WRITTEN FINDINGS OF THE
WASHINGTON STATE NOXIOUS WEED CONTROL BOARD
(October 1994)

Scientific Name: *Myriophyllum aquaticum* (Vell.) Verdc.; Synonyn: *Myriophyllum brasiliense* Camb.

Common Name: Parrot feather

Family: Haloragaceae

Legal Status: Class B: (a) regions 1, 2, 3, 4, 5, 6, 7, 9, 10
(b) Region 8 except Clark, Cowlitz, and Wahkiakum counties.

Description and Variation: Parrot feather gets its name from its feather-like leaves which are arranged around the stem in whorls of four to six. Parrot feather has both submersed and emergent leaves, with the submersed form being easily mistaken for Eurasian watermilfoil (*Myriophyllum spicatum*), a close relative. The submersed leaves are 1.5 to 3.5 centimeters long and have 20 to 30 divisions per leaf. The emergent leaves are 2 to 5 centimeters long and have 6 to 18 divisions per leaf. The bright green emergent leaves are very stiff and a darker green than the submersed leaves. The emergent stems and leaves are the most distinctive trait of parrot feather, as they can grow up to a foot above the water surface and look almost like small fir trees. Submersed leaves are limp and often appear to be decaying but the stems are very robust. Adventitious roots form at the nodes. When attached to a bank, parrot feather stems can extend out several yards over the water surface. Flowers are inconspicuous and are borne in the axils of the emergent leaves. The white flowers are approximately 1/16 inch long.

Economic Importance: Because of its attractiveness and ease of cultivation, parrot feather has been introduced worldwide for use in indoor and outdoor aquaria. It is also a popular aquatic garden plant. However, it has escaped cultivation and spread via plant fragments and intentional plantings. While parrot feather may provide cover for some aquatic organisms, it can seriously change the physical and chemical characteristics of lakes and streams. Infestations can alter aquatic ecosystems by shading out the algae in the water column that serve as the basis of the aquatic food web. In addition, the plant provides choice mosquito larvae habitat. In California, the species is becoming an increasing problem in irrigation and drainage canals. A 1985 survey of irrigation, mosquito abatement, flood control, and reclamation agencies in California indicated that parrotfeather infested nearly 600 miles of waterways and over 500 surface acres. In Washington, the Longview Diking District estimates that it spends about $30,000-40,000 per year on parrot feather control in drainage ditches. Dense infestations in southern Africa have caused flooding and drainage problems in shallow rivers and streams. The plant can also restrict recreational opportunities in these bodies of water.

Geographic Distribution: Parrot feather is a native of the Amazon River in South America, but it has naturalized worldwide, especially in warmer climates. In the United States, the plant is found throughout the southern United States and northward along both coasts. It is found

further north on the west coast because of the milder climates associated with the more northern latitudes on the west coast. Presently, Washington's parrot feather infestations appear to be limited to coastal lakes and streams, and the southwest Washington portion of the Columbia River. Parrot feather is found throughout the drainage system in the Longview/Kelso area, infests many of the drainage ditches in Wahkiakum County, and was discovered growing in the Chehalis River in 1994. As of 1994, no parrot feather populations have been discovered in eastern Washington.

Habitat: Parrot feather is found in freshwater lakes, ponds, streams, and canals and appears to be adapted to high nutrient environments. It tends to colonize slowly moving or still water rather than in areas with higher flow rates. While it grows best when rooted in shallow water, it has been known to occur as a floating plant in the deep water of nutrient-enriched lakes. The emergent stems can survive on wet banks of rivers and lake shores, so it is well adapted to moderate water level fluctuations.

History: Indigenous to South America, parrot feather was probably introduced to North America in the late 1800s; the exact date is unknown. The first collection made of this species was in the Washington D.C. area in 1890. It was reported from South Africa in 1918 or 1919, Japan in 1920, New Zealand in 1929, Australia in the 1960's, and England in the 1970's. Couch and Nelson report a single population of parrot feather in western Washington in 1944. An herbarium specimen was collected from Skamokowa, Wahkiakum County in 1983.

