SELECTIVE CONTROL OF INVASIVE SUBMERSED AQUATIC PLANTS. John D. Madsen and Kurt D. Getsinger. GeoResources Institute, Mississippi State University, Mississippi State, MS 36762 and US Army Engineer Research and Development Center, Environmental Laboratory, Vicksburg, MS 39180. (jmadsen@gri.msstate.edu.)

ABSTRACT

Submersed plant communities are being threatened by exotic invasive species such as Eurasian watermilfoil, hydrilla, and egeria. Invasion by exotic submersed species usually results in reduced native plant diversity, alteration of biogeochemical cycles, reduction in water quality, and negative impacts to threatened and endangered species, as well as interfering with riparian uses of waterbodies. Through the use of three scenarios, we demonstrated how invasive aquatic plants can be managed selectively using herbicides to allow the natural restoration of native submersed plant communities.

In the first scenario, a selective broad-leaf herbicide was used on large blocks of invasive Eurasian watermilfoil (*Myriophyllum spicatum* L.) in the Pend Oreille River (1). The Pend Oreille River is a regulated run-of-the-river reservoir in northeastern Washington State that was invaded by Eurasian watermilfoil in the early 1980's. Herbicide treatments were evaluated in a 4 ha cove plot and a 6 ha river plot, and compared to a 2 ha untreated reference plot. The river plot was treated with a subsurface application of triclopyr (Renovate 3) at a concentration of 2.5 mg/L ai water concentration, and the cove plot divided into a 2 ha treatment of 2.5 mg/L ai and a 2 ha treatment at 1.0 mg/L ai. Plant diversity and abundance were evaluated in each plot in the year of treatment and two years after treatment using both biomass (2) and four 100 m line intercept transects (3). SCUBA divers collected twelve biomass samples per plot using a 0.1-m2 quadrat. Eurasian watermilfoil biomass levels were reduced by 99% in the river and cove treatment plots by 4 weeks after treatment (WAT), remaining low in the first year after treatment (YAT), 28% and 1% of pretreatment, respectively, and remained at acceptable control levels 2 YAT, 47% and 24% of pretreatment, respectively. Native plant diversity doubled in the first YAT, and remained statistically higher at 2 YAT.

In the second scenario, small patches of Eurasian watermilfoil were treated in Loon Lake with granular 2,4-D herbicide formulation (4). Loon Lake is a 445 ha lake in the mountainous northeastern region of Washington State and has a diverse native plant community that grows to a depth of 6.7m. Four treatment plots and two untreated reference plots were established; with two 100-m line intercept transects (3) to assess each plot. In addition, SCUBA divers collected ten biomass samples from each plot using a 0.1-m2 quadrat. Sites were sampled before and 6 WAT, and 1 YAT. The two reference plots did not have Eurasian watermilfoil. Treatment with granular 2,4-D (AquaKleen) was applied at a rate of 112 kg/ha of product, or 21 kg/ha ae. Eurasian watermilfoil biomass was significantly reduced both 6 WAT and 1 YAT, and none of the native plant species were reduced significantly as a result of the herbicide treatment. Treatments performed in the context of early detection and rapid response do not necessarily cause an impact on native plant populations.

In the last scenario, small lakes in Michigan that were dominated by Eurasian watermilfoil over more than 50% of their littoral regions were treated with low doses of the herbicide fluridone (5). Laboratory and small-scale mesocosm studies had previously demonstrated that fluridone treatments could control Eurasian watermilfoil and hydrilla without impacting most native species if fluridone concentrations were initially at least 5 µg/L ai and maintained above at least 2 µg/L ai for at least 60 days (6,7). Four lakes were selected for treatment, and four were examined as reference lakes.

Treatment lakes were treated throughout the entire lake for a target water concentration of 5 µg/L ai of fluridone and retreated after two weeks to return water concentrations to the target of 5 µg/L ai of fluridone. The vegetation of the entire lake was assessed using a point-intercept method, with 200 to 500 regularly spaced points throughout each lake (3,5). A global positioning system (GPS) was used to navigate to each point, where the depth and the presence of each plant species were recorded. Each lake was assessed in May and August of the year of treatment and 1 YAT. Eurasian watermilfoil control was good to excellent in the three lakes in which adequate fluridone exposure time was maintained, but not controlled in one lake (Wolverine Lake) in which herbicide concentrations fell below the critical concentration of 2 µg/L ai before an adequate exposure time of 60 days was reached. Native species were not adversely affected in these lakes, and in some lakes native species diversity increased 1 YAT. Fluridone treatments did not result in a reduction of native plant coverage in the treatment lakes, despite a commonly held misapprehension. Treatment with low doses of fluridone is a potential tool for control of Eurasian watermilfoil and restoration of native species when Eurasian watermilfoil occupies a majority of the littoral zone.

