

Aquatic Plant Management in Oregon

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Aquatic plant management is critically important in water resource management in Oregon; yet, fish management issues, public perception, and court decisions have created conditions in the State that are antithetical to implementation of aquatic plant management efforts. Noxious aquatic weeds, such as *Egeria densa* (Egeria) and *Myriophyllum spicatum* (Eurasian watermilfoil), and other invasive aquatic plants degrade water quality and fish habitat in most Oregon lakes. A recently completed economic assessment of weeds found that aquatic, estuarine, and wetland weed infestations cause \$39 To \$666 per acre in economic losses in Oregon (Oregon Department of Agriculture 2000). This is a conservative estimate that in some instances does not include the costs of management or loss of fish habitat and production from water quality degradation. Because aquatic systems have high value, on a per area basis, aquatic and wetland weeds far exceed the cost of terrestrial weeds.

Despite the costs and obvious ecological and recreational impacts, conditions in Oregon are not conducive to effective aquatic plant management. A general mistrust of government regulation, including EPA requirements for registration of herbicides; reports of impacts of terrestrial pesticides on salmon olfactory capabilities (Moore and Waring 1996) and predator avoidance behavior (Scholz *et al.* 2000); effects of some aquatic herbicides on mortality of smolts during seawater entry tests (Lorz *et al.* 1978; Lorz *et al.* 1979); and recent court decisions have severely limited aquatic plant management activities in Oregon. The March, 2001 9th Circuit Court of Appeals decision requiring National Pollution Discharge Elimination System permit for aquatic pesticide applications halted all legal aquatic herbicide applications to lakes because no such permit exists in Oregon.

Conflicts between managing water quality impacts and lack of adequate resources and motivation within agencies to formulate rational management policies have created a schizophrenic condition. The Department of Environmental Quality (DEQ) is charged with implementing the Clean Water Act (CWA) in Oregon. Under Section 303(d) of the CWA, the State must list those waterbodies in the state that fail to meet water quality standards. The DEQ has been quite progressive in recognizing that noxious weeds are a form of biological pollution and has used the presence of noxious aquatic weeds as a criterion for listing waterbodies as water quality limited under the CWA. The CWA requires that states address problems in water quality limited waterbodies.

The DEQ is also charged with issuing NPDES permits in Oregon. California and Washington reacted to the 9th Circuit Court of Appeals decision by initiating development of an NPDES permit for aquatic pesticide applications. In order to address the immediate need for weed control in irrigation canals last summer, however, the Oregon DEQ developed a Mutual

Agreement and Order (MAO) that stated the necessary notification and application procedures for application of acrolein and xylene to irrigation canals in Oregon in 2001. While not an NPDES permit, the MAO allowed some districts to use these compounds for weed control in 2001 without threat of civil penalty, but left them vulnerable to third party lawsuits under CWA. In addition, EPA stated that enforcement of the 9th Circuit Court of Appeals decision would be a low priority in 2001. Thus, some irrigation districts were able to apply acrolein and xylene in 2001, but others resorted to mechanical control methods to reduce exposure to third party lawsuits for failure to comply with the court decision requiring a NPDES permit. The MAO did not apply to any waterbodies other than irrigation canals. Thus, the legal application of aquatic herbicides for control of weeds in lakes was stopped in Oregon in 2001 because the NPDES required by law, or a MAO in lieu of a permit, was not available.

Other aquatic weed control methods, such as mechanical harvesting and triploid grass carp, are available in Oregon. Grass carp are permitted only in lakes under 10 acres, and cannot be in a waterbody that lies within the 100-year floodplain when there is risk of flood. The narrow constraints on grass carp typically limit their use to small artificial ponds, *e.g.*, golf course, irrigation and stock ponds. Mechanical and other harvesting methods are used for aquatic weed management in Oregon, however, costs and potential “take” of threatened species, *e.g.*, juvenile coho salmon in coastal lakes, limit applicability of mechanical harvesting. Other harvesting techniques, such as diver dredging are not cost-effective on large infestations.

Lake Lytle Case Study

Lake Lytle and its associated waterbodies Moroney Canal and Crescent Lake, on the central Oregon coast just North of Tillamook Bay, are water quality limited because of a Eurasian watermilfoil infestation. An integrated aquatic vegetation management plan was developed for the 70-acre lake in 1999 (Rosenkranz and Sytsma, 1999). The Plan called for selective removal of Eurasian watermilfoil from the lake using a three-year program of low-rate, long contact-time treatments with Sonar aquatic herbicide. The initial year of the Plan was implemented in 2000 with good results (Shrestha and Sytsma 2001).

