Lake Tapps

Integrated Aquatic Vegetation Management Plan

CASCADE WATER ALLIANCE

August 2010

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LAKE TAPPS INTEGRATED AQUATIC VEGETATION MANAGEMENT PLAN

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EXECUTIVE SUMMARY

The presence of the invasive aquatic plant, Eurasian watermilfoil (*Myriophyllum spicatum*), is common to many lakes throughout Washington and the Pacific Northwest. Dense growth of Eurasian watermilfoil (milfoil) in Lake Tapps, as other areas, limits recreation, navigation, disrupts natural water flow, and impacts water quality. In particular, boating, swimming, fishing, and aesthetic enjoyment have been severely impacted by dense growth of milfoil in Lake Tapps. To date, only winter water level drawdowns have been used to control plant growth by exposing weed beds to desiccation and cold conditions. This method of control; however, has resulted in marginal success and is not sufficient to reduce nuisance plant growth throughout the summer recreational season.

In addition to preserving the lake and maintaining recreational benefits for the community, Cascade Water Alliance (Cascade) intends to use Lake Tapps as a municipal supply reservoir. The purpose of the Lake Tapps Integrated Aquatic Vegetation Management Plan (IAVMP) is to develop a long-term strategy for Cascade to eradicate milfoil from Lake Tapps Reservoir, to continue improving existing beneficial and recreational uses, and insure water quality to meet future water demands. To achieve these goals, a multi-year, aggressive, and dedicated management strategy must include:

- Community buy-in and ownership of the management goals
- Aggressive treatment protocols in Year 1 with follow-up action in subsequent years as needed
- Diligent monitoring and hand removal of satellite populations
- Establishment of a community-led management program
- Regular reviews and adaptive changes to management approaches
- Continue to identify, evaluate, and apply the best available science

The preferred management approach is a partial lake application of an aquatic herbicide the first year in combination with intensive surveys and diver hand-pulling. Beyond that, management shall rely on spot herbicide applications with increased emphasis on surveys, diver hand-pulling, and occasional drawdowns. More specifically, during the summer of Year 1, an initial biomass assessment of milfoil and native vegetation will be conducted. Based on this information, up to about 400 acres will be treated with the aquatic herbicide fluridone. In the fall, divers will hand-pull milfoil from areas less than about 5 acres while simultaneously surveying and mapping infested areas greater than 5 acres which will be targeted for herbicide application the following year. Winter drawdowns may be used to inhibit growth the following spring.

The treatment approach in Year 2 will largely be based on surveys conducted during the fall of Year 1 and the spring/summer of Year 2. If large (> 5 acres) nearly contiguous milfoil infestations are found, then treatments with fluridone or another aquatic herbicide, triclopyr, may be needed. Following treatment, divers will hand-pull milfoil and the lake will be surveyed and mapped to plan for future actions. It is assumed that by Year 3 and beyond, milfoil will be significantly less such that management will rely more on environmental and manual methods such as occasional water level drawdown, diver hand-pulling and benthic barriers.

Successful eradication of milfoil from Lake Tapps will require diligent (twice annual) monitoring for new milfoil populations (as well as other invasive plant and animal species) and committed outreach and prevention measures. Eradication will be considered attained when no new pioneer colonies of milfoil are observed during the post-treatment or spring surveys. Within its authority, Cascade is committed to preventing the re-introduction and establishment of milfoil and will advocate for the formation of a community –led management program to meet the long-term needs of a successful eradication plan.

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WATERSHED AND WATERBODY CHARACTERISTICS

Lake Tapps Reservoir is east of Tacoma, Washington, near the City of Bonney Lake and Auburn in north central Pierce County, Washington and in the northwestern portion of the Puyallup/White River Water Resource Inventory Area (WRIA) 10 (Figure 1). WRIA 10 covers 972 square miles and drains the Puyallup, Carbon and White River to Commencement Bay (Ecology 1995). The southeastern portion of the WRIA is heavily forested while the western portion is characterized as urban and agricultural. The area adjacent to Lake Tapps is predominantly urban (residential and commercial) with some forested and agricultural areas. The area adjacent to the White River is primarily classified as forest (evergreen and mixed) and barren. Shoreline designations around the lake include: Urban, Natural Environment (City of Bonney Lake 1975), Rural Residential, and Conservancy (Pierce County 2008).

Other waterbodies in the vicinity of Lake Tapps include: emergent and forested/shrub wetlands, ponds, and rivers (namely the White and Puyallup Rivers, Salmon and Fennel Creeks), and small lakes (Leaky, Debra Jane, Bonney, Hille, and Bowman) (Figure 2).

Lake Tapps Reservoir was created in 1911 by diverting water from nearby White River via an 8 mile diversion flowline into the southeast side of the lake (Figure 3). Geographic Information System (GIS) provided by Pierce County Planning; also indicate four unnamed tributaries on the south end of Lake Tapps. (February 8, 2010). Until 2004 the lake operated as a hydropower facility by Puget Sound Energy (PSE) with water released back to the White River through a tailrace canal on the lake's west side. When the reservoir was used for hydropower generation water flow in the 20.7 miles of White River between the diversion dam and tailrace (most of this reach is located on Muckleshoot Indian Tribe Reservation) was often reduced to 30 cfs, resulting in impacts to water quality and the native fisheries. In 1986 PSE established a minimum instream flow of 130 cfs in accordance with the 2008 White River Management Agreement with the Puyallup Tribe of Indians and the Muckleshoot Indian Tribe. This resulted in increased water clarity in Lake Tapps, and subsequently more prolific growth of milfoil.

From April 15 to October 31 water is diverted from the White River to maintain recreational water levels in Lake Tapps (elevation 541.5 to 543 feet) per an agreement between PSE and the homeowners. During the winter, the lake is typically drawn down to 530 feet to facilitate control of nuisance vegetation. This drawdown period is also used for dike repair work and to ensure that waves from severe winter storms do not overtop the reservoir's dikes. White River flows are now primarily determined by operations at Mud Mountain Dam (at RM 29.5) and the diversion dam that runs to Lake Tapps (at RM 24.3).

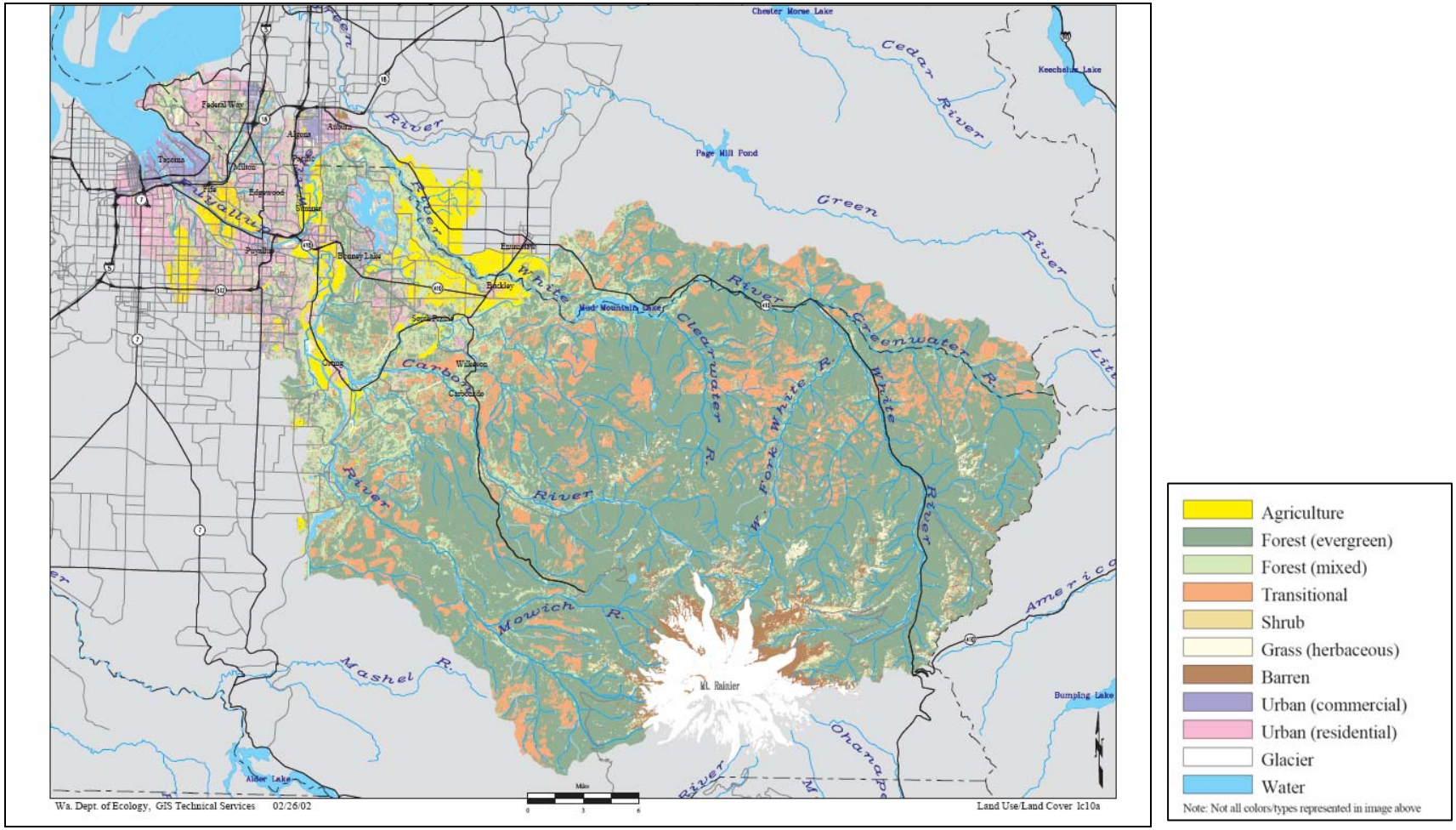

Figure 1. Puyallup/White River Water Resource Inventory Area (WRIA) 10 (Source: Washington Department of Ecology)

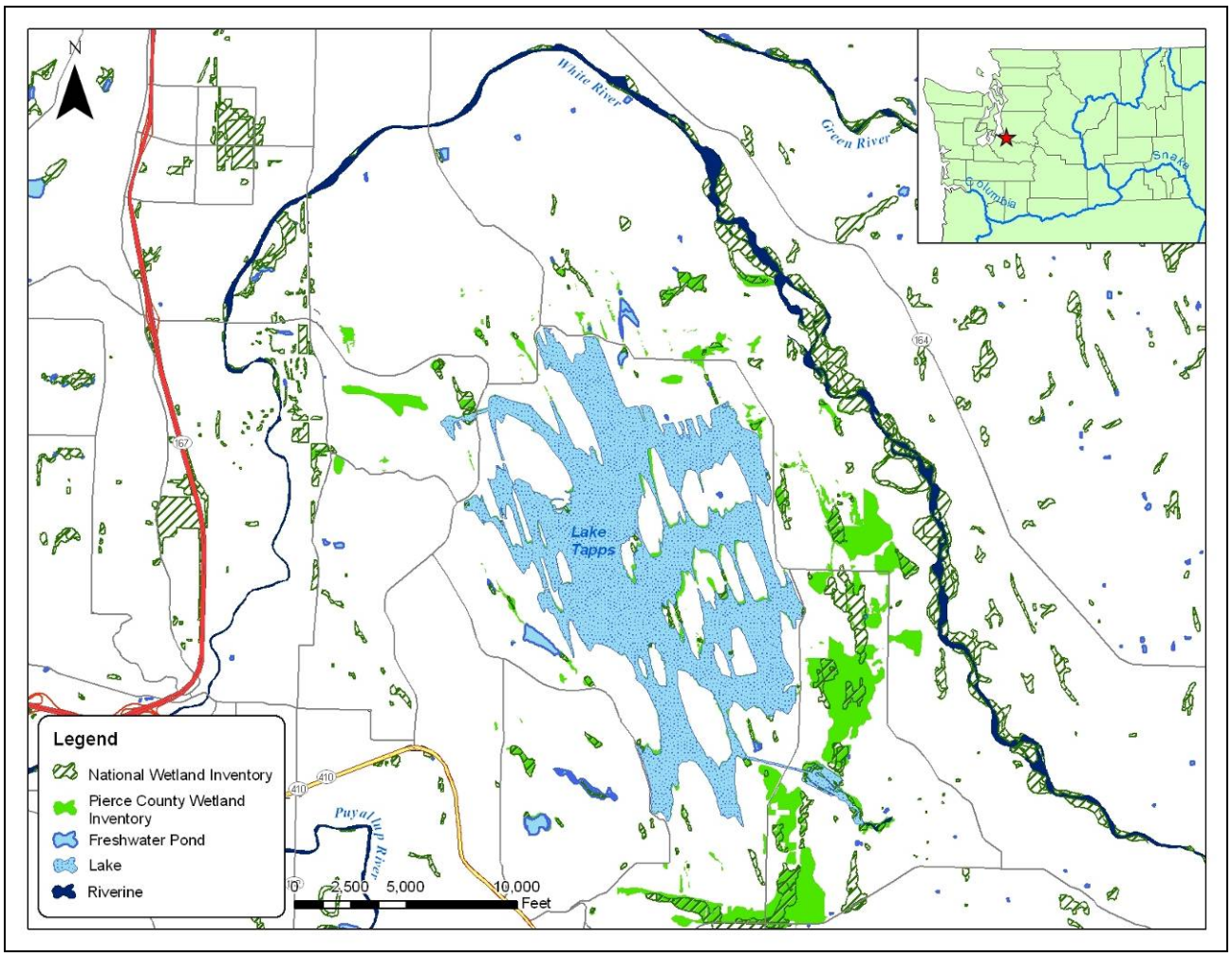

Figure 2. Wetlands and Other Waterbodies near Lake Tapps (Source: US Fish and Wildlife Service National Wetlands Inventory and Pierce County Wetland Inventory [2010])

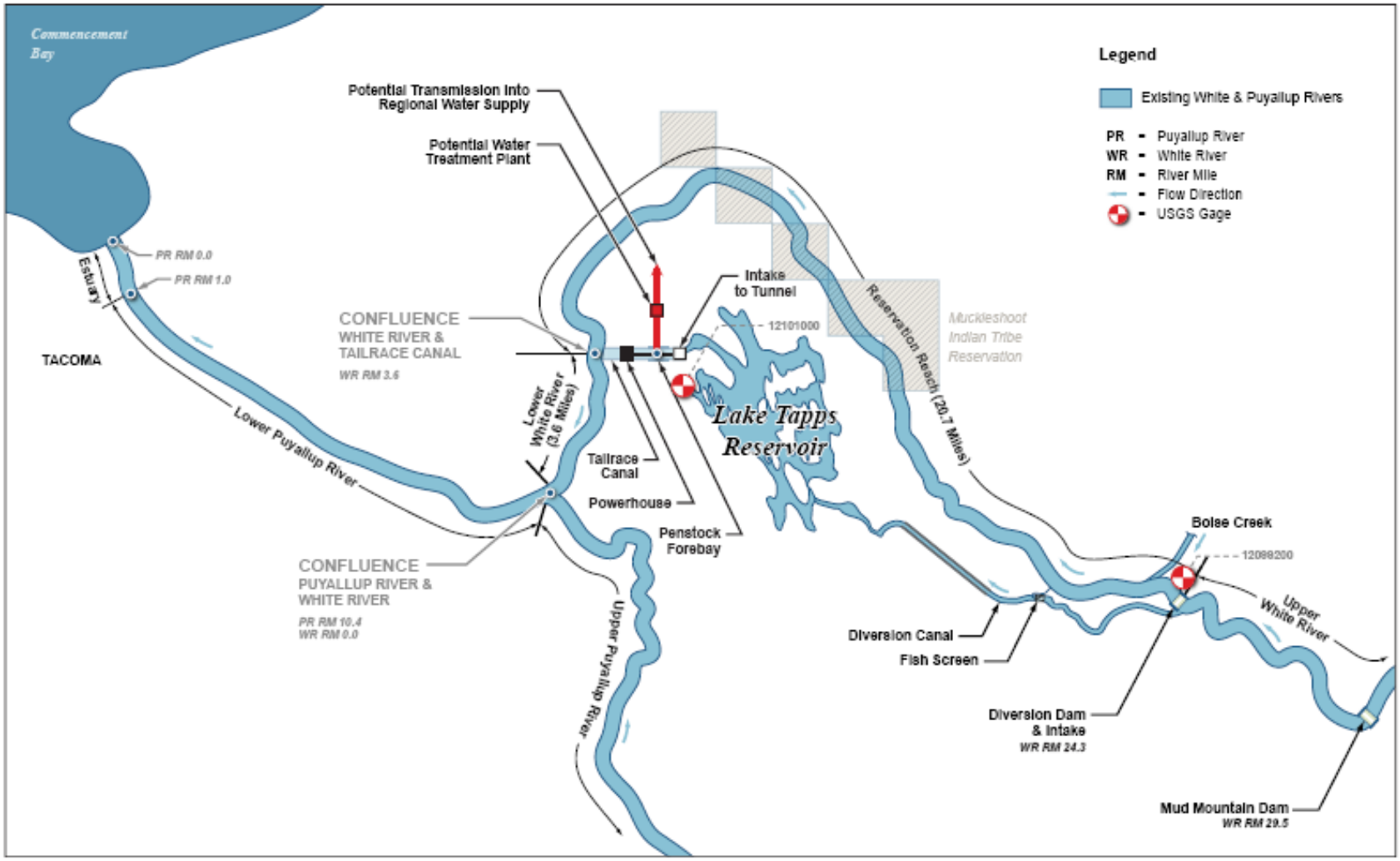

Figure 3. Stream Reaches of the White and Puyallup River (Source: Draft EIS: Lake Tapps Reservoir Water Rights and Supply Project, Cascade, January 29, 2010)

Lake Tapps has a surface area of 2,750 acres with the capacity to impound 46,700 acre-feet of water. The maximum depth is 80 feet with a mean depth of roughly 25 feet (Figure 4). The lake has approximately 45 miles of complex shoreline characterized by numerous islands and peninsulas. To form Lake Tapps, thirteen dikes were constructed around four existing lakes (Tapps, Kirtley, Crawford, and Church Lakes), explaining some of its shoreline complexity.

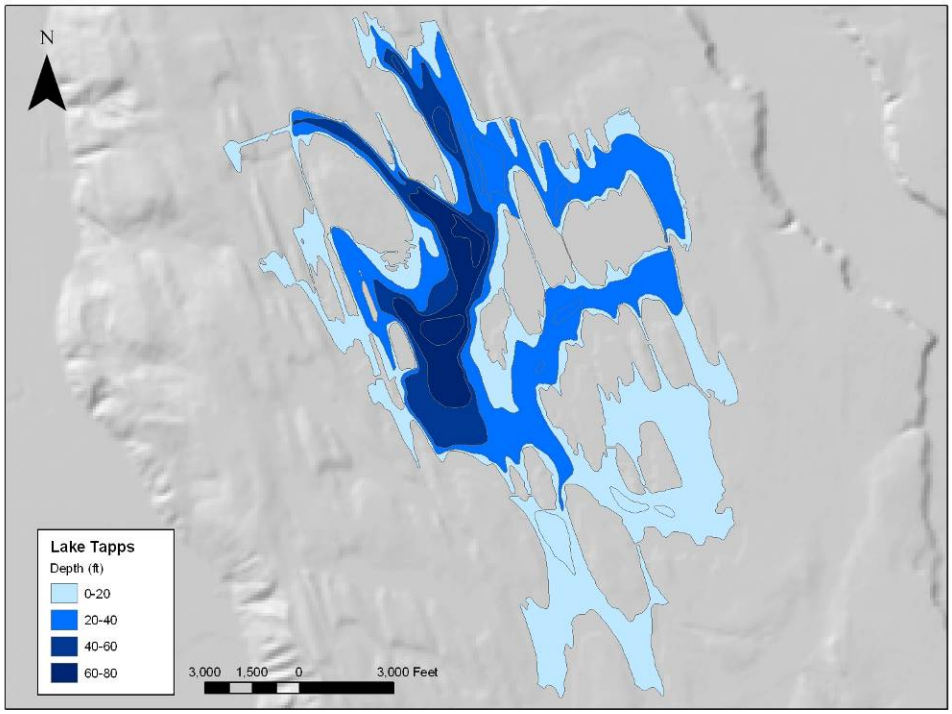

Figure 4. Lake Tapps Bathymetry (Source: Ecology 1995)

Approximately 1,500 residences are immediately adjacent to Lake Tapps with about 5,050 within ¼ mile of the lake. Much of the shoreline is characterized by cobble and gravel sediment bars with extensive armoring and numerous private boat launches (Figure 5). Silty sediment is more common to backwater areas and channels between islands (Figure 6).

Figure 5. Typical Shoreline Armoring and Exposed Littoral Zone during Drawdown

Figure 6. Channel between Islands during Drawdown

In December 2009 Cascade Water Alliance (Cascade) acquired Lake Tapps from PSE. Cascade represents a consortium of municipalities in the Puget Sound urban area whose objectives include addressing future water supply needs for the area. In addition to preserving the lake and maintaining recreational benefits for the community, Cascade intends to use Lake Tapps as a municipal water supply reservoir. The acquisition of Lake Tapps includes all water rights, assets and existing facilities that will ultimately provide projected water demand in the Cascade service area for more than 50 years. No other entities or property owners have water withdrawal rights at Lake Tapps. Operational elements of the Lake Tapps Reservoir Water Rights and Supply Project would require continued enhanced under the 2008 White River Management Agreement with the Tribes and maintenance of recreational water levels consistent with the 2009 agreement with the Lake Tapps community (Cascade 2010).

Water Quality Features

From 2004 to 2006 the lake was intensively sampled by three entities: Washington Department of Ecology (Ecology), Pierce County and the Muckleshoot Tribe. Prior to that there were only four sampling trips by Ecology; two in 1974 and one each in 1981 and 1997. The 2004 to 2006 data show the lake to be of high quality and oligotrophic with summer mean concentrations of chlorophyll (chl) and total phosphorus (TP) at 2.3 and 8.4 µg/L, respectively. Boundaries for oligotrophy-mesotrophy are 3.5 and 9 µg/L. Total nitrogen averaged 65 µg/L and nitrate-N and soluble reactive P (SRP) were usually at or below detection in the epilimnion. Specific conductance ranged from 50 to 60 µS/cm and pH from 7.5 to 8.7. Mean inflow TP concentration during 2004-2006 was 49 ± 60 µg/L.

The water quality of Lake Tapps is largely characterized by the chemical and biological attributes of the White River. Because it originates from the Emmons and Fryingpan Glaciers of Mount Rainier, the river contributes significant bedload and suspended sediment load to the lake (Ecology 1999). When Lake Tapps was operated for power production, large diversions from the White River carried a high suspended solids load to the lake. The average May to September diversion inflow during 1973-2003 was 932 cfs, which resulted in a water residence time of 39 days.

Inflows were reduced in 2004-2006, averaging 159 cfs, which produced a residence time of 277 days. As a result of reduced suspended solids and the nearly sevenfold decrease in residence time, summer Secchi disc (SD) transparency during 2004-2006 increased from a historical average

of 1 m to 3.1 m. In fact, summer SDs in 2005 and 2006 were 3.7 (mean inflows of 108 and 86 cfs), while in 2004, with mean inflow at 284 cfs, summer SD was only 2 m. Thus, the large reduction in diversions, in favor of more water left in the river for salmon, produced much improved lake clarity, with no effect on algae, contrary to previous perceptions of the effects of reduced flushing. Moreover, SD was more dependent on chl than on the high suspended solids concentration, which had caused high non-algal turbidity. Whole lake, volume-weighted TP concentrations were lower, being about 10 µg/L in the two lowest inflow summers. Lower lake TP concentrations, due to longer settling time, were predictable from longer residence times (based on scientifically recognized equation for TP retention).

Prior to 2004, plankton algae were limited by phosphorus, not light, because epilimnetic depth (i.e., mixing depth 6 m) was much less than the calculated depths (11-17 m) necessary to cause light to limit (i.e., critical depth; Welch and Jacoby, 2004). Moreover, after the diversion flows were reduced, algae (chl) did not increase, but remained at concentrations expected from TP (0.27 chl/TP - typical ratio is ~ 0.35).

The oligotrophic, high quality of Lake Tapps seems ideal for a drinking water supply. As a result of lower inflow volumes, SD was (2004-2006) at an expected depth due mainly to chl, which in turn was dependent on TP, and TP was lower than historical levels. However, there are no data on phytoplankton, which may cause problems at times in water supplies. While nuisance conditions produced by phytoplankton are usually rare in oligotrophic waters, they nonetheless can occur. With several years (at least three) of phytoplankton data, along with other pertinent chemical, physical and climatological data, a cause-effect understanding of the plankton could be developed. If a nuisance bloom occurs in the future, understanding this relationship would be valuable in explaining why it occurred and how it could be controlled.

Lake Tapps is listed under Category 4c in the 2008 Water Quality 303(d) report for invasive exotic species. Various reaches of the White River are listed for fecal coliform and instream flow (downstream of the diversion flowline), temperature and pH (just north of Lake Tapps), pH, instream flow, and temperature (upstream of the tailrace canal), and temperature and fecal coliform below the tailrace canal (Figure 7). It is not anticipated that management approaches identified later in this IAVMP further impact existing designations; in fact, the purpose of this plan is to substantially improve the condition of Lake Tapps by eliminating the invasive exotic species, Eurasian watermilfoil.

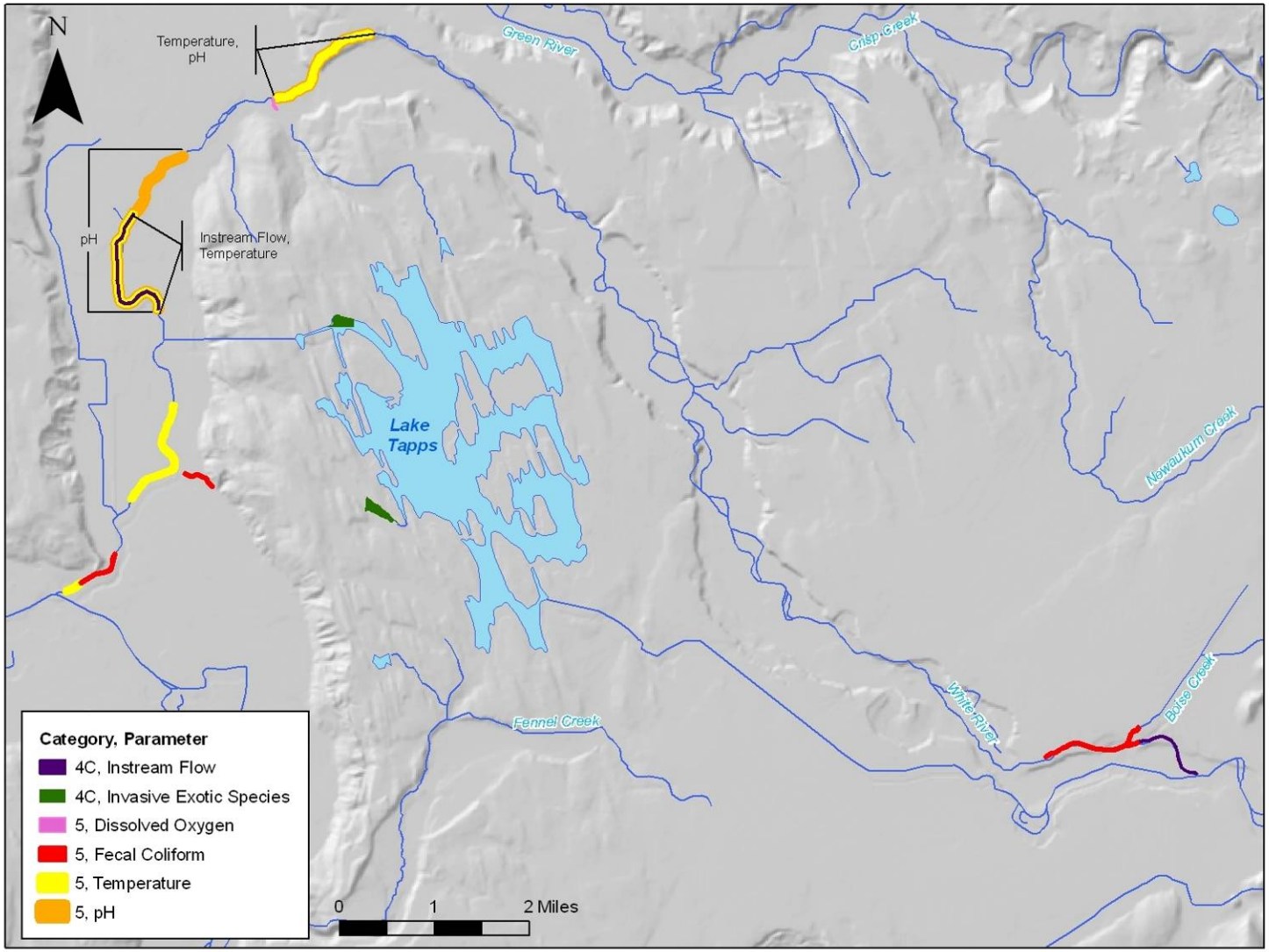

Figure 7. 2008 Water Quality Assessment 303(d) Waterbodies (Source: Washington Department of Ecology)

Biological Features

In addition to the non-native Eurasian watermilfoil (*Myriophyllum spicatum*), there are at least five native submersed aquatic plants are present in Lake Tapps: Northern watermilfoil (*Myriophyllum sibiricum*), common elodea (*Elodea canadensis*), coontail (*Ceratophyllum demersum*), pondweed (*Potamogeton* sp.) and nitella (*Nitella* sp.). Emergent aquatic plants are uncommon to Lake Tapps due to heaving water level fluctuation and shoreline armoring. The Washington Department of Natural Resource (WDNR) Natural Heritage Program (WDNR 2010) does not indicate the occurrence of state or federally-listed plant species in Lake Tapps.

Fish species native to the Puyallup-White River Watershed include bull and steelhead trout and coho, chum, pink, and Chinook salmon (NOAA 2003). In 1939, rotating drum fish screens were installed at the diversion dam (see Figure 3) to prevent downstream-migrating fishes from entering Lake Tapps. Fish species known to occur in Lake Tapps are listed in Table 1.

Table 1. Fish Composition (excluding young-of-year) at Lake Tapps (Sources: Mueller 1997, WDFW 2009).

Common carp (*Cyprinus carpio*)*	Black crappie (*Pomoxis nigromaculatus*)*
Kokanee (*Oncorhynchus nerka*)***	Cutthroat trout (*Oncorhynchus clarki*)
Largescale sucker (*Catostomus macroheilus*)	Mountain whitefish (*Prosopium williamsoni*)
Rock bass (*Ambloplites repestris*)*	Rainbow trout (*Oncorhynchus mykiss*)
Smallmouth bass (*Micropterus dolomieu*)	Sculpin (*Cottus* sp.)
Tiger musky (*Esox masquinongy* × *E. lucius*)**	Red-side shiner (*Richarsonius blateatus*)
Yellow perch (*Perca flavescens*)*	Bluegill (*Lepomis macrochirus*)*

*Non-native
**Non-native hybrid
***Land-locked sockeye salmon

The Washington Department of Fish and Wildlife (WDFW) Priority Habitats and Species (PHS) database indicates that within the 16 sections containing and surrounding Lake Tapps, bald eagle (*Haliaeetus leucocephalus*) nests are in the central and southern portions of Lake Tapps with osprey (*Pandion haliaetus*) nests located in the central portion of the lake (WDFW 2010). The PHS database also indicates a pileated woodpecker (*Dryocopus pileatus*) nest near Lake Tapps North Park (last observed January 1990). Most of the islands in Lake Tapps are considered large or small waterfowl concentration areas (WDFW 2010). The following bird species were observed during an August 2008 site visit to Lake Tapps: barn swallow (*Hirundo rustica*), violet-green swallow (*Tachycineta thalassina*), tree swallow (*Tachycineta bicolor*), osprey (*Pandion haliaetus*), mallard (*Anas platyrhynchos*), great blue heron (*Ardea herodias*), cedar waxwing (*Bombycilla cedrorum*), various sparrows (*Passer* spp.), common crow (*Corvus brachyrhynchos*), belted kingfisher (*Megaceryle alcyon*), Canada goose (*Branta canadensis*), various gulls (*Larus* spp.), and killdeer (*Charadrius vociferus*) (Cascade 2010).

Beneficial and Recreational Uses

Lake Tapps supports a variety of beneficial and recreational uses including boating, waterskiing, jet skiing, swimming, fishing, viewscapes of Mount Rainier, and residential development. Warm water fish species (largemouth bass, smallmouth bass, and yellow perch), rainbow trout, and tiger musky are popular sport fisheries at Lake Tapps. There are two public parks with boat launches on the lake: Lake Tapps North and Allan Yorke Park, with numerous access points for other recreational activities such as picnic facilities, playgrounds, athletic fields, hike/bike trails, and golf (Figure 8). Most lake-users are waterfront property owners, homeowner association members, and residents from the Seattle metro area. The vast majority of the shoreline is developed with residential

properties. Figure 8 indicates the two public and numerous private and public boat launches and shoreline access points. Not shown in Figure 8 are the numerous boat launches at private residences.

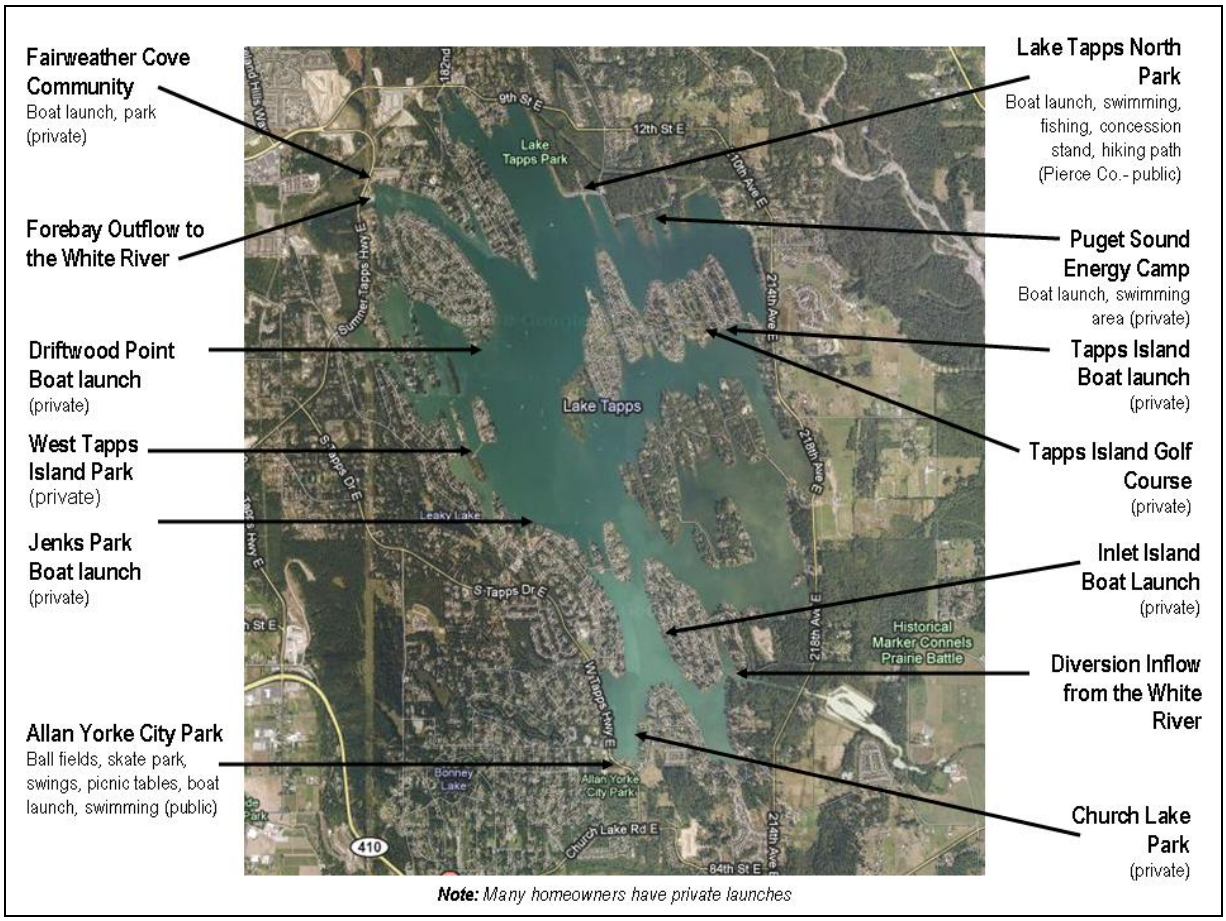

Figure 8. Lake Tapps Public and Private Boat Launches and Access (Source: Google Earth)

PROBLEM STATEMENT

The presence of the invasive aquatic plant, Eurasian watermilfoil (milfoil) (Figure 9), is common to many lakes throughout Washington and the Pacific Northwest (Figure 9Figure 10). Dense growth of milfoil in Lake Tapps, as other areas, limits recreation, navigation, disrupts natural water flow and impacts water quality. To date, only winter water level drawdowns have been used to control plant growth by exposing weed beds to desiccation and cold conditions. This method of control; however, has resulted in marginal success and is not sufficient to reduce nuisance plant growth throughout the summer recreational season.

The purpose of the Lake Tapps Integrated Aquatic Vegetation Management Plan (IAVMP) is to develop a long-term strategy for Cascade to eradicate milfoil from Lake Tapps Reservoir to continue to improve existing beneficial and recreational uses, and ensure water quality to meet future water demands.

Figure 9. Dense growth of Eurasian watermilfoil in Lake Tapps

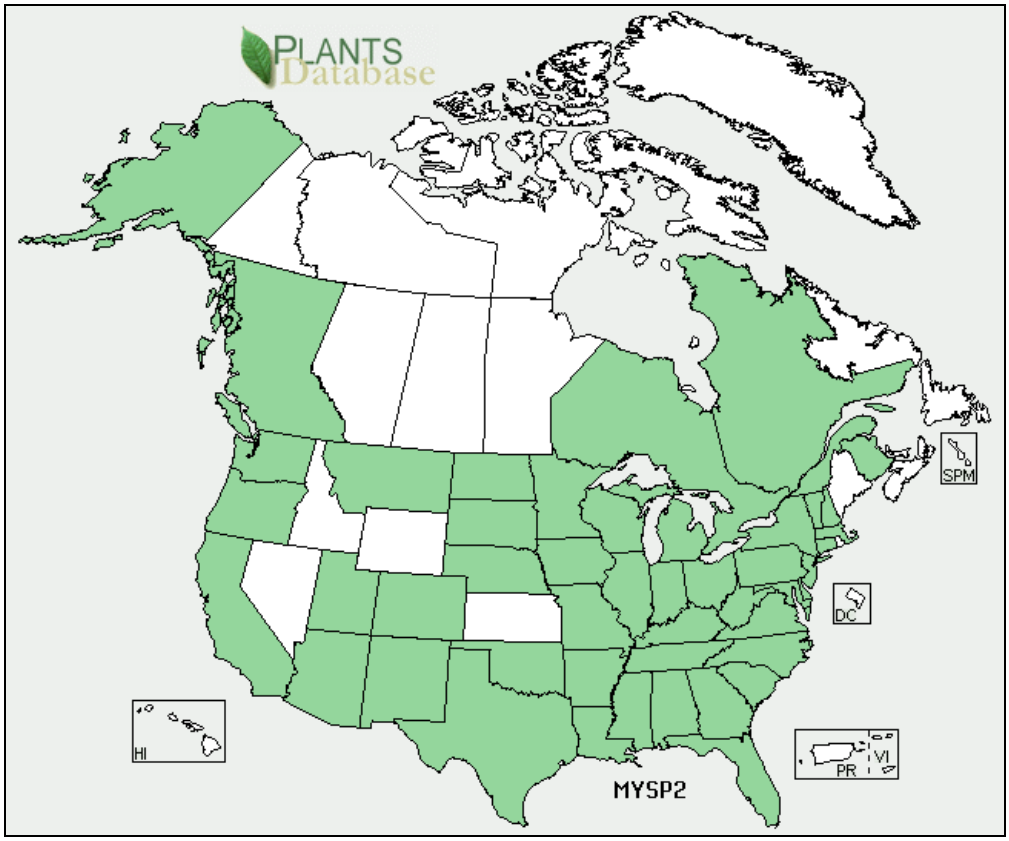

Figure 10. Distribution of *Myriophyllum spicatum* in the U.S. and Canada (Source: http://plants.usda.gov/)

COMMUNITY INVOLVEMENT

During its brief period of ownership, Cascade has cultivated a positive relationship with the Lake Tapps community and has reached out through public meetings and an open house describing their role in maintaining recreation lake levels, in meeting future drinking water supply needs, and demonstrating their commitment to address the milfoil problem.

Public involvement during the development of the Lake Tapps IVAMP was highly encouraged. Three public meetings were held between March and June 2010 (Table 2). Meetings were well attended by the Lake Tapps Community Council[1], elected officials, and the media. The first meeting was attended by approximately 120 community members. At that meeting Tetra Tech staff provided an overview of the problems associated with invasive aquatic plants along with the pros and cons of various physical, biological, mechanical, and chemical control methods. At the second meeting, attended by approximately 50 community members, the treatment alternatives and approaches were discussed. At the third meeting, attended by approximately 30 community members, preliminary vegetation maps were presented and the recommended approach for eradicating milfoil from Lake Tapps was discussedIn addition, a strategy for the application of aquatic herbicides and Ecology notification protocols were presented. During all meetings, a minimum of one and half hours was allocated to Q & A when the public was actively engaged in the discussion and were highly supportive of Cascade and commended Cascade in their proactive approach to dealing with the milfoil problem. Announcements for public meetings and supporting materials (e.g. PowerPoint slides, newspaper articles) were posted on Cascade's website (http://www.cascadewater.org/) (Appendix A).

Table 2. Schedule for the Development and Implementation of the Lake Tapps IAVMP

	Feb '10	Mar '10	Apr '10	May '10	June '10	July '10	Aug '10
Vegetation Mapping					x	x	
Plant index						x	
Public Meetings		31st		11th	10th		
Materials for Cascade Website/Newsletter			1st	x	x	x	
Apply to Ecology for Aquatic Plant & Algae Management General Permit				x			
Draft IAVMP					x		
Final IAVMP						x	
Implement Year 1 Recommendations						x	x

[1] The Lake Tapps Community Council (http://www.laketappsnews.org/) is made up of the following property owner Associations: Driftwood Point, Snag Island, Tapps Island, Tacoma Point, Inlet Island, West Tapps Maintenance, and Church Lake.

MANAGEMENT GOALS

The overarching management goal of the Lake Tapps IAVMP is to provide Cascade the guidance and tools to efficiently and effectively *eradicate* milfoil from Lake Tapps. Additionally, the management approach identified in this IAVMP will maximize the beneficial uses of Lake Tapps and maintain water quality for drinking water, recreation, fish and wildlife habitat, and aesthetics. Successful eradication will require a multi-year, aggressive, and dedicated management strategy.

