Species Management Plan
Eurasian Watermilfoil
Myriophyllum spicatum L.

Status: Eurasian watermilfoil is not listed on the noxious weed lists on the Coconino, Kaibab, and Prescott National Forests, Arizona State List or Federal Noxious Weed List.

Life History/Identification: This plant is a native of Europe, Asia and northern Africa. The plant is a perennial, submersed rooted herb. It consists of long underwater stems with many whorled, divided leaves near the surface of the water. The leaves are divided into threadlike leaflets that taper into a triangle as it nears the base. The leaflets are in whorls of four. There are twelve pairs of capillary segments, which are rigid. This characteristic distinguishes it from native species. The leaflets stand at acute angles to the rachis and are parallel to each other. The flowers are small and yellow and form on spikes and project two to four inches above the water. The seeds are formed in a four-part capsule. The plants produce many seeds, which are viable. However, regeneration is usually from rhizomes, fragmented stems and axillary buds. It is difficult to distinguish Eurasian water-milfoil plants from some native species a detailed dichotomous key is needed to identify the species. Eurasian watermilfoil samples from various parts of North America were experimentally cultivated in greenhouses. These plants differed slightly from their European counterparts but were genetically very similar. This lead the researcher to conclude that the populations of Eurasian water milfoil throughout North America may have had a common clonal origin (Invasive Exotic Plants of Canada website). The habitat of Eurasian water milfoil is ponds, lakes, reservoirs, estuaries and slow moving streams and canals.

Known Locations: Eurasian water milfoil is found in many waterways in areas throughout the country. In Arizona it has been found in a few ponds on the Colorado River Indian Reservation and in a small reservoir in the Verde Valley. These locations were reported by Everett Hall, former Arizona State Noxious Weed Program Coordinator and were documented in the Nonindigenous Aquatic Species website.

Impacts: The presence of Eurasian water milfoil can alter the natural ecosystem of a water body in the following ways: The plant forms dense mats of vegetation which can out compete native aquatic vegetation through shading and plant competition and can reduce the diversity of native aquatics. Eurasian watermilfoil provides a poorer quality of forage for such animals as ducks than the native aquatic plants it replaces (PCA Alien Plants Working Group website). The plant is so aggressive it can even suppress the presence of other exotics such as curly leaf pondweed *(Potamogeton crispus)* (Invasive Exotic Plants of Canada website). Eurasian watermilfoil can be beneficial to small fish by providing more hiding cover from predators. This makes it more difficult for predatory fish to capture prey. Aquatic macrophytes can utilize the water nutrients in Eurasian watermilfoil, therefore reducing algal blooms in lakes. However, at high densities of Eurasian watermilfoil, there is a decrease in the abundance and diversity of invertebrates, which provide food for fish (Nonindigenous Aquatic Species website). The presence of a large quantity of Eurasian watermilfoil can lower the amount of

dissolved oxygen in the water. Temperature profiles of lakes can be altered by the presence of Eurasian watermilfoil. Recreation can be affected. The plants can clog the intakes on boats and make steering more difficult. Populations of watermilfoil can also make fishing difficult by forming floating mats. These mats can make casting and retrieving fish difficult. The plants can also clog the water intakes on such structures as hydroelectric power plants.

Control:

1. Cultural Control:

Prevention of new infestations is the best method of preventing the spread of this plant to the waterways of Northern Arizona. Eurasian watermilfoil may have been introduced to the western United States through its use in the aquarium trade. Dumping of aquarium contents into waterways should be discouraged. The species may have been introduced into Oklahoma through its use as packing material for fishing worms (Invasive Exotic Plants of Canada website). It is unknown if this practice persists or if it is used in Arizona. However, this should be strongly discouraged and more inert material should be used. Aquatic organisms including plants can be transported on boats being moved from one location to another. Boaters should be encouraged to drain any water from boats and to clean them before moving from one area to another.

