facets will be addressed using interviews of recreational boaters exiting Lake Tahoe, assessment of Eurasian watermilfoil fragment density and movement both during and after recreational boating and management seasons, quantification around the Lake Tahoe shore of environmental parameters that have been identified as key in establishment, and investigations of the infestation status of other lakes in the Tahoe region.

Preliminary evidence shows that boaters leaving Lake Tahoe are carrying Eurasian watermilfoil fragments on their boats and using them in other lakes and reservoirs. Observations made here will identify vectors of possible spread and allow for predictions of future infestations. Historically many invasions received little attention during the process of invasion, and subsequently management efforts were focused on the post-establishment control of pest species. By attempting to understand the patterns and processes of the early stages of invasion, management resources can be allocated towards preventative measures before geographically widespread infestation of Eurasian watermilfoil occurs in California. Additionally, methods used within this study can serve as a template for regional or system specific assessments of aquatic plant invasability in other areas of California. Because of the wide range of ecological conditions that Eurasian watermilfoil survives in, the resulting data are expected to reveal new information relating to the growth and dispersal in western regions and to identify target areas for monitoring and management.