Short-term Goals

- Community buy-in and ownership of the management goals
- Aggressive treatment protocols in Year 1 with follow-up action in subsequent years as needed
- Diligent monitoring and hand removal of satellite populations

Long-term Goals

- Establish a community-led management program
- Regular reviews and adaptive changes to management approaches
- Continue to identify, evaluate, and apply the best available science

AQUATIC PLANT CHARACTERISTICS

Eurasian watermilfoil was introduced to the U.S. from Europe in the 1940s and is now the most widespread submersed aquatic weed in the northern U.S. (Madsen 2009). Milfoil is capable of growing in up to 30 feet of water but typically grows in 1 to 15 feet. Though milfoil produces flowers and seeds, it primarily spreads by stem fragments that can produce new roots and root crowns. The starch-rich stems and root crowns of milfoil allow it to overwinter and survive long periods in the water or sediment. Fragments are commonly created mechanically by boat props; however, milfoil natural fragments as part of its lifecycle.

Eurasian watermilfoil is a Class B Noxious Weed in Washington, meaning prevention and containment are the primary goals (WAC 16-750-04). Species are "designated" for control at the local level (by region). Milfoil is non-designated in Region 5 (which includes Pierce County). Though it is not known exactly when milfoil was introduced or became established in Lake Tapps, during a 1997 freshwater fish survey, it was noted that "…little, if any, submersed aquatic vegetation (an important source of food and shelter for most warmwater fish) was detected in Lake Tapps" (Mueller 1997). Other invasive aquatic plants within the project vicinity (but not currently known to occur in Lake Tapps) that threaten Lake Tapps, include hydrilla *(Hydrilla verticillata*), Brazilian egeria (*Egeria densa*), fanwort (*Cabomba caroliniana*), grass-leaved arrowhead (*Sagittaria graminea*), and variable-leaf milfoil (*Myriophyllum heterophyllum*).

Lake Tapps was surveyed in April, June, and July 2010 to document existing plant characteristics. During the April survey, the lake was still well below recreational level at approximately 535 feet NGVD 1929[2]. At that time, some milfoil stem fragments and root crowns were observed from the previous season; however, no new growth was observed. By the June survey, the lake had reached recreational pool level at nearly 542 feet and some plant stems were observed; however, they were less than 3 feet long and quite sparse. An aerial survey was conducted July 8, 2010 and ground truthed on July 20, 2010 (lake level at 542.7 feet). Results of these efforts confirmed the

[2] Lake surface water elevation determined from USGS: http://waterdata.usgs.gov/nwis/uv

greatest density of milfoil in the south and southeastern portions of Lake Tapps (approximately 350 acres), moderate milfoil density on the western portion of the lake (approximately 50 acres) with various intermittent plant beds scattered around the lake (Figure 11).

Figure 11. Eurasian Watermilfoil Coverage in Lake Tapps[3]

[3] Estimates based on aerial survey conducted July 8, 2010 and ground truthed July 20, 2010.

Lake Tapps is somewhat unique because the water is drawn down during the fall and refilled during the spring. The result is that, unlike natural lakes where spring plant growth is readily observed along the shoreline, vegetation in Lake Tapps is observed in deeper areas early in the growing season and in more shallow water as the growing season continues. A detailed evaluation has not been conducted on how drawdowns in Lake Tapps affect the *native* aquatic plants that rely more heavily on seeds to disperse and become. Ironically, drawdowns likely limit native plant diversity and density, particularly along the shorelines.

AQUATIC PLANT CONTROL ALTERNATIVES

Information on aquatic plant control alternatives was derived various sources including: Washington Department of Ecology (http://www.ecy.wa.gov/programs/wq/plants/management/index.html), *A Citizen's Guide for Developing Integrated Aquatic Vegetation Management Plans* (Gibbons et al. 1994), *Biology and Control of Aquatic Plants: Best Management Practices Handbook* (Gettys et al. 2009), the WDFW "pamphlet" (Pub. # APF-11-97), field-based experience of the authors, and peer or gray literature otherwise cited in the text. The following sections outline the various methods to control aquatic plants, including: background information, advantages/disadvantages, permit information, costs, and a discussion of the method's appropriateness to Lake Tapps.

Environmental Manipulation

Water Level Control

Lowering the water level, also known as drawdown, exposes plant stems and other plant propagules to freezing and drying conditions over a prolonged period of time typically during the winter. This may only be used where water levels can be controlled by a dam, siphoning, or pumping and where impacts to native plant and animal species are limited. In some cases, water level controls may already be incorporated into routine maintenance plans (e.g. dock or embankment repair).

Advantages

Provided that the infrastructure exists, water level control it is typically a relatively inexpensive method to control unwanted aquatic vegetation. This is particularly true for species that primarily spread by vegetative propagules that are particularly vulnerable to prolonged desiccation and/or freezing.

Disadvantages

In western Washington, where the temperate climate is buffered by Puget Sound, control of nuisance aquatic plant growth has been less consistent compared to other regions where the winter temperatures are lower and there is less precipitation. Additionally, repeated water level drawdowns can result in sediment compaction that may limit the growth of invasive as well as non-native plant species and can be detrimental to fish spawning habitat. In fact, water level drawdowns can actually promote the growth of invasive plant species due to loss of competitive vigor by native plant species.

Permits

Not Applicable

Costs

Again, provided the infrastructure is in place, the cost of altering water levels is relatively inexpensive. However, where applicable, there may be less direct costs associated with loss of hydropower generation, recreational revenue, or real estate values.

Appropriateness to Lake Tapps

As previously mentioned (see Hydrologic Features), the existing diversion dam on the White River and former hydropower dam allow for the control of water levels in Lake Tapps. Water level control has been used at Lake Tapps to control milfoil by reducing the summer recreational levels (between 541.5 and 543 feet) to approximately 530 feet during the winter. As with other western Washington reservoirs, this strategy has likely reduced the late spring/early summer growth of milfoil that may be observed in natural lakes, however, it has not resulted in substantial declines in milfoil across the lake by the end of summer. Despite this, the use of water level control, in cooperation with other control methods, may decrease the cost and time associated controlling invasive aquatic plants in Lake Tapps. As previously mentioned, a detailed assessment has not been conducted at Lake Tapps to determine the affects of water level drawdown on native aquatic plants. In general, however, water level drawdown impacts plants that spread vegetatively rather than those that spread by seed. In fact, water level drawdown can actually increase the biomass of plants that spread by tubers (carbohydrate-filled reproductive structures).

Biological Control Methods

Biological control is the intentional use of natural enemies such as fish, insects, or disease-causing pathogens to reduce the biomass of a specific nuisance species. Ideally, the agent will be species-specific, attacking a single organism (Gettys et al. 2009). Biological control agents are often imported from its native range after extensive research and after approval by the U.S. Department of Agriculture (USDA). In some circumstances, biological control agents are native and shift their feeding preference from a native species to a closely related non-native species. Some factors that determine the success of a biological control agent include: environmental conditions, food preference, food quality, and stocking rate.

Grass Carp

Grass carp or white amur (*Ctenopharyngodon idella* Val.) are non-native, plant consuming fish native to large rivers of China and Siberia. Known for their high growth rates and wide range of plant food preference, these fish can control certain nuisance aquatic plants under the right circumstances. Grass carp are most appropriately used for lake-wide, low-intensity control of submersed plants. Stocking rates and control success are dependent on climate, water temperature, salinity, dissolved oxygen content in the water, and type and extent of plant species.

Control Effectiveness and Duration

Effectiveness of grass carp in controlling aquatic weeds depends on feeding preferences, metabolism, temperature, stocking rates, and even fish size (Sanders et al. 1991, Ecology, 1992; Cooke et. al., 1993, Colle 2009). Triploid grass carp exhibit distinct food preferences which can vary from region to region. Laboratory and field studies in Washington State have shown that some plant species appear to be highly preferred such as the pondweeds, (e.g. *Potamogeton crispus*, *P. pectinatus* and *P. zosteriformis*); others are variably preferred such as coontaill (*Ceratophyllum demersum*) and Brazilian elodea (*Egeria densa*), and some plants are not preferred such as milfoil, watershield (*Brasenia schreberi*) and cattail (*Typha* spp.). In fact, while grass carp will consume almost any plant material (including grass clippings), there is a

conspicuous lack of preference for milfoil (Colle 2009). For example, grass carp were stocked in a Florida reservoir so preferentially fed on hydrilla that the milfoil population increased (Colle 2009). While the invasive milfoil is apparently not a highly preferred food type, especially where other more desirable plants are available, effective grazing on milfoil has been demonstrated in the Northwest several years after implantation (Bonar et al. 1993, Gibbons and Gibbons unpublished data 1994). The duration of aquatic plant control by grass carp is typically 10 years, depending on the age of stocking; however, they are known to survive up to 25 years and are not easily removed after stocking (Gettys et al. 2009).

Advantages

Depending on the problem plant species and other site constraints previously described, proper use of grass carp can achieve long-term reductions in nuisance growth of vegetation. In some cases, introduction of grass carp results in improved water quality conditions (e.g. nitrogen, phosphorus, chlorophyll, dissolved oxygen) and biological condition (phytoplankton, zooplankton, benthic invertebrates) (Thomas et. al., 1990, KCM 1997). Compared to other long-term aquatic plant control techniques (e.g. bottom barriers), costs for grass carp implantation are relatively low.

Disadvantages

Since sterile grass carp exhibit distinct food preferences, they do not graze all plants equally, limiting their applicability. The fish may avoid areas of the waterbody experiencing heavy recreational use, resulting in less plant removal. Plant reductions may not become evident for several years. Mature waterlilies (*Nuphar* and *Nymphaea* spp.) do not appear to be effectively grazed by grass carp. Overstocking of grass carp could result in eradication of beneficial plants and have serious impacts on the overall ecology of the waterbody. An escape barrier on the outlet (if present) is required to prevent movement of fish out of the system and avoid impacts on downstream aquatic ecosystems. There may be fish loss due to predation, especially by ospreys and otters.

Permits

Grass carp stocking in a private waterbody requires a stocking permit from the WDFW. The stocking permit is a two-step process involving the submission of an Application for Planting Triploid Grass Carp and a Fish Transport Application. Department of Natural Resources Natural Heritage Program must be contacted for assessment of threatened or endangered plant species. If requested by WDFW, a State Environmental Policy Act (SEPA) Grass Carp Checklist may be required with the stocking permit. Stocking grass carp in a public waterbody also requires Phase I Lake Restoration Study.

If the waterbody (public or private) flows to another body of water, the outflow must be screened which requires Hydraulic Project Approval (HPA) from WDFW. To obtain HPA, a Joint Aquatic Resources Project Approval (JARPA) will need to be completed. These documents may be downloaded at: http://www.wdfw.wa.gov/fish/trnsport.htm

For approval of all grass carp permits, WDFW regulations require that:

1) Only sterile (triploid) fish can be planted
2) All grass carp be certified disease free
3) Outlets (and possibly inlets) must be screened to prevent fish from getting into other waterbodies
4) Stocking rate will be defined by WDFW based on the current planting model

Costs

The Washington Department of Fish and Wildlife (WDFW) determines the appropriate stocking rate for each waterbody when they issue a grass carp stocking permit. Stocking rates for Washington lakes generally range from 9 fish per vegetated acre up to 25 fish per vegetated acre (based on 8 to 11 inch fish). This number will depend on the amount and type of plants in the lake as well as spring and summer water temperatures. However, WDFW generally errs on the side of stocking the least amount of grass carp possible. Based on the few large-scale grass carp implantations made in Washington since 1990, costs can range from approximately $50/acre to $2000/acre, depending on stocking rates (range $5/fish to $20/fish, depending on delivery method and quantity purchased).

Appropriateness to Lake Tapps

The use of grass carp is unlikely a viable control method for Lake Tapps due to Endangered Species Act fisheries issues from both the Muckleshoot Indian Tribe and WDFW and because grass carp exhibit a conspicuous lack of preference for milfoil.

Watermilfoil Weevil

The milfoil weevil, *Euhrychiopsis lecontei*, is a small, herbivorous aquatic beetle, belonging to the family Curculionidae. It is native to the northern U.S., including Washington, and feeds exclusively on aquatic plants in the genus *Myriophyllum.* It is often associated with the native milfoil (*M. sibericum*), however research indicates that in the presence of both the native and non-native (*M. spicatum*) milfoil, the weevil prefers feeding on the non-native, explaining the interest in using it as a biological control agent. The milfoil weevil is native to Washington lakes and rivers, more often in eastern Washington lakes and more alkaline waters; however, it is also present in cooler, wetter western Washington. It is found associated with both native northern milfoil and milfoil.

Research on the weevil has been conducted in Illinois, Minnesota, Vermont, Washington and Wisconsin as a potential biological control for milfoil. In 1989, state biologists in Vermont reported that milfoil in Brownington Pond had declined from approximately 10 hectares (in 1986) to less than 0.5 hectares. Studies in Minnesota, Vermont, Ohio and Wisconsin suggest that at least 1.5 to 2 weevils per stem is needed to control milfoil (Newman and Biesboer 2000).

Advantages

Although a successful biological control agent rarely eradicates a problem species, it can reduce populations substantially, allowing native species to return. Used in an integrated approach with other control techniques, biological agents can stress target plants making them more susceptible to other control methods. This method of control is generally agreeable to the public.

Disadvantages

To date, there have not been any documented declines of milfoil in Washington State that can be attributed to the milfoil weevil. Researchers in Minnesota have suggested that sunfish predation may be limiting weevil densities in some lakes (Sutter and Newman 1997). The same may be true for Washington State as sunfish populations are present in many lakes, including those with weevils. In addition, other environmental factors that may be keeping weevil populations in check in Washington, but have yet to be studied, include over-wintering survival and habitat quality and quantity (Jester et. al. 1997; Tamayo and Grue 2004). Although the milfoil weevil shows potential as a biological control for milfoil more work is needed to determine which factors limit weevil densities and what lakes are suitable candidates for weevil treatments in order to implement a cost- and control-effective program.

Permits

Again, the milfoil weevil is native to Washington lakes and rivers, but they are also commercially available. Importation of weevils into Washington may require a permit from the Washington Department of Agriculture (WDFA) and/or the U.S. Department of Agriculture (USDA). Contact WDFA for current permitting requirements. As of December 2009 no permits have been issued for Washington.

Costs

The costs for researchers to locate, culture, and test biological control agents is high. Once approved for use, insects can sell for $1.00 or more per insect. Private sources of weevils are available.

Appropriateness to Lake Tapps

The use of milfoil weevils is unlikely a viable control method for Lake Tapps due to permitting issues for importing weevils from out-of-state commercial suppliers and because their use will not meet the eradication goal. Additionally, there is not suitable overwintering habitat for the weevils (e.g. leave litter along the shoreline and consistent water levels) such that stocking would have to occur yearly which could result in substantial costs.

Manual Control Methods

Hand-Pulling

Hand-pulling and removal of rooted, submerged plants involves digging out the entire plant (stem and roots) with a spade of long knife and disposing residue on shore. In shallow waters less than 3 feet, no specialized gear is required. In deeper waters, hand removal can best be accomplished by divers using SCUBA equipment and Sea Sprints or similar devices to increase mobility.

Control Effectiveness and Duration

Efficacy of plant removal depends on sediment type, visibility, and thoroughness in removing the entire plant, particularly the roots or other plant parts capable of spreading and establishing. A high degree of control over more than one season is possible where complete removal has been achieved.

Advantages

Hand-pulling results in immediate clearing of the water column of nuisance plants. The technique is very selective in that individual plants are removed. It is most useful in sensitive areas where disruption must be kept to a minimum. Because the technique is highly labor-intensive, it is most appropriate for small-area, low plant density treatments. In these cases, hand-pulling is very useful for aggressive control of sparse or small pockets of aquatic plants. This method can also be useful for clearing aquatic plants from areas around docks and beaches.

Disadvantages

Hand-pulling is time-consuming and can be costly especially where contract divers are used. Diver visibility may become obscured by turbidity generated by swimming and digging activities. Also, it may be difficult to see and dig out all plant roots. Environmental impacts are limited to mostly short-term and localized turbidity increases in the overlying water and some bottom disruption.

Permits

Hand-pulling requires Hydraulic Project Approval (HPA) by WDFW for limited control of nuisance aquatic vegetation. A copy of the pamphlet may be found online at: http://www.wdfw.wa.gov/hab/aquaplnt/aquaplnt.pdf

Costs

Costs will vary depending on whether contract divers or volunteers are used. In the case of contract divers and dive tenders, expenses can run upward of $1,600 to $3,800/day with the area covered dependent on height and density of plants.

Appropriateness to Lake Tapps

Hand-pulling is an appropriate method of removing milfoil from Lake Tapps – provided all fragments are removed from the lake and allowed to dry away from the shoreline.

Hand-Cutting

This technique is also a manual method, but differs from hand-pulling in that plants are cut below the water surface (roots generally not removed). Because roots are not removed, this is a less intensive removal technique. Implements used include scythes, rakes, or other specialized devices that can be pulled through the weed beds from shoreline or dock or by boat. Mechanized weed cutters are also available that can be operated from the surface for small-scale control.

Control Effectiveness and Duration

Root systems and lower stems are often left intact. As a result, effectiveness is usually short-term as regrowth is possible from the uncut root masses or stems. Duration of control is limited to the time it takes the plant to grow to the surface

Advantages

The technique results in immediate removal of nuisance submerged plant growth. Costs can be minimal, particularly if volunteers are used.

Disadvantages

Like hand-pulling, the technique is time-consuming. Visibility may become obscured by turbidity generated by cutting activities. Also, since the entire plant is usually not removed, this technique does not result in long-term reductions in growth. Environmental impacts are limited to mostly short-term and localized turbidity increases in the overlying water and some bottom disruption. Cut plants must be removed from the water.

Permits

Hand-cutting requires Hydraulic Project Approval (HPA) by WDFW for limited control of nuisance aquatic vegetation. A copy of the pamphlet may be found online at: http://www.wdfw.wa.gov/hab/aquaplnt/aquaplnt.pdf

Costs

Where volunteer efforts are employed, costs are mostly limited to purchase of a cutting implement. This can vary from under $200 for the Aqua Wee Cutter (Sunrise Corp.) to over $1000 for the mechanized Swordfish (Redwing Products).

Appropriateness to Lake Tapps

Hand-cutting is an appropriate method of removing milfoil from Lake Tapps – provided all fragments are removed from the lake and allowed to dry away from the shoreline.

Raking

Raking is an effective aquatic plant removal technique that tears plants from the sediment, breaking some plants off and removing some roots as well. Attaching a rope to the rake allows a greater reach of plant removal in the waterbody. The rake should be pulled toward the shore to collect and dispose of plants, as weed fragments left in the waterbody can easily spread to other areas and establish or decompose and release nutrients to the lake.

Advantages

The technique results in immediate removal of nuisance submerged plant growth. Costs can be minimal.

Disadvantages

Similar to other manual plant removal methods, the raking method is time consuming and labor intensive. Another disadvantage of this method is that as the cleared plants regrow this method may have to be implemented several times throughout the summer.

Permits

Raking requires Hydraulic Project Approval (HPA) by WDFW for limited control of nuisance aquatic vegetation. A copy of the pamphlet may be found online at: http://www.wdfw.wa.gov/hab/aquaplnt/aquaplnt.pdf

Costs

A commercial rake costs about $95 to $125 and a homemade weed rake costs about $85 (asphalt rake is about $75 and the rope costs 35-75 cents per foot).

Appropriateness to Lake Tapps

Raking is an appropriate method of removing milfoil from Lake Tapps – provided all fragments are removed from the lake and allowed to dry away from the shoreline.

Bottom Barrier Application

Barrier material is applied over the lake bottom to prevent plants from growing up through the water column. Bottom covering materials such as sand-gravel, polyethylene, polypropylene, synthetic rubber, burlap, fiberglass screens, woven polyester, or nylon film have all been used with varying degrees of success. Applications can be made up to any depth, with divers often utilized for deeper water treatments. Usually bottom conditions (presence of rocks or debris) do not impede most barrier applications, although pre-treatment clearing of the site is often useful.

Control Effectiveness and Duration

Bottom barriers can provide immediate removal of nuisance plant conditions upon placement. Duration of control is dependent on a variety of factors, including type of material used, application techniques, and sediment composition. Elimination of nuisance plant conditions for at least the season of application has been demonstrated by synthetic materials like Aquascreen and Texel. Where short-term control is desired for the least expense, burlap has been found to provide up to

four years of relief from problematic growth before eventually decomposing. After satisfactory control has been achieved (usually several months), some barrier materials can be relocated to other areas to increase benefits.

Advantages

Bottom barriers can usually be easily applied to small, confined areas such as around docks, moorages or beaches. They can be hidden from view and do not interfere with shoreline use. Bottom barriers do not result in significant production of plant fragments (critical for milfoil treatment). Bottom barriers are most appropriately used for localized, small-scale control where exclusion of all plants is desirable; where other control technologies cannot be used; and where intensive control is required regardless of cost.

Disadvantages

Depending on the material, substantial drawbacks to the application of bottom barriers include some or all of the following: high materials cost, labor-intensive installation, limited material durability, possible suspension due to water movements or gas accumulation beneath covers, or regrowth of plants from above or below the material. Periodic maintenance of bottom barrier materials is required to remove accumulations of silt and any rooting fragments. In some situations, removal and relocation of barriers may not be possible (e.g. natural fiber burlap decomposes over time). Sediment covers can also produce localized depression in populations of bottom-dwelling organisms like aquatic insects.

Permits

Bottom barrier applications require HPA and authorization from WDFW. A copy of the pamphlet may be found online at: http://www.wdfw.wa.gov/hab/aquaplnt/aquaplnt.pdf.

Costs

Barrier materials cost $0.22 to $1.25 per square foot. The cost of some commercial barriers includes an installation fee. Commercial installation costs vary depending on sediment characteristics and type of bottom screen selected. It costs up to about $750 to have 1,000 square feet of bottom screen installed. Maintenance costs for a waterfront lot are about $120 each year.

Appropriateness to Lake Tapps

Bottom barriers are an appropriate method of removing milfoil from Lake Tapps and a strategy that homeowners can easily implement.

Mechanical Control Methods

Mechanical Harvesting

Mechanical harvesting involves large machines that cut and collect aquatic plants by a conveyer belt system for plant disposal. Harvesting occurs in late spring, summer, and early fall when plants are close to the water's surface. This machinery can remove several acres of plants per day and the typical speeds range from 0.5 to 1.5 acres per hour. Due to the large size and high cost of the harvester this type of aquatic plant removal system is ideal for lakes larger than a few acres. Conventional single-stage harvesters combine cutting, collecting, storing and transporting cut vegetation into one piece of machinery. Cutting machines are also available which perform only the cutting function. Maximum cutting depths for harvesters and cutting machines range from 5 to

8.2 ft with a swath width of 6.5 to 12.1 ft. Cooke et al. (1993) summarizes aquatic plant cutters and harvesters available in North America.

Advantages

Since harvesting involves physical removal and disposal of vegetation from the water, the immediate effectiveness in creating open water areas is quite apparent. Harvesting immediately clears aquatic plants and creates open areas of water for recreation and fishing access. Harvesting also has the added benefit that removal of in-lake plant biomass also eliminates a possible source of nutrients often released during fall dieback and decay. This is important in those waterbodies with extensive plant beds and low nutrient inputs from outside sources. Furthermore, harvesting can reduce sediment accumulation by removing plant organic matter that would typically decay and add to the bottom sediments. Depending on species content, harvested vegetation can be easily composted and used as a soil amendment. Mechanical harvesting costs can be relatively low compared to other physical/mechanical techniques.

Disadvantages

Mechanical harvesting is essentially a mowing operation that removes only the upper stem material, and duration of control is variable. Factors such as target plant type, frequency and timing of harvest, water depth, and depth of cut can influence duration of control. Harvesting has not proven to be an effective means of sustaining long-term reductions in growth of milfoil. Regrowth of milfoil to pre-harvest levels typically occurs within 30 to 60 days (Perkins and Sytsma 1987), depending on water depth and the depth of cut. Significant disadvantages of harvesting are the high cost for the equipment as well as the cost to operate and maintain the harvester. Harvesting needs to occur several times during the growing season and plant fragments left behind by the harvester may increase the spread of invasive species in the lake.

Harvesters should be used in large lakes greater than a few acres and are not suitable for smaller or very shallow lakes (3-5 feet of water) or those with manmade surface obstructions or tree stumps, which are common to Lake Tapps., particularly during the spring. There is usually little interference with use of waterbody during harvesting operations. Cut plant material requires collection and removal from the water. Harvesting creates plant fragments and since milfoil can rapidly disperse and regrow by stem breakage, harvesting would not be an appropriate large-scale technique or where eradication is the goal. Harvesting can be detrimental to non-target plants and animals (e.g. fish, invertebrates) associated with plant beds, which are removed indiscriminately by the process. Harvesting can lead to enhancement of growth of opportunistic plant species that may invade treated areas.

Permits

Mechanical harvesting applications require HPA and authorization from WDFW. A copy of the pamphlet may be found online at: http://www.wdfw.wa.gov/hab/aquaplnt/aquaplnt.pdf. Because harvesting collects fish along with aquatic plants, some additional monitoring may be required when harvesting in salmon bearing waters, or a permit may be denied.

Costs

Harvesting program costs depend on factors such as scale, composition and density of vegetation, equipment used, skill of personnel, and site-specific constraints (e.g. large obstacles). Detailed costs are not uniformly reported, so comparing projects costs of one program with another can be difficult. Costs as low as $250 per acre have been reported. Private contractors generally charge $500 to $800 per acre. The purchase price of harvesters ranges from $35,000 to $110,000. There are several harvester manufacturers in the United States and some lake groups may choose to operate and purchase their own machinery rather than contracting for these services.

Appropriateness to Lake Tapps

Because eradication of milfoil is the objective at Lake Tapps, use of mechanical harvesting is not considered an appropriate control method.

Driver-Assisted Suction

Diver-assisted suction (also known as diver-dredging) involves the use of hoses that are attached to small dredges to suck up plant material which are pumped to the water surface for disposal. The suction dredging removes all parts of the plant including the roots. This method will remove approximately one quarter to one acre per day depending on the plant density, sediment type and the efficiency of the diver.

Control Effectiveness and Duration

An exemplary diver suction dredging of milfoil in Western Washington's Silver Lake, Everett removed 80 percent of the plant population over two years. Diver dredging is an effective control method for milfoil but less effective for plants where seeds, turions, or tubers remain in the sediments to sprout in the next growing season.

Advantages

Diver-assisted suction is an effective aquatic plant removal method around docks and other difficult areas to reach by large equipment and is safe for the environment.

Disadvantages

Diver-assisted suction is labor intensive and therefore can be expensive. Also this method stirs up sediment, which can lead to the release of nutrients or toxins in the sediment to enter the water column

Permits

Diver dredging requires HPA from WDFW.

Costs

Depending on the density of the plants, specific equipment used, and disposal requirements, costs can range from a minimum of $1,500 to $2,000 per day.

Appropriateness to Lake Tapps

Diver-assisted suction is an appropriate method of removing milfoil from Lake Tapps and one that is recommended for managing milfoil in Lake Tapps.

Hydraulic (Suction) Dredging

Hydraulic dredging involves removal of littoral sediments and associated rooted aquatic plants using hydraulic dredging equipment. Lake sediment removal is most often performed by means of a cutter-head hydraulic pipeline dredge (Cooke et. al. 1993). In terms of operation, plants/sediment loosened by the cutter head travels to the pickup head. The slurry is then suctioned up and carried back to the dredge barge through hoses. The sediment slurry is then piped off-site for disposal.

Control Effectiveness and Duration

Large-scale sediment removal techniques can often provide multiple benefits to an aquatic system (Cooke et. al., 1993). Depending on the waterbody, possible enhancements include not only rooted macrophyte control, but also increased depth, and removal of nutrients or toxic substances. Efficiency of removal is dependent on equipment, sediment type and condition, with conventional dredges performing well on harder sediment. Various types of portable hydraulic dredges are available in the U.S. that are more effective for small lakes with softer, flocculent substrate. Longevity of control is dependent on a number of factors including sedimentation rate (the lower the better), watershed-to-surface-area ratios (nominally 10:1), and hydraulic residence time (the longer the better).

Advantages

Dredging removes entire plants, including root systems, so regrowth is minimized. Plant fragments are collected and retained, and spread is minimized (very important for control of milfoil). It can be used to cover areas larger than practical for diver-operated dredging or diver hand removal, or where herbicides cannot be used. Human health and safety concerns are negligible where operations are conducted prudently.

Disadvantages

Hydraulic dredging is very expensive and highly disruptive to the local environment. A major problem often involves finding suitable offsite disposal areas and transporting dredged materials to these sites. As a result, more specialized equipment and materials are required and the process can be much more costly. Short-term environmental effects include resuspension of sediments and localized turbidity increases in the area of treatment. Release of nutrients and other contaminants from enriched sediments can also be a problem. In addition, some non-target aquatic organisms and vegetation may be inadvertently removed during the process. However, if only a portion of the lake bed is dredged, impacts on benthic aquatic life should be short-lived (Cooke et. al., 1993).

Permits

Use of suction dredging does require HPA from WDFW and a local shoreline management permit may be needed. In addition, it will be necessary to obtain a letter of approval from the Washington State Department of Natural Resources, a Section 404 permit from the U.S. Army Corps of Engineers, and a National Pollutant Discharge Elimination System (NPDES) permit from Ecology.

Costs

Dredging costs are highly variable, depending on density and volume of sediment removed, equipment condition, transport requirements of dredged material, and eventual use of dredged material (Cook et. al., 1993). Hydraulic dredging costs typically range from a minimum of $2.25 per cubic meter to $6 per cubic meter, although figures as high as $20 to $50 per cubic meter have been reported for special cases.

Appropriateness to Lake Tapps

Hydraulic dredging is not currently considered an appropriate method of removing milfoil from Lake Tapps during due to the size of milfoil infestation, expense, and arduous permitting process.

Rotovation

Rotovation involves highly specialized large aquatic rototillers which uproot entire plants from the sediment. The rotovation blades reach seven to nine inches deep into the lake bottom and uproot plants and roots which are removed by weed raking or by a mechanical harvester.

Control Effectiveness and Duration

Rotovation can be used year-round as a mechanical control in certain waterbodies, but is most effective in winter and early spring when the plants have died back. Rotovation can remove two to three acres of plant material per day and studies have shown effective control up to two growing seasons after a rotovation.

Advantages

This mechanical control method effectively removes the entire plant and treatments decrease/control plant density for two growing seasons. Rotovation can also be used year-round in certain waterbodies if the permit allows and rotovation can stimulate the growth of native aquatic plants.

Disadvantages

Disadvantages of this mechanical control method include: difficulty to maneuver, high cost for maintenance and operation, labor intensive effort and it may actually increase the spread of invasive weeds. Underwater utilities, such as gas, water, sewer, telephone or water intake pipes, need to be located before rotovation begins.

Permits

Requires HPA from WDFW, a shoreline permit from the local jurisdiction (city/county) may be needed, and a Section 404 permit from the Army Corp of Engineers may be required.

Costs

Costs for a private contractor to harvest plants, remove obstacles, rotovate, and collect and dispose of plants range from $1,500 to $2,000 per acre. As plant density decreases and obstacles are removed, costs and time needed to rotovate each acre will decrease.

Appropriateness to Lake Tapps

Rotovation is not considered an appropriate method of controlling milfoil in Lake Tapps, largely due to expense and obstacles (tree stumps and docks) common to Lake Tapps.

Chemical Control Methods

Chemical control of invasive aquatic plants involves the application of U.S. Environmental Protection Agency (EPA) and Ecology - approved products specifically formulated for applications in or around water. Aquatic herbicides are sprayed directly onto floating or emergent aquatic plants or are applied to the water in either a liquid or granular form. Systemic herbicides are capable of killing the entire plant. Contact herbicides cause the parts of the plant in contact with the herbicide to die back, leaving the roots alive and able to regrow. Non-selective, broad spectrum herbicides will generally affect all plants that they come in contact with. Selective herbicides will affect only some plants (often dicots - broad leafed plants like milfoil will be affected by selective herbicides whereas monocots like Brazilian elodea (*Egeria densa*) may not be affected). Most aquatic plants are monocots.

Approved Herbicides

Table 3 lists some of the aquatic herbicides approved by the U.S. EPA and Ecology for use in controlling milfoil in Washington. Also included are the trade names under which these products are sold, its mode of action (e.g. systemic or contact), information about its selectivity, some considerations, and water use restrictions. See Appendix B to view the herbicide specimen labels.

Advantages

Aquatic herbicides are easily applied around docks and underwater obstructions. Aquatic herbicide application can be less expensive than other aquatic plant control methods, especially when used in controlling wide-spread infestations of state-listed noxious aquatic weeds.

Disadvantages

- Some herbicides have swimming, drinking, fishing, irrigation, and water use restrictions (check the label and the Ecology permit [discussed below]).
- Herbicide use may have unwanted impacts to people who use the water and to the environment.
- Non-targeted plants as well as nuisance plants may be controlled or killed by some herbicides.
- Depending on the herbicide used, it may take several days to weeks or several treatments during a growing season before the herbicide controls or kills treated plants.
- Rapid-acting herbicides like endothall and diquat may cause low oxygen conditions to develop as plants decompose. Low oxygen can cause fish kills.
- To be most effective, generally herbicides must be applied to rapidly-growing plants, although sometimes fall applications of perennial plants can also be effective.
- Some expertise in using herbicides is necessary in order to be successful and to avoid unwanted impacts.
- Public perception to the application of chemicals to water can be unfavorable.

Table 3. Aquatic Herbicides Approved for Use in Washington to Control Milfoil

Active Ingredient	Trade Names (G) = granular (L) = liquid	Systemic/ Contact	Selectivity	Management Uses and Considerations	Label Water Use Restrictions and Advisories (Ecology)			
					Drinking	Swimming	Fish	Irrigation***
2,4-D (butoxy-ethyl-ester [BEE])	Navigate® (G) Aqua-Kleen® (G)	Systemic	Selective for broad-leaved plants (e.g. milfoil); fast-acting; destroys entire plant	Appropriate for spot and whole-lake treatments; may selectively control non-native plants at label rate	2,4-D concentration must be < 70 ppb	Advisory (Ecology) during treatment and 24 hr post-treatment	May not be used in waters with threatened/ endangered salmon	2,4-D concentration must be <100 ppb *or* concentration-dependent setback distance *or* a 21 day waiting period
2,4-D (dimethylamine salt [DMA])	DMA*4IVM® (L) Sculpin® G (G)	Systemic	Selective for broad-leaved plants (e.g. milfoil); fast-acting; destroys entire plant	Appropriate for spot and whole-lake treatments; may selectively control non-native plants at label rate	2,4-D concentration must be < 70 ppb	Advisory (Ecology) during treatment and 24 hr post-treatment	Application subject to fish timing windows	2,4-D concentration must be <100 ppb *or* concentration-dependent setback distance *or* a 21 day waiting period
Endothall (dipotassium salt)	Aquathol® K (L) Aquathol® Super K (G)	Contact	Non-selective; fast-acting; destroys vegetative portion of plant	Short-term control; appropriate for spot treatment	7-25 days	Advisory (Ecology) during treatment and 24 hr post-treatment	3-days	14 days
Fluridone	Sonar® AS (L) Avast!®SC (L) Sonar®PR (G) Sonar®SRP (G) Sonar®Q (G) Sonar® One (G)	Systemic	Non-selective; slow acting	Appropriate for areas of low water exchange; used for whole-lake treatment or in isolated bays; not appropriate for spot treatment < 5 acres				30 days
Triclopyr (triethylamine [TEA] salt)*	Renovate® 3 (L) Renovate®OTF (G)	Systemic	Selective for broad-leaved plants; fast acting; destroys entire plant	Appropriate for spot and whole-lake treatments		Advisory (Ecology) during treatment and 12 hr post-treatment		Not for irrigation for 120 days or until <1 ppb
Diquat	Reward® (L)	Contact	Non-selective; fast-acting; destroys vegetative portion of plant	Short-term control; appropriate for spot treatment; efficacy limited in turbid water/dense algae	1-3 days** (human); 1 day livestock/ domestic animal consumption	Advisory (Ecology) during treatment and 24 hr post-treatment		1-5 days depending on crop

* Ground water monitoring protocols shall be used if a Permittee is applying triclopyr for the third time in a three year period (Appendix E).
** Ranges in days determined by application rate, see label for details.
*** See labels for more specific irrigation restrictions.

Permits

Because of environmental risks from improper application, aquatic herbicide application in Washington state waters is regulated and has the following restrictions:

- Applicators must be licensed by the Washington State Department of Agriculture.
- Applicants must obtain coverage under a National Pollutant Elimination Discharge (NPDES) permit before they can legally apply aquatic herbicides to waters of the state.
- Ecology requires notification and posting before treatment and, if applicable, there are additional mitigations to protect rare plants or threatened and endangered species.

Ecology issued a "lake" NPDES general permit March 1, 2006 to cover the management of in-lake noxious weeds and native aquatic plants and algae. For in-lake projects applicators and/or the state or local government sponsoring the project must obtain coverage under Ecology's Aquatic Plant and Algae Management General Permit (the Permit)[4] before applying herbicides. The process for obtaining NPDES coverage and follow-up actions includes:

1. Submit a Notice of Intent application form to Ecology requesting coverage under this permit at least 60 days prior to the planned activity resulting in the discharge to waters of the state. The application shall contain a copy of the public notice and the expected date of the second publication
2. Complete a SEPA Checklist and submit to Ecology
3. Adhere to all Ecology Requirements (Appendix F) as identified in the Permit, including:
    a. Ecology Notification
    b. Residential and Business Notification
    c. Camp Notification (not applicable to Lake Tapps)
    d. Posting Requirements (templates provided in Appendix G)

Costs

These costs are estimates and will vary from site to site depending on treatment rates, water depths, amount of notification needed, difficulty of access to the site, and other factors. Approximate costs for one acre herbicide treatment: Fluridone: $675 to $1,250, Endothall: $650, 2,4-D: $300-600, Diquat: $300 to $400.

Appropriateness to Lake Tapps

The application of aquatic herbicides, in combination with other aquatic plant control methods, substantially increases the likelihood of eradicating milfoil from Lake Tapps. Aquatic herbicides are particularly beneficial at Lake Tapps where submersed trees limit the deployment of benthic barriers. In situations where eradication is the goal, the application of aquatic herbicides is the most aggressive method to rapidly reduce vegetation coverage and allow for other methods such as benthic barriers and diver-assisted hand pulling.

[4] To view the Permit: http://www.ecy.wa.gov/programs/wq/pesticides/permit_documents/APAMfinalpermitrevised011509.pdf

No Action Alternative

The No Action Alternative acknowledges the presence of invasive aquatic plants but not does call for any control or even planning activities.

Advantages

There are few advantages to "doing nothing" to control or prevent the further spread of invasive aquatic plants; however, there may be a perception of saving money by not investing in activities such as herbicide application, mechanical harvesting, or boat washing stations.

Disadvantages

The No Action Alternative can result in long-term deleterious effects on the ecology, recreational uses and aesthetics of a lake. Invasive aquatic plants disrupt dissolved oxygen patterns, displace native plant species, and impair navigation. While changes to water quality may be less obvious to the casual observer, their seasonal and long-term impacts can seriously threaten features that attract homeowners, outdoor enthusiasts, anglers, and boaters to a waterbody.

Appropriateness to Lake Tapps

The current distribution of milfoil at Lake Tapps is already at nuisance levels and will likely only increase, particularly if Cascade decreases the magnitude of the winter water level drawdowns. Based on the goal of eradication, the No Action Alternative is not appropriate for Lake Tapps.

New Technologies

Aquatic plant researches and field applicators continue to improve invasive aquatic plant management techniques; whether by applying new approaches using existing technologies or developing entirely new products and methods. For example, the aquatic herbicide fluridone (Sonar® AS) is now labeled for pre-emergent applications. This method involves the application of a registered aquatic herbicide to dewatered areas (e.g. canals and shorelines) such that the product is in immediate contact with the plants when they emerge from winter dormancy or sprout from seed. Using this existing chemistry in a new way allows for early season treatment of emerging invasive plants as the water level rises. For Lake Tapps, this method may not be particularly effective under current water level drawdown regimes; however, because most research on pre-emergent applications has been conducted in irrigation canals and not large waterbodies. The application of acetic acid as a pre-emergent has been evaluated for dewatered irrigation canals (Spencer et al. 2003); however, this use is not currently permitted by EPA or Ecology and is not recommended in the Lake Tapps IAVMP.

Table 4. Permits/Documents Required for Aquatic Weed Control Activities in Washington (Source: Washington Department of Ecology)

Permit/document	Agency	Description	Control Activities	Minimum Process Time
State Environmental Policy Act (SEPA)	Local or state agency	Requires complete disclosure of proposed actions; SEPA checklist required for herbicide use and grass carp stocking	Herbicides, grass carp stocking	60 days
Aquatic Plant and Algae Management General Permit: National Pollutant Discharge Elimination System (NPDES)	Ecology	Covers aquatic plant and algae management activities that discharge chemicals and other aquatic plant and algae control products into surface waters of the state of Washington	Herbicides, algaecides, adjuvants, marker dyes, barley straw, shading projects, biological water clarifiers, and nutrient inactivation products	60 days
State Shoreline Management Act	Ecology and local jurisdiction	Permit ensures that proposed activity complies with the local Shoreline Master Program. Includes lakes 20-acres or more, and can include associated wetland and some floodplains.	Bottom barriers (based on area/cost), rotovation, harvesting, diver dredging	75 days
Hydraulic Project Approval (HPA - State Hydraulic Code)	Fish and Wildlife	HPA required for work below the ordinary high water line.	All aquatic plant control activities need an HPA, but many activities are permitted by obtaining publication #APF-1-98 - Aquatic Plants and Fish	45 days
Natural Heritage Program Letter (confirming search of date for critical plant species)	Department of Natural Resources	Natural Heritage Program is the state repository of data on endangered, threatened and sensitive species, native wetland communities, aquatic and nonvegetated wetlands.	Search should be conducted for any control activity	3-7 days
Fish Planting Permit	Fish and Wildlife	A permit is required for stocking of triploid (sterile) grass carp in Washington waters for control of aquatic vegetation.	Grass carp stocking	45 days
Local Permits	Local jurisdictions	Permits may be required on the local level for various activities. Permits may include Shoreline Management, Growth Management Act/Sensitive Area Ordinance.	Variable	Variable

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TREATMENT/CONTROL INTENSITY

The aquatic plant management objective for Lake Tapps is to *eradicate* milfoil. Eradication implies the complete and permanent elimination of all viable plant propagules (reproductive structures, including stem fragments, tubers, and seeds) (Gettys et al. 2009). Eradication will require a multi-year, aggressive, and dedicated effort using multiple tools and frequent surveys. In addition, prevention efforts will be necessary to ensure new populations of milfoil (or other invasive plant or animal species) are not introduced and established. Eradication of milfoil has been achieved in Washington, for example at Long Lake and Lake Shoecraft. In both instances, eradication was the goal and fluridone was used, followed by "bump" applications to maintain sufficient exposure of the herbicide.

The approach to eradicating aquatic plants depends on numerous factors including plant distribution and density, Specimen Label restrictions for aquatic herbicides (Appendix B), existing beneficial uses, public perception, and available funding. The following are two possible approaches for eradicating milfoil from Lake Tapps.

Whole Lake Approach

As the name implies, a whole lake approach involves aggressively treating the entire volume of the lake, typically with an aquatic herbicide. This approach is practical for waterbodies with nearly complete coverage by invasive plants and where the water depth averages about 25 ft. or less. Aquatic herbicides appropriate for whole lake treatment include fluridone, triclopyr, and 2,4-D. Other control tools such as benthic barriers, diver-assisted suction, or hand-pulling are not practical for whole lake applications when used alone; however, these tools may be used as part of an integrated approach. A whole lake treatment of aquatic herbicide is not recommended for Lake Tapps, largely due to its high water volume and expense.