Growth and Development: This rhizomenous perennial exhibits an annual pattern of growth. In the spring, shoots begin to grow rapidly from overwintering rhizomes as water temperatures increase. Rhizomes function as a support structure for adventitious roots and provide buoyancy for emergent growth during the summer. Emergent stems and leaves extend from a few inches to over 1 foot above the waters surface. Underwater leaves tend to senese as the season advances. Plants usually flower in the spring but some plants may also flower in the fall. The inconspicuous flowers form where the emergent leaves attach to the stem. In fall parrot feather typically dies back to the rhizomes. In some areas, like western Washington, parrot feather may maintain considerable winter biomass. Because parrot feather lacks tubers, turions, and winterbuds, rhizomes serve all those functions. Parrot feather does not store phosphorus or carbon in its rhizomes and this characteristic may explain the failure of parrot feather to invade areas with severe winters.

Reproduction: Even in South America, virtually all parrot feather plants are female. Male plants are unknown outside of South America, so no seeds are produced in North American populations. Since parrot feather also lacks tubers or other specialized reproductive overwintering structures like turions, it spreads exclusively by plant fragments outside of its native range. Unlike Eurasian watermilfoil, parrot feather does not form autofragments. However, fragments can be formed mechanically and will readily root. With its tough rhizomes, parrot feather can be transported long distances on boat trailers. Rhizomes stored under moist conditions in a refrigerator survived for one year.

Response to Herbicides: Although parrot feather is considered by some to be susceptible to herbicides, it is difficult to achieve complete control. The emergent stems and leaves have a thick waxy cuticle and it requires a wetting agent to penetrate this cuticle. Often the weight of the spray will cause the emergent vegetation to collapse into the water where the herbicide is washed off before it can be translocated throughout the plant. Westerdahl and Getsinger report excellent control of parrot feather with 2,4-D, diquat, diquat and complexed copper, endothall dipotassium salt, and endothall and complexed copper. Fair control was obtained with acrolein and glyphosate. The Monsanto Company suggested that applying a 1 3/4 percent solution of Rodeo® (aquatic version of Roundup®) with surfactant to the plants in the summer or fall when water levels are low would give about 95 percent control of the plants. Control of parrot feather may be achieved with low-volatility ester of 2,4-D at 4.4-8.9 kg ha, sprayed onto the emergent foliage. The granular formulation of 2,4-D was needed to control parrot feather for periods greater than 12 months. It is more effective when applied to young, actively growing plants. In actual practice, the Longview diking district report little success with using herbicides to control parrot feather. Glyphosate causes the emergent vegetation to turn black but within two weeks the plants have recovered. An experimental fall application of triclopyr to parrot feather also proved to be ineffective. Of the above herbicides, endothall, glyphosate, and copper are permitted for aquatic use in Washington waters, but copper is generally permitted only as an algicide.

Response to Cultural Methods: Parrot feather's exceedingly robust rhizomes can survive overwinter water levels draw downs in California irrigation canals as rhizomes buried in the sediment.

Response to Mechanical Methods: Because this plant can spread readily through fragmentation of rhizomes, mechanical controls such as cutting, harvesting, and rotovation (underwater rototilling) should be used only when the extent of the infestation is such that all available niches have been filled. Using mechanical controls while the plant is still invading, will tend to enhance its rate of spread. Parrot feather populations can be successfully harvested, but the dense tough rhizomes are very heavy and the plant regrows rapidly. In Longview, the Diking District relies on a dragline to remove infesting parrot feather plants. A truck-mounted crane with a special attachment plucks weeds out of the ditch. They conduct the drag line operation from August to December in each year with control generally lasting for one growing season.

Biocontrol Potentials: Parrot feather has a high tannin content, so most grazers, including grass carp, find it unpalatable. Grass carp also prefer soft plants, like *Elodea canadensis* and the tough, woody parrot feather stems are not preferred. While biological control agents are not presently available, potential agents do exist. A complex of insects feed on parrot feather in its native habitat. *Lysathia flavipes* (Boheman), a flea beetle found on parrot feather in Argentina, causes moderate damage to parrot feather under field conditions. Also found in Argentina is a weevil, *Listronotus marginicollis* (Hustache), that apparently feeds only on parrot feather in its native range.

Additional insects have been found on parrot feather in Florida. *Lysathia ludoviciana* (Fall.), a flea beetle native to the southern U.S. and Caribbean, will use parrot feather as a host plant for larvae under laboratory conditions. However, the flea beetle is not often found on parrot

feather in the field. Two members of the tortricidae family, *Argyrotaenia ivana* (Fernald) and *Choristoneura parallela* (Robison) have also been found on parrot feather in Florida, but their effect on the plant is unknown. In addition, larvae of the caterpillar, *Parapoynx allionealis* (Walker), mine parrot feather leaves, but the impact these larvae could have on parrot feather is also unknown.

