Myriophyllum aquaticum (Vell. Conc.) Verdc.

Parrotfeather

Family: Haloragaceae
Range: New Mexico, Arizona, California, Oregon, Idaho, Montana, and Washington. Also common in the southern and eastern United States.
Habitat: Ponds, lakes, rivers, streams, canals, ditches. Usually in still or slow-moving water, but occasionally found in faster moving water of streams and rivers. Grows best in tropical regions, can survive freezing conditions by becoming dormant. Does not tolerate brackish water; requires high light conditions.
Origin: Introduced from South America as an aquarium plant and pond ornamental in the late 1800s or early 1900s.
Impacts: Parrotfeather can develop colonies that form large sub-surface or surface mats. Mats impede water flow, interfere with boat traffic and recreational activities, create mosquito habitat, and displace native aquatic vegetation.
Western states listed as Noxious Weed: Washington
California Invasive Plant Council (Cal-IPC) Inventory: High Invasiveness (Alert)

Parrotfeather is a perennial with creeping rhizomes. It has emergent stems and is sometimes semi-terrestrial on mud banks. The total stem length can be up to 16 ft long, though the majority is submerged. Stems fragment easily and root at lower nodes. The submersed leaves are arranged in whorls of three to six leaves per node, pinnately dissected into linear lobes. The emergent leaves resemble submersed leaves, but are slightly thicker and not as finely dissected. In addition, the emerged leaves are typically light gray-green, mostly 5 to 6-whorled, 1 to 2 inches long, with a flattened midrib that is broader than the lobes.

Flowers are dioecious (male and female flowers develop on separate plants) and inconspicuous in the leaf axils. Most plants in the introduced range are female. Only populations within the native range have been observed to develop seed. In the introduced range, reproduction is only vegetatively by rhizomes, stem fragments, and axillary buds. Stem fragments form new roots and shoots and disperse primarily with water, or by clinging to the feet or feathers of water birds, and with human activities such as boating, mechanical harvesting, and the dumping of unwanted pond or aquarium contents. Mats sometimes detach and float to infest new areas.

NON-CHEMICAL CONTROL

Mechanical (pulling, cutting, dredging)	Repeated mechanical harvesting can help reduce stem densities, but escaped stem fragments can drift elsewhere and develop into new plants. More effective harvesting systems that remove the biomass and nutrient reserves accumulated in the emergent tissues may be an effective control measure. Removing and destroying stem fragments from recreational equipment, such as boat propellers, docking lines, and fishing gear can help prevent the spread of non-native watermilfoils. Since nearly all spread and reproduction is via shoot and rhizomes, physically removing 6 to 10 inches of infested sediment should eliminate regrowth. For small ponds or small infestations in lakes, this may be a cost-effective approach if it is coupled with stopping any further introductions.
Cultural	Dewatering (draining) can be effective if the exposed sediment is subject to hard freezes. Dewatering coupled with excavation to removed sediment-borne roots and rhizomes will also control parrotfeather.
Biological	Herbivorous insects from Argentina have been investigated and were released for control of parrotfeather in South Africa, including *Listronotus marginicollis* (stem-miner) and *Lysathia* spp. (leaf-feeders). Neither has been released in the U.S. The triploid grass carp can provide some suppression, but the fish prefers

	other submersed plants (native and non-native) and will consume those first if present. Use of grass carp usually requires a permit.

CHEMICAL CONTROL

The following specific use information is based published papers and 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.

GROWTH REGULATORS	
2,4-D *Weedar 64*	**Rate:** For emergent shoots: 1 to 2 pt product/acre (0.48 to 0.95 lb a.e./acre) with a non-ionic surfactant **Timing:** Spring to early summer is optimal; however mid-summer applications can be effective in suppressing growth. **Remarks:** Emergent shoots of parrotfeather are difficult to "wet" due to dense waxy cuticle. The use of a surfactant is highly recommended.
Triclopyr *Renovate*	**Rate:** For emergent shoots: 2.67 to 5.33 pt product/acre (1 to 2 lb a.e./acre) with a non-ionic surfactant. Submersed shoot stage (in-water application): 1 to 2.5 ppm. **Timing:** Spring to early summer is optimal; however mid-summer applications can be effective in suppressing growth. **Remarks:** Emergent shoots of parrotfeather are difficult to "wet" due to dense waxy cuticle. The use of a surfactant is highly recommended.
BRANCHED-CHAIN AMINO ACID INHIBITORS	
Bispyribac-sodium *Tradewind*	**Rate:** Foliar treatment to emergent shoots: 1 to 2 oz product/acre (0.8 to 1.6 oz a.i./acre); no more than 4 treatments per year. **Timing:** Postemergence to foliage in early spring to early summer (during rapid growth). **Remarks:** Bispyribac-sodium can be tank-mixed with 2,4-D.
Imazamox *Clearcast*	**Rate:** Foliar treatment to emergent shoots: 64 oz product/acre (8 oz a.e./acre). Spot treatment (spray-to-wet): 0.25 to 5% v/v solution. **Timing:** Postemergence to foliage in early spring to early summer (rapid growth) **Remarks:** Use an approved surfactant. Aerial application is approved in some states.
Imazapyr *Habitat*	**Rate:** Foliar treatment to emergent shoots: 2 to 4 pt/acre (0.5 to 1 lb a.e./acre). Spot treatment: 1% v/v solution. **Timing:** Postemergence to foliage in early spring to early summer (when new growth is present). **Remarks:** Imazapyr is a slow-acting systemic herbicide.
Penoxsulam *Galleon*	**Rate:** Foliar treatment to emergent shoots: 2 to 5.6 oz/acre (0.5 to 1.4 oz a.i./acre) with approved surfactant. **Timing:** Early spring to early summer **Remarks:** Provides partial control and suppression. May be tank-mixed with endothall or other herbicides.
PIGMENT SYNTHESIS INHIBITORS	
Fluridone *Sonar*	**Rate:** For in-water treatment: 10 to 30 ppb **Timing:** Apply to water in early spring to early summer (when new growth is present). **Remarks:** Use various formulations (variable release-rates) or repeated applications to achieve desired concentration for 5 to 7 weeks.
CONTACT PHOTOSYNTHETIC INHIBITORS	
Diquat *Reward*	**Rate:** Spot treatment of emergent shoots: 0.5% v/v solution (2 qt/ 100 gal water) **Timing:** Spring to early summer is optimal. Repeat treatments may be needed in mid-summer. **Remarks:** Use only clean water to mix and spray as diquat is inactivated in turbid water. Since diquat is a contact herbicide, repeat treatment will be necessary at 3 to 5 week intervals.

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.