Partial Lake Approach

Partial lake treatment means that a large area is uniformly treated, typically with an aquatic herbicide or by environmental manipulation (i.e., water level draw down), but not the entire volume of the lake. For example, if an invasive aquatic plant infestation is only known to occur on one end of a waterbody, then there is no need to treat the entire lake. Instead, the infestation and some reasonable buffer around the infestation could be treated. In lakes with deep water areas and a measureable summer thermocline (depth where the water is much colder than the surface), invasive plants are typically found along the shoreline during late summer. Fragments may be observed elsewhere, but the ability of fragments to establish will likely be limited by water depth. In these situations, such as in Lake Tapps, then only the shoreline or areas where water depth is less than about 15 to 20 ft. is treated. Aquatic herbicides appropriate for partial lake treatment of large areas include fluridone, triclopyr, and 2,4-D. Water level drawdown has been used in Lake Tapps, in part to control milfoil. While this approach may help alleviate some shoreline growth early in the summer, water level drawdown alone clearly has not and will not eradicate milfoil from Lake Tapps. Similar to whole lake treatment, other control tools such as benthic barriers, diver-assisted suction, or hand-pulling are not practical for partial lake applications when used alone; however, these tools may be used as part of an integrated approach.

Targeted Area Approach

Using a targeted area approach to control invasive aquatic plants allows for the use of a variety of control methods, including physical, mechanical, or aquatic herbicides. Examples of targeted

areas include bays, specific shorelines, and navigation lanes. These areas are prioritized for treatment based on factors such as plant density, role as a source of propagules, feasibility of treatment tools (e.g. benthic barriers near docks, but diver hand-pulling in areas with dense tree stumps), and cost. This approach is practical for smaller infestations, for example areas less than 5 acres, boat launches, along navigation routes, or swimming beaches. Where eradication is the goal, this approach should be employed after more aggressive methods are used.

Also where eradication is the goal, appropriate physical methods for managing aquatic weeds in targeted areas should only rely on methods that *remove or kill all viable plant parts*. These methods may include diver hand-pulling (then removing the plants from the lake) and benthic barriers. Aquatic herbicides appropriate for spot treatments include triclopyr, endothall, diquat, and 2,4-D. Granular formulations of fluridone are more commonly used for spot treatments than the liquid formulations because the latter typically cannot provide sufficient contact time. Ecology reports more success using 2,4-D or triclopyr for spot treatments of milfoil in the littoral zone. Endothall is routinely used to spot treat milfoil along shorelines. At higher concentrations of endothall (2 to 3 ppb), shorter contact time is required for more complete control; however, at lower concentrations (1 to 1.5 ppb) impacts to native vegetation are lessened, increasing the likelihood of a more robust and diverse plant community.

LAKE TAPPS INTEGRATED TREATMENT SCENARIOS

A multi-year, aggressive, and integrated treatment approach will be necessary to eradicate milfoil from Lake Tapps. Two scenarios are provided to accomplish this goal (Figure 12). Both scenarios integrate multiple management tools and emphasize prevention and surveys. Where they differ are in the selection of control tools, the short versus long-term term benefits, costs, and anticipated results over time. Both treatment scenarios assume that approximately 400 acres between the shoreline at full recreational level (between 542 and 543 feet) out to the 15 ft. contour will be treated in Year 1.

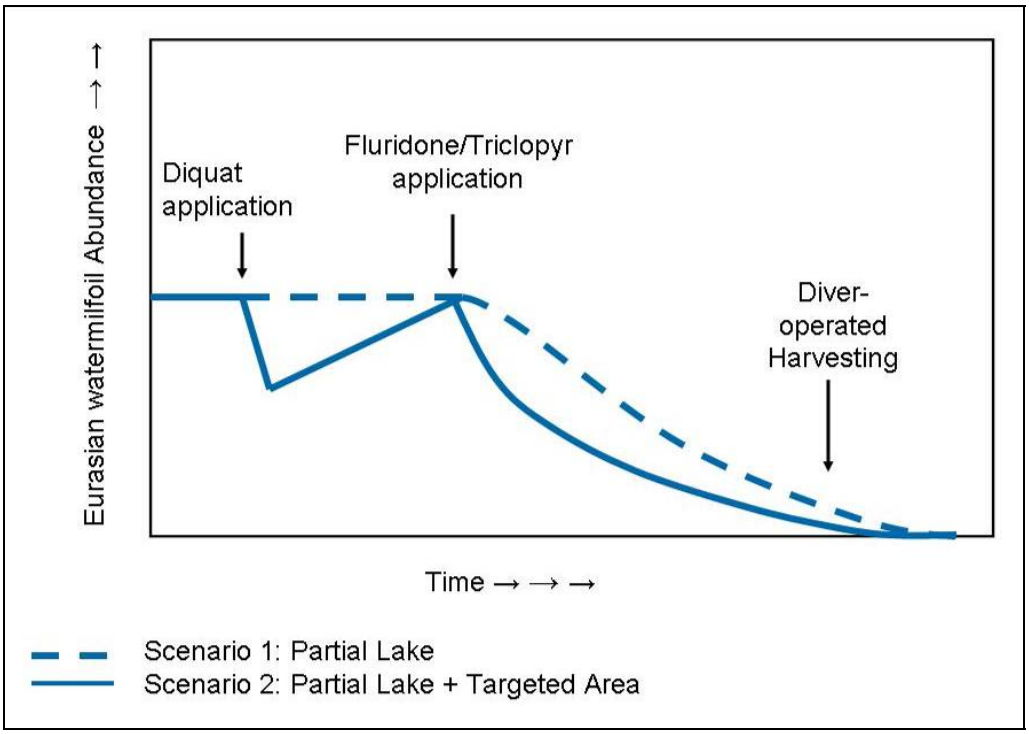

Figure 12. Temporal Selection of Management (Modified from Madsen 2005)

Scenario 1: Partial Lake (Five-year Program)

Scenario 1 (Table 5) involves a partial lake application of fluridone in combination with intensive surveys and diver hand-pulling. Fluridone has no drinking, fishing, swimming, or livestock/pet consumption restrictions[5] and may be applied under whole lake, partial, or target area approaches (Appendix B).

Year 1

During the summer of Year 1, an initial biomass assessment of milfoil and native vegetation will be conducted. Based on this information, the area between the shoreline out to the 15 to 20 ft. contour (at full recreational level) will be treated with granular fluridone to maintain concentration 8 ppb. The treatment area will be based on coverage of non-native and native plant species and financial constraints. Water samples will be collected every two weeks within the treatment area and analyzed for fluridone concentration using FasTEST® Water Analysis (SePRO Corp., Carmel, IN). Water samples will be collected every two weeks within the treatment area and analyzed for fluridone concentration using FasTEST® water analysis (SePRO Corp., Carmel, IN). "Bump" applications will be made (typically 2 to 4) to ensure the target concentration is maintained for at least 45 days (Ecology suggests up to 10 weeks for eradication projects). While milfoil is capable of growing in water deeper than 15 ft., fluridone is known to disperse to areas beyond the target area, thus it is anticipated that plants adjacent to the treatment area will be affected. During the fall of Year 1, divers will hand-pull milfoil from areas less than about 5 acres. At the same time, divers will survey and map infested areas greater than 5 acres. For infestations greater than 5 acres, it is recommended they be targeted for herbicide application the following year. Winter drawdowns may be used to inhibit growth the following spring.

Year 2

The treatment approach in Year 2 will largely be based on surveys conducted during the fall of Year 1 and spring/summer of Year 2. Although it is unlikely, if large (> 5 acres) nearly contiguous milfoil infestations are found, then spot treatments with fluridone (isolated bays) or triclopyr (exposed shorelines) may be needed. If applicable and/or feasible, at least 2 acres surrounding the infestation should also be treated. In any case, during the fall of Year 2, divers will once again hand-pull milfoil from areas less than about 5 acres and survey and map areas greater than 5 acres. For infestations greater than 5 acres, it is recommended they be targeted for herbicide application the following year. Winter drawdowns may be used to inhibit growth the following spring.

Year 3 and Beyond

Surveys will again be conducted during the spring/summer of Year 3. It is assumed that the population of milfoil will be significantly less such that spot treatments may not be necessary. Instead, areas may be controlled using a wider selection of tools. More specifically, emphasis will be placed on diver hand-pulling or diver-assisted suction, particularly for sites with infestations less than 5 acres while fluridone or triclopyr may be used for areas greater than 5 acres. During the fall of Year 3, divers will once again hand-pull milfoil from areas less than about 5 acres and survey and map areas greater than 5 acres. For infestations greater than 5 acres, it is recommended they be targeted for herbicide application the following year. Winter drawdowns may be used to inhibit growth the following spring.

[5] Fluridone does have irrigation restrictions for up to 30 days.

Surveys will again be conducted during the spring/summer of Year 4 and beyond, when it is expected that diver hand-pulling will be sufficient to control milfoil in Lake Tapps; however, the use of triclopyr or fluridone will be used for spot treatments of larger areas. Winter drawdowns may be used to inhibit growth the following spring.

Table 5. Summary of Scenario 1: Partial Lake (Five-year Program)

Year	Action	
1	Summer	Asses the biomass and map existing populations of milfoil and native aquatic plants Partial lake application with fluridone; apply 2 to 4 "bump" applications to maintain desired concentration for at least 45 days Implement prevention efforts to eliminate introduction of plant propagules
	Fall	Survey to inform Year 2 treatment; hand-pull areas less than < 5 acres
2	Summer	Survey for milfoil and native aquatic plants Spot application of fluridone (isolated bays) or triclopyr (exposed shorelines) to 2 acres surrounding infested areas identified in Year 1 fall survey; apply 2 to 4 "bump" applications to maintain desired concentration for at least 45 days Increase prevention efforts to eliminate introduction of plant propagules
	Fall	Deploy divers for hand removal of plants in areas less than 5 acres and mark areas greater than 5 acres for herbicide application in Year 3
3	Summer	Survey for milfoil and native aquatic plants Spot application of fluridone (isolated bays) or triclopyr (exposed shorelines) to 2 acres surrounding infested areas identified in Year 2 fall survey; apply 2 to 4 "bump" applications to maintain desired concentration for at least 45 days Further increase prevention efforts to eliminate introduction of plant propagules
	Fall	Deploy divers for hand removal of plants in areas less than 5 acres and mark areas greater than 5 acres for herbicide application in Year 4
4	Summer	Survey for milfoil and native aquatic plants Spot application of fluridone (isolated bays) or triclopyr (exposed shorelines) to 2 acres surrounding infested areas identified in Year 3 fall survey; apply 2 to 4 "bump" applications to maintain desired concentration for at least 45 days Continue prevention efforts to eliminate introduction of plant propagules
	Fall	Deploy divers for hand removal of plants in areas less than 5 acres and mark areas greater than 5 acres for herbicide application in Year 5
5	Summer	Survey for milfoil and native aquatic plants Spot application of fluridone (isolated bays) or triclopyr (exposed shorelines) to 2 acres surrounding infested areas identified in Year 4 fall survey; apply 2 to 4 "bump" applications to maintain desired concentration for at least 45 days Continue prevention efforts to eliminate introduction of plant propagules
	Fall	Deploy divers for hand removal of plants

Scenario 2: Partial Lake + Targeted Areas (Five-year Program)

Scenario 2 (Table 6) also involves a partial lake application of fluridone in combination with intensive surveys and diver hand-pulling. Additionally, Scenario 2 involves application of diquat to quickly open up high priority areas (e.g. boat launches and boat lanes). According to the label, diquat has drinking water and irrigation restrictions (up to three and five days, respectively), and one day domestic animal consumption restrictions. Ecology has a swimming advisory during treatment and for 24 hours following application (Table 3 and Appendix B).

Year 1

During the summer of Year 1, an initial biomass assessment of milfoil and native vegetation will be conducted. Based on this information, the area between the shoreline out to the 15 to 20 ft. contour (at full recreational level) will be treated with granular fluridone to maintain concentration 8 ppb. Again, fluridone has no drinking, fishing, swimming, or livestock/pet consumption restrictions[6] and may be applied under whole lake, partial, or target area approaches (Appendix B). The treatment area will be based on coverage of non-native and native plant species and financial constraints. Water samples will be collected every two weeks within the treatment area and analyzed for fluridone concentration using FasTEST® Water Analysis (SePRO Corp., Carmel, IN). "Bump" applications will be made (typically 2 to 4) to ensure the target concentration is maintained for at least 45 days (Ecology suggests up to 10 weeks for eradication projects). While milfoil is capable of growing in water deeper than 15 ft., fluridone is known to disperse to areas beyond the target area, thus it is anticipated that plants adjacent to the treatment area will be affected. Diquat would be applied to targeted areas at concentrations not to exceed the label rate. Applications would be made after July 1 due to the presence of largemouth bass.

During the fall of Year 1, divers will hand-pull milfoil from areas less than about 5 acres. At the same time, divers will survey and map infested areas greater than 5 acres. For infestations greater than 5 acres, it is recommended they be targeted for herbicide application the following year. Winter drawdowns may be used to inhibit growth the following spring.

Year 2

As in Scenario 1, the treatment approach in Year 2 will largely be based on surveys conducted during the fall of Year 1 and spring/summer of Year 2. Although it is unlikely, if large (> 5 acres) nearly contiguous milfoil infestations are found, then spot treatments with fluridone (isolated bays) or triclopyr (exposed shorelines) may be needed. If applicable and/or feasible, at least 2 acres surrounding the infestation should also be treated. Diquat may be used in high use areas such as navigation lanes. During the fall of Year 2, divers will once again hand-pull milfoil from areas less than about 5 acres and survey and map areas greater than 5 acres. For infestations greater than 5 acres, it is recommended they be targeted for herbicide application the following year. Winter drawdowns may be used to inhibit growth the following spring.

Year 3 and Beyond

Surveys will again be conducted during the spring/summer of Year 3. Once again, it is assumed that by Year 3, the population of milfoil will be significantly less such that spot treatments may not be necessary. Instead, areas may be controlled using wider selection of tools. More

[6] Fluridone does have irrigation restrictions for up to 30 days.

specifically, emphasis will be placed on diver hand-pulling, particularly for sites with infestations less than 5 acres while fluridone or triclopyr may be used for areas greater than 5 acres and diquat used for high use areas. During the fall of Year 3, divers will once again hand-pull milfoil from areas less than about 5 acres and survey and map areas greater than 5 acres. For infestations greater than 5 acres, it is recommended they be targeted for herbicide application the following year. Winter drawdowns may be used to inhibit growth the following spring.

Surveys will again be conducted during the spring/summer of Year 4 and beyond, when it is expected that diver hand-pulling will be sufficient to control milfoil in Lake Tapps; however, the use of triclopyr or fluridone will be used for spot treatments of larger areas. Winter drawdowns may be used to inhibit growth the following spring.

Table 6. Summary of Scenario 2: Partial Lake + Targeted Areas (Five-year Program)

Year	Action	
1	Summer	Asses the biomass and map existing populations of milfoil and native aquatic plants Partial lake application with fluridone; apply 2 to 4 "bump" applications to maintain desired concentration for at least 45 days; targeted application of diquat to high use areas (e.g. navigation lanes) Implement prevention efforts to eliminate introduction of plant propagules
	Fall	Survey to inform Year 2 treatment; hand-pull areas less than < 5 acres
2	Summer	Survey for milfoil and native aquatic plants Spot application of fluridone (isolated bays) or triclopyr (exposed shorelines) to 2 acres surrounding infested areas identified in Year 1 fall survey; apply 2 to 4 "bump" applications to maintain desired concentration for at least 45 days; targeted application of diquat to high use areas (e.g. navigation lanes) Increase prevention efforts to eliminate introduction of plant propagules
	Fall	Deploy divers for hand removal of plants in areas less than 5 acres and mark areas greater than 5 acres for herbicide application in Year 3
3	Summer	Survey for milfoil and native aquatic plants Spot application of fluridone (isolated bays) or triclopyr (exposed shorelines) to 2 acres surrounding infested areas identified in Year 2 fall survey; apply 2 to 4 "bump" applications to maintain desired concentration for at least 45 days; targeted application of diquat to high use areas (e.g. navigation lanes) Increase prevention efforts to eliminate introduction of plant propagules
	Fall	Deploy divers for hand removal of plants in areas less than 5 acres and mark areas greater than 5 acres for herbicide application in Year 4
4	Summer	Survey for milfoil and native aquatic plants Spot application of fluridone (isolated bays) or triclopyr (exposed shorelines) to 2 acres surrounding infested areas identified in Year 3 fall survey; apply 2 to 4 "bump" applications to maintain desired concentration for at least 45 days Continue prevention efforts to eliminate introduction of plant propagules
	Fall	Deploy divers for hand removal of plants in areas less than 5 acres and mark areas greater than 5 acres for herbicide application in Year 5
5	Summer	Survey for milfoil and native aquatic plants Spot application of fluridone (isolated bays) or triclopyr (exposed shorelines) to 2 acres surrounding infested areas identified in Year 4 fall survey; apply 2 to 4 "bump" applications to maintain desired concentration for at least 45 days Continue prevention efforts to eliminate introduction of plant propagules
	Fall	Deploy divers for hand removal of plants

Preferred Scenario

Scenario 1 includes the application of fluridone in Year 1and triclopyr and/or fluridone in Year 2 and beyond. In addition to the application of fluridone, Scenario 2 includes the additional use of diquat in Year 1 to open up high use areas such as navigation channels. Fluridone has no swimming advisory or restriction and triclopyr only has a 12 hour swimming advisory (Ecology); however, there is a 24 hour swimming advisory for diquat (Ecology). Also, the application of a contact herbicide (diquat) would only provide short-term benefits yet incur an added expense. That is, the short term benefits provided by Scenario 2 do not outweigh the added cost and reduced recreation benefit.

Other aquatic herbicides are available to effectively manage milfoil, including 2,4-D and endothall. These products were considered but not recommended for the Lake Tapps IAVMP. 2,4-D is a fast-acting and selective herbicide that systemically kills the entire plant. The liquid and granular formulations of 2,4-D have varying levels of efficacy, the liquid providing increased milfoil control but also persists in the water column longer. While 2,4-D has been used to successfully to control milfoil in Washington, recent evidence from Idaho strongly suggests that an aggressive treatment with fluridone followed by triclopyr the following year provides longer control of milfoil compared to 2,4-D used alone (Shuler personal communication). There are also concerns about the endocrine disruption potential of 2,4-D (EPA-738-F-05-002). Endothall is a fast-acting contact herbicide; however, it is not appropriate for whole-lake applications and species-selectivity is largely based on rates and treatment timing (Netherland 2009). There are 24 hour swimming advisories for endothall and 2,4-D (Ecology) and endothall has increased drinking, fish, and irrigation restrictions (Table 3).

Biological control agents such as grass carp and the milfoil weevil can effectively reduce existing populations of milfoil; however, the survival of the organism is inherently linked to the survival of the plant. Because eradication of milfoil is the goal for Lake Tapps, biological controls are not recommended in this IAVMP. Additionally, it is not known whether the native watermilfoil weevil is present at Lake Tapps and Washington Department of Agriculture does not currently have a permitting system for importing weevils that are commercially reared out of state.

Mechanical harvesters are an effective mechanism to open up navigation lanes and other high use areas; however, they are not appropriate for eradication projects. Additionally, many areas in Lake Tapps have submersed trees and other obstacles that would limit the utility of mechanical harvesters and compromise operator safety.

Budget

Development and implementation of the Lake Tapps IAVMP will be highest during the first couple of years when the management approach is most aggressive (Table 7). Over time, the effort will move away from reliance on herbicide applications and, instead the emphasis will be on monitoring and removing satellite populations of milfoil using manual methods.

Table 7. Estimated Cost of Developing and Implementing the Lake Tapps IAVMP

	Year 1	Year 2	Year 3	Year 4	Year 5
IAVMP Development and Reviews	$30,000	$8,000	$5,000	$5,000	$5,000
Chemical Treatment	$500,000	$250,000	$125,000	$60,000	$30,000
Plant Surveys (twice annual)	$23,000	$10,000	$8,000	$8,000	$8,000
Diver-assisted Hand-pulling (fall)	$10,000	$10,000	$10,000	$10,000	$10,000
Capital Costs (rakes, benthic barriers, etc.)	$10,000	$5,000	$3,000	$3,000	$3,000
Maintenance					
Public Education (signs, presentation, brochures)	$8,000	$3,000	$3,000	$3,000	$3,000
Estimated Total	$573,000	$283,000	$151,000	$93,000	$63,000

MONITORING, RESPONSE AND PREVENTION

Successful eradication of milfoil from Lake Tapps will require diligent (twice annual) monitoring for new milfoil populations (and other invasive plant and animal species), removal of targeted species with minimal impacts to non-target species, and committed outreach and prevention measures. It is anticipated that at least 90% control will be achieved in Year 1. Following treatment in Year 1, divers will hand-pull remaining plant beds less than about 5 acres and surveys will guide management in Year 2. The purpose of using such aggressive treatment approaches in Year 1 is to minimize carry-over of milfoil into Year 2. With that said, it is anticipated that milfoil density will be substantially reduced by Year 2 and beyond, such that treatment emphasis should shift from chemical control to manual (i.e. diver-assisted hand-pulling, benthic barriers) and environmental controls (i.e. water level drawdown).

Within its authority, Cascade is committed to preventing the re-introduction of milfoil as well as other noxious weeds through public education (websites, mailings, and public meetings) and by working closely with existing community groups such as the Lake Tapps Community Council and regional parks/boat launch operators. Cascade will advocate for the formation of a community-led group that would assume the long-term responsibility of coordinating prevention and control activities, raising funds to support future management efforts, and to coordinate local and regional stakeholders.

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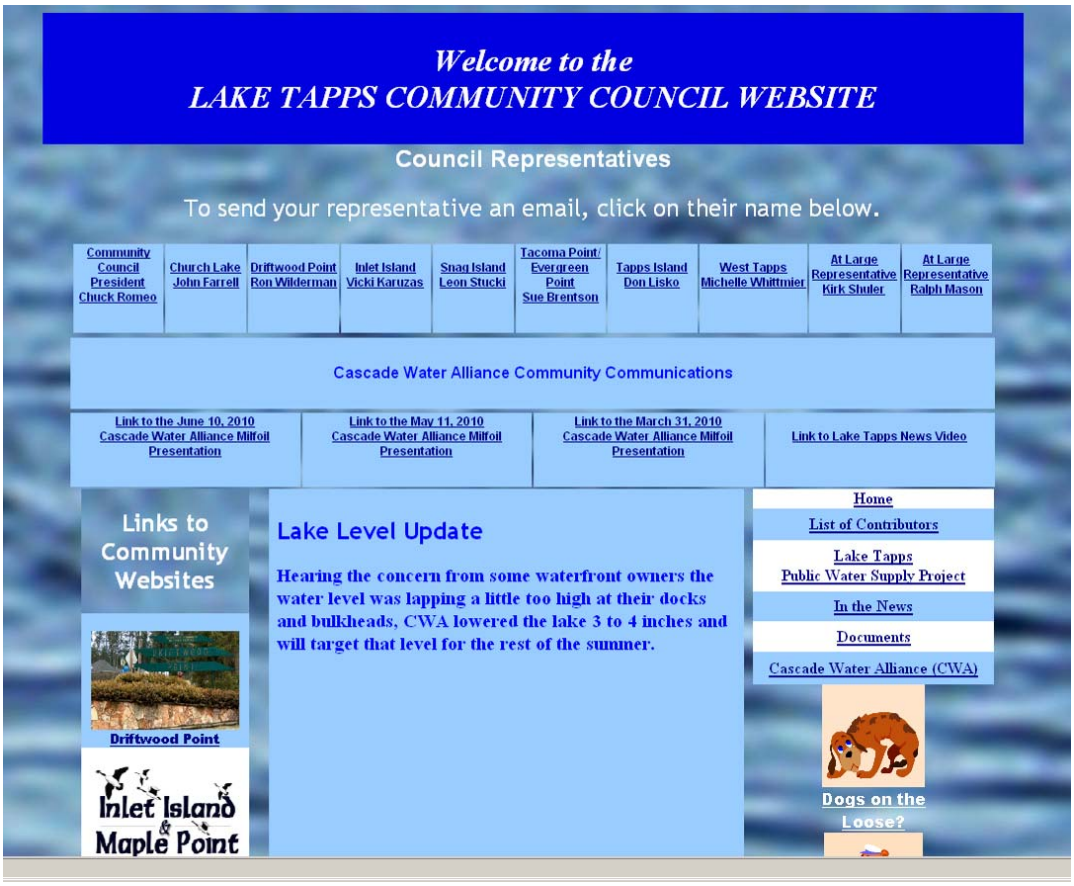
APPENDIX A PUBLIC MEETING ANNOUNCEMENTS AND NEWS ARTICLES


Welcome to the
LAKE TAPPS COMMUNITY COUNCIL WEBSITE
Council Representatives
To send your representative an email, click on their name below.
Community Council President Chuck Romeo
Church Lake John Farrell
Driftwood Point Ron Wilderman
Inlet Island Vicki Karuzas
Snag Island Leon Stucki
Tacoma Point/ Evergreen Point Sue Brentson
Tapps Island Don Lisko
West Tapps Michelle Whittmier
At Large Representative Kirk Shuler
At Large Representative Ralph Mason
Cascade Water Alliance Community Communications
Link to the June 10, 2010 Cascade Water Alliance Milfoil Presentation
Link to the May 11, 2010 Cascade Water Alliance Milfoil Presentation
Link to the March 31, 2010 Cascade Water Alliance Milfoil Presentation
Link to Lake Tapps News Video
Links to Community Websites
Driftwood Point
Inlet Island & Maple Point
Lake Level Update
Hearing the concern from some waterfront owners the water level was lapping a little too high at their docks and bulkheads, CWA lowered the lake 3 to 4 inches and will target that level for the rest of the summer.
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Documents
Cascade Water Alliance (CWA)
Dogs on the Loose?

Lake Tapps milfoil meeting draws big crowd to North Tapps Middle School

Harry Gibbons of Tetra Tech explains the Eurasian milfoil eradication plan to Lake Tapps residents at a meeting March 31 at North Tapps Middle School.
Brian Beckley/The Courier-Herald
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Apr 08 2010

More than 120 Lake Tapps residents packed into the North Tapps Middle School multi-purpose room March 31 to hear Cascade Water Alliance's plans for helping to rid their lake of eurasian milfoil, an invasive species of plant that is clogging beaches and coves from one end of the lake to the other.

"You have it and it's a problem" said Harry Gibbons, a senior limnologist for Tetra Tech, a consultant group hired by Cascade Water Alliance.

The plan announced by Gibbons and Cascade calls for a multi-year approach that combines several measures to try and completely eradicate milfoil from Lake Tapps.

The standing room only crowd listened as Gibbons explained necessity of removing the invasive weed from the lake as well as the options being considered.

Gibbons compared milfoil in the lake to a tumor in the body.

"Your best hope is to grab that tumor and get it out of your body before it spreads," he said, calling the weed a "game-changer" in a lake.

"With the invasives like eurasian (milfoil), you can't play nice," he said.

RELATED STORIES

Bonney Lake-Sumner Courier-Herald
- TONIGHT: Meeting on Milfoil in Lake Tapps at North Tapps Middle School
- REMINDER: Cascade Water Alliance hosts third meeting on Milfoil plan tonight at North Tapps Middle School
- Second meeting to discuss milfoil in Lake Tapps set for May 11
- Lake Tapps, CWA agreement finalized

Pierce County
- No injuries in early morning house fire in Lake Tapps Estates
- Lake Tapps Sports Briefs

Gibbons listed six options, ranging from doing nothing to bio controls to manual controls to chemicals, though he said several had no applicability to Lake Tapps.

"'No action' is just going to cost you money in the long term," he said. "I don't think this is an option and that's why we're here today."

Other options, such as drawdown of the lake have also proven to be ineffective in Lake Tapps, primarily because winters in this area are not cold or dry enough to kill off the plant.

Gibbons also said biocontrol measures ("Biocontrol means 'is there something out there that eats it?'" Gibbons explained.) such as use of a milfoil weevil or grass carp are not applicable to Lake Tapps either because of the difficulty in getting permits due to fisheries downstream from the lake.

Gibbons said the plan for Lake Tapps combines three techniques: drawdown, manual control and chemical control, though Gibbons said the chemicals used would be bio-friendly, though any short term negative effects would be countered by the long term viability after the milfoil is removed.

The timeline for implementation of the milfoil plan states that Cascade will finish mapping the lake for the weed this month, draft a management plan in May and begin to implement in June.

Though there will be activity this summer, Gibbons said a second round of mapping and checks will be necessary this year to check effectiveness and eradication efforts would continue for up to five years.

Gibbons said there should be no effect on recreational uses and that residents would be informed 30 days prior to any chemical treatment.

Cascade Water Alliance has estimated an initial cost of $250,000 for milfoil treatment, according to Capital Projects Director Jon Shinoda.

"We are ready to spend a substantial amount to fix this," he told the residents.

Several residents at the meeting said they were pleased to see Cascade "stepping up" to deal with the issue of milfoil, which according to the agreement signed with the Lake Tapps Community Council is the corporation's responsibility.

"We're very pleased with their attitude and their willingness to step up," said Council vice president Leon Stucki, adding that cascade has gone "above and beyond" on their efforts.

"I'm happy they're taking an aggressive approach," said Dave Little, who lives in the Church Lake section of the lake.

Little called milfoil a "terrible problem" and said in the summer months he takes half a garbage can's worth of the weed out of the lake each day.

Gibbons urged residents to take preventive measures, such as education about the dangers of milfoil and to take care to make sure boats being put into the lake are clean of the plant, which can start a new colony from a few simple bits of leaf.

He also urged residents not to buy any fertilizers with phosphorus and to use sparingly the fertilizers they do buy.

For more information on the meeting visit http://www.cascadewater.org/community_comm_meetings.php

Slide Show from the meeting:

Tapps Public Meeting_31MAR10

Wednesday, 7/7/2010 3:07 pm

BONNEY LAKE & SUMNER COURIER-HERALD

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Cascade Water Alliance announces second milfoil information meeting

Apr 21 2010

From a press release:

Cascade Water Alliance next month will host the second in a series of three public meetings to talk about strategies to eradicate milfoil in Lake Tapps.

The meeting is scheduled for 6 to 8 p.m. May 11, at North Tapps Middle School, 20029 12th Street East.

On March 31, more than 120 community members attended the first in this series of meetings about milfoil in Lake Tapps. At that meeting Cascade informed the community of its intention to eradicate milfoil from the lake, and environmental consultants from Tetra Tech described the pros and cons of various eradication approaches.

Cascade and Tetra Tech gave an overview of the eradication program and plans to survey and map milfoil growth in the lake. The plan includes both mechanical and chemical means to eliminate the plant.

The Lake Tapps milfoil eradication plan is now nearly complete. On May 11, Cascade and Tetra Tech will share specifics of the plan with the community, answer questions and take public comment. They will also provide an update on the milfoil mapping in the lake, which is the first step in developing a complete plan.

Looking ahead: The third in this series of milfoil public meetings is scheduled for Wednesday, June 9, 6 to 8 pm, location to be announced.

Milfoil poses environmental and maintenance challenges for a healthy lake. According to the Washington State Department of Ecology (DOE), milfoil starts spring growth earlier than native aquatic plants and can out shade these beneficial plants. Because it is widely distributed and difficult to control, DOE says milfoil is considered the most problematic plant in Washington State.

Questions and comments about milfoil in Lake Tapps can also be sent to Jon Shimada, Capital Projects Director, at contact@cascadewater.org, or call Cascade at 1-877-299-0930.

For a recap of the first meeting, visit http://www.pnwlocalnews.com/pierce/bch/news/90280862.html

RELATED STORIES

Bonney Lake-Sumner Courier-Herald
- REMINDER: Cascade Water Alliance hosts third meeting on Milfoil plan tonight at North Tapps Middle School
- Cascade to host public meeting to discuss milfoil plan
- Cascade to treat milfoil this summer
- TONIGHT: Meeting on Milfoil in Lake Tapps at North Tapps Middle School

Pierce County
- None at this time.

APPENDIX B HERBICIDE SPECIMEN LABELS

Specimen Label

Sonar* Q

Aquatic Herbicide

An herbicide for management of aquatic vegetation in fresh water ponds, lakes, reservoirs, potable water sources, drainage canals, irrigation canals and rivers.

Active Ingredient	
Fluridone:	
1-methyl-3-phenyl-5-[3-(trifluoromethyl)phenyl]	
-4(1*H*)-pyridinone	5.0%
Other Ingredients	95.5%
TOTAL	100.0%

Contains 0.05 pounds active ingredient per pound.

Keep Out of Reach of Children

CAUTION / PRECAUCIÓN

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

Precautionary Statements

Hazards to Humans and Domestic Animals

Harmful if Swallowed, Absorbed Through Skin, or if Inhaled

Avoid breathing of dust or contact with skin, eyes or clothing. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash before reuse.

ENVIRONMENTAL HAZARDS

Follow use directions carefully so as to minimize adverse effects on non-target organisms. In order to avoid impact on threatened or endangered aquatic plant or animal species, users must consult their State Fish and Game Agency or the U.S. Fish and Wildlife Service before making applications.

Trees and shrubs growing in water treated with Sonar Q may occasionally develop chlorosis. Do not apply in tidewater/brackish water.

Lowest rates should be used in shallow areas where the water depth is considerably less than the average depth of the entire treatment site, for example, shallow shoreline areas.

First Aid	
If in eyes	• Hold eye open and rinse slowly and gently with water for 15 - 20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. • Call poison control center or doctor for treatment advice.
If on skin or clothing	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15 – 20 minutes. • Call a poison control center or doctor for treatment advice.
If swallowed	• Call a poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if able to swallow. • Do not induce vomiting unless told to do so by a poison control center or doctor. • Do not give anything by mouth to an unconscious person.
If inhaled	• Move person to fresh air. • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. • Call a poison control center or doctor for further treatment advice.

EMERGENCY NUMBER

Have the product container or label with you when calling a poison control center or doctor, or going for treatment. In case of emergency endangering health or the environment involving this product, call **INFOTRAC** at **1-800-535-5053**.

Refer to inside of label booklet for additional precautionary information and Directions for Use.

Notice: Read the entire label before using. Use only according to label directions. **Before buying or using this product, read "Warranty Disclaimer", "Inherent Risks of Use"** and **"Limitation of Remedies"** inside label booklet.

For product information, visit our web site at **www.sepro.com**.

EPA Reg. No. 67690-3
FPL 060206

SePRO Corporation Carmel, IN 46032 U.S.A.

Directions for Use

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling.

Read all Directions Carefully Before Applying Sonar Q.

GENERAL INSTRUCTIONS

Sonar Q herbicide is a selective systemic aquatic herbicide for management of aquatic vegetation in fresh water ponds, lakes, reservoirs, drainage canals, irrigation canals, and rivers. Sonar Q is a pelleted formulation containing 5% fluridone. Sonar is absorbed from water by plant shoots and from hydrosoil by the roots of aquatic vascular plants. It is important to maintain Sonar in contact with the target plants for as long as possible. Rapid water movement or any condition which results in rapid dilution of Sonar in treated water will reduce its effectiveness. In susceptible plants, Sonar inhibits the formation of carotene. In the absence of carotene, chlorophyll is rapidly degraded by sunlight. Herbicidal symptoms of Sonar appear in seven to ten days and appear as white (chlorotic) or pink growing points. Under optimum conditions 30 to 90 days are required before the desired level of aquatic weed management is achieved with Sonar. Species susceptibility to Sonar Q may vary depending on time of year, stage of growth and water movement. For best results, apply Sonar Q prior to initiation of weed growth or when weeds begin active growth. Application to mature target plants may require higher application rates and may take longer to control.

Sonar Q is not corrosive to application equipment.

The label provides recommendations on the use of a chemical analysis for the active ingredient. SePRO Corporation recommends the use of an Enzyme-Linked Immunoassay (ELISA Test) for the determination of the active ingredient concentration in the water. Contact SePRO Corporation to incorporate this test, known as a FasTEST*, into your treatment program. Other proven chemical analyses for the active ingredient may also be used. The chemical analysis, FasTEST, is referenced in this label as the preferred method for the rapid determination of the concentration of the active ingredient in the water.

Application rates are provided in pounds of Sonar Q to achieve a desired concentration of the active ingredient in part per billion (ppb). The maximum application rate or sum of all application rates is 90 ppb in ponds and 150 ppb in lakes and reservoirs per annual growth cycle. This maximum concentration is the amount of product calculated as the target application rate, NOT determined by testing the residues of the active ingredient in the treated water.

GENERAL USE PRECAUTIONS

- **Obtain required permits:** Consult with appropriate state or local water authorities before applying this product. Permits may be required by state or local public agencies.

- **NEW YORK STATE:** Application of Sonar Q is not permitted in waters less than two (2) feet deep.

- **Hydroponic Farming:** Do not use Sonar Q treated water for hydroponic farming.

- **Greenhouse and Nursery Plants:** Do not use Sonar Q treated water for irrigating greenhouse or nursery plants. Use of an approved assay should confirm that residues are <1 ppb.

- **Water Use Restrictions Following Applications with Sonar Q (Days)**

Application Rate	Drinking†	Fishing	Swimming	Livestock/Pet Consumption	Irrigation††
Maximum Rate (150 ppb) or less	0	0	0	0	See irrigation instructions below

† Note below, under Potable Water Intakes, the information for application of Sonar Q within 1/4 miles, (1320 feet) of a functioning potable water intake.

††Note below, under Irrigation, specific time frames or fluridone residues that provide the widest safety margin for irrigating with fluridone treated water.

- **Potable Water Intakes:** Concentrations of the active ingredient fluridone up to 150 ppb are allowed in potable water sources; however, in lakes and reservoirs or other sources of potable water, **DO NOT APPLY** Sonar Q at application rates greater than 20 ppb within one-fourth mile (1320 feet) of any functioning potable water intake. At application rates of 8 - 20 ppb, Sonar Q **MAY BE APPLIED** where functioning potable water intakes are present.
  Note: Existing potable water intakes which are no longer in use, such as those replaced by connections to potable water wells or a municipal water system, are not considered to be functioning potable water intakes.

- **Irrigation:** Irrigation with Sonar Q treated water may result in injury to the irrigated vegetation. SePRO Corporation recommends following these precautions and informing those who irrigate from areas treated with Sonar Q of the irrigation time frames or water assay requirements presented in the table below. These time frames and assay recommendations are suggestions which should be followed to reduce the potential for injury to vegetation irrigated with water treated with Sonar Q. Greater potential for crop injury occurs where Sonar Q treated water is applied to crops grown on low organic and sandy soils.

Days After Application			
Application Site	Established Tree Crops	Established Row Crops/ Turf/Plants	Newly Seeded Crops/Seedbeds or Areas to be Planted Including Overseeded Golf Course Greens
†Ponds and Static Canals	7	30	Assay required
Canals	7	7	Assay required
Rivers	7	7	Assay required
††Lakes and Reservoirs	7	7	Assay required

† For purposes of Sonar Q labeling, a pond is defined as a body of water 10 acres or less in size. A lake or reservoir is greater than 10 acres.

†† In lakes and reservoirs where one-half or greater of the body of water is treated, use the pond and static canal irrigation precautions.

Where the use of Sonar Q treated water is desired for irrigating crops prior to the time frames established above, the use of FasTEST assay is recommended to measure the concentration in the treated water. Where FasTEST has determined that concentrations are less than 10 parts per billion, there are no irrigation precautions for irrigating established tree crops, established row crops or turf. **For tobacco, tomatoes, peppers or other plants within the Solanaceae Family and newly seeded crops or newly seeded grasses such as overseeded golf course greens, do not use Sonar Q treated water if concentration are greater than 5 ppb; furthermore, when rotating crops, do not plant members of the Solanaceae family in land that has been previously irrigated with fluridone concentrations in excess of 5 ppb. It is recommended that an aquatic specialist be consulted prior to commencing irrigation of these sites.**

PLANT CONTROL INFORMATION

Sonar Q selectivity is dependent upon dosage, time of year, stage of growth, method of application, and water movement. The following categories, controlled, partially controlled, and not controlled are provided to describe expected efficacy under ideal treatment conditions using higher to maximum label rates. Use of lower rates will increase selectivity of some species listed as controlled or partially controlled. Additional aquatic plants may be controlled, partially controlled, or tolerant to Sonar Q. Consult an aquatic specialist prior to application of Sonar Q to determine a plant's susceptibility to Sonar Q.

VASCULAR AQUATIC PLANTS CONTROLLED BY SONAR Q†

Submersed Plants:

Bladderwort (*Utricularia* spp.)
Common coontail (*Ceratophyllum demersum*)
Common Elodea (*Elodea canadensis*)
Egeria, Brazilian Elodea (*Egeria densa*)
Fanwort, Cabomba (*Cabomba caroliniana*)
Hydrilla (*Hydrilla verticillata*)
Naiad (*Najas* spp.)
Pondweed (*Potamogeton* spp., except Illinois pondweed)
Watermilfoil (*Myriophyllum* spp. except variable-leaf milfoil)

Shoreline Grasses:

Paragrass (*Urochloa mutica*)

†Species denoted by an asterisk are native plants that are often tolerant to Sonar at lower use rates. Please consult an aquatic specialist for recommended Sonar Q use rates when selective control of exotic species is desired.

VASCULAR AQUATIC PLANTS PARTIALLY CONTROLLED BY SONAR Q

Floating Plants:

Salvinia (*Salvinia* spp.)

Emersed Plants:

Alligatorweed (*Alternanthera philoxeroides*)
American lotus (*Nelumbo lutea*)
Cattail (*Typha* spp.)
Creeping waterprimrose (*Ludwigia peploides*)
Parrotfeather (*Myriophyllum aquaticum*)
Smartweed (*Polygonum* spp.)
Spatterdock (*Nuphar luteum*)
Spikerush (*Eleocharis* spp.)
Waterlily (*Nymphaea* spp.)
Waterpurslane (*Ludwigia palustris*)
Watershield (*Brasenia schreberi*)

Submersed Plants:

Illinois pondweed (*Potamogeton illinoensis*)
Limnophila (*Limnophila sessiliflora*)
Tapegrass, American eelgrass (*Vallisneria americana*)
Watermilfoil–variable-leaf (*Myriophyllum heterophyllum*)

Shoreline Grasses:

Barnyardgrass (*Echinochloa crusgalli*)
Giant cutgrass (*Zizaniopsis miliacea*)
Reed canarygrass (*Philaris arundinaceae*)
Southern watergrass (*Hydrochloa caroliniensis*)
Torpedograss (*Panicum repens*)

VASCULAR AQUATIC PLANTS NOT CONTROLLED BY SONAR Q

Floating Plants:

Floating waterhyacinth (*Eichhornia crassipes*)

Waterlettuce (*Pistia stratiotes*)

Emersed Plants:

American frogbit (*Limnobium spongia*)

Arrowhead (*Sagittaria* spp.)

Bacopa (*Bacopa* spp.)

Big floatingheart, banana lily (*Nymphoides aquatica*)

Bulrush (*Scirpus* spp.)

Pickerelweed, lanceleaf (*Pontederia* spp.)