Fungal control options exist, as well. An isolate of *Pythium carolinianum* Matt. collected in California has shown some promise as a potential biocontrol agent. Parrot feather stems that were experimentally inoculated with this fungus produced significantly less growth than control plants.

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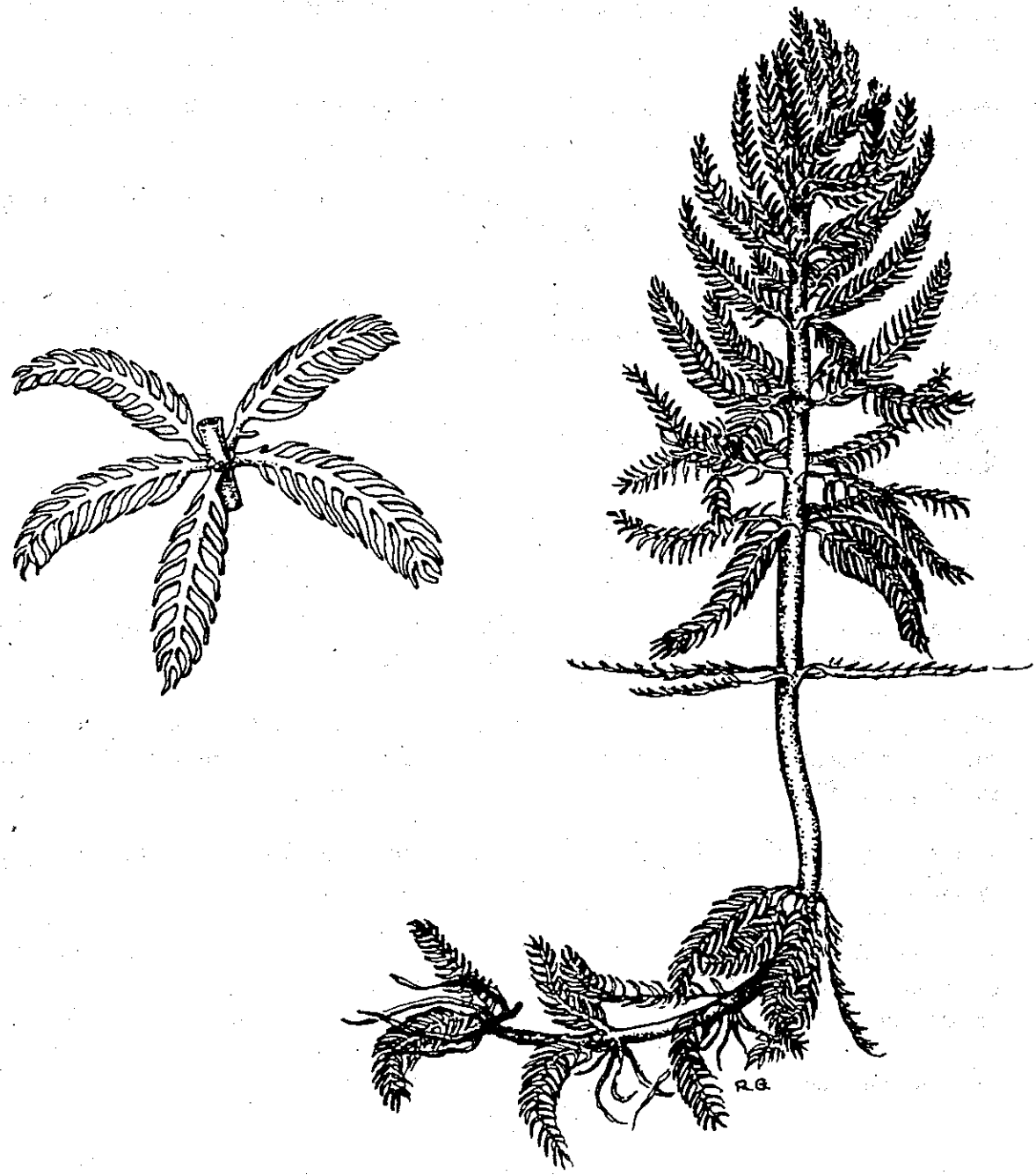
**References available from the Washington State Noxious Weed Control Board office in Kent.*

Parrotfeather
(Myriophyllum aquaticum (Vell.) Verdc.)



Key features:

- Bright green, christmas-tree like emergent stems
- Dense mat of intertwined rhizomes in the water with abundant, long roots
- Reddish feathery-leaved, very limp submersed leaves may be present