2. Mechanical Control:

Mechanically removal of the plants from the water using large mechanical harvesters or underwater cultivators has been used. This method can remove a large amount of biomass quickly. However, there are some risks with this method. The method is non- selective, removing all plants in the water. Non-target desirable native species can be removed in the process. The process can also produce fragments. These fragments can reproduce at the collection location or float on the water to new locations forming new populations. Fragmentation barriers can reduce this risk. The process is costly and needs to be done several times a year to provide adequate control. Eurasian watermilfoil absorbs large amounts of phosphorus from the water. In one lake in southern Ontario, 92% of the annual phosphorus loading was contained Eurasian watermilfoil plants, which were removed from the lake. This coincided with a reduction of natural algal biomass in the lake that year (Invasive Exotic Plants of Canada website). Care should be taken when removing large quantities of this plant to ensure that the nutrient balance of the aquatic system is not affected.

Hand removal using rakes or other tools could be used on populations accessible from the shore or boat. This method would be labor intensive and there would be the risks of fragmentation and removal of non- target species.

Manipulation of water levels combined with cold temperatures was successful in reducing infestations in Tennessee Valley Authority Reservoirs. Water drawdowns were not successful in controlling the species in lakes in Canada. In these cases reinfestation

occurred rapidly and there were concerns over damage to lakefront properties and fish kills (Invasive Exotic Plants of Canada website). Lowering the water level without combination of cold temperatures can also help control Eurasian watermilfoil by dehydrating the plants. Raising water levels can kill the plants by lowering the amount of available light.

Shading structures or **light limiting dyes** can be used to reduce infestations by reducing the amount of available light to the Eurasian watermilfoil plants. This affects individual plant growth rates.

Physical barriers can be used on lakes and ponds to restrict the population of undesirable plants to the area of infestation.

Impacts to other species in the aquatic system should be considered before any of the above methods are used.

3. Chemical Control: *Noted here are chemical control techniques in use in other areas. Always check with weed specialists or chemical suppliers to ensure correct dosage and application. Mention of these products does not imply endorsement by the Northern Arizona Weed Council, San Francisco Peaks Weed Management Area, the USDA Forest Service, nor the Nature Conservancy. Currently the use of herbicides is not allowed on lands administered by the Coconino, Kaibab and Prescott National Forests. Always check with your local land manager before using herbicides on public lands.*

2,4-D can be used in control of Eurasian watermilfoil. Effective control of this species can be accomplished when used at levels as low as 1 ppm if the water is calm. At levels of 5 ppm all plans will be killed. There is no effect on aquatic fauna or water quality. (Invasive Exotic Plants of Canada website).

Fluridone is a selective herbicide that is used on milfoil and other exotic aquatic species. Fluridone is available in granular or liquid form. Control can often be obtained in one treatment. (PCA Alien Plants website). There are no documented direct affects on other aquatic species for these two herbicides. However, **indirect affects** such as fish mortality caused by decaying vegetation can occur.

4. Biological Control:

There are no approved biological controls agents approved for control of Eurasian watermilfoil. However, Several agents have been considered in Canada and the Northern United States. One organism that shows promise is a native weevil, *Euhyrchiopsis lecontei.* This weevil forages on native watermilfoil plants but has shown a preference for feeding on Eurasian watermilfoil when exposed to it. The weevil feeds on the apical meristem and stems of the plant. This can suppress plant growth and reduce carbohydrate stores. If there is enough damage to the plant it will sink below the surface of the water. Effect control of Eurasian watermilfoil has occurred at some sites but not others. Currently there is no way of predicting when this weevil will provide effective

control (Biological Control of Eurasian Watermilfoil website). A native midge, Cricotopus *myriphylli* has been associated with milfoil declines in the Pacific Northwest. Large numbers of the insect are required for effect control. A moth larva, *Acentria nivea* has been studied for use in combination with the weevil or alone. The moth larvae reduce plant growth by cutting through the stems and leaves of the plant (Invasive Exotic Plants of Canada website). All of these species are native species known to feed on native plants. Damage to non-target species could occur. Other organisms studied in the past for control of Eurasian watermilfoil include a fish known as the grass carp *(Ctenopharyngodon lecontei)* and a plant pathogen *(Mycoleptodiscus terrestris)* but were not approved for use in the United States.

5. Integrated Control:

No specific examples of integrated control of Eurasian watermilfoil were found in the literature reviewed. However, a combination of two or more methods of control generally provides better control than a single method used alone.

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