Rush (*Juncus* spp.)

Water pennywort (*Hydrocotyle* spp.)

Shoreline Grasses:

Maidencane (*Panicum hemitomon*)

NOTE: Algae (chara, nitella, and filamentous species are not controlled by Sonar Q).

APPLICATION DIRECTIONS

The aquatic plants present in the treatment site should be identified prior to application to determine their susceptibility to Sonar Q. It is important to determine the area (acres) to be treated and the average depth in order to select the proper application rate. Do not exceed the maximum labeled rate for a given treatment site per annual growth cycle.

Application to Ponds

Sonar Q may be applied to the entire surface area of a pond. For single applications, rates may be selected to provide 45 to 90 ppb to the treated water, although actual concentrations in treated water may be substantially lower at any point in time due to the slow-release formulation of this product. When treating for optimum selective control, lower rates may be applied for sensitive target species. Use the higher rate within the rate range where there is a dense weed mass, when treating more difficult to control species, and for ponds less than 5 acres in size with an average depth less than 4 feet. Application rates necessary to obtain these concentrations in treated water are shown in the following table. For additional application rate calculations, refer to *Application Rate Calculations – Ponds, Lakes and Reservoirs*. Split or multiple applications are recommended where dilution of treated water is anticipated; however, the sum of all applications should total 45 to 90 ppb and must not exceed a total of 90 ppb per annual growth cycle.

Application Rates for Ponds

Average Water Depth of Treatment Site (feet)	Pounds of Sonar Q per treated surface acre 45 ppb to 90 ppb	
1	2.5	5
2	5	10
3	7.5	15
4	10	20
5	12.5	25
6	15	30
7	17	34
8	19.5	39
9	22	44
10	24.5	49

Application to Lakes and Reservoirs

The following treatments are recommended for treating both whole lakes or reservoirs and partial areas of lakes or reservoirs (bays, etc.). For best results in treating partial lakes and reservoirs, Sonar Q treatment areas should be a minimum of 5 acres in size. Treatment of areas smaller than 5 acres or treatment of narrow strips such as boat lanes or shorelines may not produce satisfactory results due to dilution by untreated water. Rate ranges are provided as a guide to include a wide range of environmental factors, such as target species, plant susceptibility, selectivity and other aquatic plant management objectives. Application rates and methods should be selected to meet the specific lake/reservoir aquatic plant management goals.

A. Whole Lake or Reservoir Treatments (Limited or No Water Discharge)

1. Single Application to Whole Lakes or Reservoirs

Where single applications to whole lakes or reservoirs are desired, apply Sonar Q at an application rate of 16 to 90 ppb. Application rates necessary to obtain these concentrations in treated water are shown in the following table. For additional rate calculations, refer to *Application Rate Calculation – Ponds, Lakes and Reservoirs*. Choose an application rate to meet the aquatic plant management objective. **Where greater plant selectivity is desired such as when controlling Eurasian watermilfoil and curlyleaf pondweed, choose an application rate lower in the rate range.** For other plant species, SePRO recommends contacting an aquatic specialist in determining when to choose application rates lower in the rate range to meet specific plant management goals. Use the higher rate within the rate range where there is a dense weed mass or when treating more difficult to control plant species or in the event of a heavy rainfall event where dilution has occurred. In these cases, a second application or more may be required; however, the sum of all applications cannot exceed 150 ppb per annual growth cycle. Refer to the following Section (No. 2) *Split or Multiple Applications* for guidelines and maximum rate allowed.

Single Application Rates

Average Water Depth of Treatment Site (feet)	Pounds of Sonar Q per treated surface acre 45 ppb to 90 ppb	
1	0.9	5
2	1.7	10
3	2.6	15
4	3.5	20
5	4.3	25
6	5.2	30
7	6.0	34
8	6.9	39
9	7.8	44
10	8.6	49
11	9.5	54
12	10.4	59
13	11.2	64
14	12.1	68
15	13.0	73
16	13.8	78
17	14.7	83
18	15.6	88
19	16.4	93
20	17.3	98

2. Split or Multiple Applications to Whole Lakes or Reservoirs

To meet certain plant management objectives, split or multiple applications may be desired in making whole lake treatments. Split or multiple application programs are desirable when the objective is to use the minimum effective dose and to maintain this lower dose for the sufficient time to ensure efficacy and enhance selectivity. Under these situations, use the lower rates (16 to 75 ppb) within the rate range. **In controlling Eurasian watermilfoil and curlyleaf pondweed and where greater plant selectivity is desired, choose an application rate lower in the rate range.** For other plant species, SePRO recommends contacting an aquatic specialist in determining when to choose application rates lower in the rate range to meet specific plant management goals. For split or repeated applications, the sum of all applications must not exceed 150 ppb per annual growth cycle.

NOTE: In treating lakes or reservoirs that contain potable water intakes and the application requires treating within 1/4 mile of a potable water intake, no single application can exceed 20 ppb. Additionally, the sum of all applications cannot exceed 150 ppb per annual growth cycle.

B. Partial Lake or Reservoir Treatments

Where dilution of Sonar Q with untreated water is anticipated, such as in partial lake or reservoir treatments, split or multiple applications may be used to extend the contact time to the target plants. The application rate and use frequency of Sonar Q in a partial lake is highly dependent upon the treatment area. Higher application rates may be required and frequency of applications will vary depending upon the potential of untreated water diluting the Sonar Q concentration in the treatment area. Use higher rates where greater dilution with untreated water is anticipated.

1. Application Sites Greater Than 1/4 Mile from a Functioning Potable Water Intake

For single applications, apply Sonar Q at application rates from 45 to 150 ppb. Split or multiple applications may be made; however, the sum of all applications cannot exceed 150 ppb per annual growth cycle. Split applications should be conducted to maintain a sufficient concentration in the target area for a period of 45 days or longer. The use of FasTEST is recommended to maintain the desired concentration in the target area over time.

2. Application Sites Within 1/4 Mile of a Functioning Potable Water Intake

In treatment areas that are within 1/4 mile of a potable water intake, no single application can exceed 20 ppb. When utilizing split or repeated applications of Sonar Q for sites which contain a potable water intake, FasTEST is required to determine the actual concentration in the water. Additionally, the sum of all applications cannot exceed 150 ppb per annual growth cycle.

APPLICATION RATE CALCULATION – PONDS, LAKES AND RESERVOIRS

The amount of Sonar Q to be applied to provide the desired ppb concentration of active ingredient equivalents in treated water may be calculated as follows:

- Pounds of Sonar Q required per treated acre **=** Average water depth of treatment site **x** Desired ppb concentration of active ingredient equivalents **x** 0.054

For example, the pounds per acre of Sonar Q required to provide a concentration of 25 ppb of active ingredient equivalents in water with an average depth of 5 feet is calculated as follows:

5 **x** 25 **x** 0.054 **=** 6.75 pounds per treated surface acre.

NOTE: Calculated rates should not exceed the maximum allowable rate in pounds per treated surface acre for the water depth listed in the application rate table for the site to be treated.

APPLICATION TO DRAINAGE CANALS, IRRIGATION CANALS AND RIVERS

Static Canals: In static drainage and irrigation canals, Sonar Q should be applied at the rate of 20 to 40 pounds per surface acre.

Moving Water Canals and Rivers: The performance of Sonar Q will be enhanced by restricting or reducing water flow. In slow moving bodies of water use an application technique that maintains a concentration of 10 to 40 ppb in the applied area for a minimum of 45 days. Sonar Q can be applied by split or multiple broadcast applications or by metering in the product to provide a uniform concentration of the herbicide based upon the flow pattern. The use of FasTEST is recommended to maintain the desired concentration in the target area over time.

Static or Moving Water Canals or Rivers Containing a Functioning Potable Water Intake: In treating a static or moving water canal or river which contains a functioning potable water intake, applications of Sonar Q greater than 20 ppb must be made more than 1/4 mile from a functioning potable water intake. Applications less than 20 ppb may be applied within 1/4 mile from a functioning potable water intake; however, if applications of Sonar Q are made within 1/4 mile from a functioning water intake, the FasTEST must be utilized to demonstrate that concentrations do not exceed 150 ppb at the potable water intake.

APPLICATION RATE CALCULATION – DRAINAGE CANALS, IRRIGATION CANALS AND RIVERS

The amount of Sonar Q to be applied through a metering system to provide the desired ppb concentration of active ingredient in treated water may be calculated as follows:

1. Average flow rate (feet per second) **x** average width (ft.) **x** average depth (ft.) x 0.9 **=** CFS (cubic feet per second)

2. CFS **x** 1.98 **=** acre feet per day (water movement)

3. Acre feet per day **x** desired ppb **x** 0.054 **=** pounds Sonar Q required per day

Storage and Disposal

Do not contaminate water, food or feed by storage or disposal.

Pesticide Storage: Store in original container only. Do not store near feed or foodstuffs. In case of leak or spill, contain material and dispose as waste.
Pesticide Disposal: Wastes resulting from use of this product may be used according to label directions or disposed of at an approved waste disposal facility.
Container Disposal: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by incineration, or if allowed by State and Local authorities, by burning. If burned, stay out of smoke.
General: Consult federal, state, or local disposal authorities for approved alternative procedures.

Warranty Disclaimer

SePRO Corporation warrants that the product conforms to the chemical description on the label and is reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. SEPRO CORPORATION MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY.

Inherent Risks Of Use

It is impossible to eliminate all risks associated with use of this product. Plant injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label such as unfavorable temperatures, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner or application, or other factors, all of which are beyond the control of SePRO Corporation as the seller. All such risks shall be assumed by buyer.

Limitation of Remedies

The exclusive remedy for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories) shall be limited to, at SePRO Corporation's election, one of the following:

1. Refund of purchase price paid by buyer or user for product bought, or
2. Replacement of amount of product used.

SePRO Corporation shall not be liable for losses or damages resulting from handling or use of this product unless SePRO Corporation is promptly notified of such losses or damages in writing. In no case shall SePRO Corporation be liable for consequential or incidental damages or losses.

The terms of the Warranty Disclaimer above and this Limitation of Remedies can not be varied by any written or verbal statements or agreements. No employee or sales agent of SePRO Corporation or the seller is authorized to vary or exceed the terms of the Warranty Disclaimer or Limitations of Remedies in any manner.

Specimen Label

Sonar* PR

Aquatic Herbicide

An herbicide for management of aquatic vegetation in fresh water ponds, lakes, reservoirs, potable water sources, drainage canals, irrigation canals and rivers.

Active Ingredient	
Fluridone: 1-methyl-3-phenyl-5-[3-(trifluoromethyl) phenyl]-4(1*H*)-pyridinone	5.0%
Other Ingredients	95.0%
TOTAL	100.0%

Contains 0.05 pound active ingredient per pound.

Precautionary Statements

Hazards to Humans and Domestic Animals

Keep Out of Reach of Children

CAUTION / PRECAUCIÓN

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

Harmful if Swallowed, Absorbed Through Skin, or if Inhaled. Avoid breathing of dust or contact with skin, eyes or clothing. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash before reuse.

ENVIRONMENTAL HAZARDS

Follow use directions carefully so as to minimize adverse effects on non-target organisms. Trees and shrubs growing in water treated with Sonar PR may occasionally develop chlorosis. Do not apply in tidewater/brackish water. Lowest rates should be used in shallow areas where the water depth is considerably less than the average depth of the entire treatment site, for example, shallow shoreline areas.

First Aid	
If in eyes	• Hold eye open and rinse slowly and gently with water for 15 - 20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. • Call a poison control center or doctor for treatment advice.
If on skin or clothing	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15 - 20 minutes. • Call a poison control center or doctor for treatment advice.
If swallowed	• Call a poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if able to swallow. • Do not induce vomiting unless told to do so by a poison control center or doctor. • Do not give anything by mouth to an unconscious person.
If inhaled	• Move person to fresh air. • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. • Call a poison control center or doctor for further treatment advice.

EMERGENCY NUMBER
Have the product container or label with you when calling a poison control center or doctor, or going for treatment. For medical emergencies involving this product, call **1-800-535-5053**.

Notice: Read the entire label before using. Use only according to label directions. **Before buying or using this product, read *Warranty Disclaimer, Inherent Risks of Use,*** and ***Limitation of Remedies*** inside label booklet.

For additional information on our products, please visit **www.sepro.com.**

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FPL081808

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SePRO Corporation 11550 North Meridian Street, Suite 600, Carmel, IN 46032 U.S.A.

Directions for Use

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling.

Read all directions carefully before applying Sonar PR.

GENERAL INFORMATION

Sonar PR herbicide is a selective systemic aquatic herbicide for management of aquatic vegetation in fresh water ponds, lakes, reservoirs, drainage canals, irrigation canals, and rivers. Sonar PR is a pelleted formulation containing 5% fluridone. Sonar PR is absorbed from water by plant shoots and from hydrosoil by the roots of aquatic vascular plants. It is important to maintain Sonar PR in contact with the target plants for as long as possible. Rapid water movement or any condition which results in rapid dilution of Sonar PR in treated water will reduce its effectiveness.

In susceptible plants, Sonar PR inhibits the formation of carotene. In the absence of carotene, chlorophyll is rapidly degraded by sunlight. Herbicidal symptoms of Sonar PR appear in seven to ten days and appear as white (chlorotic) or pink growing points. Under optimum conditions 30 to 90 days are required before the desired level of aquatic weed management is achieved with Sonar PR. Species susceptibility to Sonar PR may vary depending on time of year, stage of growth and water movement. For best results, apply Sonar PR prior to initiation of weed growth or when weeds begin active growth. Application to mature target plants may require an application rate at the higher end of the specified rate range and may take longer to control.

Sonar PR is not corrosive to application equipment.

The label provides recommendations on the use of a chemical analysis for the active ingredient. SePRO Corporation recommends the use of an Enzyme-Linked Immunoassay (ELISA Test) for the determination of the active ingredient concentration in the water. Contact SePRO Corporation to incorporate this test, known as a FasTEST,* into your treatment program. Other proven chemical analyses for the active ingredient may also be used. The chemical analysis, a FasTEST, is referenced in this label as the preferred method for the rapid determination of the concentration of the active ingredient in the water.

Application rates are provided in pounds of Sonar PR to achieve a desired concentration of the active ingredient in parts per billion (ppb). **The maximum application rate or sum of all application rates is 90 ppb in ponds and 150 ppb in lakes and reservoirs per annual growth cycle.** This maximum concentration is the amount of product calculated as the target application rate, NOT determined by testing the residues of the active ingredient in the treated water.

GENERAL USE PRECAUTIONS

- **Obtain required permits:** Consult with appropriate state or local water authorities before applying this product. Permits may be required by state or local public agencies.

- **NEW YORK STATE:** Application of Sonar PR is not permitted in waters less than two (2) feet deep.

- **Hydroponic Farming:** Do not use Sonar PR treated water for hydroponic farming.

- **Greenhouse and Nursery Plants:** Do not use Sonar PR treated water for irrigating greenhouse or nursery plants unless a FasTEST assay has been run and confirmed that residues are less than 1 ppb.

- **Water use restrictions following applications with Sonar PR (Days)**

Application Rate	Drinking†	Fishing	Swimming	Livestock/Pet Consumption	Irrigation††
Maximum Rate (150 ppb) or less	0	0	0	0	See irrigation instructions below

† Note below, under *Potable Water Intakes*, the information for application of Sonar PR within 1/4 miles (1,320 feet) of a functioning potable water intake.

†† Note below, under *Irrigation*, specific time frames or fluridone residues that provide the widest safety margin for irrigating with fluridone treated water.

- **Potable Water Intakes:** Concentrations of the active ingredient fluridone up to 150 ppb are allowed in potable water sources; however, in lakes and reservoirs or other sources of potable water, **DO NOT APPLY** Sonar PR at application rates greater than 20 ppb within one-fourth (1/4) mile (1,320 feet) of any functioning potable water intake. At application rates of 8 - 20 ppb, Sonar PR **MAY BE APPLIED** where functioning potable water intakes are present. **Note: Existing potable water intakes which are no longer in use, such as those replaced by connections to potable water wells or a municipal water system, are not considered to be functioning potable water intakes.**

- **Irrigation:** Irrigation with Sonar PR treated water may result in injury to the irrigated vegetation. Follow these precautions and inform those who irrigate from areas treated with Sonar PR of the irrigation time frames or water FasTEST assay requirements presented in the table below. These time frames and a FasTEST assay recommendations are suggestions which should be followed to reduce the potential for injury to vegetation irrigated with water treated with Sonar PR. Greater potential for crop injury occurs where Sonar PR treated water is applied to crops grown on low organic and sandy soils.

Days After Application			
Application Site	Established Tree Crops	Established Row Crops/ Turf/Plants	Newly Seeded Crops/Seedbeds or Areas to be Planted Including Overseeded Golf Course Greens
Ponds and Static Canals†	7	30	FasTEST assay required
Canals	7	7	FasTEST assay required
Rivers	7	7	FasTEST assay required
Lakes and Reservoirs††	7	7	FasTEST assay required

† For purposes of Sonar PR labeling, a pond is defined as a body of water 10 acres or less in size. A lake or reservoir is greater than 10 acres.

†† In lakes and reservoirs where one-half or greater of the body of water is treated, use the pond and static canal irrigation precautions.

Where the use of Sonar PR treated water is desired for irrigating crops prior to the time frames established above, the use of a FasTEST assay is recommended to measure the concentration in the treated water. Where a FasTEST has determined that concentrations are less than 10 parts per billion, there are no irrigation precautions for irrigating established tree crops, established row crops or turf. **For tobacco, tomatoes, peppers or other plants within the Solanaceae Family and newly seeded crops or newly seeded grasses such as overseeded golf course greens, do not use Sonar PR treated water if concentrations are greater than 5 ppb; furthermore, when rotating crops, do not plant members of the Solanaceae family in land that has been previously irrigated with fluridone concentrations in excess of 5 ppb. It is recommended that an aquatic specialist be consulted prior to commencing irrigation of these sites.**

PLANT CONTROL INFORMATION

Sonar PR selectivity is dependent upon dosage, time of year, stage of growth, method of application, and water movement. The following categories, controlled, partially controlled, and not controlled are provided to describe expected efficacy under ideal treatment conditions using higher to maximum label rates. Use of lower rates will increase selectivity of some species listed as controlled or partially controlled. Additional aquatic plants may be controlled, partially controlled, or tolerant to Sonar PR. Consult an aquatic specialist prior to application of Sonar PR to determine a plant's susceptibility to Sonar PR.

VASCULAR AQUATIC PLANTS CONTROLLED BY SONAR PR[1]

Submersed Plants:

Bladderwort (*Utricularia* spp.)
Common coontail (*Ceratophyllum demersum*)†
Common Elodea (*Elodea canadensis*)†
Egeria, Brazilian Elodea (*Egeria densa*)
Fanwort, Cabomba (*Cabomba caroliniana*)
Hydrilla (*Hydrilla verticillata*)
Naiad (*Najas* spp.)†
Pondweed (*Potamogeton* spp., except Illinois pondweed)†
Watermilfoil (*Myriophyllum* spp. except variable-leaf milfoil)

Shoreline Grasses:

Paragrass (*Urochloa mutica*)

1 Species denoted by a dagger (†) are native plants that are often tolerant to fluridone at lower use rates. Please consult an aquatic specialist for recommended Sonar PR use rates (not to exceed maximum labeled rates) when selective control of exotic species is desired.

VASCULAR AQUATIC PLANTS PARTIALLY CONTROLLED BY SONAR PR PRECISION RELEASE:

Submersed Plants:

Illinois pondweed (*Potamogeton illinoensis*)
Limnophila (*Limnophila sessiliflora*)
Tapegrass, American eelgrass (*Vallisneria americana*)
Watermilfoil–variable-leaf (*Myriophyllum heterophyllum*)

Emersed Plants:

Alligatorweed (*Alternanthera philoxeroides*)
American lotus (*Nelumbo lutea*)
Cattail (*Typha* spp.)
Creeping waterprimrose (*Ludwigia peploides*)
Parrotfeather (*Myriophyllum aquaticum*)
Smartweed (*Polygonum* spp.)
Spatterdock (*Nuphar luteum*)
Spikerush (*Eleocharis* spp.)
Waterlily (*Nymphaea* spp.)
Waterpurslane (*Ludwigia palustris*)
Watershield (*Brasenia schreberi*)

Floating Plants:

Salvinia (*Salvinia* spp.)

Shoreline Grasses:

Barnyardgrass (*Echinochloa crusgalli*)
Giant cutgrass (*Zizaniopsis miliacea*)
Reed canarygrass (*Philaris arundinaceae*)
Southern watergrass (*Hydrochloa caroliniensis*)
Torpedograss (*Panicum repens*)

VASCULAR AQUATIC PLANTS NOT CONTROLLED BY SONAR PR PRECISION RELEASE:

Emersed Plants:

American frogbit (*Limnobium spongia*)

Arrowhead (*Sagittaria* spp.)

Bacopa (*Bacopa* spp.)

Big floatingheart, banana lily (*Nymphoides aquatica*)

Bulrush (*Scirpus* spp.)

Pickerelweed, lanceleaf (*Pontederia* spp.)

Rush (*Juncus* spp.)

Water pennywort (*Hydrocotyle* spp.)

Floating Plants:

floating waterhyacinth (*Eichhornia crassipes*)

waterlettuce (*Pistia stratiotes*)

Shoreline Grasses:

Maidencane (*Panicum hemitomon*)

NOTE: Algae (chara, nitella, and filamentous species) are not controlled by Sonar PR.

APPLICATION DIRECTIONS

The aquatic plants present in the treatment site should be identified prior to application to determine their susceptibility to Sonar PR. It is important to determine the area (acres) to be treated and the average depth in order to select the proper application rate. Do not exceed the maximum labeled rate for a given treatment site per annual growth cycle.

Application to Ponds

Sonar PR may be applied to the entire surface area of a pond. For single applications, rates may be selected to provide 45 to 90 ppb to the treated water, although actual concentrations in treated water may be substantially lower at any point in time due to the slow-release formulation of this product. When treating for optimum selective control, lower rates may be applied for sensitive target species. Use the higher rate within the rate range where there is a dense weed mass, when treating more difficult to control species, and for ponds less than 5 acres in size with an average depth less than 4 feet. Application rates necessary to obtain these concentrations in treated water are shown in the following table. For additional application rate calculations, refer to the *Application Rate Calculation—Ponds, Lakes and Reservoirs* section of this label. Split or multiple applications may be used where dilution of treated water is anticipated; however, the sum of all applications should total 45 to 90 ppb and must not exceed a total of 90 ppb per annual growth cycle.

Average Water Depth of Treatment Site (feet)	Pounds of Sonar PR per treated surface acre	
	45 ppb	90 ppb
1	2.5	5.0
2	5.0	10.0
3	7.5	15.0
4	10.0	20.0
5	12.5	25.0
6	15.0	30.0
7	17.0	34.0
8	19.5	39.0
9	22.0	44.0
10	24.5	49.0

Application to Lakes and Reservoirs

The following treatments may be used for treating both whole lakes or reservoirs and partial areas of lakes or reservoirs (bays, etc.). For best results in treating partial lakes and reservoirs, Sonar PR treatment areas should be a minimum of 5 acres in size. Treatment of areas smaller than 5 acres or treatment of narrow strips such as boat lanes or shorelines may not produce satisfactory results due to dilution by untreated water. Rate ranges are provided as a guide to include a wide range of environmental factors, such as target species, plant susceptibility, selectivity and other aquatic plant management objectives. Application rates and methods should be selected to meet the specific lake/reservoir aquatic plant management goals.

A. Whole Lake or Reservoir Treatments

(Limited or No Water Discharge)

1. Single Application to Whole Lakes or Reservoirs

Where single applications to whole lakes or reservoirs are desired, apply Sonar PR at an application rate of 16 to 90 ppb. Application rates necessary to obtain these concentrations in treated water are shown in the following table. For additional application rate calculations, refer to the *Application Rate Calculation—Ponds, Lakes and Reservoirs* section of this label. Choose an application rate from the table below to meet the aquatic plant management objective. **Where greater plant selectivity is desired such as when controlling Eurasian watermilfoil and curlyleaf pondweed, choose an application rate lower in the rate range.** For other plant species, SePRO recommends contacting an aquatic specialist in determining when to choose application rates lower in the rate range to meet specific plant management goals. Use the higher rate within the rate range where there is a dense weed mass or when treating more difficult to control plant species or in the event of a heavy rainfall event where dilution has occurred. In these cases, a second application or more may be required; however, the sum of applications cannot exceed 150 ppb per annual growth cycle. Refer to the section of this label entitled, *Split or Multiple Applications to Whole Lakes or Reservoirs*, for guidelines and maximum rate allowed.

Average Water Depth of Treatment Site (feet)	Pounds of Sonar PR per treated surface acre	
	16 ppb	90 ppb
1	0.9	5.0
2	1.7	10.0
3	2.6	15.0
4	3.5	20.0
5	4.3	25.0
6	5.2	30.0
7	6.0	34.0
8	6.9	39.0
9	7.8	44.0
10	8.6	49.0
11	9.5	54.0
12	10.4	59.0
13	11.2	64.0
14	12.1	68.0
15	13.0	73.0
16	13.8	78.0
17	14.7	83.0
18	15.6	88.0
19	16.4	93.0
20	17.3	98.0

2. Split or Multiple Applications to Whole Lakes or Reservoirs

To meet certain plant management objectives, split or multiple applications may be desired in making whole lake treatments. Split or multiple application programs are desirable when the objective is to use the minimum effective dose and to maintain this lower dose for the sufficient time to ensure efficacy and enhance selectivity. Under these situations, use the lower rates (16 to 75 ppb) within the rate range. **In controlling Eurasian watermilfoil and curlyleaf pondweed and where greater plant selectivity is desired, choose an application rate lower in the rate range.** For other plant species, SePRO recommends contacting an aquatic specialist in determining when to choose application rates lower in the rate range to meet specific plant management goals. For split or repeated applications, the sum of all applications must not exceed 150 ppb per annual growth cycle.

NOTE: In treating lakes or reservoirs that contain potable water intakes and the application requires treating within 1/4 mile of a potable water intake, no single application can exceed 20 ppb. Additionally, the sum of all applications cannot exceed 150 ppb per annual growth cycle.

B. Partial Lake or Reservoir Treatments

Where dilution of Sonar PR with untreated water is anticipated, such as in partial lake or reservoir treatments, split or multiple applications may be used to extend the contact time to the target plants. The application rate and use frequency of Sonar PR in a partial lake is highly dependent upon the treatment area.

An application rate at the higher end of the specified rate range may be required and frequency of applications will vary depending upon the potential of untreated water diluting the Sonar PR concentration in the treatment area. Use a rate at the higher end of the rate range where greater dilution with untreated water is anticipated.

1. Application Sites Greater Than 1/4 Mile from a Functioning Potable Water Intake

For single applications, apply Sonar PR at application rates from 45 to150 ppb. Split or multiple applications may be made; however, the sum of all applications cannot exceed 150 ppb per annual growth cycle. Split applications should be conducted to maintain a sufficient concentration in the target area for a period of 45 days or longer. The use of a FasTEST is recommended to maintain the desired concentration in the target area over time.

2. Application Sites Within 1/4 Mile of a Functioning Potable Water Intake

In treatment areas that are within 1/4 mile of a potable water intake, no single application can exceed 20 ppb. When utilizing split or repeated applications of Sonar PR for sites which contain a potable water intake, a FasTEST is required to determine the actual concentration in the water. Additionally, the sum of all applications cannot exceed 150 ppb per annual growth cycle.

APPLICATION RATE CALCULATION – PONDS, LAKES AND RESERVOIRS

The amount of Sonar PR to be applied to provide the desired ppb concentration of active ingredient equivalents in treated water may be calculated as follows:

- **Pounds of Sonar PR required per treated acre =** Average water depth of treatment site **x** Desired ppb concentration of active ingredient equivalents **x** 0.054

For example, the pounds per acre of Sonar PR required to provide a concentration of 25 ppb of active ingredient equivalents in water with an average depth of 5 feet is calculated as follows:

5 **x** 25 **x** 0.054 **=** 6.75 pounds per treated surface acre.

NOTE: Calculated rates may not exceed the maximum allowable rate in pounds per treated surface acre for the water depth listed in the application rate table for the site to be treated.

APPLICATION TO DRAINAGE CANALS, IRRIGATION CANALS AND RIVERS

Static Canals: In static drainage and irrigation canals, apply Sonar PR at the rate of 20 to 40 pounds per surface acre.

Moving Water Canals and Rivers: The performance of Sonar PR will be enhanced by restricting or reducing water flow. In slow moving bodies of water use an application technique that maintains a concentration of 10 to 40 ppb in the applied area for a minimum of 45 days. Sonar PR can be applied by split or multiple broadcast applications or by metering in the product to provide a uniform concentration of the herbicide based upon the flow pattern. The use of a FasTEST is recommended to maintain the desired concentration in the target area over time.

Static or Moving Water Canals or Rivers Containing a Functioning Potable Water Intake: In treating a static or moving water canal or river which contains a functioning potable water intake, applications of Sonar PR greater than 20 ppb must be made more than 1/4 mile from a functioning potable water intake. Applications less than 20 ppb may be applied within 1/4 mile from a functioning potable water intake; however, if applications of Sonar PR are made within 1/4 mile from a functioning water intake, a FasTEST must be utilized to demonstrate that concentrations do not exceed 150 ppb at the potable water intake.

APPLICATION RATE CALCULATION – DRAINAGE CANALS, IRRIGATION CANALS AND RIVERS

The amount of Sonar PR to be applied through a metering system to provide the desired ppb concentration of active ingredient in treated water may be calculated as follows:

1. Average flow rate (feet per second) **x** average width (ft.) **x** average depth (ft.) x 0.9 **=** CFS (cubic feet per second)

2. CFS **x** 1.98 **=** acre feet per day (water movement)

3. Acre feet per day **x** desired ppb **x** 0.054 **=** pounds Sonar PR Precision Release required per day

Storage and Disposal

Do not contaminate water, food or feed by storage or disposal.

Pesticide Storage: Store in original container only. Do not store near feed or foodstuffs. In case of spill, contain material and dispose as waste.

Pesticide Disposal: Wastes resulting from use of this product may be used according to label directions or disposed of at an approved waste disposal facility.

Nonrefillable Container Disposal (rigid, ≤ 50 pounds): Do not reuse or refill this container. Triple rinse (or equivalent). Then offer for recycling (if available) or reconditioning, or puncture and dispose of in a sanitary landfill, or by incineration, or if allowed by State and Local authorities, by burning. If burned, stay out of smoke.

Refillable Container Disposal: Refill this container with pesticide only. Do not reuse this container for any other purpose. Cleaning the container before final disposal is the responsibility of the person disposing of the container. Cleaning before refilling is the responsibility of the refiller. To clean the container before final disposal, empty the remaining contents from this container into application equipment or mix tank. Fill the container about 10 percent full with water. Agitate vigorously or recirculate water with the pump for 2 minutes. Pour or pump rinsate into application equipment or rinsate collection system. Repeat this rinsing procedure two more times. Seal all openings which have been opened during use. Return the empty container to a collection site designated by SePRO Corporation. If the container has been damaged and cannot be returned according to the recommended procedures, contact SePRO Corporation at 1-800-419-7779 to obtain proper handling instructions.

Warranty Disclaimer

SePRO Corporation warrants that the product conforms to the chemical description on the label and is reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. To the extent consistent with applicable law, SEPRO CORPORATION MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY.

Inherent Risks of Use

It is impossible to eliminate all risks associated with use of this product. Plant injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label such as unfavorable temperatures, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner or application, or other factors, all of which are beyond the control of SePRO Corporation as the seller. To the extent consistent with applicable law, all such risks shall be assumed by buyer.

Limitation of Remedies

To the extent consistent with applicable law, the exclusive remedy for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories) shall be limited to, at SePRO Corporation's election, one of the following:

(1) Refund of purchase price paid by buyer or user for product bought, or
(2) Replacement of amount of product used.

To the extent consistent with applicable law, SePRO Corporation shall not be liable for losses or damages resulting from handling or use of this product unless SePRO Corporation is promptly notified of such losses or damages in writing. In no case shall SePRO Corporation be liable for consequential or incidental damages or losses.

The terms of the *Warranty Disclaimer* above and this *Limitation of Remedies* can not be varied by any written or verbal statements or agreements. No employee or sales agent of SePRO Corporation or the seller is authorized to vary or exceed the terms of the *Warranty Disclaimer* or *Limitations of Remedies* in any manner.

Specimen Label

Sonar* SRP

Aquatic Herbicide

An herbicide for management of aquatic vegetation in fresh water ponds, lakes, reservoirs, potable water sources, drainage canals, irrigation canals and rivers.

Active Ingredient:
Fluridone:
1-methyl-3-phenyl-5-[3-(trifluoromethyl)phenyl]
-4(1*H*)-pyridinone 5.0%
Other Ingredients. 95.0%
TOTAL 100.0%
Contains 0.05 pounds active ingredient per pound.

Keep Out of Reach of Children

CAUTION / PRECAUCIÓN

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

Precautionary Statements

Hazards to Humans and Domestic Animals

Harmful if Swallowed, Absorbed Through Skin, or if Inhaled

Avoid breathing of dust or contact with skin, eyes or clothing. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash before reuse.

ENVIRONMENTAL HAZARDS

Follow use directions carefully so as to minimize adverse effects on non-target organisms. In order to avoid impact on threatened or endangered aquatic plant or animal species, users must consult their State Fish and Game Agency or the U.S. Fish and Wildlife Service before making applications.

Trees and shrubs growing in water treated with Sonar SRP may occasionally develop chlorosis. Do not apply in tidewater/brackish water.

Lowest rates should be used in shallow areas where the water depth is considerably less than the average depth of the entire treatment site, for example, shallow shoreline areas.

First Aid	
If in eyes	• Hold eye open and rinse slowly and gently with water for 15 - 20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. • Call a poison control center or doctor for treatment advice.
If on skin or clothing	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15 - 20 minutes. • Call a poison control center or doctor for treatment advice.
If swallowed	• Call a poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if able to swallow. • Do not induce vomiting unless told to do so by a poison control center or doctor. • Do not give anything by mouth to an unconscious person.
If inhaled	• Move person to fresh air. • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. • Call a poison control center or doctor for further treatment advice.

EMERGENCY NUMBER
Have the product container or label with you when calling a poison control center or doctor, or going for treatment. In case of emergency endangering health or the environment involving this product, call **INFOTRAC** at **1-800-535-5053**.

Refer to inside of label booklet for additional precautionary information and Directions for Use including Storage and Disposal.

Notice: Read the entire label before using. Use only according to label directions. **Before buying or using this product, read "Warranty Disclaimer," "Inherent Risks of Use," and "Limitation of Remedies" inside label booklet.**

For product information, visit our web site at **www.sepro.com**.

EPA Reg. No. 67690-3
FPL 060206

SePRO Corporation Carmel, IN 46032 U.S.A.

Directions for Use

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Read all Directions Carefully Before Applying Sonar SRP.

GENERAL INSTRUCTIONS

Sonar SRP herbicide is a selective systemic aquatic herbicide for management of aquatic vegetation in fresh water ponds, lakes, reservoirs, drainage canals, irrigation canals, and rivers. Sonar SRP is a pelleted formulation containing 5% fluridone. Sonar is absorbed from water by plant shoots and from hydrosoil by the roots of aquatic vascular plants. It is important to maintain Sonar in contact with the target plants for as long as possible. Rapid water movement or any condition which results in rapid dilution of Sonar in treated water will reduce its effectiveness. In susceptible plants, Sonar inhibits the formation of carotene. In the absence of carotene, chlorophyll is rapidly degraded by sunlight. Herbicidal symptoms of Sonar appear in seven to ten days and appear as white (chlorotic) or pink growing points. Under optimum conditions 30 to 90 days are required before the desired level of aquatic weed management is achieved with Sonar. Species susceptibility to Sonar SRP may vary depending on time of year, stage of growth and water movement. For best results, apply Sonar SRP prior to initiation of weed growth or when weeds begin active growth. Application to mature target plants may require higher application rates and may take longer to control.

Sonar SRP is not corrosive to application equipment.

The label provides recommendations on the use of a chemical analysis for the active ingredient. SePRO Corporation recommends the use of an Enzyme-Linked Immunoassay (ELISA Test) for the determination of the active ingredient concentration in the water. Contact SePRO Corporation to incorporate this test, known as a FasTEST*, into your treatment program. Other proven chemical analyses for the active ingredient may also be used. The chemical analysis, FasTEST, is referenced in this label as the preferred method for the rapid determination of the concentration of the active ingredient in the water.

Application rates are provided in pounds of Sonar SRP to achieve a desired concentration of the active ingredient in part per billion (ppb). The maximum application rate or sum of all application rates is 90 ppb in ponds and 150 ppb in lakes and reservoirs per annual growth cycle. This maximum concentration is the amount of product calculated as the target application rate, NOT determined by testing the residues of the active ingredient in the treated water.

GENERAL USE PRECAUTIONS

- **Obtain required permits:** Consult with appropriate state or local water authorities before applying this product. Permits may be required by state or local public agencies.

- **NEW YORK STATE:** Application of Sonar SRP is not permitted in waters less than two (2) feet deep.

- **Hydroponic Farming:** Do not use Sonar SRP treated water for hydroponic farming.

- **Greenhouse and Nursery Plants:** Do not use Sonar SRP treated water for irrigating greenhouse or nursery plants. Use of an approved assay should confirm that residues are <1 ppb.

WATER USE RESTRICTIONS FOLLOWING APPLICATIONS WITH SONAR SRP (DAYS)

Application Rate	Drinking†	Fishing	Swimming	Livestock/Pet Consumption	Irrigation††
Maximum Rate (150 ppb) or less	0	0	0	0	See irrigation instructions below

† Note below, under Potable Water Intakes, the information for application of Sonar SRP within 1/4 miles (1,320 feet) of a functioning potable water intake.

†† Note below, under Irrigation, specific time frames or fluridone residues that provide the widest safety margin for irrigating with fluridone treated water.

- **Potable Water Intakes:** Concentrations of the active ingredient fluridone up to 150 ppb are allowed in potable water sources; however, in lakes and reservoirs or other sources of potable water, DO NOT APPLY Sonar SRP at application rates greater than 20 ppb within one-fourth mile (1,320 feet) of any functioning potable water intake. At application rates of 8 - 20 ppb, Sonar SRP MAY BE APPLIED where functioning potable water intakes are present. **Note: Existing potable water intakes which are no longer in use, such as those replaced by connections to potable water wells or a municipal water system, are not considered to be functioning potable water intakes.**

- **Irrigation:** Irrigation with Sonar SRP treated water may result in injury to the irrigated vegetation. SePRO Corporation recommends following these precautions and informing those who irrigate from areas treated with Sonar SRP of the irrigation time frames or water assay requirements presented in the table below. These time frames and assay recommendations are suggestions which should be followed to reduce the potential for injury to vegetation irrigated with water treated with Sonar SRP. Greater potential for crop injury occurs where Sonar SRP treated water is applied to crops grown on low organic and sandy soils.

Days After Application

Application Site	Established Tree Crops	Established Row Crops/ Turf/Plants	Newly Seeded Crops/Seedbeds or Areas to be Planted Including Overseeded Golf Course Greens
†Ponds and Static Canals	7	30	Assay required
Canals	7	7	Assay required
Rivers	7	7	Assay required
††Lakes and Reservoirs	7	7	Assay required

† For purposes of Sonar SRP labeling, a pond is defined as a body of water 10 acres or less in size. A lake or reservoir is greater than 10 acres.

†† In lakes and reservoirs where one-half or greater of the body of water is treated, use the pond and static canal irrigation precautions.

Where the use of Sonar SRP treated water is desired for irrigating crops prior to the time frames established above, the use of FasTEST assay is recommended to measure the concentration in the treated water. Where FasTEST has determined that concentrations are less than 10 parts per billion, there are no irrigation precautions for irrigating established tree crops, established row crops or turf. **For tobacco, tomatoes, peppers or other plants within the Solanaceae Family and newly seeded crops or newly seeded grasses such as overseeded golf course greens, do not use Sonar SRP treated water if concentration are greater than 5 ppb; furthermore, when rotating crops, do not plant members of the Solanaceae family in land that has been previously irrigated with fluridone concentrations in excess of 5 ppb. It is recommended that an aquatic specialist be consulted prior to commencing irrigation of these sites.**

PLANT CONTROL INFORMATION

Sonar SRP selectivity is dependent upon dosage, time of year, stage of growth, method of application, and water movement. The following categories, controlled, partially controlled, and not controlled are provided to describe expected efficacy under ideal treatment conditions using higher to maximum label rates. Use of lower rates will increase selectivity of some species listed as controlled or partially controlled. Additional aquatic plants may be controlled, partially controlled, or tolerant to Sonar SRP. Consult an aquatic specialist prior to application of Sonar SRP to determine a plant's susceptibility to Sonar SRP.

VASCULAR AQUATIC PLANTS CONTROLLED BY SONAR SRP†

Submersed Plants:

Bladderwort (*Utricularia* spp.)
Common coontail (*Ceratophyllum demersum*)†
Common Elodea (*Elodea canadensis*)†
Egeria, Brazilian Elodea (*Egeria densa*)
Fanwort, Cabomba (*Cabomba caroliniana*)
Hydrilla (*Hydrilla verticillata*)
Naiad (*Najas* spp.)†
Pondweed (*Potamogeton* spp., except Illinois pondweed)†
Watermilfoil (*Myriophyllum* spp. except variable-leaf milfoil)

Shoreline Grasses:

Paragrass (*Urochloa mutica*)

†Species denoted are native plants that are often tolerant to Sonar at lower use rates. Please consult an aquatic specialist for recommended Sonar SRP use rates when selective control of exotic species is desired.

VASCULAR AQUATIC PLANTS PARTIALLY CONTROLLED BY SONAR Q

Floating Plants:

Salvinia (*Salvinia* spp.)

Emersed Plants:

Alligatorweed (*Alternanthera philoxeroides*)
American lotus (*Nelumbo lutea*)
Cattail (*Typha* spp.)
Creeping waterprimrose (*Ludwigia peploides*)
Parrotfeather (*Myriophyllum aquaticum*)
Smartweed (*Polygonum* spp.)
Spatterdock (*Nuphar luteum*)
Spikerush (*Eleocharis* spp.)
Waterlily (*Nymphaea* spp.)
Waterpurslane (*Ludwigia palustris*)
Watershield (*Brasenia schreberi*)

Submersed Plants:

Illinois pondweed (*Potamogeton illinoensis*)
Limnophila (*Limnophila sessiliflora*)
Tapegrass, American eelgrass (*Vallisneria americana*)
Watermilfoil–variable-leaf (*Myriophyllum heterophyllum*)

Shoreline Grasses:

Barnyardgrass (*Echinochloa crusgalli*)
Giant cutgrass (*Zizaniopsis miliacea*)
Reed canarygrass (*Philaris arundinaceae*)
Southern watergrass (*Hydrochloa caroliniensis*)
Torpedograss (*Panicum repens*)

VASCULAR AQUATIC PLANTS NOT CONTROLLED BY SONAR SRP

Floating Plants:

Floating waterhyacinth (*Eichhornia crassipes*)
Waterlettuce (*Pistia stratiotes*)

Emersed Plants:

American frogbit (*Limnobium spongia*)
Arrowhead (*Sagittaria* spp.)
Bacopa (*Bacopa* spp.)
Big floatingheart, banana lily (*Nymphoides aquatica*)
Bulrush (*Scirpus* spp.)
Pickerelweed, lanceleaf (*Pontederia* spp.)
Rush (*Juncus* spp.)
Water pennywort (*Hydrocotyle* spp.)