A second year of treatment was planned in 2001, however, the 9th Circuit Court of Appeals decision in the Spring of 2001, and lack of a NPDES permit in Oregon for application of aquatic herbicide, forced use of a diver-operated dredge for Eurasian watermilfoil management in 2001. The method was not capable of adequately managing the weed in Lake Lytle in 2001, and as a consequence, the infestation expanded throughout the summer to a point where all the gains of the previous year were lost (Table). Failure to completely implement the integrated management plan resulted in failure of the control program and will require reevaluation of the goals and objectives of the management plan, or restarting the three-year program when herbicide application permits are available.

The Future

The future of aquatic weed management in Oregon is difficult to discern. Noxious aquatic weeds will continue to degrade water quality and fish habitat, interfere with recreation, and decrease property values. Presence of threatened fish species within infested waters will continue to complicate and perhaps prohibit management actions. Many lakes will continue to be listed as water quality limited under the CWA because of noxious aquatic weed infestation, and require State action to alleviate the cause of the listing. DEQ is considering development of necessary permits, however, there has been no action to-date on development of the required NPDES permit. At best, a MAO may be available for application herbicides in irrigation canals and lakes in 2002, however, it is important to note that an MAO is not a NPDES permit, and application of herbicides under an MAO leaves the applicator vulnerable to third-party lawsuits under the CWA. Lack of information on sublethal impacts of aquatic herbicides on threatened and endangered salmon species may result in prohibition of aquatic herbicide use under the Endangered Species Act, even if the problems with the CWA are resolved.

Prevention is often cited as the most cost-effective invasive species management option. In Oregon, prevention may be the only effective management option available in the future, regardless of the cost. Oregon does not have any known infestations of hydrilla, water hyacinth, salvinia, or smooth cordgrass; aquatic weeds that have caused serious problems in neighboring states. Preventing the introduction of these and other aquatic invasive species is a high priority element of the Oregon Aquatic Nuisance Species (ANS) Management Plan, which was submitted by the Governor and approved by the federal Aquatic Nuisance Species Task Force in 2001. Oregon is one of two western states with approved ANS Management Plans.

The Oregon ANS Management Plan includes public education, surveillance and detection, contingency plan development, management, and research elements. Funding for the Oregon ANS Management Plan from the federal ANS Task Force and the Oregon Watershed Enhancement Board is expected in 2002. The federal and state funding will supplement ongoing efforts by the Oregon Department of Agriculture, DEQ, and the Center for Lakes and Reservoirs at Portland State University to address aquatic weed issues, and will permit a more coordinated and comprehensive approach to aquatic invasive species management in the state.

Frequency of aquatic plants in samples collected in Lake Lytle and associated water bodies before Sonar (BS) and after Sonar (AS) treatment in 2000 and before harvesting (BH) and after harvesting (AH) in 2001 (Shrestha and Sytsma 2001).

Plants Sampled	Lake Lytle				Moroney Canal				Crescent Lake			
	2000		2001		2000		2001		2000		2001	
	BS	AS	BH	AH	BS	AS	BH	AH	BS	AS	BH	AH
<i>Myriophyllum spicatum</i>	42%	5%	13%	55%	100%	17%	61%	42%	28%	4%	4%	2%*
<i>Najas flexilis</i>	77%	0	40.5%	71%			11.5%	58%			10%	56%
<i>Potamogeton pectinatus</i>	18%	0	4.5%	30%	40%	17%	90%	67%	92%	92%	90%	92%
<i>Sagittaria subulata</i>	6%	3%	25%	0	10%	16%						
<i>Elodea canadensis</i>	23%	28.6%	17%	70%	20%	8%	4%	17%				
<i>Chara vulgaris</i>	29%	44%	35.5%	17%								
<i>Utricularia vulgaris</i>	25%	14%	14.5%	2.6%		25%	8%	17%				4%
<i>Nitella sp</i>	17%	18%	17%	9%			8%					
<i>Potamogeton nodosus</i>	2%	2%	4.5%	13%	40%	17%						
<i>Isoetes lacustris</i>		5%	1.8%	4.5%								
<i>Potamogeton richardsonii</i>		2.8%	5.4%	13%								
<i>Callitriche sp.</i>												4%
<i>Ruppia sp.</i>			5%	14%								4%

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