Lagarosiphon major (Ridley) Moss

Oxygenweed

Family: Hydrocharitaceae
Range: Not yet present in the United States.
Habitat: Lakes, rivers, streams and ponds, including high mountain streams and ponds. Prefers cooler waters of the temperate zone, particularly clear, still or slow-moving freshwater with silty or sandy soils. Growth is greatest in sheltered areas protected from wind, waves and currents. It also tolerates relatively alkaline conditions.
Origin: Native to southern Africa. Initially introduced as an aquarium plant.
Impacts: Should the plant become established it is believed that the impacts would be similar to those of hydrilla. Problematic in New Zealand and Europe. *Lagarosiphon major* can form dense floating mats in deep-water reservoirs and other water bodies, and it can block the intakes of hydroelectric systems. Populations can grow to 23 ft in depth and reduce light levels to about 1% within 2 ft of the water surface. This dramatic reduction in light penetration can eliminate growth of native water plants and reduce associated populations of aquatic invertebrates. Despite its common name, dense infestations of oxygenweed can dramatically reduce dissolved oxygen levels and impact fish populations. In addition, it can also restrict the passage of boats and limit recreational activities like swimming and angling. Storms can tear weed mats loose and deposit large masses of rotting vegetation on beaches, spoiling their amenity value.
Western states listed as Noxious Weed: While it is not yet in the United States, oxygenweed is listed as a noxious weed in California, Oregon, and Washington. Also on the U.S. Federal Noxious Weed List

Lagarosiphon major is a rhizomatous, perennial, submerged aquatic plant. Its stems are long (to 20 ft) and brittle with many small narrow leaves that are curved downward. Plants are related to and resemble *Egeria densa* and *Hydrilla verticillata*. The stems grow fast, and when they reach the water surface they spread to form thick mats. Shallow lakes to 10 ft deep can be completely covered.

Flowers are tiny, transparent to white or pinkish. Plants are dioecious (sexes on different plants), but only female plants are known outside its native range. Female flowers reach the surface on long thread-like tubes (to 10 inches long). In the native range where male plants are present, male flowers separate from the plant and pollinate the female flowers by chance when they bump into them. Outside the native range, the lack of male flowers restricts reproduction to vegetative fragmentation or local growth by rhizomatous spread. Dispersal is through movement of vegetative fragments by water or from boating, fishing, weed harvesters and float planes, and possibly some species of bird. In New Zealand, spread is significantly associated with boating and fishing activities.

NON-CHEMICAL CONTROL

Mechanical (pulling, cutting, disking)	Hand removal, mechanical harvesting and diver-assisted suction removal and dredging can be effective, but these actions also produce viable fragments that can disperse, lodge on the bottom or shoreline, and start new populations. Bottom barriers (synthetic or natural fibers) can control small areas (< 2 acres). Jute (similar to burlap) has been used successfully in Ireland to control *Lagarosiphon*. This also resulted in releasing native plants that emerged through the jute. Some jute material is treated with chemicals to increase its preservation; only untreated jute or other natural matting should be used. Suppliers and sources should be carefully evaluated..
Cultural	Dewatering (drawdown) during summer can reduce some subsequent growth, but unless the bottom is

	well-dried for several weeks, plants will recover. Reduced nutrient inputs can also help, but *Lagarosiphon* derives most of its nutrients from the sediment.
Biological	The most effective biological control agent is the triploid (sterile) grass carp (white amur), though it is a relatively nonselective herbivorous fish that will consume several species of submersed plant species. *Lagarosiphon* is a moderately preferred food source. Careful monitoring of consumption and impacts on native plants should be considered.

CHEMICAL CONTROL

The following specific use information is based on reports by researchers and land managers. Other trade names may be available, and other compounds also are labeled for this weed. Directions for use may vary between brands; see label before use. Herbicides are listed by mode of action and then alphabetically. The order of herbicide listing is not reflective of the order of efficacy or preference.

CONTACT PHOTOSYNTHETIC INHIBITORS	
Diquat *Reward*	**Rate:** For in-water treatment: 0.1 to 0.25 ppm **Timing:** Apply directly to water in late spring to early summer. **Remarks:** Diquat is a fast-acting contact herbicide that can also be effective in mid- to late summer. If biomass is large, only a portion of the infested sites should be treated to minimize effects of reduced dissolved oxygen. Diquat is quickly bound to, and becomes inactivated on, suspended clay particles and it should not be used in moderately or highly turbid water.
GENERAL CELL TOXICANTS	
Acrolein *Magnacide H*	**Rate:** For in-water treatment: 1 to 15 ppm. The recommended rate is variable and depends on target weeds, temperature and flow rates. **Timing:** Apply directly to water in late spring to fall and use no more than 8 applications per year. **Remarks:** Acrolein is a very fast-acting, nonselective contact herbicide and algaecide. It is a "Restricted Use" pesticide but can be used in some irrigation canals under specific conditions, with proper permits, and may only be applied by qualified, trained applicators. Symptoms of efficacy may appear in less than an hour and include discoloration of leaves and loss of turgidity. Acrolein is toxic to all organisms.
Endothall *Cascade; Teton; Aquathol K*	**Rate:** For in-water treatment: 1 to 3 ppm; exposures must be maintained for 24 to 48 hours for optimal control. **Timing:** Apply directly to water in early spring to early summer. Endothall can also be used in mid-summer, but partial treatments are recommended if biomass is large to prevent dramatic reduction in dissolved oxygen. **Remarks:** Endothall is a selective, contact herbicide. It affects young, rapidly growing plants and mature plants. Lower rates can be used if applied during early spring growth and when water movement is not likely to dilute or move the herbicide.
INORGANIC HERBICIDES	
Chelated copper *Komeen, Cutrine-Plus*	**Rate:** 0.5 to 1 ppm elemental copper. **Timing:** Apply directly to water in early summer when plants and biomass are small. **Remarks:** Chelated copper is a fast-acting contact herbicide and retreatment may be required within 3 to 5 weeks. If biomass is large, treat only one-third of the infested area to minimize decrease in dissolved oxygen. Chelated copper products are less affected by high pH compared to non-chelated copper.
NON-HERBICIDAL CHEMICALS	
Dyes or colorants *Aquashade*	Although technically not herbicides, dyes and colorants control submerged aquatic plants by absorbing light in the water column and reducing photosynthesis. Applications should be made in early spring and repeated to maintain concentration recommended on the label. Colorants are not as effective on well-established plants in mid- to late summer.

RECOMMENDED CITATION: DiTomaso, J.M., G.B. Kyser et al. 2013. *Weed Control in Natural Areas in the Western United States*. Weed Research and Information Center, University of California. 544 pp.