Shoreline Grasses:

Maidencane (*Panicum hemitomon*)

NOTE: Algae (chara, nitella, and filamentous species are not controlled by Sonar SRP).

APPLICATION DIRECTIONS

The aquatic plants present in the treatment site should be identified prior to application to determine their susceptibility to Sonar SRP. It is important to determine the area (acres) to be treated and the average depth in order to select the proper application rate. Do not exceed the maximum labeled rate for a given treatment site per annual growth cycle.

Application to Ponds

Sonar SRP may be applied to the entire surface area of a pond. For single applications, rates may be selected to provide 45 to 90 ppb to the treated water, although actual concentrations in treated water may be substantially lower at any point in time due to the slow-release formulation of this product. When treating for optimum selective control, lower rates may be applied for sensitive target species. Use the higher rate within the rate range where there is a dense weed mass, when treating more difficult to control species, and for ponds less than 5 acres in size with an average depth less than 4 feet. Application rates necessary to obtain these concentrations in treated water are shown in the following table. For additional application rate calculations, refer to *Application Rate Calculations – Ponds, Lakes and Reservoirs*. Split or multiple applications are recommended where dilution of treated water is anticipated; however, the sum of all applications should total 45 to 90 ppb and must not exceed a total of 90 ppb per annual growth cycle.

Application to Lakes and Reservoirs

The following treatments are recommended for treating both whole lakes or reservoirs and partial areas of lakes or reservoirs (bays, etc.). For best results in treating partial lakes and reservoirs, Sonar SRP treatment areas should be a minimum of 5 acres in size. Treatment of areas smaller than 5 acres or treatment of narrow strips such as boat lanes or shorelines may not produce satisfactory results due to dilution by untreated water. Rate ranges are provided as a guide to include a wide range of environmental factors, such as target species, plant susceptibility, selectivity and other aquatic plant management objectives. Application rates and methods should be selected to meet the specific lake/reservoir aquatic plant management goals.

Application Rates

Average Water Depth of Treatment Site (feet)	Pounds of Sonar SRP per treated surface acre 45 ppb to 90 ppb	
1	2.5	5
2	5	10
3	7.5	15
4	10	20
5	12.5	25
6	15	30
7	17	34
8	19.5	39
9	22	44
10	24.5	49

A. Whole Lake or Reservoir Treatments (Limited or No Water Discharge)

1. Single Application to Whole Lakes or Reservoirs

Where single applications to whole lakes or reservoirs are desired, apply Sonar SRP at an application rate of 16 to 90 ppb. Application rates necessary to obtain these concentrations in treated water are shown in the following table. For additional rate calculations, refer to *Application Rate Calculation-Ponds, Lakes and Reservoirs*. Choose an application rate to meet the aquatic plant management objective. **Where greater plant selectivity is desired such as when controlling Eurasian watermilfoil and curlyleaf pondweed, choose an application rate lower in the rate range.** For other plant species, SePRO recommends contacting an aquatic specialist in determining when to choose application rates lower in the rate range to meet specific plant management goals. Use the higher rate within the rate range where there is a dense weed mass or when treating more difficult to control plant species or in the event of a heavy rainfall event where dilution has occurred. In these cases, a second application or more may be required; however, the sum of all applications cannot exceed 150 ppb per annual growth cycle. Refer to the following Section (No. 2) *Split or Multiple Applications* for guidelines and maximum rate allowed.

Application Rates

Average Water Depth of Treatment Site (feet)	Pounds of Sonar SRP per treated surface acre 16 ppb to 90 ppb	
1	0.9	5
2	1.7	10
3	2.6	15
4	3.5	20
5	4.3	25
6	5.2	30
7	6.0	34
8	6.9	39
9	7.8	44
10	8.6	49
11	9.5	54
12	10.4	59
13	11.2	64
14	12.1	68
15	13.0	73
16	13.8	78
17	14.7	83
18	15.6	88
19	16.4	93
20	17.3	98

2. Split or Multiple Applications to Whole Lakes or Reservoirs

To meet certain plant management objectives, split or multiple applications may be desired in making whole lake treatments. Split or multiple application programs are desirable when the objective is to use the minimum effective dose and to maintain this lower dose for the sufficient time to ensure efficacy and enhance selectivity. Under these situations, use the lower rates (16 to 75 ppb) within the rate range. In controlling Eurasian watermilfoil and curlyleaf pondweed and where greater plant selectivity is desired, choose an application rate lower in the rate range. For other plant species, SePRO recommends contacting an aquatic specialist in determining when to choose application rates lower in the rate range to meet specific plant management goals. For split or repeated applications, the sum of all applications must not exceed 150 ppb per annual growth cycle.

NOTE: In treating lakes or reservoirs that contain potable water intakes and the application requires treating within 1/4 mile of a potable water intake, no single application can exceed 20 ppb. Additionally, the sum of all applications cannot exceed 150 ppb per annual growth cycle.

B. Partial Lake or Reservoir Treatments

Where dilution of Sonar SRP with untreated water is anticipated, such as in partial lake or reservoir treatments, split or multiple applications may be used to extend the contact time to the target plants. The application rate and use frequency of Sonar SRP in a partial lake is highly dependent upon the treatment area. Higher application rates may be required and frequency of applications will vary depending upon the potential of untreated water diluting the Sonar SRP concentration in the treatment area. Use higher rates where greater dilution with untreated water is anticipated.

1. Application Sites Greater Than 1/4 Mile from a Functioning Potable Water Intake

For single applications, apply Sonar SRP at application rates from 45 to150 ppb. Split or multiple applications may be made, however, the sum of all applications cannot exceed 150 ppb per annual growth cycle. Split applications should be conducted to maintain a sufficient concentration in the target area for a period of 45 days or longer. The use of FasTEST is recommended to maintain the desired concentration in the target area over time.

2. Application Sites Within 1/4 Mile of a Functioning Potable Water Intake

In treatment areas that are within 1/4 mile of a potable water intake, no single application can exceed 20 ppb. When utilizing split or repeated applications of Sonar SRP for sites which contain a potable water intake, FasTEST is required to determine the actual concentration in the water. Additionally, the sum of all applications cannot exceed 150 ppb per annual growth cycle.

APPLICATION RATE CALCULATION - PONDS, LAKES AND RESERVOIRS

The amount of Sonar SRP to be applied to provide the desired ppb concentration of active ingredient equivalents in treated water may be calculated as follows:

- Pounds of Sonar SRP required per treated acre = Average water depth of treatment site x Desired ppb concentration of active ingredient equivalents x 0.054

For example, the pounds per acre of Sonar SRP required to provide a concentration of 25 ppb of active ingredient equivalents in water with an average depth of 5 feet is calculated as follows:

5 x 25 x 0.054 = 0.33 6.75 pounds per treated surface acre.

NOTE: Calculated rates should not exceed the maximum allowable rate in pounds per treated surface acre for the water depth listed in the application rate table for the site to be treated.

APPLICATION TO DRAINAGE CANALS, IRRIGATION CANALS AND RIVERS

Static Canals: In static drainage and irrigation canals, Sonar SRP should be applied at the rate of 20 to 40 pounds per surface acre.

Moving Water Canals and Rivers: The performance of Sonar SRP will be enhanced by restricting or reducing water flow. In slow moving bodies of water use an application technique that maintains a concentration of 10 to 40 ppb in the applied area for a minimum of 45 days. Sonar SRP can be applied by split or multiple broadcast applications or by metering in the product to provide a uniform concentration of the herbicide based upon the flow pattern. The use of FasTEST is recommended to maintain the desired concentration in the target area over time.

Static or Moving Water Canals or Rivers Containing a Functioning Potable Water Intake: In treating a static or moving water canal or river which contains a functioning potable water intake, applications of Sonar SRP greater than 20 ppb must be made more than 1/4 mile from a functioning potable water intake. Applications less than 20 ppb may be applied within 1/4 mile from a functioning potable water intake; however, if applications of Sonar SRP are made within 1/4 mile from a functioning water intake, the FasTEST must be utilized to demonstrate that concentrations do not exceed 150 ppb at the potable water intake.

APPLICATION RATE CALCULATION – DRAINAGE CANALS, IRRIGATION CANALS AND RIVERS

The amount of Sonar SRP to be applied through a metering system to provide the desired ppb concentration of active ingredient in treated water may be calculated as follows:

1. Average flow rate (feet per second) x average width (ft.) x average depth (ft.) x 0.9 = CFS (cubic feet per second)

2. CFS x 1.98 = acre feet per day (water movement)

3. Acre feet per day x desired ppb x 0.054 = pounds Sonar SRP required per day

Storage and Disposal

Do not contaminate water, food or feed by storage or disposal.

Pesticide Storage: Store in original container only. Do not store near feed or foodstuffs. In case of leak or spill, contain material and dispose as waste.

Pesticide Disposal: Wastes resulting from use of this product may be used according to label directions or disposed of at an approved waste disposal facility.

Container Disposal: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by incineration, or if allowed by State and Local authorities, by burning. If burned, stay out of smoke.

Container Disposal for Refillable Containers: Seal all openings which have been opened during use. Return the empty container to a collection site designated by SePRO Corporation. If the container has been damaged and cannot be returned according to the recommended procedures, contact SePRO Corporation at 1-800-419-7779 to obtain proper handling instructions.

General: Consult federal, state, or local disposal authorities for approved alternative procedures.

Warranty Disclaimer

SePRO Corporation warrants that the product conforms to the chemical description on the label and is reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. SEPRO CORPORATION MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY.

Inherent Risks of Use

It is impossible to eliminate all risks associated with use of this product. Plant injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label such as unfavorable temperatures, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner or application, or other factors, all of which are beyond the control of SePRO Corporation as the seller. All such risks shall be assumed by buyer.

Limitation of Remedies

The exclusive remedy for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories) shall be limited to, at SePRO Corporation's election, one of the following:

1. Refund of purchase price paid by buyer or user for product bought, or
2. Replacement of amount of product used.

SePRO Corporation shall not be liable for losses or damages resulting from handling or use of this product unless SePRO Corporation is promptly notified of such losses or damages in writing. In no case shall SePRO Corporation be liable for consequential or incidental damages or losses.

The terms of the "Warranty Disclaimer" above and this "Limitation of Remedies" can not be varied by any written or verbal statements or agreements. No employee or sales agent of SePRO Corporation or the seller is authorized to vary or exceed the terms of the "Warranty Disclaimer" or "Limitations of Remedies" in any manner.

Specimen Label

Sonar* A.S.
Aquatic Herbicide

AN HERBICIDE FOR MANAGEMENT OF AQUATIC VEGETATION IN FRESH WATER PONDS, LAKES, RESERVOIRS, POTABLE WATER SOURCES, DRAINAGE CANALS AND IRRIGATION CANALS.

Active Ingredient

Fluridone: 1-methyl-3-phenyl-5-[3-(trifluoromethyl)phenyl] -4(1*H*)-pyridinone	41.7%
Other Ingredients	58.3%
TOTAL	100.0%

Contains 4 pounds active ingredient per gallon.

Keep Out of Reach of Children
CAUTION / PRECAUCIÓN

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

Precautionary Statements

Hazards to Humans and Domestic Animals

Harmful if Swallowed, Absorbed Through Skin, or if Inhaled. Avoid breathing of dust or contact with skin, eyes or clothing. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash before reuse.

ENVIRONMENTAL HAZARDS

Do not apply to water except as specified on the label. Do not contaminate water by disposal of equipment washwaters. Do not apply in tidewater/brackish water. Lowest rates should be used in shallow areas where the water depth is considerably less than the average depth of the entire treatment site, for example, shallow shoreline areas. Trees and shrubs growing in water treated with Sonar A.S. herbicide may occasionally develop chlorosis. Follow use directions carefully so as to minimize adverse effects on non-target organisms.

First Aid	
If in eyes	• Hold eye open and rinse slowly and gently with water for 15 - 20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. • Call a poison control center or doctor for treatment advice.
If on skin or clothing	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15 - 20 minutes. • Call a poison control center or doctor for treatment advice.
If swallowed	• Call a poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if able to swallow. • Do not induce vomiting unless told to do so by a poison control center or doctor. • Do not give anything by mouth to an unconscious person.
If inhaled	• Move person to fresh air. • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. • Call a poison control center or doctor for further treatment advice.

EMERGENCY NUMBER
Have the product container or label with you when calling a poison control center or doctor, or going for treatment.
In case of emergency endangering health or the environment involving this product, call **INFOTRAC** at **1-800-535-5053**.

Notice: Read the entire label before using. Use only according to label directions. **Before buying or using this product, read *Warranty Disclaimer, Inherent Risks of Use,* and *Limitation of Remedies* inside label booklet.**

For product information, visit our web site at **www.sepro.com**.

Shake well before using.

EPA Reg. No. 67690-4
FPL081408

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SePRO Corporation 11550 North Meridian Street, Suite 600, Carmel, IN 46032 U.S.A.

Directions for Use

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Read all *Directions for Use* carefully before applying.

Shake Well Before Using.

GENERAL INSTRUCTIONS

Sonar A.S. herbicide is a selective systemic aquatic herbicide for management of aquatic vegetation in fresh water ponds, lakes, reservoirs, drainage canals and irrigation canals, including dry or de-watered areas of these sites. Sonar A.S. is absorbed from water by plant shoots and from hydrosoil by the roots of aquatic vascular plants. For in-water treatments, it is important to maintain the specified concentration of Sonar A.S. in contact with the target plants for a minimum of 45 days. Rapid water movement or any condition which results in rapid dilution of Sonar A.S. in treated water will reduce its effectiveness. In susceptible plants, Sonar A.S. inhibits the formation of carotene. In the absence of carotene, chlorophyll is rapidly degraded by sunlight. Herbicidal symptoms of Sonar A.S. appear in seven to ten days and appear as white (chlorotic) or pink growing points. Under optimum conditions, 30 to 90 days are required before the desired level of aquatic plant management is achieved with Sonar A.S. Species susceptibility to Sonar A.S. may vary depending on time of year, stage of growth, and water movement. For best results, apply Sonar A.S. prior to initiation of weed growth or when weeds begin active growth. Application to mature target plants may require an application rate at the higher end of the specified rate range and may take longer to control.

Sonar A.S. is not corrosive to application equipment.

The label provides recommendations on the use of a chemical analysis for the active ingredient. SePRO Corporation recommends the use of an Enzyme-Linked Immunoassay (ELISA Test) for the determination of the active ingredient concentration in the water. Contact SePRO Corporation for the utilization of this test, known as a FasTEST*, for the incorporation of this analysis in your treatment program. Other proven chemical analyses for the active ingredient may also be used. The chemical analysis, a FasTEST, is referenced in this label as the preferred method for the rapid determination of the concentration of the active ingredient in the water.

Application rates are provided in ounces or quarts of Sonar A.S. to achieve a desired concentration of the active ingredient in parts per billion (ppb). **The maximum application rate or sum of all application rates is 90 ppb in ponds and 150 ppb in lakes, reservoirs and static canals per annual growth cycle.** This maximum concentration is the amount of product calculated as the target application rate, NOT determined by testing the residues of the active ingredient in the treated water.

GENERAL USE PRECAUTIONS

- **Obtain Required Permits:** Consult with appropriate state or local water authorities before applying this product. Permits may be required by state or local public agencies.
- **Chemigation:** Do not apply Sonar A.S. through any type of irrigation system.
- **Hydroponic Farming:** Do not use Sonar A.S. treated water for hydroponic farming.
- **Greenhouse and Nursery Plants:** Do not use Sonar A.S. treated water for irrigating greenhouse or nursery plants. Use of an approved assay should confirm that residues are <1 ppb.
- **WATER USE RESTRICTIONS FOLLOWING APPLICATIONS WITH SONAR A.S. (DAYS)**

Application Rate	Drinking†	Fishing	Swimming	Livestock/Pet Consumption	Irrigation††
Maximum Rate (150 ppb) or less	0	0	0	0	See irrigation instructions below

† Note below, under Potable Water Intakes, the information for application of Sonar A.S. within 1/4 mile (1,320 feet) of a functioning potable water intake.

†† Note below, under Irrigation, specific time frames or fluridone residues that provide the widest safety margin for irrigating with fluridone treated water.

- **Potable Water Intakes:** In lakes and reservoirs or other sources of potable water, **do not apply** Sonar A.S. at application rates greater than 20 ppb within one-fourth mile (1,320 feet) of any functioning potable water intake. At application rates of 6 - 20 ppb, Sonar A.S. **may be applied** where functioning potable water intakes are present. **NOTE: Existing potable water intakes which are no longer in use, such as those replaced by potable water wells or connections to a municipal water system, are not considered to be functioning potable water intakes.**

- **Irrigation:** Irrigation from a Sonar A.S. treated area may result in injury to the irrigated vegetation. Follow these precautions and inform those who irrigate from areas treated with Sonar A.S. of the irrigation time frames or water assay requirements presented in the table below. Follow the following time frames and assay directions to reduce the potential for injury to vegetation irrigated with water treated with Sonar A.S. Greater potential for crop injury occurs where Sonar A.S. treated water is applied to crops grown on low organic and sandy soils.

Days After Application			
Application Site	Established Tree Crops	Established Row Crops/ Turf/Plants	Newly Seeded Crops/Seedbeds or Areas to be Planted Including Overseeded Golf Course Greens
†Ponds and Static Canals	7	30	Assay required
Canals	7	14	Assay required
††Lakes and Reservoirs	7	14	Assay required
†††Dry or de-watered canals	0	0	†††

† For purposes of Sonar A.S. labeling, a pond is defined as a body of water 10 acres or less in size. A lake or reservoir is greater than 10 acres.

†† In lakes and reservoirs where one-half or greater of the body of water is treated, use the pond and static canal irrigation precautions. When applying Sonar A.S. to exposed sediments of aquatic sites such as lakes and reservoirs, follow these time frames prior to using water for irrigation once sites are reflooded.

††† When Sonar A.S. is applied to exposed sediments of dry or de-watered canals, allow canals to refill for a minimum of 24 hours before using water for irrigation.

Where the use of Sonar A.S. treated water is desired for irrigating crops prior to the time frames established above, the use of a FasTEST assay is recommended to measure the concentration in the treated water. Where a FasTEST has deteremined that the concentrations are less than 10 parts per billion, there are no irrigation precautions for irrigating established tree crops, established row crops or turf. **For tobacco, tomatoes, peppers or other plants within the Solanaceae Family and newly seeded crops or newly seeded grasses such as overseeded golf course greens, do not use Sonar A.S. treated water if measured fluridone concentrations are greater than 5 ppb. Furthermore, when rotating crops, do not plant members of the Solanceae family in land that has been previously irrigated with fluridone concentrations in excess of 5 ppb. It is recommended that an aquatic specialist be consulted prior to commencing irrigation of these sites.**

PLANT CONTROL INFORMATION

Sonar A.S. selectivity is dependent upon dosage, time of year, stage of growth, method of application and water movement. The following categories, controlled, partially controlled, and not controlled are provided to describe expected efficacy under ideal treatment conditions using higher to maximum label rates. Use of lower rates will increase selectivity of some species listed as controlled or partially controlled. Additional aquatic plants may be controlled, partially controlled, or tolerant to Sonar A.S. Consult an aquatic specialist prior to application of Sonar A.S. to determine a plant's susceptibility to Sonar A.S.

NOTE: algae (chara, nitella, and filamentous species) are not controlled by Sonar A.S.

VASCULAR AQUATIC PLANTS CONTROLLED BY SONAR A.S.

Floating Plants:

Common duckweed (*Lemna minor*)

Emersed Plants:

Spatterdock (*Nuphar luteum*)

Water-lily (*Nymphaea* spp.)

Submersed Plants:

Bladderwort (*Utricularia* spp.)

Common coontail (*Ceratophyllum demersum*)

Common Elodea (*Elodea canadensis*)

Egeria, Brazilian Elodea (*Egeria densa*)

Fanwort, Cabomba (*Cabomba caroliniana*)

Hydrilla (*Hydrilla verticillata*)

Naiad (*Najas* spp.)

Pondweed (*Potamogeton* spp., except Illinois pondweed)

Watermilfoil (*Myriophyllum* spp. except variable-leaf milfoil)

Shoreline Grasses:

Paragrass (*Urochloa mutica*)

VASCULAR AQUATIC PLANTS PARTIALLY CONTROLLED BY SONAR A.S.:

Floating Plants:

Common watermeal (*Wolffia columbiana*)†

Salvinia (*Salvinia* spp.)

Emersed Plants:

Alligatorweed (*Alternanthera philoxeroides*)

American lotus (*Nelumbo lutea*)

Cattail (*Typha* spp.)

Creeping waterprimrose (*Ludwigia peploides*)

Parrotfeather (*Myriophyllum aquaticum*)

Smartweed (*Polygonum* spp.)

Spatterdock (*Nuphar luteum*)

Spikerush (*Eleocharis* spp.)

Waterpurslane (*Ludwigia palustris*)

Watershield (*Brasenia schreberi*)

Submersed Plants:

Illinois pondweed (*Potamogeton illinoensis*)

Limnophila (*Limnophila sessiliflora*)

Tapegrass, American eelgrass (*Vallisneria americana*)

Watermilfoil–variable-leaf (*Myriophyllum heterophyllum*)

Shoreline Grasses:

Barnyardgrass (*Echinochloa crusgalli*)

Giant cutgrass (*Zizaniopsis miliacea*)

Reed canarygrass (*Philaris arundinaceae*)

Southern watergrass (*Hydrochloa caroliniensis*)

Torpedograss (*Panicum repens*)

† Partial control only with Sonar A.S. applied at the maximum labeled rate.

VASCULAR AQUATIC PLANTS NOT CONTROLLED BY SONAR A.S.:

Floating Plants:

Waterlettuce (*Pistia stratiotes*)

Emersed Plants:

American frogbit (*Limnobium spongia*)

Arrowhead (*Sagittaria* spp.)

Bacopa (*Bacopa* spp.)

Big floatingheart, banana lily (*Nymphoides aquatica*)

Bulrush (*Scirpus* spp.)

Pickerelweed, lanceleaf (*Pontederia* spp.)

Rush (*Juncus* spp.)

Water pennywort (*Hydrocotyle* spp.)

Shoreline Grasses:

Maidencane (*Panicum hemitomon*)

MIXING AND APPLICATION DIRECTIONS

The aquatic plants present in the treatment site should be identified prior to application to determine their susceptibility to Sonar A.S. It is important to determine the area (acres) to be treated and the average depth in order to select the proper application rate. Do not exceed the maximum labeled rate for a given treatment site per annual growth cycle.

Shake Sonar A.S. well before using. Add the specified amount of Sonar A.S. to water in the spray tank during the filling operation. Agitate while filling and during spraying. Surface or subsurface application of the spray can be made with conventional spray equipment. Sonar A.S. can also be applied near the surface of the hydrosoil using weighted trailing hoses. A spray volume of 5 to 100 gallons per acre may be used. Sonar A.S. may also be diluted with water and the concentrated mix metered into the pumping system.

Tank-Mix Directions

Sonar A.S. may be tank mixed with other aquatic herbicides and algaecides to enhance efficacy and plant selectivity. Refer to the companion herbicide or algaecide label for use directions, precautions, and restrictions on use.

Application to Ponds

Sonar A.S. may be applied to the entire surface area of a pond. For single applications, rates may be selected to provide 45 to 90 ppb to the treated water. Use the higher rate within the rate range where there is a dense weed mass, when treating more difficult to control species, and for ponds less than 5 acres in size with an average depth less than 4 feet. Application rates necessary to obtain these concentrations are shown in the following table. For additional application rate calculations, refer to the *Application Rate Calculation-Ponds, Lakes and Reservoirs* section of this label. Split or multiple applications may be used where dilution of treated water is anticipated; however, the sum of all applications must not exceed a total of 90 ppb per annual growth cycle.

Application Rates for Ponds

Average Water Depth of Treatment Site (feet)	Quarts of Sonar A.S. per Treated Surface Acre to Achieve 45 ppb to 90 ppb		Fluid Ounces of Sonar A.S.Per Treated Surface Acre to Achieve: 45 ppb to 90 ppb	
1	0.12	0.24	3.8	7.7
2	0.24	0.49	7.7	15.7
3	0.37	0.73	11.8	23.4
4	0.49	0.98	15.7	31.4
5	0.61	1.22	19.5	39.0
6	0.73	1.46	23.4	46.7
7	0.85	1.70	27.2	54.4
8	0.98	1.95	31.4	62.4
9	1.10	2.19	35.2	70.1
10	1.22	2.44	39.0	78.1

Application to Lakes and Reservoirs

The following treatments may be used for treating both whole lakes or reservoirs and partial areas of lakes or reservoirs (bays, etc.). For best results in treating partial lakes and reservoirs, Sonar A.S. treatment areas should be a minimum of 5 acres in size. Treatment of areas smaller than 5 acres or treatment of narrow strips such as boat lanes or shorelines may not produce satisfactory results due to dilution by untreated water. Rate ranges are provided as a guide to include a wide range of environmental factors, such as, target species, plant susceptibility, selectivity and other aquatic plant management objectives. Application rates and methods should be selected to meet the specific lake/reservoir aquatic plant management goals.

A. Whole Lake or Reservoir Treatments (Limited or No Water Discharge)

1. Single Application to Whole Lakes or Reservoirs

Where single applications to whole lakes or reservoirs are desired, apply Sonar A.S. at an application rate of 10 to 90 ppb. Application rates necessary to obtain these concentrations in treated water are shown in the following table. For additional rate calculations, refer to the *Application Rate Calculation — Ponds, Lakes, and Reservoirs* section of the label. Choose an application rate from the table below to meet the aquatic plant management objective. **Where greater plant selectivity is desired such as when controlling Eurasian watermilfoil and curlyleaf pondweed, choose an application rate lower in the rate range.** For other plant species, SePRO recommends contacting an aquatic specialist in determining when to choose application rates lower in the rate range to meet specific plant management goals. Use the higher rate within the rate range where there is a dense weed mass or when treating more difficult to control plant species. Retreatments may be required to control more difficult to control species or in the event of a heavy rainfall event where dilution of the treatment concentration has occurred. In these cases, a second application or more may be required; however, the sum of all

applications cannot exceed 150 ppb per annual growth cycle. Refer to the section of this label entitled, *Split or Multiple Applications to Whole Lakes or Reservoirs*, for guidelines and maximum rate allowed.

Single Application Rates

Average Water Depth of Treatment Site (feet)	Quarts of Sonar A.S. per Treated Surface Acre to Achieve 10 ppb to 90 ppb		Fluid Ounces of Sonar A.S.Per Treated Surface Acre to Achieve: 10 ppb to 90 ppb	
1	0.03	0.24	1.0	7.7
2	0.05	0.49	1.6	15.7
3	0.08	0.73	2.6	23.4
4	0.11	0.98	3.2	31.4
5	0.14	1.22	4.5	39.0
6	0.16	1.46	5.1	46.7
7	0.19	1.70	6.1	54.4
8	0.22	1.95	7.0	62.4
9	0.24	2.19	7.6	70.1
10	0.27	2.44	8.6	78.1
11	0.30	2.68	9.6	86.0
12	0.32	2.93	10.2	93.8
13	0.35	3.17	11.2	101.4
14	0.38	3.42	12.1	109.4
15	0.41	3.66	13.1	117.1
16	0.43	3.90	13.8	124.8
17	0.46	4.15	14.7	132.2
18	0.49	4.39	15.7	140.5
19	0.51	4.63	16.3	148.2
20	0.54	4.88	17.3	156.2

2. Split or Multiple Applications to Whole Lakes or Reservoirs

To meet certain plant management objectives, split or multiple applications may be desired in making whole lake treatments. Split or multiple application programs are desirable when the objective is to use the minimum effective dose and, through the use of a water analysis, e.g. a FasTEST, add additional Sonar A.S. to maintain this lower dose for the sufficient time to ensure efficacy and enhance selectivity. Water may be treated at an initial application of 4 to 50 ppb. Additional split applications should be conducted to maintain a sufficient concentration for a minimum of 45 days or longer. **In controlling Eurasian watermilfoil and curlyleaf pondweed and where greater plant selectivity is desired, choose an application rate lower in the rate range.** For other plant species, SePRO recommends contacting an aquatic specialist in determining when to choose application rates lower in the rate range to meet specific plant management goals. When utilizing split or multiple applications of Sonar A.S., the utilization of FasTEST is strongly recommended to determine the actual concentration in the water over time. For split or multiple applications, the sum of all applications must not exceed 150 ppb per annual growth cycle.

NOTE: In treating lakes or reservoirs that contain functioning potable water intakes and the application requires treating within 1/4 mile of a potable water intake, no single application can exceed 20 ppb. Additionally, the sum of all applications cannot exceed 150 ppb per annual growth cycle.

B. Partial Lake or Reservoir Treatments

Where dilution of Sonar A.S. with untreated water is anticipated, such as in partial lake or reservoir treatments, split or multiple applications may be used to extend the contact time to the target plants. The application rate and use frequency of Sonar A.S. in a partial lake is highly dependent upon the treatment area. An application rate at the higher end of the specified rate range may be required and frequency of applications will vary depending upon the potential of untreated water diluting the Sonar A.S. concentration in the treatment area. Use a rate at the higher end of the rate range where greater dilution with untreated water is anticipated.

1. Treatment Areas Greater Than 1/4 Mile from a Functioning Potable Water Intake

For single applications, apply Sonar A.S. at application rates from 30 to 150 ppb. Split or multiple applications may be made; however, the sum of all applications cannot exceed 150 ppb per annual growth cycle. Split applications should be conducted to maintain a sufficient concentration in the target area for a period of 45 days or longer. The use of a FasTEST is recommended to maintain the desired concentration in the target area over time.

2. Treatment Areas Within 1/4 Mile of a Functioning Potable Water Intake

In treatment areas that are within 1/4 mile of a potable water intake, no single application can exceed 20 ppb. When utilizing split or multiple applications of Sonar A.S. for sites which contain a potable water intake, a FasTEST is required to determine the actual concentration in the water. Additionally, the sum of all applications cannot exceed 150 ppb per annual growth cycle.

APPLICATION RATE CALCULATION – PONDS, LAKES AND RESERVOIRS

The amount of Sonar A.S. to be applied to provide the desired ppb concentration of active ingredient in treated water may be calculated as follows:

Quarts of Sonar A.S. required per treated surface acre = Average water depth of treatment site (feet) x Desired ppb concentration of active ingredient x 0.0027

For example, the quarts per acre of Sonar A.S. required to provide a concentration of 25 ppb of active ingredient in water with an average depth of 5 feet is calculated as follows:

5 x 25 x 0.0027 = 0.33 quarts per treated surface acre

When measuring quantities of Sonar A.S., quarts may be converted to fluid ounces by multiplying quarts to be measured x 32. For example, 0.33 quarts x 32 = 10.5 fluid ounces.

NOTE: Calculated rates may not exceed the maximum allowable rate in quarts per treated surface acre for the water depth listed in the application rate table for the site to be treated.

APPLICATION TO SEDIMENTS OF DRY OR DE-WATERED AQUATIC SITES

For application of Sonar A.S. to sediments of dry or de-watered aquatic sites, including exposed sediments of lakes or reservoirs, irrigation canals, non-irrigation canals and drainage canals, apply a maximum of 2 quarts of Sonar A.S. per surface acre per annual growth cycle. Apply Sonar A.S. evenly to the sediment surface, but not above the high water line, with a minimum spray solution of 30 to 100 gallons per surface acre. High levels of organic matter in treated sediments may reduce efficacy. Sonar A.S. may be applied with other aquatic herbicides labeled for this use. Please contact your SePRO Aquatic Specialist for further use recommendations.

APPLICATION TO DRAINAGE CANALS AND IRRIGATION CANALS

Static Canals: In static drainage and irrigation canals, apply Sonar A.S. at the rate of 30 to 150 ppb per treated surface acre. The maximum application rate or sum of all application rates cannot exceed 150 ppb per annual growth cycle.

Moving Water Canals: The performance of Sonar A.S. will be enhanced by restricting or reducing water flow. In slow moving bodies of water use an application technique that maintains a concentration of 15 - 40 ppb in the target area for a minimum of 45 days. Sonar A.S. can be applied by split or multiple broadcast applications or by metering in the product to provide a uniform concentration of the herbicide based upon the flow pattern. The use of a FasTEST is recommended to maintain the desired concentration in the target area over time.

Static or Moving Water Canals Containing a Functioning Potable Water Intake: In treating a static or moving water canal which contains a functioning potable water intake, applications of Sonar A.S. greater than 20 ppb must be made more than 1/4 mile from a functioning potable water intake. Applications less than 20 ppb may be applied within 1/4 mile from a functioning potable water intake; however, if applications of Sonar A.S. are made within 1/4 mile of a functioning potable water intake, a FasTEST must utilized to demonstrate that concentrations do not exceed 150 ppb at the functioning potable water intake.

APPLICATION RATE CALCULATION – MOVING WATER DRAINAGE AND IRRIGATION CANALS

The amount of Sonar A.S. to be applied through a metering system to provide the desired ppb concentration of active ingredient in treated water may be calculated as follows:

1. Average flow rate (feet per second) x average canal width (ft.) x average canal depth (ft.) x 0.9 = CFS (cubic feet per second).

2. CFS x 1.98 = acre feet per day (water movement).

3. Acre feet per day x desired ppb x 0.0027 = Quarts of Sonar A.S. required per day.

Storage and Disposal

Do not contaminate water, food, or feed by storage or disposal.

Pesticide Storage: Store in original container only. Do not store near feed or foodstuffs. In case of leak or spill, use absorbent materials to contain liquids and dispose as waste.

Pesticide Disposal: Wastes resulting from use of this product may be used according to label directions or disposed of at an approved waste disposal facility.

Nonrefillable Container Disposal (rigid, 5 gallons or less): Do not reuse or refill this container. Triple rinse container (or equivalent) promptly after emptying. **Triple rinse as follows:** Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat the procedure two more times. Offer for recycling, if available.

Refillable Container Disposal (rigid, greater than 5 gallons): Refill this container with pesticide only. Do not reuse this container for any other purpose. Cleaning the container before final disposal is the responsibility of the person disposing of the container. Cleaning before refilling is the responsibility of the refiller. To clean the container before final disposal, empty the remaining contents from this container into application equipment or mix tank. Fill the container about 10 percent full with water. Agitate vigorously or recirculate water with the pump for 2 minutes. Pour or pump rinsate into application equipment or rinsate collection system. Repeat this rinsing procedure two more times. Seal all openings which have been opened during use. Return the empty container to a collection site designated by SePRO Corporation. If the container has been damaged and cannot be returned according to the recommended procedures, contact SePRO Corporation at **1-800-419-7779** to obtain proper handling instructions.

Warranty Disclaimer

SePRO Corporation warrants that the product conforms to the chemical description on the label and is reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. SEPRO CORPORATION MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY.

Inherent Risks of Use

It is impossible to eliminate all risks associated with use of this product. Plant injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label such as unfavorable temperatures, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner or application, or other factors, all of which are beyond the control of SePRO Corporation as the seller. To the extent consistent with applicable law, all such risks shall be assumed by buyer.

Limitation of Remedies

To the extent consistent with applicable law, the exclusive remedy for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories) shall be limited to, at SePRO Corporation's election, one of the following:

(1) Refund of purchase price paid by buyer or user for product bought, or
(2) Replacement of amount of product used.

To the extent consistent with applicable law, SePRO Corporation shall not be liable for losses or damages resulting from handling or use of this product unless SePRO Corporation is promptly notified of such losses or damages in writing. In no case shall SePRO Corporation be liable for consequential or incidental damages or losses.

The terms of the *Warranty Disclaimer* above and this *Limitation of Remedies* cannot be varied by any written or verbal statements or agreements. No employee or sales agent of SePRO Corporation or the seller is authorized to vary or exceed the terms of the *Warranty Disclaimer* or *Limitations of Remedies* in any manner.

Specimen Label

Renovate® 3

Aquatic Herbicide

Aquatic Sites: For control of emersed, submersed and floating aquatic plants in aquatic sites such as ponds, lakes, reservoirs, non-irrigation canals, seasonal irrigation waters and ditches which have little or no continuous outflow, marshes, and wetlands, including broadleaf and woody vegetation on banks and shores within or adjacent to these and other aquatic sites.

For use in New York State, comply with Section 24(c) Special Local Need labeling for Renovate® 3, SLN NY-060001.

Active Ingredient	
triclopyr: 3,5,6-trichloro-2-pyridinyloxyacetic acid, triethylamine salt	44.4%
Other Ingredients	55.6%
TOTAL	100.0%

Acid equivalent: triclopyr - 31.8% - 3 lbs/gal.

Precautionary Statements

Hazards to Humans and Domestic Animals

Keep Out of Reach of Children

DANGER / PELIGRO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

Corrosive. Causes irreversible eye damage. Harmful if swallowed or absorbed through skin. Prolonged or frequently repeated skin contact may cause allergic reaction in some individuals. Do not get in eyes or on skin or clothing.

Notice: Read the entire label. Use only according to label directions. **Before using this product, read *Warranty Disclaimer, Inherent Risks of Use,* and *Limitation of Remedies* at end of label booklet. If terms are unacceptable, return at once unopened.**

If you wish to obtain additional product information, visit our web site at **www.sepro.com.**

FIRST AID	
If in eyes	• Hold eye open and rinse slowly and gently with water for 15 - 20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. • Call a poison control center or doctor for treatment advice.
If on skin or clothing	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15 - 20 minutes. • Call a poison control center or doctor for treatment advice.
If swallowed	• Call a poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if able to swallow. • Do not induce vomiting unless told to do so by a poison control center or doctor. • Do not give anything by mouth to an unconscious person

Have the product container or label with you when calling a poison control center or doctor, or going for treatment. In case of emergency endangering health or the environment involving this product, call **INFOTRAC** at **1-800-535-5053**.

Note to Applicator: Allergic skin reaction is not expected from exposure to spray mixtures of Renovate 3 aquatic herbicide when used as directed.

Note to Physician: Probable mucosal damage may contraindicate the use of gastric lavage.

Personal Protective Equipment (PPE)

Applicators and other handlers must wear:

- Long-sleeved shirt and long pants;
- Shoes plus socks;
- Protective eyewear; and
- Chemical-resistant gloves (≥14 mils) such as butyl rubber, natural rubber, neoprene rubber or nitrile rubber.

Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them. Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry.

EPA Reg. No. 62719-37-67690
FPL082109

Produced for: **SePRO Corporation** 11550 North Meridian Street, Suite 600
Carmel, IN 46032 U.S.A.

Engineering Controls

When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in the WPS [(40 CFR 170.240(d)(4-6)], the handler PPE requirements may be reduced or modified as specified in the WPS.

User Safety Recommendations

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

ENVIRONMENTAL HAZARDS

Do not contaminate water when cleaning equipment or disposing of equipment washwaters. Under certain conditions, treatment of aquatic weeds can result in oxygen depletion or loss due to decomposition of dead plants, which may contribute to fish suffocation. This loss can cause fish suffocation. Therefore, to minimize this hazard, do not treat more than one-third to one-half of the water area in a single operation and wait at least 10 to 14 days between treatments. Begin treatment along the shore and proceed outwards in bands to allow fish to move into untreated areas. Consult with the State agency for fish and game before applying to public water to determine if a permit is needed.

PHYSICAL OR CHEMICAL HAZARDS

Combustible. Do not use or store the product near heat or open flame.

Agricultural Chemical: Do not ship or store with food, feeds, drugs or clothing.

Directions for Use

It is a violation of Federal law to use this product in a manner inconsistent with its labeling. Read all *Directions for Use* carefully before applying.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your state or tribe, consult the agency responsible for pesticide regulation.

GENERAL INFORMATION FOR AQUATIC AND WETLAND SITES

Use Renovate® 3 aquatic herbicide for control of emersed, submersed and floating aquatic plants in aquatic sites such as ponds, lakes, reservoirs, non-irrigation canals, and ditches which have little or no continuous outflow, marshes and wetlands, including broadleaf and woody vegetation on banks and shores within or adjacent to these and other aquatic sites.

Obtain Required Permits: Consult with appropriate state or local water authorities before applying this product to public waters. State or local public agencies may require permits.

Agricultural Use Requirements

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR Part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE), and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 48 hours.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is:

- Coveralls;
- Shoes plus socks;
- Protective eyewear; and
- Chemical-resistant gloves (≥ 14 mils) such as butyl rubber, natural rubber, neoprene rubber or nitrile rubber.

Non-Agricultural Use Requirements

The requirements in this box apply to uses of this product that are **NOT** within the scope of the Worker Protection Standard for Agricultural Pesticides (40 CFR Part 170). The WPS applies when this product is used to produce agricultural plants on farms, forests, nurseries, or greenhouses.

Entry Restrictions for Non-WPS Uses: For applications to non-cropland areas, do not allow entry into areas until sprays have dried, unless applicator and other handler PPE is worn.

GENERAL USE PRECAUTIONS AND RESTRICTIONS

For use in New York State, comply with Section 24(c) Special Local Need labeling for Renovate® 3, SLN NY-060001.

When applying this product in tank mix combination, follow all applicable use directions, precautions and limitations on each manufacturer's label.

Chemigation: Do not apply this product through any type of irrigation system.

Irrigation: Do not use treated water for irrigation for 120 days following application. As an alternative to waiting 120 days, treated water may be used for irrigation once the triclopyr level in the intake water is determined to be non-detectable by laboratory analysis (immunoassay). There is no restriction on use of water from the treatment area to irrigate established grasses.

Water treated with Renovate 3 may not be used for irrigation purposes for 120 days after application or until residue levels of Renovate 3 are determined by laboratory analysis, or other appropriate means of analysis, to be 1 ppb or less.

Seasonal Irrigation Waters: Renovate 3 may be applied during the off-season to surface waters that are used for irrigation on a seasonal basis provided that there is a minimum of 120 days between applying Renovate 3 and the first use of treated water for irrigation purposes, or until residues levels of Renovate 3 are determined by laboratory analysis, or other appropriate means of analysis, to be 1 ppb or less.

Irrigation Canals/Ditches: Do not apply Renovate 3 to irrigation canals/ditches unless the 120-day restriction on irrigation water usage can be observed or residue levels of Renovate 3 are determined by laboratory analysis, or other appropriate means of analysis, to be 1 ppb or less.

Do not apply Renovate 3 directly to, or otherwise permit it to come into direct contact with grapes, tobacco, vegetable crops, flowers, or other desirable broadleaf plants, and do not permit spray mists containing it to drift into them.

- **Do not** apply to salt water bays or estuaries.
- **Do not** apply directly to un-impounded rivers or streams.
- **Do not** apply on ditches or canals currently being used to transport irrigation water or that will be used for irrigation within 4 months following treatment. It is permissible to treat irrigation and non-irrigation ditch banks.
- **Do not** apply where runoff water may flow onto agricultural land as injury to crops may result.
- When making applications to control unwanted plants on banks or shorelines of moving water sites, minimize overspray to open water.
- The use of a mist blower is not recommended.

Grazing and Haying Restrictions
Except for lactating dairy animals, there are no grazing restrictions following application of this product.

- **Grazing Lactating Dairy Animals: Do not** allow lactating dairy animals to graze treated areas until the next growing season following application of this product.
- **Do not** harvest hay for 14 days after application.
- Grazed areas of non-cropland and forestry sites may be spot treated if they comprise no more than 10% of the total grazable area.

Slaughter Restrictions: During the season of application, withdraw livestock from grazing treated grass at least 3 days before slaughter.

AVOIDING INJURIOUS SPRAY DRIFT

Applications should be made only when there is little or no hazard from spray drift. Very small quantities of spray, which may not be visible, may seriously injure susceptible plants. **Do not** spray when wind is blowing toward susceptible crops or ornamental plants near enough to be injured. It is suggested that a continuous smoke column at or near the spray site or a smoke generator on the spray equipment be used to detect air movement, lapse conditions, or temperature inversions (stable air). If the smoke layers indicate a potential of hazardous spray drift, do not spray.

Aerial Application: For aerial application near susceptible crops, apply through a Microfoil† or Thru-Valve boom†, or use a drift control additive labeled for aquatic use. Other drift reducing systems or thickened sprays prepared by using high viscosity inverting systems may be used if they are made as drift-free mixtures containing thickening agents labeled for use in aquatics or applications made with the Microfoil or Thru-Valve boom. Keep spray pressures low enough to provide coarse spray droplets. Spray boom should be no longer than 3/4 of the rotor length. Do not use a thickening agent with the Microfoil or Thru-Valve booms, or other systems that cannot accommodate thick sprays. Spray only when the wind velocity is low (follow state regulations). Avoid application during air inversions. If a spray thickening agent is used, follow all use recommendations and precautions on the product label.

†Reference within this label to a particular piece of equipment produced by or available from other parties is provided without consideration for use by the reader at its discretion and subject to the reader's independent circumstances, evaluation, and expertise. Such reference by SePRO Corporation is not intended as an endorsement of such equipment, shall not constitute a warranty (express or implied) of such equipment, and is not intended to imply that other equipment is not available and equally suitable. Any discussion of methods of use of such equipment does not imply that the reader should use the equipment other than is advised in directions available from the equipment's manufacturer. The reader is responsible for exercising its own judgment and expertise, or consulting with sources other than SePRO Corporation, in selecting and determining how to use its equipment.

Spray Drift Management
Avoiding spray drift at the application site is the responsibility of the applicator. The interaction of many equipment and weather related factors determine the potential for spray drift. The applicator and the grower are responsible for considering all these factors when making decisions.

The following drift management requirements must be followed to avoid off-target drift movement from aerial applications:

1. The distance of the outer most operating nozzles on the boom must not exceed 3/4 the length of the rotor.
2. Nozzles must always point backward parallel with the air stream and never be pointed downwards more than 45 degrees.

Where states have more stringent regulations, they should be observed.

The applicator should be familiar with and take into account the information covered in the following *Aerial Drift Reduction Advisory*. [This information is advisory in nature and does not supersede mandatory label requirements.]

AERIAL DRIFT REDUCTION ADVISORY
Information on Droplet Size: The most effective way to reduce drift potential is to apply large droplets. The best drift management strategy is to apply the largest droplets that provide sufficient coverage and control. Applying larger droplets reduces drift potential, but will not prevent drift if applications are made improperly, or under unfavorable environmental conditions (see *Wind, Temperature and Humidity, and Temperature Inversions*).

Controlling Droplet Size:

- **Volume** - Use high flow rate nozzles to apply the highest practical spray volume. Nozzles with higher rated flows produce larger droplets.
- **Pressure** - Do not exceed the nozzle manufacturer's recommended pressures. For many nozzle types lower pressure produces larger droplets. When higher flow rates are needed, use higher flow rate nozzles instead of increasing pressure.
- **Number of Nozzles** - Use the minimum number of nozzles that provide uniform coverage.
- **Nozzle Orientation** - Orienting nozzles so that the spray is released parallel to the airstream produces larger droplets than other orientations and is the recommended practice. Significant deflection from horizontal will reduce droplet size and increase drift potential.
- **Nozzle Type** - Use a nozzle type that is designed for the intended application. With most nozzle types, narrower spray angles produce larger droplets. Consider using low-drift nozzles. Solid stream nozzles oriented straight back produce the largest droplets and the lowest drift.

Boom Length: For some use patterns, reducing the effective boom length to less than 3/4 of the wingspan or rotor length may further reduce drift without reducing swath width.

Application Height: Applications should not be made at a height greater than 10 feet above the top of the largest plants unless a greater height is required for aircraft safety. Making applications at the lowest height that is safe reduces exposure of droplets to evaporation and wind.

Swath Adjustment: When applications are made with a crosswind, the swath will be displaced downwind. Therefore, on the up and downwind edges of the field, the applicator must compensate for this displacement by adjusting the path of the aircraft upwind. Swath adjustment distance should increase, with increasing drift potential (higher wind, smaller drops, etc.).

Wind: Drift potential is lowest between wind speeds of 2 to 10 mph. However, many factors, including droplet size and equipment type determine drift potential at any given speed. Application should be avoided below 2 mph due to variable wind direction and high inversion potential. **Note:** Local terrain can influence wind patterns. Every applicator should be familiar with local wind patterns and how they affect spray drift.

Temperature and Humidity: When making applications in low relative humidity, set up equipment to produce larger droplets to compensate for evaporation. Droplet evaporation is most severe when conditions are both hot and dry.

Temperature Inversions: Applications should not occur during a local, low level temperature inversion because drift potential is high. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain in a concentrated cloud. This cloud can move in unpredictable directions due to the light variable winds common during inversions. Temperature inversions are characterized by increasing temperatures with altitude and are common on nights with limited cloud cover and light to no wind. They begin to form as the sun sets and often continue into the morning. Their presence can be indicated by ground fog; however, if fog is not present, inversions can also be identified by the movement of the smoke from a ground source or an aircraft smoke generator. Smoke that layers and moves laterally in a concentrated cloud (under low wind conditions) indicates an inversion, while smoke that moves upward and rapidly dissipates indicates good vertical air mixing.

Sensitive Areas: The pesticide should only be applied when the potential for drift to adjacent sensitive areas (e.g., residential areas, known habitat for threatened or endangered species, non-target crops) is minimal (e.g., when wind is blowing away from the sensitive areas).

Ground Equipment: To aid in reducing spray drift, Renovate 3 should be used in thickened (high viscosity) spray mixtures using a labeled drift control additive, high viscosity invert system, or equivalent as directed by the manufacturer. With ground equipment, spray drift can be reduced by keeping the spray boom as low as possible; by applying 20 gallons or more of spray per acre; by keeping the operating spray pressures at the lower end of the manufacturer's recommended pressures for the specific nozzle type used (low pressure nozzles are available from spray equipment manufacturers); and by spraying when wind velocity is low (follow state regulations). In hand-gun applications, select the minimum spray pressure that will provide adequate plant coverage (without forming a mist). Do not apply with nozzles that produce a fine-droplet spray.

High Volume Leaf-Stem Treatment: To minimize spray drift, do not use pressure exceeding 50 psi at the spray nozzle and keep sprays no higher than brush tops. A labeled thickening agent may be used to reduce drift.

PLANTS CONTROLLED

Woody Plant Species

alder	cascara	maples
arrowwood	ceanothus	mulberry
ash	cherry	oaks
aspen	Chinese tallow	poison ivy
bear clover (bearmat)	chinquapin	poison oak
beech	choke cherry	poplar
birch	cottonwood	salt-bush (*Baccharis* spp.)
blackberry	crataegus (hawthorn)	sweetgum
blackgum	locust	waxmyrtle
Brazilian pepper	maleleuca (seedlings)	willow

Annual and Perennial Broadleaf Weeds

burdock	plantain	tropical sodaapple
Canada thistle	smartweed	vetch
curly dock	tansy ragwort	wild lettuce
elephant ear		

Aquatic Weeds

alligatorweed	milfoil species	pickerelweed
American lotus	nuphar (spatterdock)	purple loosestrife
American frogbit	parrotfeather†	waterhyacinth
aquatic sodaapple	pennywort	waterlily
Eurasian watermilfoil	phragmities	watershield
		water primrose

†Retreatment may be needed to achieve desired level of control.

Application Methods

FLOATING AND EMERGED WEEDS

For control of waterhyacinth, alligatorweed (see specific directions below), and other susceptible emerged and floating herbaceous weeds and woody plants, apply 1 1/2 to 6 lb ae triclopyr (2 to 8 quarts of Renovate 3) per acre as a foliar application using surface or aerial equipment. Use higher rates in the rate range when plants are mature, when the weed mass is dense, or for difficult to control species. Repeat as necessary to control regrowth and plants missed in the previous operation, but do not exceed a total of 6 lb ae triclopyr (8 quarts of Renovate 3) per acre per annual growing season.

Use a non-ionic surfactant in the spray mixture to improve control. Follow all directions and use precautions on the aquatic surfactant label.

Apply when plants are actively growing.

Surface Application

Use a spray boom, handgun or other similar suitable equipment mounted on a boat or vehicle. Thorough wetting of foliage is essential for maximum effectiveness. Use 20 to 200 gallons per acre of spray mixture. Special precautions such as the use of low spray pressure, large droplet producing nozzles or addition of a labeled thickening agent may minimize spray drift in areas near sensitive crops.

Aerial Application (Helicopter Only)

Apply with a helicopter using a Microfoil or Thru-Valve boom, or a drift control additive in the spray solution. Apply in a minimum of 10 gallons of total spray mix per acre. Do not apply when weather conditions favor drift to sensitive areas. See label section on aerial application directions and precautions.

Waterhyacinth (*Eichhornia crassipes*)

Apply Renovate 3 at 1 1/2 to 6 lb ae triclopyr (2 to 8 quarts of Renovate 3) per acre to control waterhyacinth. Apply when plants are actively growing. Use the higher rate in the rate range when the weed mass is dense. It is important to thoroughly wet all foliage with the spray mixture. Use of a non-ionic surfactant in the spray mixture is recommended. A repeat treatment may be needed to control regrowth or plants missed in the previous treatment.

Alligatorweed (*Alternanthera philoxeroides*)

Apply Renovate 3 at 2 to 6 lb ae triclopyr (3 to 8 quarts of Renovate 3) per acre to control alligatorweed. It is important to thoroughly wet all foliage with the spray mixture. For best results, add an approved non-ionic aquatic surfactant to the spray mixture. Alligatorweed growing outside the margins of a body of water can be controlled with this treatment. However, alligatorweed growing in water will only be partially controlled. Top growth above the water will be controlled, but the plant will likely regrow from tissue below the water surface.

Precautions for Potable Water Intakes – Lakes, Reservoirs, Ponds:

For applications of Renovate 3 to control floating and emerged weeds in lakes, reservoirs or ponds that contain a functioning potable water intake for human consumption, see chart below to determine the minimum setback distances of the application from the functioning potable water intakes.

Renovate 3 Application Rate

Area Treated (acres)	Setback Distance (ft)			
	2 qt/acre	4 qt/acre	6 qt/acre	8 qt/acre
< 4	0	200	400	500
> 4 - 8	0	200	700	900
> 8 - 16	0	200	700	1,000
> 16	0	200	900	1,300

Note: Existing potable water intakes which are no longer in use, such as those replaced by potable water wells or connections to a municipal water system, are not considered to be functioning potable water intakes. These setback restrictions do not apply to terrestrial applications made adjacent to potable water intakes.

To apply Renovate 3 around and within the distances noted above from a functioning potable water intake, the intake must be turned off until the triclopyr level in the intake water is determined to be 0.4 parts per million (ppm) or less by laboratory analysis or immunoassay.

- **Recreational Use of Water in Treatment Area:** There are no restrictions on use of water in the treatment area for recreational purposes, including swimming and fishing.
- **Livestock Use of Water from Treatment Area:** There are no restrictions on livestock consumption of water from the treatment area.

SUBMERGED WEEDS

For control of Eurasian watermilfoil (*Myriophyllum spicatum*) and other susceptible submerged weeds in ponds, lakes, reservoirs, and in non-irrigation canals or ditches that have little or no continuous outflow, apply Renovate 3 as either a surface or subsurface application. Rates should be selected according to the rate chart below to provide a triclopyr concentration of 0.75 to 2.5 ppm ae in treated water. Use higher rates in the rate range in areas of greater water exchange. These areas may require a repeat application. However, total application of Renovate 3 must not exceed an application rate of 2.5 ppm triclopyr for the treatment area per annual growing season.

Apply in spring or early summer when Eurasian watermilfoil or other submersed weeds are actively growing.

Areas near susceptible crops or other desirable broadleaf plants may be treated by subsurface injection applied by boat to avoid spray drift.

Subsurface Application

Apply desired amount of Renovate 3 per acre directly into the water through boat-mounted distribution systems. When treating target plants that are 6 feet below the surface of the water, trailing hoses should be used along with an aquatic approved sinking agent (except California).

Surface Application
Apply the desired amount of Renovate 3 as either a concentrate or a spray mixture in water. However, use a minimum spray volume of 5 gallons per acre. Do not apply when weather conditions favor drift to sensitive areas.

Average water depth (feet) x 0.905 x target concentration (ppm) = gallons of Renovate 3 per surface acre treated.

Example: to achieve a 2 ppm concentration of triclopyr in water averaging 4 feet deep

4 x 0.905 x 2 ppm = 7.2 gallons of Renovate 3 per surface acre treated.

Concentration of Triclopyr Acid in Water (ppm ae)

Water Depth (ft)	Gallons of Renovate 3 per Surface Acre at Specified Depth				
	0.75 ppm	1.0 ppm	1.5 ppm	2.0 ppm	2.5 ppm
1	0.7	0.9	1.4	1.8	2.3
2	1.4	1.8	2.7	3.6	4.6
3	2.1	2.7	4.1	5.4	6.8
4	2.7	3.6	5.4	7.2	9.1
5	3.4	4.5	6.8	9.0	11.3
6	4.1	5.4	8.1	10.9	13.6
7	4.8	6.3	9.5	12.7	15.8
8	5.5	7.2	10.9	14.5	18.1
9	6.1	8.1	12.2	16.3	20.4
10	6.8	9.0	13.6	18.1	22.6
15	10.2	13.6	20.4	27.2	33.9
20	13.6	18.1	27.2	36.2	45.3

Precautions for Potable Water Intakes – Lakes, Reservoirs, Ponds:
For applications of Renovate 3 to control submerged weeds in lakes, reservoirs or ponds that contain a functioning potable water intake for human consumption, see the chart below to determine the minimum setback distances of the application from the functioning potable water intakes.

Concentration of Triclopyr Acid in Water (ppm ae)

Area Treated (acres)	Required Setback Distance (ft) from Potable Water Intake				
	0.75 ppm	1.0 ppm	1.5 ppm	2.0 ppm	2.5 ppm
< 4	300	400	600	800	1,000
> 4 - 8	420	560	840	1,120	1,400
> 8 - 16	600	800	1,200	1,600	2,000
> 16 - 32	780	1,040	1,560	2,080	2,600
> 32 acres, calculate a setback using the formula for the appropriate rate	Setback (ft) = (800*ln (acres) – 160)/3.33	Setback (ft) = (800*ln (acres) – 160)/2.50	Setback (ft) = (800*ln (acres) – 160)/1.67	Setback (ft) = (800*ln (acres) – 160)/1.25	Setback (ft) = (800*ln (acres) – 160)

Example Calculation 1: to apply 2.5 ppm Renovate 3 to 50 acres:

Setback in feet = (800 x ln (50 acres) - 160
= (800 x 3.912) – 160
= 2,970 feet

Example Calculation 2: to apply 0.75 ppm Renovate 3 to 50 acres:

$$\text{Setback in feet} = \frac{(800 \times \ln(50 \text{ acres}) - 160}{3.33}$$
$$= \frac{(800 \times 3.912) - 160}{3.33}$$
= 892 feet

NOTE: Existing potable water intakes which are no longer in use, such as those replaced by potable water wells or connections to a municipal water system, are not considered to be functioning potable water intakes. These setback restrictions do not apply to terrestrial applications made adjacent to potable water intakes.

To apply Renovate 3 around and within the distances noted above from a functioning potable water intake, the intake must be turned off until the triclopyr level in the intake water is determined to be 0.4 parts per million (ppm) or less by laboratory analysis or immunoassay.

- **Recreational Use of Water in Treatment Area:** There are no restrictions on use of water in the treatment area for recreational purposes, including swimming and fishing.
- **Livestock Use of Water from Treatment Area:** There are no restrictions on livestock consumption of water from the treatment area.

WETLAND SITES
Wetlands include flood plains, deltas, marshes, swamps, bogs, and transitional areas between upland and lowland sites. Wetlands may occur within forests, wildlife habitat restoration and management areas and similar sites as well as areas adjacent to or surrounding domestic water supply reservoirs, lakes and ponds.

For control of woody plants and broadleaf weeds in these sites, follow use directions and application methods on this label for terrestrial sites associated with wetland areas.

Use Precautions: Minimize overspray to open water when treating target vegetation in and around non-flowing, quiescent or transient water. When making applications to control unwanted plants on banks or shorelines of flowing water, minimize overspray to open water. **NOTE:** Consult local public water control authorities before applying this product in and around public water. Permits may be required to treat such areas.

Purple Loosestrife (*Lythrum salicaria*)
Purple loosestrife can be controlled with foliar applications of Renovate 3. For broadcast applications, use a minimum of 4 1/2 to 6 lb ae triclopyr (6 to 8 quarts of Renovate 3) per acre. Apply Renovate 3 when purple loosestrife is at the bud to mid-flowering stage of growth. Follow-up applications for control of regrowth should be made the following year in order to achieve increased control of this weed species. For all applications, a non-ionic surfactant labeled for aquatics should be added to the spray mixture. Follow all directions and use precautions on the label of the surfactant. Thorough wetting of the foliage and stems is necessary to achieve satisfactory control. A minimum spray volume of 50 gallons per acre is recommended for ground broadcast applications.

If using a backpack sprayer, a spray mixture containing 1% to 1.5% Renovate 3 or 5 to 7.6 fl oz of Renovate 3 per 4 gallons of water should be used. All purple loosestrife plants should be thoroughly wetted.

Phragmites (*Phragmites australis*)
Phragmites can be selectively controlled with foliar applications of Renovate 3. For broadcast applications, a minimum of 2 1/4 lb ae triclopyr (3 quarts of Renovate 3) per acre should be used. For optimum control, apply Renovate 3 when phragmites is in the early stage of growth, 1/2 to 3 feet in height, prior to seed head development. Follow-up applications for control of regrowth may be made the following year in order to achieve increased control of this weed species. For all applications, a non-ionic surfactant labeled for aquatics should be added to the spray mixture. Follow all directions and use precautions on the label of the surfactant. Thorough wetting of the foliage and stems is necessary to achieve satisfactory control. A minimum spray volume of 50 gallons per acre is recommended for ground broadcast applications.

If a backpack sprayer is used, a spray mixture containing 1% to 1.5% Renovate 3 or 5 to 7.6 fl oz of Renovate 3 per 4 gallons of water should be used. All Phragmities foliage should be thoroughly wetted.

Aerial application by helicopter may be needed when treating restoration sites that are inaccessible, remote, difficult to traverse, isolated, or otherwise unsuited to ground application, or in circumstances where invasive exotic weeds dominate native plant populations over extensive areas and efforts to restore native plant diversity are being conducted. By air, apply in a minimum spray volume of 30 gallons per acre using Thru-Valve or Microfoil boom only.

- **Recreational Use of Water in Treatment Area:** There are no restrictions on use of water in the treatment area for recreational purposes, including swimming and fishing.
- **Livestock Use of Water from Treatment Area:** There are no restrictions on livestock consumption of water from the treatment area.

TERRESTRIAL SITES ASSOCIATED WITH WETLAND AREAS

- Apply no more than 2 lb ae triclopyr (2/3 gallon of Renovate 3) per acre per growing season on range and pasture sites, including rights-of-way, fence rows or any area where grazing or harvesting is allowed.
- On forestry sites, Renovate 3 may be used at rates up to 6 lb ae of triclopyr (2 gallons of Renovate 3) per acre per year.

Use Renovate 3 at rates of 3/4 to 6 lb ae triclopyr (1/4 to 2 gallons of Renovate 3) per acre to control broadleaf weeds and woody plants. In all cases use the amount specified in enough water to give uniform and complete coverage of the plants to be controlled. Use only water suitable for spraying. Use a labeled non-ionic surfactant for all foliar applications. When using surfactants, follow the use directions and precautions listed on the surfactant manufacturer's label. Use the higher recommended concentrations of surfactant in the spray mixture when applying lower spray volumes per acre. The order of addition to the spray tank is water, spray thickening agent (if used), additional herbicide (if used), and Renovate 3. A labeled aquatic surfactant should be added to the spray tank last or as recommended on the product label. If combined with emulsifiable concentrate herbicides, moderate continuous adequate agitation is required.

Before using any recommended tank mixtures, read the directions and all use precautions on both labels.

For best results, apply when woody plants and weeds are actively growing. When hard to control species such as ash, blackgum, choke cherry, maples, or oaks are prevalent and during applications made in late summer when the plants are mature and during drought conditions, use the higher rates of Renovate 3.

When using Renovate 3 in combination with a 2,4-D herbicide approved for aquatic use, such as DMA 4 IVM, generally the higher rates should be used for satisfactory brush control.

Use the higher dosage rates when brush approaches an average of 15 feet in height or when the brush covers more than 60% of the area to be treated. If lower rates are used on hard to control species, resprouting may occur the year following treatment.

High Volume Foliage Treatment
For control of woody plants, use Renovate 3 at the rate of 3 to 6 lb ae triclopyr (1 to 2 gallons of Renovate 3) per 100 gallons of spray solution, or Renovate 3 at 3/4 to 3 lb ae triclopyr (1 to 4 quarts of Renovate 3) may be tank mixed with 1/4 to 1/2 gallons of 2,4-D 3.8 lb amine, like DMA 4 IVM, diluted to make 100 gallons of spray solution. Apply at a volume of 100 to 400 gallons of total spray per acre depending on size and density of woody plants. Coverage should be thorough to wet all leaves, stems, and root collars. (See *General Use Precautions and Restrictions*.) Do not exceed the maximum allowable use rate of 6 lb ae of triclopyr (2 gallons of Renovate 3) per acre per growing season.

Low Volume Foliage Treatment
To control susceptible woody plants, apply up to 15 lb ae triclopyr (5 gallons of Renovate 3) in 10 to 100 gallons of finished spray. The spray concentration of Renovate 3 and total spray volume per acre may be adjusted according to the size and density of target woody plants and kind of spray equipment used. With low volume sprays, use sufficient spray volume to obtain uniform coverage of target plants including the surfaces of all foliage, stems, and root collars (see *General Use Precautions and Restrictions*). For best results, a labeled aquatic surfactant should be added to all spray mixtures. Match equipment and delivery rate of spray nozzles to height and density of woody plants. When treating tall, dense brush, a truck mounted spray gun with spray tips that deliver up to 2 gallons per minute at 40 to 60 psi may be required. Backpack or other types of specialized spray equipment with spray tips that deliver less than 1 gallon of spray per minute may be appropriate for short, low to moderate density brush.

Cut Surface Treatments (Woody Plants)
Individual plant treatments such as basal bark and cut surface applications may be used on any use site listed on this label at a maximum use rate of 2.67 gallons of Renovate 3 (8 lb ae of triclopyr) per acre. These types of applications are made directly to ungrazed parts of plants and, therefore, are not restricted by the grazing maximum rate of 2/3 of a gallon of Renovate 3 (2 lb ae of triclopyr) per acre.

To control unwanted trees and other listed woody plants, apply Renovate 3, either undiluted or diluted in a 1 to 1 ratio with water as directed below.

With Tree Injector Method
Apply by injecting 1/2 milliliter of undiluted Renovate 3 or 1 milliliter of the diluted solution through the bark at intervals of 3 to 4 inches between centers of the injector wound. The injections should completely surround the tree at any convenient height. **NOTE: No Worker Protection Standard worker entry restrictions or worker notification requirements apply when this product is injected directly into plants.**

With Hack and Squirt Method
Make cuts at a convenient height around the tree trunk with a hatchet or similar equipment so that the cuts overlap slightly and make a continuous circle around the trunk. Spray 1/2 milliliter of undiluted Renovate 3 or 1 milliliter of the diluted solution into each cut.

With Frill or Girdle Method
Make a single girdle through the bark completely around the tree at a convenient height. Wet the cut surface with undiluted or diluted solution.

Both of the above methods may be used successfully at any season except during periods of heavy sap flow of certain species—for example, maples.

Stump Treatment
Spray or paint the cut surfaces of freshly cut stumps and stubs with undiluted Renovate 3. The cambium area next to the bark is the most vital area to wet.

STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage and disposal.
Open dumping is prohibited.
Pesticide Storage: Store above 28˚F or agitate before use.
Pesticide Disposal: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.
Nonrefillable containers 5 gallons or less: Container Reuse: Nonrefillable container. Do not reuse or refill this container. Offer for recycling if available. Triple rinse or pressure rinse container (or equivalent) promptly after emptying. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times. **Pressure rinse** as follows: Empty the remaining contents into application equipment or a mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank or collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container, and rinse at about 40 psi for at least 30 seconds. Drain for 10 seconds after the flow begins to drip.
Nonrefillable containers 5 gallons or larger: Container Reuse: Nonrefillable container. Do not reuse or refill this container. Offer for recycling if available. Triple rinse or pressure rinse container (or equivalent) promptly after emptying. Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank. Fill the container 1/4 full with water. Replace and tighten closures. Tip container on its side and roll it back and forth, ensuring at least one complete revolution, for 30 seconds. Stand the container on its end and tip it back and forth several times. Turn the container over onto its other end and tip it back and forth several times. Empty the rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Repeat this procedure two more times. **Pressure rinse** as follows: Empty the remaining contents into application equipment or a mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank or collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container, and rinse at about 40 psi for at least 30 seconds. Drain for 10 seconds after the flow begins to drip.
Refillable containers 5 gallons or larger: Container Reuse: Refillable container. Refill this container with pesticide only. Do not reuse this container for any other purpose. Cleaning the container before final disposal is the responsibility of the person disposing of the container. Cleaning before refilling is the responsibility of the refiller. To clean the container before final disposal, empty the remaining contents from this container into application equipment or a mix tank. Fill the container about 10% full with water and, if possible, spray all sides while adding water. If practical, agitate vigorously or recirculate water with the pump for two minutes. Pour or pump rinsate into application equipment or rinsate collection system. Repeat this rinsing procedure two more times.

Terms and Conditions of Use

If terms of the following *Warranty Disclaimer, Inherent Risks of Use* and *Limitation of Remedies* are not acceptable, return unopened package at once to the seller for a full refund of purchase price paid. Otherwise, use by the buyer or any other user constitutes acceptance of the terms under *Warranty Disclaimer, Inherent Risks of Use* and *Limitations of Remedies*.

Warranty Disclaimer

SePRO Corporation warrants that the product conforms to the chemical description on the label and is reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. SEPRO CORPORATION MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY.

Inherent Risks of Use

It is impossible to eliminate all risks associated with use of this product. Plant injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label, such as unfavorable temperature, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner of application, or other factors, all of which are beyond the control of SePRO Corporation or the seller. All such risks shall be assumed by buyer.

Limitation of Remedies

The exclusive remedy for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories) shall be limited to, at SePRO Corporation's election, one of the following:

(1) Refund of purchase price paid by buyer or user for product bought, or
(2) Replacement of amount of product used.

SePRO Corporation shall not be liable for losses or damages resulting from handling or use of this product unless SePRO Corporation is promptly notified of such losses or damages in writing. In no case shall SePRO Corporation be liable for consequential or incidental damages or losses.

The terms of the *Warranty Disclaimer, Inherent Risks of Use,* and this *Limitation of Remedies* cannot be varied by any written or verbal statements or agreements. No employee or sales agent of SePRO Corporation or the seller is authorized to vary or exceed the terms of the *Warranty Disclaimer* or this *Limitation of Remedies* in any manner.

EPA Stamped Notification: 06/13/2008 Revised: 1/29/10.

Specimen Label

Renovate® OTF

Aquatic Herbicide

Aquatic Sites: For control of emersed, submersed and floating aquatic weeds in the following aquatic sites: ponds; lakes; reservoirs; marshes; wetlands; impounded rivers, streams and other bodies of water that are quiescent; non-irrigation canals, seasonal irrigation waters and ditches which have little or no continuous outflow.

For use in New York State, comply with Section 24(c) Special Local Need labeling for Renovate® OTF, SLN NY-070004

Active Ingredient:	
triclopyr: 3,5,6-trichloro-2-pyridinyloxyacetic acid, triethylamine salt	14.0%
Other Ingredients	86.0%
TOTAL	100.0%

Acid equivalent: triclopyr - 10.0%.

Keep Out of Reach of Children

CAUTION / PRECAUCIÓN

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.)

Precautionary Statements

Hazards to Humans and Domestic Animals

Causes moderate eye irritation. Avoid contact with eyes or clothing.

USER SAFETY RECOMMENDATIONS

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
- Remove clothing immediately if pesticide gets inside, then wash thoroughly and put on clean clothing.

First Aid	
If in eyes	• Hold eye open and rinse slowly and gently with water for 15 - 20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. • Call a poison control center or doctor for treatment advice.
If on skin or clothing	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15 - 20 minutes. • Call a poison control center or doctor for treatment advice.
If swallowed	• Call a poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if able to swallow. • Do not induce vomiting unless told to do so by a poison control center or doctor. • Do not give anything by mouth to an unconscious person.
If inhaled	• Move person to fresh air. • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. • Call a poison control center or doctor for further treatment advice.

Have the product container or label with you when calling a poison control center or doctor, or going for treatment. In case of emergency endangering health or the environment involving this product, call **INFOTRAC** at **1-800-535-5053**.

Notice: Read the entire label. Use only according to label directions. **Before using this product, read "Warranty Disclaimer", "Inherent Risks of Use", and "Limitation of Remedies" at end of label booklet. If terms are unacceptable, return at once unopened.**

If you wish to obtain additional product information, please visit our web site at **www.sepro.com**.

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FPL 011808

Manufactured by: **SePRO Corporation** 11550 North Meridian Street, Suite 600 Carmel, IN 46032 U.S.A.

ENVIRONMENTAL HAZARDS

Under certain conditions, treatment of aquatic weeds can result in oxygen depletion or loss due to decomposition of dead plants, which may cause fish suffocation. Therefore, to minimize this hazard **DO NOT** treat more than one-half (1/2) of the water area in a single operation *and* wait at least 10 days between treatments when susceptible plants are mature and have grown to the water's surface, or when the treatment would result in significant reductions in total plant biomass. Begin treatment along the shore and proceed outwards in bands to allow fish to move into untreated areas. Consult with the State agency for fish and game before applying to public water to determine if a permit is needed.

AGRICULTURAL CHEMICAL: Do not ship or store with food, feeds, drugs or clothing.

Directions for Use

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

Read all *Directions for Use* carefully before applying.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your state or tribe, consult the agency responsible for pesticide regulation.

General Information

When applying this product follow all applicable use directions, precautions and limitations.

For Aquatic and Wetland Sites: Use Renovate OTF Granular herbicide for control of emersed, submersed and floating aquatic weeds in the following aquatic sites: ponds; lakes; reservoirs; marshes; wetlands; impounded rivers, streams and other bodies of water that are quiescent; non-irrigation canals, seasonal irrigation waters and ditches which have little or no continuous outflow.

Obtain Required Permits: Consult with appropriate state or local water authorities before applying this product in and around public waters. State or local public agencies may require permits.

Recreational Use of Water in Treatment Area: There are no restrictions on use of water in the treatment area for recreational purposes, including swimming and fishing.

Livestock Use of Water from Treatment Area: There are no restrictions on livestock consumption of water from the treatment area.

GENERAL USE PRECAUTIONS AND RESTRICTIONS

Chemigation: Do not apply this product through any type of irrigation system.

Irrigation: Water treated with Renovate OTF may not be used for irrigation purposes for 120 days after application or until triclopyr residue levels are determined by laboratory analysis, or other appropriate means of analysis, to be 1.0 ppb or less. This label describes both required and recommended uses of a chemical analysis for the active ingredient, triclopyr. SePRO Corporation recommends the use of an Enzyme-Linked Immunoassay (ELISA) test for the determination of the active ingredient concentration in water. Contact SePRO Corporation for the incorporation of this analysis in your treatment program. Other proven chemical analysis for the active ingredient may also be used. The ELISA analysis is referenced in this label as the preferred method for the rapid determination of the concentration of the active ingredient in the water.

– **Seasonal Irrigation Waters:** Renovate OTF may be applied during the off-season to surface waters that are used for irrigation on a seasonal basis, provided that there is a minimum of 120 days between Renovate OTF application and the first use of treated water for irrigation purposes or until triclopyr residue levels are determined by laboratory analysis, or other appropriate means of analysis, to be 1.0 ppb or less.

– **Irrigation Canals/Ditches: Do not** apply Renovate OTF to irrigation canals/ditches unless the 120 day restriction on irrigation water usage can be observed or triclopyr residue levels are determined by laboratory analysis, or other appropriate means of analysis, to be 1.0 ppb or less.

– **There is no restriction on use of treated water to irrigate established grasses.**

- **Do not** apply Renovate OTF directly to, or otherwise permit it to come into direct contact with grapes, tobacco, vegetable crops, flowers, or other desirable broadleaf plants, and do not permit dust to drift into these areas.
- **Do not** apply to salt water bays or estuaries.
- **Do not** apply directly to un-impounded rivers or streams.
- **Do not** apply on ditches or canals currently being used to transport irrigation water or that will be used for irrigation within 120 days following treatment or until triclopyr residue levels are determined to be 1.0 ppb or less.
- **Do not** apply where runoff water may flow onto agricultural land as injury to crops may result.

Grazing and Haying Restrictions:
Except for lactating dairy animals, there are no grazing restrictions following application of this product.

- **Grazing Lactating Dairy Animals: Do not** allow lactating dairy animals to graze treated areas until the next growing season following application of this product.
- **Do not** harvest hay for 14 days after application.
- Grazed areas of non-cropland and forestry sites may be spot treated if they comprise no more than 10% of the total grazable area.

Slaughter Restrictions: During the season of application, withdraw livestock from grazing treated grass at least 3 days before slaughter.

BEST MANAGEMENT PRACTICES FOR DRIFT MANAGEMENT

Equipment used in the application of Renovate OTF should be carefully calibrated to be sure it is working properly and delivering a uniform distribution pattern. Aerial application should be made only when the wind velocity is 2 to 10 mph.

Applications should be made only when there is little or no hazard for volatility or dust drift, and when application can maintain Renovate OTF placement in the intended area. Very small quantities of dust, which may not be visible, may seriously injure susceptible plants, and Renovate OTF may be blown outside of the intended treatment area under extreme conditions. **Do not** spread Renovate OTF when wind is blowing toward susceptible crops or ornamental plants that are near enough to be injured.

Avoiding drift at the application site is the responsibility of the applicator. The interaction of many equipment and weather related factors determine the potential for drift. The applicator is responsible for considering all these factors when making decisions.

Ground Application Equipment: To aid in reducing drift, Renovate OTF should be applied when wind velocity is low (follow state regulations; see *Sensitive Area* under *Aerial Drift Reduction Advisory* below) or using a slurry injection system.

AERIAL DRIFT REDUCTION ADVISORY

This section is advisory in nature and does not supersede the mandatory label requirements.

Application Height: Applications should not be made at a height greater than 10 feet above the top of the largest plants unless a greater height is required for aircraft safety. Making applications at the lowest height that is safe reduces drift potential.

Swath Adjustment: When applications are made with a crosswind, the swath will be displaced downwind. Therefore, on the up and downwind edges of the field, the applicator must compensate for this displacement by

adjusting the path of the aircraft upwind. Swath adjustment distance should increase, with increasing drift potential (e.g. higher wind).

Wind: Drift potential is lowest between wind speeds of 2 - 10 mph (follow state regulations). However, many factors, including equipment type, determine drift potential at any given speed. Application should be avoided below 2 mph due to variable wind direction and high inversion potential. **Note:** Local terrain can influence wind patterns. Every applicator should be familiar with local wind patterns and how they affect drift.

Sensitive Areas: Renovate OTF should only be applied when the potential for drift to adjacent sensitive areas (e.g., residential areas, known habitat for threatened or endangered species, non-target crops) is minimal (e.g., when wind is blowing away from the sensitive areas).

AQUATIC WEEDS CONTROLLED BY RENOVATE OTF

alligatorweed	pennywort
American lotus	smartweed
bladderwort	water chestnut†, ††
Eurasian watermilfoil	yellow water lily (*Nuphar spp.,* spatterdock)
milfoil species	white water lily (*Nymphaea* spp.)
parrotfeather††	water primrose (*Ludwigia* spp.)
pickerelweed	watershield (*Brasenia* spp.)

† Not for use in California.
††Retreatment may be needed to achieve desired level of control.

Application Methods

Surface Application
Use a mechanical spreader such as a fertilizer spreader or mechanical seeder, or similar equipment capable of uniformly applying Renovate OTF. Before spreading any product, carefully calibrate the application equipment. When using boats and power equipment, you must determine the proper combination of (1) boat speed, (2) rate of delivery from the spreader, and (3) width of swath covered by the granules.

Use the following formula to calibrate the spreader's delivery in pounds of Renovate OTF per minute:

$$\frac{\text{miles per hour x swath width (feet) x pounds per acre}}{495} = \text{pounds per minute}$$

Aerial Application (Helicopter Only)
Ensure uniform application. All equipment should be properly calibrated using blanks with similar physical characteristics to Renovate OTF. To avoid streaked, uneven or overlapped application, use an appropriate tracking device (e.g. GPS). Refer to the *Aerial Drift Reduction Advisory* section of this label for additional precautions and instructions for aerial application.

Floating and Emersed Weeds
For control of water lily's (*Nymphaea* spp. and *Nuphar* spp.), watershield (*Brasenia* spp.), and other susceptible emersed and floating herbaceous weeds, apply 1.0 to 2.5 ppm a.e. triclopyr per acre. Apply when plants are actively growing.

Use higher rates in the rate range when plants are mature, when the weed mass is dense, in areas of greater water exchange, or for difficult to control species. Repeat as necessary to control regrowth, but do not exceed a total of 2.5 ppm a.e. triclopyr for the treatment area per annual growing season.

Submersed Weeds
For control of Eurasian watermilfoil (*Myriophyllum spicatum*) and other susceptible submersed weeds in ponds, lakes, reservoirs, impounded rivers, streams, and other bodies of water that are quiescent; non-irrigation canals, and seasonal irrigation waters, or ditches that have little or no continuous outflow, apply Renovate OTF using mechanical or portable granule spreading equipment. Rates should be selected according to the rate chart below to provide a triclopyr concentration of 0.50 to 2.5 ppm a.e. in treated water. Use of higher rates in the rate range is recommended in areas of greater water exchange. These areas may require a repeat application. However, total application of Renovate OTF must not exceed an application rate of 2.5 ppm a.e. triclopyr for the treatment area per annual growing season.

For optimal control, apply when Eurasian watermilfoil or other submersed weeds are actively growing.

Concentration of Triclopyr Acid in Water (ppm a.e.)

Avg. Water Depth (ft)	Pounds Renovate OTF / acre					
	0.5 ppm	0.75 ppm	1.0 ppm	1.5 ppm	2.0 ppm	2.5 ppm
1	14	20	27	41	54	67
2	27	41	54	81	108	135
3	41	61	81	122	162	202
4	54	81	108	162	216	270

For applications greater in depth than 4 feet, when targeting difficult to control species and/or in sites with high dilution potential, the following formula should be used to calculate applications rates should greater than 270 pounds of Renovate OTF be needed to achieve desired weed control. **NOTE: Do not** exceed 2.5 ppm a.e. triclopyr for the treatment area per annual growing season.

average depth x target ppm x 27 = pounds of Renovate OTF per acre

Example Calculation:
6 foot average depth x 2.5 ppm x 27 = 405 pounds of Renovate OTF per acre

SMALL SITE (LESS THAN 1/2 ACRE) / SPOT TREATMENT APPLICATION

For small treatment sites of 1/2 acre or less use the rate chart below to determine the application rate depending on average water depth to achieve a concentration of 1.25 to 2.5 ppm a.e. **Do not** exceed 2.5 ppm a.e. triclopyr for the treatment area per annual growing season. Use higher rates in small treatment areas and in areas prone to higher dilution and for heavy weed infestation. Use the lower rates for spot treatment application of areas less prone to dilution and lighter weed infestations. For best results, split the total application rate into three equal applications 8 to 12 hours apart. Apply when water is calm.

Example: A 100 ft. by 40 ft. lakeshore swimming area with a 4 ft. average depth, heavily infested with Eurasian watermilfoil

Step 1: Determine the area to be treated in square feet (ft^2) by multiplying the length of the area by the width.
– 100 ft. x 40 ft. = 4,000 ft^2

Step 2: Determine the amount of Renovate OTF to be used by consulting the Renovate OTF Rate Chart for Areas Less than 1/2 Acre.
– Use 24.7 lbs. of Renovate OTF total based on 4 foot average depth in Rate Chart below.

Step 3: Apply Renovate OTF uniformly over weeds in treatment site in three equal applications of 8.2 lbs. each, 8 - 12 hours apart.

Renovate OTF Rate Chart for Areas Less than 1/2 Acre

Area (ft^2)	Pounds Renovate OTF			
	3 foot average depth		4 foot average depth	
	1.25 ppm a.e.	2.5 ppm a.e.	1.25 ppm a.e.	2.5 ppm a.e.
500	1.2	2.3	1.5	3.0
1,000	2.3	4.6	3.1	6.1
4,000	9.3	18.6	12.4	24.7
10,000	23.2	46.5	31.0	61.9
20,000	46.5	93.0	62.0	123.9

For applications with an area or depth not included in the above chart, the following formula should be used to calculate application rates.

area (ft^2)/43,560 x average depth x target ppm x 27 = pounds of Renovate OTF

Example Calculation:
8,250 ft^2/43,560 x 4 foot average depth x 1.25 ppm x 27 = 25.6 pounds of Renovate OTF

Small treatment application of Renovate OTF is recommended with waterproof gloves or a hand spreader to uniformly distribute flakes on target weeds.

Precautions for Potable Water Intakes:
For applications of Renovate OTF to control floating, emersed, and submersed weeds in sites that contain a functioning potable water intake for human consumption, see the chart below to determine the minimum setback distances of the application from the functioning potable water intakes.

Concentration of Triclopyr Acid in Water (ppm a.e.)

Area Treated (acres)	Required Setback Distance (ft) from Potable Water Intake				
	0.75 ppm	1.0 ppm	1.5 ppm	2.0 ppm	2.5 ppm
< 4	300	400	600	800	1000
> 4 - 8	420	560	840	1120	1400
> 8 - 16	600	800	1200	1600	2000
>16 - 32	780	1040	1560	2080	2600
> 32 acres, calculate a setback using the formula for the appropriate rate	Setback (ft) = (800*ln (acres) – 160) /3.33	Setback (ft) = (800*ln (acres) – 160) /2.50	Setback (ft) = (800*ln (acres) – 160) /1.67	Setback (ft) = (800*ln (acres) – 160) /1.25	Setback (ft) = (800*ln (acres) – 160)

Note: ln = natural logarithm

Example Calculation 1:
to apply 2.5 ppm Renovate OTF to 50 acres:

Setback in feet = (800 x ln (50 acres) – 160
= (800 x 3.912) – 160
= 2970 feet

Example Calculation 2:
to apply 0.75 ppm Renovate OTF to 50 acres:

$$\text{Setback in feet} = \frac{(800 \times \ln(50 \text{ acres}) - 160}{3.33}$$
$$= \frac{(800 \times 3.912) - 160}{3.33}$$
= 892 feet

Note: Existing potable water intakes which are no longer in use, such as those replaced by potable water wells or connections to a municipal water system, are not considered to be functioning potable water intakes.

To apply Renovate OTF around and within the distances noted above from a functioning potable water intake, the intake must be turned off until the triclopyr level in the intake water is determined to be 0.4 parts per million (ppm) or less by laboratory analysis or immunoassay.

WETLAND SITES
Wetlands include flood plains, deltas, marshes, swamps, bogs, and transitional areas between upland and lowland sites. Wetlands may occur within forests, wildlife habitat restoration and management areas and similar sites as well as areas adjacent to or surrounding domestic water supply reservoirs, lakes and ponds.

For control of emersed, floating or submersed aquatic weeds in wetland sites, follow use directions and application methods associated with the *Floating and Emersed Weeds* or *Submersed Weeds* sections on this label.

Use Precautions
Minimize unintentional application to open water when treating target vegetation in wetland sites. **Note:** Consult local public water control authorities before applying this product in and around public water. Permits may be required to treat such areas.

IF ANY CONTENT ON THIS LABEL IS NOT UNDERSTOOD, OR YOU NEED FURTHER ASSISTANCE, CONTACT A SEPRO AQUATIC SPECIALIST WITH QUESTIONS SPECIFIC TO YOUR APPLICATION.

Terms and Conditions of Use

If terms of the following *Warranty Disclaimer, Inherent Risks of Use,* and *Limitation of Remedies* are not acceptable, return unopened package at once to the seller for a full refund of purchase price paid. Otherwise, use by the buyer or any other user constitutes acceptance of the terms under *Warranty Disclaimer, Inherent Risks of Use* and *Limitations of Remedies.*

Warranty Disclaimer

SePRO Corporation warrants that the product conforms to the chemical description on the label and is reasonably fit for the purposes stated on the label when used in strict accordance with the directions, subject to the inherent risks set forth below. SEPRO CORPORATION MAKES NO OTHER EXPRESS OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY.

Inherent Risks of Use

It is impossible to eliminate all risks associated with use of this product. Plant injury, lack of performance, or other unintended consequences may result because of such factors as use of the product contrary to label instructions (including conditions noted on the label such as unfavorable temperatures, soil conditions, etc.), abnormal conditions (such as excessive rainfall, drought, tornadoes, hurricanes), presence of other materials, the manner of application, or other factors, all of which are beyond the control of SePRO Corporation as the seller. To the extent permitted by applicable law all such risks shall be assumed by buyer.

Limitation of Remedies

To the fullest extent permitted by law, SePRO Corporation shall not be liable for losses or damages resulting from this product (including claims based on contract, negligence, strict liability, or other legal theories) shall be limited to, at SePRO Corporation's election, one of the following:

1. Refund of purchase price paid by buyer or user for product bought, or
2. Replacement of amount of product used.

SePRO Corporation shall not be liable for losses or damages resulting from handling or use of this product unless SePRO Corporation is promptly notified of such losses or damages in writing. In no case shall SePRO Corporation be liable for consequential or incidental damages or losses.

The terms of the *Warranty Disclaimer* above and this *Limitation of Remedies* cannot be varied by any written or verbal statements or agreements. No employee or sales agent of SePRO Corporation or the seller is authorized to vary or exceed the terms of the *Warranty Disclaimer* or *Limitations of Remedies* in any manner.

Storage and Disposal

Nonrefillable container. Do not reuse or refill this container. Offer for recycling if available. Do not contaminate water, food, or feed by storage and disposal. Open dumping is prohibited.

Pesticide Storage: Store in original container. Do not store near food or feed. In case of leak or spill, contain material and dispose as waste.

Pesticide Disposal: Wastes resulting from the use of this product must be disposed of on site or at an approved waste disposal facility.

Container Disposal (Plastic Bags): Completely empty bag into application equipment. Then dispose of empty bag in a sanitary landfill or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

General: Consult federal, state, or local disposal authorities for approved alternative procedures.

PULL HERE TO OPEN

Reward®

Landscape and Aquatic Herbicide

TO PREVENT ACCIDENTAL POISONING, NEVER PUT INTO FOOD, DRINK, OR OTHER CONTAINERS, AND USE STRICTLY IN ACCORDANCE WITH ENTIRE LABEL.

DO NOT USE THIS PRODUCT FOR REFORMULATION.

Active Ingredient:	
Diquat dibromide [6,7-dihydrodipyrido (1,2-a:2′,1′-c) pyrazinediium dibromide]	37.3%
Other Ingredients:	62.7%
Total:	100.0%

Contains 2 lbs. diquat cation per gal. (3.73 lbs. diquat dibromide per gal.)

KEEP OUT OF REACH OF CHILDREN.

CAUTION

See additional precautionary statements on label.

EPA Reg. No. 100-1091
EPA Est. 100-LA-001

Product of United Kingdom
Formulated in the USA

SCP 1091A-L2E 0508
264067

2.5 gallons
Net Contents

syngenta®

FIRST AID	
If inhaled	• Move person to fresh air. • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth, if possible. • Call a poison control center or doctor for further treatment advice.
If swallowed	• Call a poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if able to swallow. • Do not induce vomiting unless told to do so by the poison control center or doctor. • Do not give anything by mouth to an unconscious person.
If in eyes	• Hold eye open and rinse slowly and gently with water for 15-20 minutes. • Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. • Call a poison control center or doctor for treatment advice.
If on skin or clothing	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15-20 minutes. • Call a poison control center or doctor for treatment advice.

NOTE TO PHYSICIANS

To be effective, treatment for diquat poisoning must begin **IMMEDIATELY**. Treatment consists of binding diquat in the gut with suspensions of activated charcoal or bentonite clay, administration of cathartics to enhance elimination, and removal of diquat from the blood by charcoal hemoperfusion or continuous hemodialysis.

Have the product container or label with you when calling a poison control center or doctor, or going for treatment.

HOTLINE NUMBER

For 24-Hour Medical Emergency Assistance (Human or Animal) or Chemical Emergency Assistance (Spill, Leak, Fire, or Accident), Call

1-800-888-8372

PRECAUTIONARY STATEMENTS

Hazards to Humans and Domestic Animals

CAUTION

Harmful if inhaled. Harmful if swallowed. Causes moderate eye irritation. Avoid breathing spray mist. Avoid contact with eyes, skin, or clothing.

continued...

PRECAUTIONARY STATEMENTS *(continued)*

Personal Protective Equipment (PPE)

Some materials that are chemical-resistant to this product are: barrier laminate, butyl rubber ≥14 mils, nitrile rubber ≥14 mils. If you want more options, follow the instructions for Category A on an EPA Chemical Resistance Category Selection Chart.

Mixers, Loaders, Applicators and other handlers must wear:

- Coveralls over short-sleeved shirt and short pants or coveralls over long-sleeved shirt and long pants
- Chemical-resistant gloves
- Chemical-resistant footwear plus socks
- Protective eyewear
- Chemical-resistant headgear for overhead exposure
- Chemical-resistant apron when cleaning equipment, mixing, or loading
- Face shield when mixing or loading

Exception: After this product has been diluted to 0.50% Reward or less in water (i.e., the labeled rate for some spot applications), applicators for AQUATIC SURFACE APPLICATIONS must, at a minimum, wear (Note - Mixers and Loaders for this application method must still wear the personal protective equipment (PPE) as described in the above section):

- Long-sleeved shirt and long pants
- Shoes plus socks
- Waterproof gloves
- Protective eyewear

Exception: At a minimum, applicators for AQUATIC SUBSURFACE APPLICATIONS must wear (Note - Mixers and Loaders for this application method must still wear the personal protective equipment (PPE) as described in the above section):

- Short-sleeved shirt and short pants
- Waterproof gloves
- Chemical-resistant footwear plus socks

Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them. Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry.

Engineering Control Statements

Mixers and loaders supporting aerial applications are required to use closed systems that provide dermal protection. The closed system must be used in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240(d)(4)]. When using the closed system, mixers and loaders PPE requirements may be reduced or modified as specified in the WPS.

When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240(d)(4-6)], the handler PPE requirements may be reduced or modified as specified in the WPS.

User Safety Recommendations

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.
- Remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing. Prolonged contact of the product with the skin may produce burns.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

Environmental Hazards

This pesticide is toxic to aquatic invertebrates. **For Terrestrial Uses,** do not apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment wash water. **For Aquatic Uses** do not apply directly to water except as specified on this label.

CONDITIONS OF SALE AND LIMITATION OF WARRANTY AND LIABILITY

NOTICE: Read the entire Directions for Use and Conditions of Sale and Limitation of Warranty and Liability before buying or using this product. If the terms are not acceptable, return the product at once, unopened, and the purchase price will be refunded.

The Directions for Use of this product must be followed carefully. It is impossible to eliminate all risks inherently associated with the use of this product. Crop injury, ineffectiveness or other unintended consequences may result because of such factors as manner of use or application, weather or crop conditions, presence of other materials or other influencing factors in the use of the product, which are beyond the control of SYNGENTA CROP PROTECTION, Inc. or Seller. To the extent permitted by applicable law, Buyer and User agree to hold SYNGENTA and Seller harmless for any claims relating to such factors.

SYNGENTA warrants that this product conforms to the chemical description on the label and is reasonably fit for the purposes stated in the Directions for Use, subject to the inherent risks referred to above, when used in accordance with directions under normal use conditions. To the extent permitted by applicable law: (1) this warranty does not extend to the use of the product contrary to label instructions or under conditions not reasonably foreseeable to or beyond the control of Seller or SYNGENTA, and, (2) Buyer and User assume the risk of any such use. To the extent permitted by applicable law, SYNGENTA MAKES NO WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE NOR ANY OTHER EXPRESS OR IMPLIED WARRANTY EXCEPT AS WARRANTED BY THIS LABEL.

To the extent permitted by applicable law, in no event shall SYNGENTA be liable for any incidental, consequential or special damages resulting from the use or handling of this product. **TO THE EXTENT PERMITTED BY APPLICABLE LAW, THE EXCLUSIVE REMEDY OF THE USER OR BUYER, AND THE EXCLUSIVE LIABILITY OF SYNGENTA AND SELLER FOR ANY AND ALL CLAIMS, LOSSES, INJURIES OR DAMAGES (INCLUDING CLAIMS BASED ON BREACH OF WARRANTY, CONTRACT, NEGLIGENCE, TORT, STRICT LIABILITY OR OTHERWISE) RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT, SHALL BE THE RETURN OF THE PURCHASE PRICE OF THE PRODUCT OR, AT THE ELECTION OF SYNGENTA OR SELLER, THE REPLACEMENT OF THE PRODUCT.**

SYNGENTA and Seller offer this product, and Buyer and User accept it, subject to the foregoing Conditions of Sale and Limitation of Warranty and Liability, which may not be modified except by written agreement signed by a duly authorized representative of SYNGENTA.

DIRECTIONS FOR USE

It is a violation of federal law to use this product in a manner inconsistent with its labeling.

READ ENTIRE LABEL. USE STRICTLY IN ACCORDANCE WITH PRECAUTIONARY STATEMENTS AND DIRECTIONS, AND WITH APPLICABLE STATE AND FEDERAL REGULATIONS.

Do not apply this product through any type of irrigation system.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your State or Tribe, consult the agency responsible for pesticide regulation.

AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE), and restricted-entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted-entry interval (REI) of 24 hours.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water is:

- Coveralls over short-sleeved shirt and short pants, or coveralls over long-sleeved shirt and long pants
- Chemical-resistant gloves made of any waterproof material
- Chemical-resistant footwear plus socks
- Protective eyewear
- Chemical-resistant headgear for overhead exposure

NON-AGRICULTURAL USE REQUIREMENTS

The requirements in this box apply to uses of this product that are NOT within the scope of the Worker Protection Standard for agricultural pesticides (40 CFR part 170). The WPS applies when this product is used to produce agricultural plants on farms, forests, nurseries, or greenhouses.

Keep all unprotected persons out of operating areas or vicinity where there may be drift.

For terrestrial uses, do not enter or allow entry of maintenance workers into treated areas, or allow contact with treated vegetation wet with spray, dew, or rain, without appropriate protective clothing until spray has dried.

For aquatic uses, do not enter treated areas while treatments are in progress.

SPECIFIC USE DIRECTIONS

Reward Landscape and Aquatic Herbicide is a nonvolatile herbicidal chemical for use as a general herbicide to control weeds in commercial greenhouses and nurseries; ornamental seed crops (flowers, bulbs, etc. – except in the state of California); landscape, industrial, recreational, commercial, residential, and public areas; turf renovation (all turf areas except commercial sod farms); dormant established turfgrass (bermudagrass, zoysiagrass – nonfood or feed crop); and aquatic areas. Absorption and herbicidal action is usually quite rapid with effects visible in a few days. Reward Landscape and Aquatic Herbicide controls weeds by interfering with photosynthesis within green plant tissue. Weed plants should be succulent and actively growing for best results. Rinse all spray equipment thoroughly with water after use. Avoid spray drift to crops, ornamentals, and other desirable plants during application, as injury may result. Application to muddy water may result in reduced control. Minimize creating muddy water during application. Use of dirty or muddy water for Reward Landscape and Aquatic Herbicide dilution may result in reduced herbicidal activity. Avoid applying under conditions of high wind, water flow, or wave action.

SPRAY DRIFT MANAGEMENT

Avoiding spray drift at the application site is the responsibility of the applicator and the grower. The interaction of many equipment- and weather-related factors determine the potential for spray drift. The applicator and the grower are responsible for considering all these factors when making decisions.

The following drift management requirements must be followed to avoid off-target movement from aerial applications to agricultural field crops. These requirements do not apply to forestry applications, public health uses, or to applications using dry formulations.

- The distance of the outermost nozzles on the boom must not exceed 3/4 the length of the wingspan or rotor.
- Nozzles must always point backward parallel with the air stream and never be pointed downward more than 45 degrees.

Where states have more stringent regulations, they should be observed.

Droplet Size

The most effective way to reduce drift potential is to apply large droplets. The best drift management strategy is to apply the largest droplets that provide sufficient coverage and control. Applying larger droplets reduces drift potential, but will not prevent drift if applications are made improperly, or under unfavorable environmental conditions (See **Wind, Temperature and Humidity,** and **Temperature Inversions**).

Controlling Droplet Size

- **Volume** – Use high flow rate nozzles to apply the highest practical spray volume. Nozzles with higher rated flows produce larger droplets.
- **Pressure** – Do not exceed the nozzle manufacturer's recommended pressures. For many nozzle types, lower pressure produces larger droplets. When higher flow rates are needed, use higher flow rate nozzles instead of increasing pressure.
- **Number of Nozzles** – Use the minimum number of nozzles that provide uniform coverage.
- **Nozzle Orientation** – Orienting nozzles so that the spray is released parallel to the airstream produces larger droplets than other orientations and is the recommended practice. Significant deflection from horizontal will reduce droplet size and increase drift potential.
- **Nozzle Type** – Use a nozzle type that is designed for the intended application. With most nozzle types, narrower spray angles produce larger droplets. Consider using low-drift nozzles. Solid stream nozzles oriented straight back produce the largest droplets and the lowest drift.

Boom Length

For some use patterns, reducing the effective boom length to less than 3/4 of the wingspan or rotor length may further reduce drift without reducing swath width.

Application Height

Applications should not be made at a height greater than 10 ft. above the top of the target plants, unless a greater height is required for aircraft safety. Making applications at the lowest height that is safe reduces exposure of droplets to evaporation and wind.

Swath Adjustment

When applications are made with a crosswind, the swath will be displaced downwind. Therefore, on the up and downwind edges of the field, the applicator must compensate for this displacement by adjusting the path of the aircraft upwind. Swath adjustment distance should increase with increasing drift potential (higher wind, smaller drops, etc.).

Wind

Drift potential is lowest between wind speeds of 2-10 mph. However, many factors, including droplet size and equipment type, determine drift potential at any given speed. Application should be avoided below 2 mph due to variable wind direction and high inversion potential. **Note:** Local terrain can influence wind patterns. Every applicator should be familiar with local wind patterns and how they affect spray drift.

Temperature and Humidity

When making applications in low relative humidity, set up equipment to produce larger droplets to compensate for evaporation. Droplet evaporation is most severe when conditions are both hot and dry.

Temperature Inversions

Applications should not occur during a temperature inversion because drift potential is high. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain in a concentrated cloud. This cloud can move in unpredictable directions due to the light variable winds common during inversions. Temperature inversions are characterized by increasing temperatures with altitude and are common on nights with limited cloud cover and light to no wind. They begin to form as the sun sets and often continue into the morning. Their presence can be indicated by ground fog; however, if fog is not present, inversions can also be identified by the movement of smoke from a ground source or an aircraft smoke generator. Smoke that layers and moves laterally in a concentrated cloud (under low wind conditions) indicates an inversion, while smoke that moves upward and rapidly dissipates indicates good vertical air mixing.

Sensitive Areas

The pesticide should only be applied when the wind is blowing away from adjacent sensitive areas (e.g., residential areas, bodies of water, known habitat for threatened or endangered species, nontarget crops).

COMMERCIAL GREENHOUSES AND NURSERIES

For general weed control in commercial greenhouses (beneath benches), field grown and container stock, and other similar areas, Reward Landscape and Aquatic Herbicide may be applied preplant or postplant preemergence in field grown ornamental nursery plantings or postemergence as a directed spray. Reward Landscape and Aquatic Herbicide may also be applied preemergence in ornamental seed crops (except in the state of California). Avoid contact with desirable foliage as injury may occur. Do not use on food or feed crops.

Spot spray: 1-2 qts. Reward Landscape and Aquatic Herbicide plus the labeled rate of a 75% or greater nonionic surfactant per 100 gals. of water, or 0.75 oz. (22 mls.) Reward Landscape and Aquatic Herbicide plus the labeled rate of a 75% or greater nonionic surfactant per 1 gal. of water.

Broadcast: 1-2 pts. Reward Landscape and Aquatic Herbicide in a minimum of 15 gals. of water per acre. Add the labeled rate of a 75% or greater nonionic surfactant per 100 gals. of spray mixture. Use an adequate spray volume to insure good coverage.

ORNAMENTAL SEED CROPS (FLOWERS, BULBS, ETC.) EXCEPT IN THE STATE OF CALIFORNIA

For preharvest desiccation of ornamental seed crops. NOT FOR FOOD OR FIBER CROPS.

Broadcast (Air or Ground): 1.5-2 pts. Reward Landscape and Aquatic Herbicide plus the labeled rate of a 75% or greater nonionic surfactant per acre in sufficient water (minimum of 5 gals. by air; 15 gals. by ground) for desiccation and weed burndown. Repeat as needed at no less than 5-day intervals up to three applications. Do not use seed, screenings, or waste as feed or for consumption.

DIRECTIONS FOR LANDSCAPE, INDUSTRIAL, RECREATIONAL, COMMERCIAL, RESIDENTIAL, AND PUBLIC AREAS

Reward Landscape and Aquatic Herbicide provides fast control of broadleaf and grassy weeds in industrial, recreational, golf course, commercial, residential, and public areas.

Reward Landscape and Aquatic Herbicide is a nonselective herbicide that rapidly kills undesirable above ground weed growth in 24-36 hours. Avoid application of Reward Landscape and Aquatic Herbicide to desirable plants.

Reward Landscape and Aquatic Herbicide is a contact/desiccant herbicide; it is essential to obtain complete coverage of the target weeds to get good control. Improper application technique and/or application to stressed weeds may result in unacceptable weed control. For best results, apply to actively growing, young weeds.

Difficult weeds (such as perennial or deeply-rooted weeds) can often be controlled by tank mixing Reward Landscape and Aquatic Herbicide with other systemic-type herbicides. Refer to other product labels for specific application directions.

For residual weed control, tank mix Reward Landscape and Aquatic Herbicide with a preemergent herbicide labeled for the intended use site. When mixing Reward Landscape and Aquatic Herbicide with another herbicide, it is recommended to mix just a small amount first to determine if the mixture is physically compatible before proceeding with larger volumes.

Syngenta has not tested all possible tank mixtures with other herbicides for compatibility, efficacy or other adverse effects. Before mixing with other herbicides Syngenta recommends you first consult your state experimental station, state university or extension agent.

Grounds maintenance weed control: Reward Landscape and Aquatic Herbicide can be used as a spot or broadcast spray to control weeds in public, commercial and residential landscapes, including landscape beds, lawns, golf courses and roadsides. Reward Landscape and Aquatic Herbicide can also be used for weed control around the edges and nonflooded portions of ponds, lakes and ditches.

Trim and Edge weed control: Reward Landscape and Aquatic Herbicide can be used to eliminate undesired grass and broadleaf plant growth in a narrow band along driveways, walkways, patios, cart paths, fence lines, and around trees, ornamental gardens, buildings, other structures, and beneath noncommercial greenhouse benches. Vegetation control with Reward Landscape and Aquatic Herbicide is limited to the spray application width. Do not exceed the labeled rate of Reward Landscape and Aquatic Herbicide as excessive rates may result in staining of concrete-based materials.

Reward Landscape and Aquatic Herbicide, since it does not translocate systemically, can be used as an edging or pruning tool when precisely applied to select areas of grass or to undesirable growth on desirable ornamental bedding plants, ground covers, etc.

Industrial weed control: Reward Landscape and Aquatic Herbicide can be used as a spot or broadcast spray either alone or in combination with other herbicides as a fast burndown or control weeds in rights-of-ways, railroad beds/yards, highways, roads, dividers and medians, parking lots, pipelines, pumping stations, public utility lines, transformer stations and substations, electric utilities, storage yards, and other non-crop areas.

Spot spray: Apply either 1-2 qts. of Reward Landscape and Aquatic Herbicide plus the labeled rate of a 75% or greater nonionic surfactant per 100 gals. water, or 0.75 oz. (22 mls.) Reward Landscape and Aquatic Herbicide plus the labeled rate of a 75% or greater nonionic surfactant per 1 gal. of water.

Broadcast: 1-2 pts. Reward Landscape and Aquatic Herbicide per acre in sufficient water to insure good spray coverage. Add the labeled rate of 75% or greater nonionic surfactant per 100 gals. spray mixture. Greater water volumes are necessary if the target plants are tall and/or dense. It is recommended that 60 gals. or greater water volume be used to obtain good coverage of dense weeds.

TURF RENOVATION (ALL TURF AREAS EXCEPT COMMERCIAL SOD FARMS)

To desiccate golf course turf and other turf areas prior to renovation, apply 1-2 pts. of Reward Landscape and Aquatic Herbicide per acre plus the labeled rate of a 75% or greater nonionic surfactant in 20-100 gals. of water (4 teaspoons of Reward Landscape and Aquatic Herbicide plus the labeled rate of a 75% or greater nonionic surfactant per 1 gal. of water) using ground spray equipment. Apply for full coverage and thorough contact with the turfgrass. Apply only when the turf is dry, free from dew and incidental moisture. For enhanced turf desiccation, especially in the case of thick turfgrass, water volumes should approach 100 gals. of water per acre.

For **suppression** of regrowth and quick desiccation of treated turfgrass, Reward Landscape and Aquatic Herbicide may be mixed with other systemic nonselective or systemic postemergence grassy weed herbicides. Refer to other product labels for specific application directions and restrictions.

Avoid spray contact with, or spray drift to, foliage of ornamental plants or food crops.

Do not graze livestock on treated turf or feed treated thatch to livestock.

DORMANT ESTABLISHED TURFGRASS (BERMUDAGRASS, ZOYSIAGRASS), NONFOOD OR FEED CROP

For control of emerged annual broadleaf and grass weeds, including Little Barley*****, Annual Bluegrass, Bromes including Rescuegrass, Sixweeks fescue, Henbit, Buttercup, and Carolina Geranium in established dormant bermudagrass lawns, parks, golf courses, etc.

Apply 1-2 pts. Reward Landscape and Aquatic Herbicide per acre in 20-100 gals. of spray mix by ground as a broadcast application. Add the labeled rate of a 75% or greater nonionic surfactant per 100 gals. of spray mixture.

Bermudagrass must be dormant at application. Application to actively growing bermudagrass may cause delay or permanent injury. Users in the extreme Southern areas should be attentive to the extent of dormancy at the time of application.

*****For control of Little Barley, apply Reward Landscape and Aquatic Herbicide prior to the mid-boot stage.

AQUATIC USE DIRECTIONS

New York – Not for Sale or Use in New York State without Supplemental Special Local Needs Labeling.

Necessary approval and/or permits must be obtained prior to application if required. Consult the responsible State Agencies (i.e., Fish and Game Agencies, State Water Conservation authorities, or Department of Natural Resources).

Treatment of dense weed areas may result in oxygen loss from decomposition of dead weeds. This loss of oxygen may cause fish suffocation. Therefore, treat only 1/3 to 1/2 of the water body area at one time and wait 14 days between treatments.

For best results on submersed weeds, Reward Landscape and Aquatic Herbicide should be applied to actively growing (photosynthesizing) weeds when water temperatures have reached or exceeded approximately 50°F, typically during the Spring or early Summer.

For application only to **still water** (i.e. ponds, lakes, and drainage ditches) where there is minimal or no outflow to public waters.

and/or

For applications to **public waters** in ponds, lakes, reservoirs, marshes, bayous, drainage ditches, canals, streams, rivers, and other slow-moving or quiescent bodies of water for control of aquatic weeds. For use by:

- Corps of Engineers; or
- Federal or State Public Agencies (i.e., Water Management District personnel, municipal officials); or
- Applicators and/or Licensees (certified for aquatic pest control) that are authorized by the State or Local government.

Treated water may be used according to the following table or until such time as an approved assay (example: PAM II Spectromatic Method) shows that the water does not contain more than the designated maximum contaminant level goal (MCLG) of 0.02 mg/l. (ppm) of diquat dibromide (calculated as the cation).

Water Use Restrictions Following Applications With Reward Landscape And Aquatic Herbicide (Days)

Application Rate	Drinking	Fishing and Swimming	Livestock/ Domestic Animals Consumption	Spray Tank Applications** and Irrigation to Turf and Landscape Ornamentals	Spray Tank Applications** and Irrigation to Food Crops and Production Ornamentals
2 gals./surface acre	3 days	0	1 day	3 days	5 days
1 gal./surface acre	2 days	0	1 day	2 days	5 days
0.75 gal./surface acre	2 days	0	1 day	2 days	5 days
0.50 gal./surface acre	1 day	0	1 day	1 day	5 days
Spot Spray* (< 0.5 gal./surface acre)	1 day	0	1 day	1 day	5 days

***Add a nonionic surfactant (with at least 75% of the constituents active as a spray adjuvant) at the rate recommended by the manufacturer.

****For preparing agricultural sprays for food crops, turf or ornamentals (to prevent phytotoxicity), do not use water treated with Reward Landscape and Aquatic Herbicide before the specified time period.

When the contents of more than one spray tank is necessary to complete a single aquatic application, no water holding restrictions apply between the consecutive spray tanks.

No applications are to be made in areas where commercial processing of fish, resulting in the production of fish protein concentrate or fish meal, is practiced. Before application, coordination and approval of local and/or State authorities must be obtained.

Floating and Marginal Weeds Including:

Water lettuce, *Pistia stratiotes*
Water hyacinth, *Eichhornia crassipes*
Duckweed, *Lemna* spp.
Salvinia spp. (including *S. molesta*)
Pennywort (*Hydrocotyle* spp.)
Frog's Bit[1], *Limnobium spongia*
Cattails, *Typha* spp.

[1]Not for use in California

Reward Landscape and Aquatic Herbicide may be applied by backpack, airboat, spray handgun, helicopter, airplane, or similar application equipment that results in thorough spray coverage.

Spot Treatment: Apply Reward Landscape and Aquatic Herbicide at 2 quarts per 100 gallons spray carrier (0.5% solution) with an approved aquatic wetting agent at 0.25-1.0% v/v (1 quart to 1 gallon per 100 gallons water). For cattail control, Reward Landscape and Aquatic Herbicide should be applied prior to flowering at the maximum application rate (8 quarts of Reward Landscape and Aquatic Herbicide/100 gallons spray carrier) plus the wetting agent. Repeat treatments may be necessary for complete control.

Spray to completely wet target weeds but not to runoff. Densely packed weeds or mats may require additional applications due to incomplete spray coverage. Re-treat as needed. For best results, re-treat weed escapes within 2 weeks of the initial treatment.

Broadcast Treatment: Apply Reward Landscape and Aquatic Herbicide at the rate of 0.5-2.0 gallons per surface acre in sufficient carrier along with 16-32 oz./A of an approved wetting agent. Re-treat as necessary for densely populated weed areas. Good coverage is necessary for control of the target weeds.

For duckweed control, apply Reward Landscape and Aquatic Herbicide at 1-2 gallons/A.

Submersed Weeds Including:

Bladderwort, *Utricularia* spp.
Hydrilla, *Hydrilla verticillata*
Watermilfoils (including Eurasian), *Myriophyllum* spp.
Pondweeds[1], *Potamogeton* spp.
Coontail, *Ceratophyllum demersum*
Elodea, *Elodea* spp.
Brazilian Elodea, *Egeria densa*
Naiad, *Najas* spp.
Algae[2], *Spirogyra* spp. and *Pithophora* spp.

[1]Reward Landscape and Aquatic Herbicide controls *Potamogetan* species except Richardson's pondweed, *P. richardsonii*.

[2]Suppression only. For control of *Spirogyra* and/or *Pithophora*, use Reward Landscape and Aquatic Herbicide in a tank mix with an approved algaecide.

For severe weed or algae infestations, the use of an approved algaecide either as a pretreatment to the Reward Landscape and Aquatic Herbicide application or in a tank mix, may result in enhanced weed control.

To control submersed weeds, apply Reward Landscape and Aquatic Herbicide in water at 0.5-2.0 gallons per surface acre (per 4 foot water depth). For severe weed infestations, use the 2.0 gallon per surface acre rate. For best results, re-treat as necessary on 14-21 day intervals. The table below shows how many gallons of Reward Landscape and Aquatic Herbicide to apply per surface acre based on water depth.

	Gallons of Reward Landscape and Aquatic Herbicide per Surface Acre Average Water Depth			
	1 Foot	**2 Feet**	**3 Feet**	**4 Feet**
1 gallon/acre rate	0.25 gal.	0.50 gal.	0.75 gal.	1.0 gal.
2 gallon/acre rate	0.50 gal.	1.0 gal.	1.5 gals.	2.0 gals.

Note: For water depths of 2 feet or less including shorelines, do not exceed 1 gallon per surface acre.

Subsurface Applications: Where the submersed weed growth, especially Hydrilla, has reached the water surface, apply either in a water carrier or an invert emulsion through boom trailing hoses carrying nozzle tips to apply the dilute spray below the water surface to insure adequate coverage.

Bottom Placement: Where submersed weeds such as Hydrilla, Bladderwort, or Coontail have reached the water surface and/or where the water is slowly moving through the weed growth, the use of an invert emulsion carrier injecting diluted Reward Landscape and Aquatic Herbicide near the bottom with weighted hoses may improve control. The addition of a copper based algaecide may improve control. If algae are present along with the submersed weeds, a pretreatment with a copper based algaecide may improve overall control.

Surface Application for Submerged Aquatic Weeds: Apply the recommended rate of Reward Landscape and Aquatic Herbicide as a spray in sufficient carrier to fully cover the target area. Applications should be made to ensure complete coverage of the weed areas. In mixed weed populations, use the high rate of application as indicated by weeds present. For dense submersed weeds or water over 2 feet deep, a surface spray is not recommended (Reward Landscape and Aquatic Herbicide should be applied subsurface in these situations.)

If posting is required by your state or tribe – consult the agency responsible for pesticide regulations for specific details.

STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage or disposal.

Pesticide Storage

Keep pesticide in original container. Do not put concentrate or dilute into food or drink containers. Do not contaminate feed, foodstuffs, or drinking water. Do not store or transport near feed or food. Store at temperatures above 32°F. For help with any spill, leak, fire, or exposure involving this material, call **1-800-888-8372**.

Pesticide Disposal

Open dumping is prohibited. Pesticide wastes are toxic. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of federal law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

Container Disposal

Do not reuse container. Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or incineration, or if allowed by State and local authorities, by burning. If burned, stay out of smoke.

Reward®, the Syngenta logo, and the CP FRAME  are trademarks of a Syngenta Group Company.

For non-emergency (e.g., current product information), call Syngenta Crop Protection at 1-800-334-9481.

Manufactured for:
Syngenta Crop Protection, Inc.
P. O. Box 18300
Greensboro, North Carolina 27419-8300
www.syngenta-us.com

SCP 1091A-L2E 0508
264067

Reward®

Landscape and Aquatic Herbicide

TO PREVENT ACCIDENTAL POISONING, NEVER PUT INTO FOOD, DRINK, OR OTHER CONTAINERS, AND USE STRICTLY IN ACCORDANCE WITH ENTIRE LABEL.

DO NOT USE THIS PRODUCT FOR REFORMULATION.

Active Ingredient:	
Diquat dibromide [6,7-dihydrodipyrido (1,2-a:2',1'-c) pyrazinediium dibromide]	37.3%
Other Ingredients:	62.7%
Total:	100.0%

Contains 2 lbs. diquat cation per gal. (3.73 lbs. diquat dibromide per gal.)

See additional precautionary statements in booklet.

AGRICULTURAL USE REQUIREMENTS

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR part 170. Refer to supplemental labeling under "Agricultural Use Requirements" in the Directions for Use section for information about this standard.

EPA Reg. No. 100-1091
EPA Est. 100-LA-001

Product of United Kingdom
Formulated in the USA

Manufactured for:
Syngenta Crop Protection, Inc.
P. O. Box 18300
Greensboro, North Carolina 24719-8300
www.syngenta-us.com

SCP 1091A-L2E 0508
264067

2.5 gallons
Net Contents

BAR CODE # IS
(01) 0 07 02941 73710
LAST DIGIT IS CHECK DIGIT
(Barcode type: UCC/EAN 128)

KEEP OUT OF REACH OF CHILDREN.

CAUTION

FIRST AID

If inhaled: Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth, if possible. Call a poison control center or doctor for further treatment advice.

If swallowed: Call poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by the poison control center or doctor. Do not give anything by mouth to an unconscious person.

If in eyes: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

If on skin or clothing: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

NOTE TO PHYSICIANS: To be effective, treatment for diquat poisoning must begin **IMMEDIATELY**. Treatment consists of binding diquat in the gut with suspensions of activated charcoal or bentonite clay, administration of cathartics to enhance elimination, and removal of diquat from the blood by charcoal hemoperfusion or continuous hemodialysis.

Have the product container or label with you when calling a poison control center or doctor, or going for treatment.

HOT LINE NUMBER: For 24-Hour Medical Emergency Assistance (Human or Animal) or Chemical Emergency Assistance (Spill, Leak, Fire, or Accident), Call **1-800-888-8372.**

PRECAUTIONARY STATEMENTS

Hazards to Humans and Domestic Animals

CAUTION

Harmful if inhaled. Harmful if swallowed. Causes moderate eye irritation. Avoid breathing spray mist. Avoid contact with eyes, skin, or clothing.

Environmental Hazards: This pesticide is toxic to aquatic invertebrates. For Terrestrial Uses, do not apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment wash water. For Aquatic Uses do not apply directly to water except as specified on this label.

STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage or disposal.

Pesticide Storage: Keep pesticide in original container. Do not put concentrate or dilute into food or drink containers. Do not contaminate feed, foodstuffs, or drinking water. Do not store or transport near feed or food. Store at temperatures above 32°F. For help with any spill, leak, fire, or exposure involving this material, call 1-800-888-8372.

Pesticide Disposal: Open dumping is prohibited. Pesticide wastes are toxic. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of federal law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

Container Disposal: Do not reuse container. Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or incineration, or if allowed by State and local authorities, by burning. If burned, stay out of smoke.

For minor spills, leaks, etc., follow all precautions indicated on this label and clean up immediately. Take special care to avoid contamination of equipment and facilities during cleanup procedures and disposal of wastes. In the event of a major spill, fire, or other emergency, call 1-800-888-8372, day or night.

CONTAINER IS NOT SAFE FOR FOOD, FEED, OR DRINKING WATER!

syngenta®

APPENDIX C HERBICIDE FACT SHEETS

Fluridone (Sonar®)

March 2000

Fact Sheet

Environmental Health Programs
Office of Environmental Health & Safety

Washington State Department of Health

Fluridone is an aquatic herbicide used to control common nuisance plants like pondweed and watermilfoil. It is not equally effective at killing all water plants and has been used in Washington to selectively remove certain nuisance weeds. It is absorbed by the leaves, shoots and roots of vascular plants and kills susceptible plants by inhibiting their ability to form carotene, a substance which plants need to maintain essential levels of chlorophyll. Damage in susceptible plants usually appears in 7-10 days after water treatment.

Fluridone is the active ingredient in Sonar® and comes in two formulations: pellets (Sonar SRP) and liquid concentrate (Sonar A.S.)

The initial rate of application recommended by Sonar labels is quite dilute and varies depending on the size of pond or lake, density of weeds, and susceptibility of targeted weeds. Control of watermilfoil in Washington is often accomplished with rates as low as 10-20 parts per billion (ppb).

Environmental Persistence

Fluridone is moderately persistent in water and sediments following treatment of a pond or lake. Field tests have shown that the average half-life in pond water is 21 days and longer in sediments (90 days in hydrosoil). Residues may persist longer depending on the amount of sunlight and the water temperature. Fluridone is primarily degraded by sunlight and microorganisms.

Health Impacts

Laboratory animals (mice, rats, dogs) fed fluridone in their diets showed little signs of toxicity even when fed levels which far exceed potential human exposure from use of Sonar. Fluridone is not considered to be a carcinogen or mutagen and is not associated with reproductive or developmental effects in test animals.

There is no EPA standard for maximum allowable concentration (MCL) of fluridone in public water supplies. For the purpose of Sonar product registration, EPA determined that 150 ppb is an acceptable level for potable water following Sonar use. This level provides a 1000-fold safety factor between the no effect level in experimental animals and the estimated human exposure via drinking water.

Common Questions

Can I use treated lake water for drinking? The Sonar label prohibits application to water within 1/4 mile of functioning potable water intakes unless the treatment rate is 20 ppb or less. Estimated human exposure from daily consumption of water with 20 ppb of fluridone is 10,000-fold less than the no effect level in test animals. People who wish to avoid even minimal residues can do so by filtering their drinking water with a charcoal-based filter.

Can I swim and fish in treated water? There are no swimming or fishing restrictions associated with fluridone treatment. Fluridone does not significantly bioaccumulate or biomagnify in fish. Consumption of fish from treated water does not pose a threat to human health.

Can fluridone leach into groundwater wells, which are shallow and close to a treated water body? Fluridone tends to bind to organic matter and should not leach into groundwater from aquatic sediments. Fluridone shows a limited ability to leach if applied to soil.

What about the other ingredients in Sonar? "Inert" ingredients included in formulations of fluridone are confidential. DOH was permitted to review the list of inerts in Sonar and concluded that these chemicals are not of human concern at applied concentrations.

Can I use treated water for watering domestic plants? For information about susceptibility of specific plants, consult the product label or contact the manufacturer. According to the manufacturer, Sonar used at the maximum-labeled rate (150 ppb) may affect domestic plants, especially plants in the *Solanaceae* family (tomato, potato, eggplant, peppers etc.). More dilute concentrations are unlikely to affect domestic plants. Again, a charcoal-based filter will remove fluridone residues from water.

Need More Information?

Please Contact:

- Your county health agency
- Washington State Department of Health Pesticide Program (360)236-3360
- Washington State Department of Ecology Water Quality Program (360)407-6563
- Sepro is the company which manufactures Sonar products. Material Safety Data Sheets and current copies of Sonar labels are available by calling 1-800-419-7779 or at the Sepro website www.sepro.com/aquatics/sonar/index.html
- Additional copies of this fact sheet can be obtained from:
  Office of Environmental Health & Safety
  P.O. Box 47825
  Olympia, Washington 98504-7825
  Tollfree: (888) 586-9427

Technical Factsheet on: DIQUAT

List of Contaminants

As part of the Drinking Water and Health pages, this fact sheet is part of a larger publication:
National Primary Drinking Water Regulations

Drinking Water Standards
MCLG: 0.02 mg/L
MCL: 0.02 mg/L
HAL(child): none

Health Effects Summary

Acute: EPA has found diquat to potentially cause the following health effects from acute exposures at levels above the MCL: dehydration.

Drinking water levels which are considered "safe" for short-term exposures have not been established.

Chronic: Diquat has the potential to cause the following health effects from long-term exposures at levels above the MCL: cataracts.

Cancer: There is inadequate evidence to state whether or not diquat has the potential to cause cancer from a lifetime exposure in drinking water.

Usage Patterns

Diquat is a herbicide that has been used extensively in the US since the late 1950s to control both crop and aquatic weeds. Its uses include potato haulm destruction; as a desiccant and defoliant to aid harvesting cotton, rapeseed and other oil seed crops; to pre-wilt silage, standing hay, etc. for storage; a plant growth regulator and sugar cane-flowering suppressant. Diquat usage in 1980 was estimated to be 200,000 lbs. of active ingredient. 1982 data indicates that diquat was not produced domestically, but imports were nearly 835,000 lbs. In 1982 it was estimated that diquat usage patterns were as follows: Industrial/commercial uses, 67%; aquatic uses, 33%.

Release Patterns

Diquat is released into the environment during its use as a contact herbicide, aquatic weed control agent, seed desiccant and sugarcane flowering suppressant agent. It may also be released into wastewater or in spills during its manufacture, transport and storage.

Since diquat is not a listed chemical in the Toxics Release Inventory, data on releases during its manufacture and handling are not available.

Environmental Fate

Diquat is rapidly adsorbed by clay constituents of soil and in the sorbed state is resistant to biodegradation and photodegradation. The duration of residual activity in soil is a few days; the deactivation resulting from its binding to the soil. In some soils such as montorillonite clay, adsorption is considered irreversible. There is some evidence of a more loosely bound component, the fraction of which depends on the type of soil.

Diquat is removed rapidly from aquatic systems, principally by adsorption. If adsorption is initially to weeds, biodegradation to soluble or volatile products occurs in several weeks. When sorbed to sediment, little or no degradation probably occurs. In any case, the diquat disappears from the water in 2-4 weeks. Diquat will photodegrade in surface layers of water in 1-3 or more weeks when not adsorbed to particulate matter.

Should diquat be released to the atmosphere during spraying operations, it would be associated with aerosols. It will be subject to photolysis (half-life approx 48 hrs) and gravitational settling.

Little or no bioconcentration in fish will occur, as is expected for a chemical whose log octanol/water partition coefficient is -3.05. No residues were detected in organs or tissues of channel catfish collected from pools 5 months after a single application or 2 months after a second treatment of 1 ppm diquat.

Human exposure will principally be by agriculture workers or others who use the chemical or are in the vicinity of fields or bodies of water where diquat is used.

Chemical/ Physical Properties

CAS Number: 85-00-7

Color/ Form/Odor: Colorless to yellow crystals; water solution is dark reddish brown

M.P.: 335-340 C B.P.: N/A

Vapor Pressure: 1.3x10-5 mm Hg at 20 C

Octanol/Water Partition (Kow): Log Kow = -3.05

Density/Spec. Grav.: 1.22 - 1.27 at 20 C

Solubility: 700 g/L of water at 20 C; Very soluble in water

Soil sorption coefficient: Koc N/A; very low mobility in soil

Odor/Taste Thresholds: N/A

Bioconcentration Factor: Not expected to bioconcentrate in aquatic organisms.

Henry's Law Coefficient: N/A; no evaporation from water/soil

Trade Names/Synonyms: 1,1-Ethylene 2,2-dipyridylium dibromide; Reglone

Other Regulatory Information

Monitoring For Ground/Surface Water Sources:

Initial Frequency- 4 quarterly samples every 3 years
Repeat Frequency- If no detections during initial round:
    2 quarterly per year if serving >3300 persons;
    1 sample per 3 years for smaller systems
Triggers - Return to Initial Freq. if detect at > 0.0004 mg/L

Analysis:

Reference Source	Method Numbers
EPA 600/4-88-039	549.1

Treatment- Best Available Technologies:
Granular Activated Charcoal

For Additional Information:

EPA can provide further regulatory and other general information:
EPA Safe Drinking Water Hotline - 800/426-4791

Other sources of toxicological and environmental fate data include:
Toxic Substance Control Act Information Line - 202/554-1404
Toxics Release Inventory, National Library of Medicine - 301/496-6531
Agency for Toxic Substances and Disease Registry - 404/639-6000
National Pesticide Hotline - 800/858-7378

Washington State Department of Health

April 2004

Health Questions and Answers

On use of triclopyr to treat Eurasian watermilfoil

What is triclopyr?

Triclopyr *(pronounced tri–clo–peer)* is an herbicide that can control infestations of *Eurasian watermilfoil* and other invasive water plants. *E. watermilfoil* is more sensitive to triclopyr than many native pond weed species including coontail, rushes and cattails. Triclopyr can therefore be used at low concentrations to remove *E. watermilfoil* without killing many native plants. One triclopyr product is currently marketed for aquatic weeds under two names: Garlon 3A and Renovate 3. Both products contain mostly triclopyr and water. Other ingredients include ethanol, 3% triethylamine, and 2.3% ethylenediaminetetraacetic acid (EDTA). The whole product, including these other ingredients, is diluted more than 100,000-fold during an application for *E. watermilfoil*.

How toxic is triclopyr?

Only dilute amounts of triclopyr are needed to kill *E. watermilfoil*. These dilute concentrations have not been shown to cause skin irritation or other health effects. Triclopyr is not well absorbed through skin. If ingested, research has shown that low doses of triclopyr are rapidly excreted in humans and are unlikely to accumulate in human tissue or cause adverse effects. Concentrated triclopyr products are corrosive and can cause skin irritation and irreversible eye damage. Pesticide applicators must take care to protect their eyes and skin during the application.

In natural waters, the initial breakdown products of triclopyr are TCP and TMP.[1] Tests in laboratory animals on both these metabolites have shown that their toxicity to mammals is less than or equal to triclopyr. These metabolites are relatively short-lived in the environment. Complete breakdown of triclopyr results in carbon dioxide, oxamic acid, and other low molecular weight carboxylic acids.

Triclopyr is not considered by the EPA to be a cause of cancer, birth defects, or genetic mutations. Nor is it considered likely to cause systemic, reproductive, or developmental effects in mammals at or near concentrations encountered during normal human use.

[1] TCP is 3,5,6-trichloro-2-pyridinol. TMP is 3,5,6-trichloro-2-methoxypyridine

Washington State Department of Health considers it prudent public health advice to minimize exposure to pesticides regardless of their known toxicity.

How long will the herbicide last in the lake water?

In natural water, sunlight and microorganisms rapidly degrade triclopyr.

Triclopyr concentrations decline sharply over the first several days after treatment. Residues should be more than 95% degraded and dissipated from treated water in 1-2 weeks following treatment with triclopyr.

If Capitol Lake is treated with triclopyr, will I be exposed to this herbicide?

Residues of triclopyr and its metabolites should not be detectable in lake water more than a couple weeks past the application. Capitol Lake is not commonly used for swimming or other water play. If you do wade or swim in the lake, touch pets that have been in the lake, or eat fish from treated water shortly after the treatment, you may be exposed to dilute concentrations of triclopyr and its metabolites.

There is little chance of inhalation exposure to bystanders. This is because liquid triclopyr herbicide is injected directly into the water column. The application method eliminates opportunity for drift of sprays onto bystanders or nearby residents during the application. Triclopyr has a low vapor pressure and is quite water-soluble so it will not volatilize from treated water and drift through air following the application.

Is it safe to swim or play in the water following the herbicide application?

There are no swimming restrictions on the Garlon 3A or Renovate 3 labels following applications of triclopyr to water. This means that the federal Environmental Protection Agency (EPA) considers the treated water safe for swimming.

Washington State Department of Ecology recently contracted for an independent scientific assessment of triclopyr safety including this question of a swimmer's exposure. The worst-case scenario considered a 6 year-old who swims for 3 hours and inadvertently swallows 150 ml of water from the treated water immediately following an milfoil application with triclopyr. The estimated amount the child would absorb in this scenario was still more than 100 times less than the daily dose animals were fed over their lifetime with no observable adverse effects.

Washington State Department of Health (DOH) has reviewed the data and agrees that skin contact with treated water at the dilute treatment concentration is unlikely to result in any adverse health effect in people. Triclopyr products are concentrated when initially injected into water during an application so, as a precaution, DOH advises people to avoid contact with water

in treated areas for twelve hours following an application to allow the herbicide concentrate to disperse and reach the dilute treatment concentration.

Are fish from the treated area safe to eat?

One breakdown product of triclopyr, called TMP, can temporarily accumulate in fish and shellfish immediately following a triclopyr application. The EPA did not consider the concentration of this metabolite to be of health concern and requires no fishing restrictions.

Washington State Department of Ecology recently contracted for an independent scientific assessment of triclopyr safety including this question of eating fish from treated waters. Scenarios for children and adults consuming fish every day from treated water resulted in estimated exposures that were more than 1000 times less than the daily doses animals were fed over their lifetime with no observable adverse effects.

Has Triclopyr been tested for special sensitivity to children?

The EPA is required to assess each pesticide for its potential to cause toxicity specifically to infants and young children. This is because children's bodies are still developing and they may be more susceptible to the action of a toxicant. EPA conducted this assessment using animal tests and concluded "Reliable pre-and post-natal data indicate no special sensitivity of young animals to triclopyr residues."

FOR MORE INFORMATION CONTACT:

Washington State Department of Health
Office of Environmental Health and Safety - Pesticide Program
(360) 236-3360

National Pesticide Information Center
1-800-858-7378
This hotline provides pesticide information to the public and health care providers. Funding comes from state university cooperative extension and from the Environmental Protection Agency.

Risk Assessments of triclopyr that are available online:

http://www.epa.gov/oppsrrd1/REDs/factsheets/2710fact.pdf (fact sheet on triclopyr by EPA)
http://www.epa.gov/oppsrrd1/REDs/2710red.pdf (detail risk assessment of triclopyr by EPA)
http://www.ecy.wa.gov/pubs/0410018.pdf (Environmental Impact Statement for use of triclopyr on aquatic weeds, prepared by WA Dept of Ecology)

APPENDIX D HERBICIDE FREQUENTLY ASKED QUESTIONS

Sonar*

An Effective Herbicide That Poses
Negligible Risk To Human Health
And The Environment

SONAR*
An Effective Herbicide That Poses Negligible Risk To Human Health And The Environment

Sonar is a highly effective aquatic herbicide used to selectively manage undesirable aquatic vegetation in freshwater ponds, lakes, reservoirs, rivers and canals. Sonar is absorbed through the leaves, shoots, and roots of susceptible plants, and destroys the plant by interfering with its ability to make and use food. As with any substance introduced into the environment, concerns arise about possible harmful effects on humans who may come into contact with it, and about its effects on wildlife and plants that we wish to protect and preserve. The following discussion, presented in a "Question and Answer" format, provides information regarding Sonar and evidence that Sonar presents negligible risk[1] to human health and the environment when applied according to its legally allowed uses and label directions.

Q1. What are the legally approved uses of Sonar?

A1. Sonar has been approved for use by the U.S. Environmental Protection Agency (USEPA) since 1986 for the management of aquatic vegetation in freshwater ponds, lakes, reservoirs, drainage canals, irrigation canals and rivers. Four different formulations have been approved for use—an aqueous suspension known as Sonar A.S. (USEPA Registration Number 67690-4) and three pellet forms known as Sonar SRP (USEPA Registration Number 67690-3), Sonar PR Precision Release (USEPA Registration Number 67690-12), and Sonar Q Quick Release (USEPA Registration Number 67690-3). There are no USEPA restrictions on the use of Sonar-treated water for swimming or fishing when used according to label directions. The Agency has approved Sonar's application in water used for drinking as long as residue levels do not exceed 0.15 parts per million (ppm) or 150 part per billion (ppb). For reference, one (1) ppm can be considered equivalent to roughly one second in 12 days or one foot in 200 miles, and (0.1) ppm can be considered approximately equal to one second in 120 days or one foot in 2,000 miles.

Sonar's USEPA-approved labeling states that in lakes and reservoirs that serve as drinking water sources, Sonar applications can be made up to within one-fourth mile (1,320 feet) of a potable water intake. For the control of Eurasian watermilfoil, curlyleaf pondweed and hydrilla where treatment concentrations are 0.01 to 0.02 ppm (10 to 20 ppb), this setback distance of one-fourth mile from a potable water intake is not required. Note that these effective treatment concentrations are well below the 0.15 ppm (150 ppb) allowable limit in water used for drinking.

Local public agencies may require permits for use of an herbicide in public waters. Therefore, the Sonar label states that the user must consult appropriate state or local water authorities before applying the herbicide.

[1]Throughout this document, we use the phrases "negligible risk" or "no significant risk." We use these terms because it is beyond the capabilities of science to prove that a substance is absolutely safe, i.e., that the substance poses no risk whatsoever. Any substances, be it aspirin, table salt, caffeine, or household cleaning products, will cause adverse health effects at sufficiently high doses. Normal exposures to such substances in our daily lives, however, are well below those associated with adverse health effects. At

some exposure, risks are so small that, for all practical purposes, no risk exists. We consider such risks to be negligible or insignificant.

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Q2. How does a product such as Sonar gain approval for use? (How does it become registered?)

A2. Federal law requires that an aquatic herbicide be registered with the USEPA before it can be shipped or sold in the United States. To obtain registration, manufacturers are required to conduct numerous studies (i.e., over 120 studies depending upon the intended uses) and to submit a thorough and extensive data set to USEPA to demonstrate that, under its conditions of use, the product will not pose a significant risk to human health and the environment and that the herbicide is effective against the target weeds or plants.

Individual states can establish registration standards that are more strict than federal standards, but not less strict.

Q3. What types of information must be submitted to regulatory agencies before an herbicide is registered?

A3. To register a herbicide, the manufacturer must submit information that falls into the following categories: product chemistry (for example, solubility, volatility, flammability and impurities), environmental fate (for example, how the substance degrades in the environment), mammalian toxicology (studies in laboratory animals used to assess potential health risks to humans), and wildlife and aquatic (for example, bird and fish) toxicology. If there are any residues in the environment, their levels must be determined. A manufacturer also conducts studies of product performance (or efficacy as a herbicide).

Q4. Have all of the data required for registration of Sonar been submitted to regulatory agencies, and have those agencies found the data acceptable?

A4. The data required for registration of Sonar by the USEPA is complete and has been accepted by the USEPA and by all states.

Q5. What happens to Sonar when it is used according to approved labeling -- that is, what is its environmental fate or what happens to Sonar once it is released or applied to the water?

A5. Tests under field conditions show that Sonar disappears from treated water in a matter of weeks or months, depending on a number of environmental factors such as sunlight, water temperature and depth. In lakes, reservoirs, rivers and canals where only a portion of the water body is treated, dilution reduces the level of Sonar relatively quickly following application.

Sonar does not persist in the environment. Its disappearance from aquatic environments is accomplished by several processes. First, the plants that are being

treated absorb Sonar, thereby removing a portion of it from the water. Second, Sonar degrades or breaks down in the presence of sunlight by a process called "photo degradation." Photo degradation is the primary process contributing to the loss of Sonar from water. Third, adsorption of Sonar to hydrosoil (sediments) also contributes to its loss from water. As Sonar is released from hydrosoil back into the water, it is photo degraded.

Study results indicate that Sonar has a low bioaccumulation potential and therefore is not a threat to the food chain. Specifically, studies have shown that Sonar does not accumulate in fish tissue to any significant degree. The relatively small amounts of Sonar that may be taken up by fish following application are eliminated as the Sonar levels in water decline. In a study of crops irrigated with Sonar treated water, no residues of Sonar were found in any human food crops, and only very low levels were detected in certain forage crops. Consumption by livestock of Sonar-treated water and crops irrigated with Sonar-treated water was shown to result in negligible levels of Sonar in lean meat and milk. Sonar-treated water can be used immediately for watering livestock.

To ensure that residue levels of Sonar pose no significant risk, USEPA has established tolerances, or maximum legally allowable levels, in water, fish, and crops irrigated with Sonar-treated water, and other agricultural products (including eggs, milk, meat, and chicken). For example, the 0.15 ppm (150 ppb) concentration in water mentioned in the answer to Question #1 is the tolerance limit for water that is used for drinking. The recommended application rates of Sonar (detailed on the label) are established to ensure the product will do its job and that tolerance limits won't be exceeded.

Q6. How might people come into contact with Sonar after it is applied to an aquatic site?

A6. People could come into contact with Sonar by swimming in water bodies treated with the herbicide, by drinking water from treated lakes or reservoirs, by consuming game fish taken from treated waters, and by consuming meat, poultry, eggs or milk from livestock that were provided water from treated surface water sources.

Q7. Is it likely that people will be harmed because of those contacts?

A7. Extensive studies have demonstrated that contact with Sonar poses negligible health risks when the herbicide is used according to label instructions. The label for Sonar carries no restrictions for swimming or fishing in treated water or against drinking water treated with Sonar. Sonar does not build up in the body.

The conclusion that Sonar poses negligible health risks is evidenced by USEPA's toxicity rating for Sonar. The USEPA classifies herbicides according to their acute toxicity or potential adverse health effects and requires that a "signal word" indicating the relative toxicity of the herbicide be prominently displayed on the product label. Every herbicide carries such a signal word. The most acutely toxic herbicide category requires the signal word DANGER. However, if the product is especially toxic, the additional word POISON is displayed. Herbicides of moderate acute toxicity require the signal word WARNING. The least toxic products require the signal word CAUTION. Sonar labels display the word CAUTION, the USEPA's lowest acute toxicity rating category.

Q8. How do we know that humans are not likely to experience any harmful effects from Sonar's temporary presence in the environment?

A8. Companies that develop new herbicides are required to: 1) conduct extensive investigations of the toxicology of their product in laboratory animals; 2) characterize the ways by which people may contact the herbicide after it has been applied to an aquatic site; 3) determine the amount of exposure resulting from these possible contacts; and 4) demonstrate the fate of the herbicide in the environment. Before USEPA will register a herbicide, the Agency must establish with a high degree of certainty that an ample safety margin exists between the level to which people may be exposed and the level at which adverse effects have been observed in the toxicology studies.

Investigations of the toxicity of Sonar have been performed in laboratory animals under a variety of exposure conditions, including exposure to very high doses for short periods (acute studies), as well as repeated exposures to lower doses (which are still far in excess of any exposures that humans might actually receive) throughout the lifetime of the laboratory animals (chronic studies). Other special studies have been performed to evaluate the potential for Sonar to cause reproductive effects, cancer, and genetic damage. Study results indicate a low order of toxicity to mammalian species following acute exposures and repeat-dose exposures for up to a lifetime. In addition, repeated doses of Sonar did not result in the development of tumors, adverse effects on reproduction or on development of offspring, or genetic damage.

In characterizing the toxicity of a compound and its safety margin for exposures of humans and wildlife, toxicologists attempt to identify the maximum dose at which a chemical produces no toxicity. Another way of stating this is how much of the chemical can an organism be exposed to before it reaches a toxic level (recall from the footnote to the introduction on page 1 that all substances are toxic at some dose or level). This maximum non-toxic dose is usually established by studies in laboratory animals and is reported as the "no-observed-effect level" or NOEL. The dietary NOEL for Sonar (that is, the highest dose at which no adverse effects were observed in laboratory animals fed Sonar) is approximately 8 milligrams of Sonar per kilogram of body weight per day, abbreviated 8 mg/kg/day. This NOEL was derived from a study in rats that were fed Sonar in their regular diets every day for their entire two-year lifetime.

To put this NOEL into perspective, a 70-kg adult (about 150 pounds) would have to drink over 1,000 gallons of water containing the maximum legally allowable concentration of Sonar in potable water (0.15 ppm) daily for a significant portion of their lifetime to receive a dose equivalent to the 8 mg/kg/day NOEL. At most, adults drink about 2 quarts (one-half gallon) of water daily, which means that even if a person were drinking water with the maximum legally allowable concentration of Sonar, their margin of safety would still be at least 2,000. Similarly, a 20-kg child (about 40 pounds) would have to drink approximately 285 gallons of Sonar-treated water every day to receive a dose equivalent to the NOEL. Because children drink only about one quart of water daily, this provides a safety margin of greater than 1,000.

The above example calculation of safety margins is based on the assumption that potable water will contain levels of Sonar at its maximum allowable concentration of 0.15 ppm (150 ppb). In fact, the Sonar concentration achieved under typical applications is closer to 0.02 ppm (20 ppb), thereby providing a safety margin seven times greater. The

point is that adults and children who drink water from potable water sources that have been treated with Sonar according to label instructions are at negligible risk.

Similarly, the levels of Sonar allowed in various food products pose negligible risk to human health. For example, even if Sonar were present at the maximum allowable limit of 0.05 ppm in meat, poultry, eggs, and milk, a 70-kg adult would have to consume almost 25,000 pounds of these foods daily (and again for a significant portion of a lifetime) to receive a dose equivalent to the dietary NOEL for Sonar. A child would have to consume over 7,000 pounds of these foods daily.

Because Sonar is used only intermittently in any one area, and because it disappears from the environment, there is virtually no way that anyone will be exposed continuously for a lifetime. Because the NOEL derives from a study involving daily exposures for a lifetime, the actual safety margin for people is, in fact, much greater than is suggested by the above illustrative examples.

Q9. How complete is the toxicology information upon which this conclusion rests?

A9. All toxicity studies required by the USEPA to obtain registration approval for Sonar have been completed.

Q10. What about the people who apply Sonar—are they at risk?

A10. The Sonar label states that individuals who use Sonar should avoid breathing spray mist or contact with skin, eyes, or clothing; should wash thoroughly with soap and water after handling; and should wash exposed clothing before reuse. These precautions are the minimum recommendations for the application of any pesticide. If Sonar is used according to label instructions, exposures to the product should be minimal and use should pose negligible risks to applicators.

Sonar has been shown to be of low acute toxicity in laboratory animal studies (that is, toxicity from a high dose exposure for a short period of time). Therefore, any exposure to the product (even undiluted) that might occur during use is unlikely to lead to adverse effects as long as label instructions are followed. As discussed in Question #7, Sonar's label carries the signal word CAUTION that corresponds to the USEPA's lowest acute toxicity rating category.

Studies in laboratory animals show that the lethal dose from a single oral exposure of Sonar is greater than 10,000 mg/kg. To put this into perspective, an adult would have to drink over one million gallons of Sonar-treated water (at the 0.15 [150 ppb] ppm maximum allowable limit) to receive a dose of 10,000 mg/kg; a 20-kg child would have to drink approximately 350,000 gallons.

Because applicators are more likely to contact the undiluted material than the general population, questions about the toxicity of Sonar following direct skin contact have been raised. A laboratory study of the toxicity of an 80 percent solution of Sonar applied to rabbit skin (a standard model to predict effects in humans) suggests that Sonar is minimally toxic by this route. In this study, when Sonar was repeatedly applied to the skin of rabbits for 21 days (in the largest amounts that could be applied practically), there were no signs of toxicity and only slight skin irritation was observed. Further, the dermal

administration of the 80 percent solution of Sonar did not induce sensitization in guinea pigs.

Q11. Has there been any investigation of the possible harmful effects of Sonar on fish, wildlife, pets and livestock?

A11. The toxicity of Sonar has been investigated in laboratory studies in birds (including the bobwhite quail and mallard duck), in the honey bee (as a representative insect) and in the earthworm (as a representative soil organism), in five different species of freshwater and marine fish, and in other aquatic animals. These studies have involved exposures to high concentrations for brief periods as well as exposures lasting as long as an entire lifetime, including during reproduction.

Extensive studies have also been performed to evaluate the effects of Sonar on various aquatic and terrestrial plants (both those considered undesirable aquatic weeds and those native plants that we wish to protect). Studies in laboratory animals designed primarily to assess potential health risk in humans are also relevant to the assessment of potential health effects in mammalian wildlife, livestock, and pets.

In addition, **Sonar** has been monitored in water, plants and fish during field trials. This provides firsthand information on residue levels in the environment following application of Sonar.

Q12. What do these investigations reveal?

A12. A combination of the toxicity studies and residue monitoring data reveals that Sonar poses negligible risks to aquatic animals including fish, wildlife, pets, and livestock when used according to label directions.

As was done with laboratory mammals, toxicity studies were conducted to establish a dietary no-observed effect level (NOEL) for birds. This maximum, non-toxic chronic dose is 1,000 ppm in the diet. One thousand (1,000) ppm is 2,500 times the highest average concentration of total residue found in fish (0.40 ppm), about 2,100 times the highest concentration found in aquatic plants (0.47 ppm), and about 11,500 times the highest average concentration of Sonar found in the water at field trial sites (0.087 ppm). Because the residue levels in these “bird food” items are so far below the NOEL, it can be concluded is that there are negligible risks to birds that might be exposed to Sonar in their diet following application of Sonar.

The highest average Sonar concentration found in Sonar-treated water is below the lowest NOEL values for both short and long term exposures from freshwater and marine fish. Honeybees and earthworms are not particularly sensitive to Sonar. Sonar caused no deaths in honey bees when they were dusted directly with the herbicide, and earthworms were not affected when they were placed in soil containing more than 100 ppm Sonar.

Extensive testing of Sonar in laboratory animals used to assess potential risks to human health indicates that a large safety margin exists for mammalian species in general. Thus, Sonar poses negligible risk to pets, livestock, and mammalian wildlife that might drink from water treated with Sonar.

Q13. Can Sonar be used in environmentally sensitive areas?

A13. Sonar has been used in a wide range of aquatic environments in the United States without incident for almost 15 years. Florida canals and rivers are examples of environmentally sensitive areas that have been treated with Sonar. Some sites are habitats for the endangered Florida manatee. Although toxicity testing data for the manatee, or for other endangered species, cannot be collected directly, questions about whether Sonar treatment will pose any significant risk to the manatee can be answered with results of the mammalian toxicity studies.

The Florida manatee is an aquatic mammal that consumes up to 20% (one-fifth) of its body weight per day in aquatic plants. Treatment of canal water with Sonar according to label directions is expected to result in a maximum Sonar concentration of 0.15 ppm in the water and from 0.8 to 2.6 ppm in aquatic plants. Calculations show that it would be impossible for a manatee to ingest enough Sonar in its diet to cause any adverse effects, based on results of laboratory studies in other mammals. To reach the maximum non-toxic dose or NOEL for sensitive mammalian species, a manatee would have to drink more than 40 times its body weight per day in treated water, or eat at least 3 to 10 times its body weight per day in aquatic plants. This calculation indicates that treatment with Sonar in manatee habitats—as one example of an environmentally sensitive area—will pose negligible risk. In fact, application to Florida canals and rivers has been approved by the U.S. Fish and Wildlife Service, Florida Department of Environmental Protection, and the Florida Game and Fresh Water Fish Commission.

Sonar has also been used in other environmentally sensitive areas such as Disney World, Ducks Unlimited MARSH projects, Sea World, state and federal parks, and numerous fish and waterfowl management areas.

Q14. What is it that makes Sonar an effective aquatic herbicide while being a compound of relatively low toxicity to humans?

A14. Sonar inhibits a plant's ability to make food. Specifically, Sonar inhibits carotenoid synthesis, a process specific only to plants. Carotenoids (yellow, orange and red pigments) are an important part of the plant's photosynthetic (food making) system. These pigments protect the plant's green pigments (called chlorophyll) from photo degradation or breakdown by sunlight. When carotenoid synthesis is inhibited, the chlorophyll is gradually destroyed by sunlight. As a plant's chlorophyll decreases, so does its capacity to produce carbohydrates (its food source) through photosynthesis. Without the ability to produce carbohydrates, the plant dies.

Humans do not have carotenoid pigments. Therefore, the property of Sonar that makes it an effective herbicide at low doses does not affect the human body.

Q15. Will Sonar have an adverse effect on water quality?

A15. Extensive testing of a wide range of water bodies has shown no significant changes in water quality after Sonar treatment. In fact, Sonar has a practical advantage over certain other aquatic herbicides in this area. Specifically, the dissolved oxygen content of the water does not change significantly following Sonar treatment because the relatively slow herbicidal activity of the product permits a gradual decay of the treated vegetation. Maintaining adequate dissolved oxygen levels are critical to fish and other

aquatic animals, which require oxygen to survive. This contrasts with the changes in water quality that can arise from the application of certain other aquatic herbicides that are "fast-acting." The sudden addition of large amounts of decaying plant matter to the water body can lead to decreased oxygen levels and result in a fish kill. To avoid depressions in dissolved oxygen content, label directions for certain "fast-acting" aquatic herbicides recommend that only portions of areas of dense weeds be treated at a time. Because Sonar does not have any substantial impact on dissolved oxygen, it is possible to treat an entire water body with Sonar at one time.

Q16. Is there any reason for concern about the inert ingredients used in Sonar?

A16. Inert ingredients are those components of the product that do not exhibit herbicidal activity; that is, the components other than Sonar. Water is the primary inert ingredient in Sonar A.S., making up approximately 45% of the formulation. The second largest (approximately 10%) inert is propylene glycol; a compound used in facial creams and other health and beauty products. Other inert ingredients are added to serve as wetters, dispersants, and thickeners in the formulation. Trace amounts of an antifoaming agent and a preservative are also added. The primary inert ingredient in the pelleted formulations is clay, which makes up approximately 89% of the formulation. Small amounts of a binder or coating solution are also added to reduce the dustiness of the pellets. None of the inert ingredients in Sonar formulations are on the USEPA's list of "Inerts of Toxicological Concern" or list of "Potentially Toxic Inerts/High Priority for Testing." Thus, there is no reason for concern about the inert ingredients used in Sonar.

Q17. Is it important to follow label directions for use and disposal of Sonar?

A17. Yes. It is a violation of federal law to use products, including Sonar, in a manner inconsistent with product labeling or to improperly dispose of excess products or rinsate. Although the results of extensive toxicity testing in the laboratory and in field trials indicate a low order of toxicity to non-target plants, animals, and people, Sonar, like all chemicals, will cause adverse effects at sufficiently high exposure levels. Failure to follow label directions for use and disposal of Sonar could result in environmental levels that exceeds the tolerances for Sonar established to be protective of human health and the health of pets, livestock and other wildlife. In addition, improper use of Sonar could result in unintended damage to non-target plants.

Q18. If Sonar is used in conformance with label directions, is there any reason to be concerned that Sonar will pose risk to human health or the environment?

A18. As discussed in the answers to the previous questions, results of laboratory and field studies and extensive use experience with Sonar in a wide range of water bodies strongly support the conclusion that Sonar will pose negligible risks to human health and the environment when used in conformance with label directions.

In summary, it can be said that Sonar has a favorable toxicological profile for humans. It has an overall low relative toxicity and it is not a carcinogen, mutagen or reproductive toxicant. Sonar also has a very good environmental profile for an aquatic product because of: 1) its low toxicity to non-target organisms; 2) its non-persistent behavior when applied to water bodies (i.e., it readily breaks down to carbon, hydrogen, oxygen, nitrogen and fluorine); and 3) its low bioaccumulation potential, which means it does not build up in the body or in the food chain.

Triclopyr Questions and Answers

These questions were submitted by the public. The questions were answered by a team of experts.

1. **What is triclopyr?**

   Triclopyr *(pronounced tri–clo–peer)* is an herbicide that can control infestations of Eurasian watermilfoil and other broad-leaf water plants. Eurasian watermilfoil is more sensitive to triclopyr than many native aquatic species including coontail, rushes and cattails. Triclopyr can therefore be used at label concentrations to remove Eurasian watermilfoil without killing many native plants. One triclopyr product is currently registered and marketed for aquatic weeds - Renovate 3™.

2. **There are two types of triclopyr. Which one is registered for aquatic use? What distinguishes these two types of triclopyr from each other?**

   Renovate 3™ (triethylamine salt of triclopyr – 3 lb/gal acid equivalent) is the only formulation of triclopyr registered by the US EPA as an aquatic herbicide. The other formulation Garlon 4 is a butoxyethyl ester formulation with 4 lb/gal acid equivalent and this formulation is not registered for aquatic use.

3. **Has a full risk assessment been performed on triclopyr? If so, by whom?**

   An Environmental Impact Statement (EIS) has been completed by the Washington Department of Ecology and a full risk assessment was conducted by Ecology and formed the basis for the EIS.

4. **How toxic is triclopyr to humans?**

   Concentrated triclopyr products are corrosive and can cause skin irritation and irreversible eye damage if splashed in the eye. However, only dilute amounts of triclopyr are needed to kill Eurasian watermilfoil. These dilute concentrations have not been shown to cause skin irritation or other health effects. Triclopyr is not well absorbed through skin. If ingested, research has shown that low doses of triclopyr are rapidly excreted in humans and are unlikely to accumulate in human tissue or cause adverse effects.

   In natural waters, the initial breakdown products of triclopyr are TCP and TMP. Tests in laboratory animals on both these metabolites have shown that their toxicity to mammals is less than or equal to triclopyr. These metabolites are relatively short-lived in the environment. Complete breakdown of triclopyr results in carbon dioxide, oxamic acid, and other low molecular weight carboxylic acids.

   Triclopyr is not considered to be a cause of cancer, birth defects, or genetic mutations. Nor is it considered likely to cause systemic, reproductive, or

developmental effects in mammals at or near concentrations encountered during normal human use. However, Washington State Department of Health considers it prudent public health advice to minimize exposure to pesticides regardless of their known toxicity.

5. **Does triclopyr accumulate in human and animals?**

   Triclopyr and its metabolites are excreted rapidly in humans and mammals. A study in human volunteers, given low doses showed that blood levels peaked two to three hours after ingestion and declined to undetectable levels within 48 hrs. A studies in rodents showed that triclopyr and metabolites have a short residence time in other bodily tissues (12-15 hours).

6. **Is there any relationship between triclopyr and cancer?**

   Triclopyr was determined to be "not classifiable as to human carcinogenicity" by EPA reviewers. This means the EPA did not consider the animal evidence to be sufficient to list triclopyr as a possible human carcinogen. Nor did it find the evidence definitive enough to rule out carcinogenicity. EPA considered results of the a 22 month assay in mice, a 24 month assay in rat, and results from *in vitro* tests for mutations. There were marginal increases in some breast tumors (benign) but no consistent pattern across dose groups and no dose-response pattern. EPA does not consider this a data gap since the required studies were conducted and were acceptable to EPA.

7. **Does triclopyr have impacts on reproduction?**

   EPA requires that pesticides be assessed for reproductive effects. In the reproductive tests two generations of rodents are fed the pesticide in their daily diet. It is common that pesticides have a positive response at the highest dose tested. This is because the test protocol requires the highest dose to be high enough to elicit a reproductive effect (unless the dose required causes death or severe suffering of the animal). Generally the highest dose must show an effect or the test is unacceptable to EPA. Impairment of reproduction by triclopyr was seen only at doses high enough to cause toxicity to the mothers. No reproductive effects were seen at lower doses. The high dose was very high relative to potential human exposure. It was 500 times the dose considered by EPA to be safe for daily exposure to humans and over 1400 times higher than the worst-case scenario for human exposure to triclopyr in lake treatments.

8. **At what levels of application is there documented evidence of impacts to people, fish, wildlife, microorganisms etc? Will these levels be achieved in applications to lakes to control Eurasian watermilfoil?**

   Renovate 3™ is used at levels no greater than 2.5 ppm (maximum labeled rate) in lakes. These levels have been found to be safe to the environment and non-target species based upon testing conducted for US EPA Registration.

9. **If my lake is treated with triclopyr, will I be exposed to this herbicide?**

   Residues of triclopyr and its metabolites should not be detectable in lake water more than a couple weeks past the application. If you do wade or swim in the lake, touch pets that have been in the lake, or eat fish from treated water shortly after the treatment, you may be exposed to dilute concentrations of triclopyr and its metabolites.

   There is little chance of exposure to bystanders during the herbicide application process. This is because liquid triclopyr herbicide is injected directly into the water column. The application method eliminates opportunity for drift of sprays onto bystanders or nearby residents during the application. Triclopyr has a low vapor pressure and is quite water-soluble so it will not volatilize from treated water and drift through air following the application.

10. **Is it safe to swim or play in the water following the herbicide application?**

    There are no swimming restrictions on the Renovate 3™ label following application of triclopyr to water. This means that the federal EPA considers the treated water safe for swimming. However, to impose an additional layer of safety to swimmers (due to potential for eye irritation) the Washington Department of Ecology is imposing a twelve hour swimming restriction in Washington after treatment with triclopyr.

    Washington State Department of Ecology recently contracted for an independent scientific assessment of triclopyr safety including this question of a swimmer's exposure. The most conservative scenario considered was a six-year-old who swims for three hours and inadvertently swallows 150 ml of water from a lake treated with the maximum allowable rate of triclopyr. The estimated amount the child would absorb in this scenario was still more than 100 times less than the daily dose animals were fed over their lifetime with no observable adverse effects.

    Washington State Department of Health (DOH) has reviewed the data and agrees that skin contact with treated water at the dilute treatment concentration is unlikely to result in any adverse health effect in people. Triclopyr products are concentrated when initially injected into water during an application so, as a precaution, DOH advises people to avoid contact with water in treated areas for twelve hours following an application to allow the herbicide concentrate to disperse and reach the dilute treatment concentration.

11. **Are fish from the treated area safe to eat?**

    One breakdown product of triclopyr, called TMP, can temporarily accumulate in fish and shellfish immediately following a triclopyr application. The EPA did not consider the concentration of this metabolite to be of health concern and requires no fishing restrictions.

    Washington State Department of Ecology recently contracted for an independent scientific assessment of triclopyr safety including this question of eating fish from treated

waters. Scenarios for children and adults consuming fish every day from treated water resulted in estimated exposures that were more than 1000 times less than the daily doses animals were fed over their lifetime with no observable adverse effects.

12. **Has triclopyr been tested for special sensitivity to children?**

The EPA is required to assess each pesticide for its potential to cause toxicity specifically to infants and young children. This is because children's bodies are still developing and they may be more susceptible to the action of a toxicant. EPA conducted this assessment using animal tests and concluded "Reliable pre-and post-natal data indicate no special sensitivity of young animals to triclopyr residues."

13. **What are the toxicity levels of triclopyr to aquatic organisms?**

For aquatic organisms, the acute toxicity values for triclopyr with rainbow trout, salmon species, bluegill sunfish, and the water flea (*D. magna*) are shown below in Text Table 1. Note: All testing done with laboratory water at pH of ~7-8, typical of conditions in the Pacific NW area, as demonstrated in Figure 1.

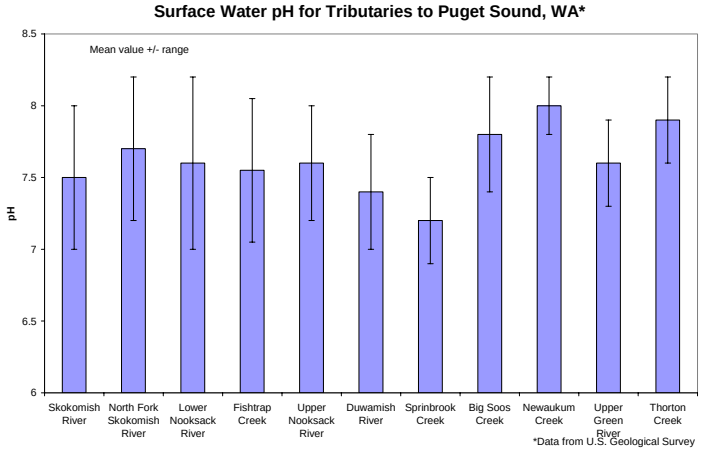

Figure 1. Surface water pH for Puget Sound tributaries (from U.S. Geological Survey)

Text Table 1. Acute toxicity data for aquatic species with Triclopyr

	R. Trout	Salmon sp.	Bluegill	Water Flea
Acute 96-hr LC50 (ppm)	86 to 117	82 to 182	148	133 (48-hr)

EPA Toxicity Rating: "Slightly toxic to Practically non-toxic"

The EPA classifies pesticides according to their acute toxicity responses. Compounds with acute values >100 ppm are classified "Practically non-toxic" (best rating), while compounds with acute values of 10-100 ppm are classified as "Slightly toxic" (second best classification). The overall weight of evidence indicates that triclopyr acute toxicity values average ~100 mg/L or greater with invertebrate and vertebrate species, indicating

that a collective “Practically non-toxic” rating is most appropriate as a generic classification.

14. **What does “practically non-toxic” mean?**

Practically non-toxic is an ecotoxicological category used to describe pesticides and other chemicals. In the chart below you will see that it is the lowest toxicological category.

Table II: Ecotoxicological Categories

Toxicity Category	Mammalian (Acute Oral)* mg/kg	Avian (Acute Oral)* mg/kg	Avian (Dietary)– ppm	Aquatic Organisms‡ ppm
very highly toxic	<10	<10	<50	<0.1
highly toxic	10-50	10-50	50-500	0.1-1
moderately toxic	51-500	51-500	501-1000	>1-10
slightly toxic	501-2000	501-2000	1000-5000	>10-100
practically non-toxic	>2000	>2000	>5000	>100

* Reflects dose given to test animals and is based on body weight of the test animal.
_Concentration in the diet. Unrelated to body weight of the test animal. Measure of environmental exposure.
‡Concentration in water. Unrelated to body weight of test animal. Measure of environmental exposure.

The words "pesticide" and "poison" are not synonymous. Relatively few pesticides are poisonous to humans according to the standard meaning of the term. “The dose makes the poison" is a saying all doctors understand. What it means, in essence, is that it’s not simply *what* you come in contact with or ingest that determines risk, it’s also *how much* you contact or ingest. This point is important because most pesticides are designed to control pests with amounts far smaller than the amount that would affect humans and pets. Contrary to popular belief, pesticides are not a uniquely toxic class of substances. They range from practically non-toxic to highly toxic—as with other classes of natural and manmade substances.

15. **Why does the Renovate 3™ label state to not apply to saltwater? Does it become toxic in a saltwater environment? Are salt water plants, creatures etc more susceptible to triclopyr than freshwater? If so how and why?**

A pesticide can only be directly applied to sites that it has been approved for through the US EPA label registration process. The label only indicates where a pesticide may be applied and does not restrict where residues may be discharged. Triclopyr does not become toxic in salt water. Salt water plants and animals should not be any more sensitive to triclopyr than the freshwater organisms that have been tested with triclopyr. As an example from the Renovate 3™ Material Safety Date Sheet (MSDS) the Acute

LC50 for pink shrimp (*Penaeus duorarum*) is 895 mg/L. This is over 350 times higher than the maximum rate that is normally applied to lakes.

16. **What are the long term affects of triclopyr on mammal systems - if it accumulated in mammalian tissue 5 yr, 10 yr, 20 yr. later?**

    Populations of several native mammals and birds were studied for several years following triclopyr, prescribed burning, and combination treatments in oak-savanna woodlands. Populations for all species showed either no change or increases following treatments. Thymus gland weights showed a statistically significant increase in burned areas both with and without triclopyr applications (Lochmiller et al. 1995). Recently published studies showed no impact of triclopyr applications on wildlife populations, relative to non-herbicide based vegetation management practices (Duchesne et al. 1999; Harpole and Haas 1999; Leslie et al. 1996; Leutenschlager et al. 1998; Lindgren et al. 1998; Nolte and Fulbright 1997). One study (Obenshain et al. 1997) reports that the combined use of triclopyr with 2,4-D and glyphosate may lead to concentrations of these herbicides in water that may cause adverse effects which are not detailed in the publication. In mammals, most triclopyr is excreted, unchanged, in the urine. Triclopyr was observed to concentrate slightly in ovaries of laboratory animals given repeated doses. No accumulation was observed in other tissues. The authors concluded that triclopyr and its metabolites are likely to have a low potential to accumulate upon repeated exposure (Timchalk et al. 1990). Data quoted from this website: http://www.fs.fed.us/r6/weeds/Triclopyr_Profile.PDF

17. **Could triclopyr possibly impact bats and or other mammals, especially bats that are pregnant or nursing their young?**

    Renovate3™ has a low potential for bioaccumulation. Triclopyr is typically found at a concentration in animals many times less than what is present within the surrounding water and is eliminated relatively quickly. The LD50 for Rats has ranged from 630-729 mg/Kg (Tu et. al.). Since the material does not bioaccumulate bats would not be able to develop concentrations that would affect them or their offspring by drinking treated water or foraging on insects from the treated water.

18. **What are the inert ingredients in triclopyr?**

    Garlon 3A™ and Renovate 3™ are identical products marketed under two names. Ingredients listed on either the pesticide label or Material Safety Data Sheet are:

    - triclopyr TEA salt (44.4%)
    - ethanol (amount not specified but more than 1%)
    - triethylamine 3%,
    - ethylenediamine tetraacetic acid 2.3%.

    The regulatory manager at Dow Agrosciences (manufacturer of triclopyr) disclosed that the product is more than 45% water and contains small amounts of an antifoam product

and a surfactant. He explained that triethylamine is used extensively in cosmetics and has an allowable level in food. He also explained that EDTA helps the product adjust to the hardness of the lake water. He confirmed that the ethanol was present at ~2% of the formulated product. Some of the other ingredients could contribute to the hazard of the product for pesticide applicators if direct skin or eye contact with the concentrated product occurs. The other ingredients listed do not pose a risk to the general public in contact with the diluted product. This is because the product is diluted in water more than 100,000–fold for control of Eurasian watermilfoil.

19. **Are there "gaps" in the data on triclopyr - things that we do not know the answers to?**

    There are often site-specific endangered animals or rare plants that have not been tested. To avoid impacts, the Washington Department of Ecology requires that the applicant check with the Department of Natural Resource's Heritage Program for rare plant locations and to consult the lists for animals. Because some salmon stocks are listed as threatened and endangered in the Pacific Northwest, the Washington Department of Ecology has also contracted with the University of Washington to conduct tests for potential sub-lethal effects on salmon with various herbicides.

20. **Are there any "unknown" risks to the use of triclopyr?**

    The world is full of potentially toxic substances and dangerous situations. However, separating the trivial and low level risks from the important environmental risks requires the application of sound scientific principles. Both the US EPA and the Washington Department of Ecology have examined the wealth of data and conducted risk assessments on triclopyr. They have both determined that triclopyr will have no significant acute or chronic impact on people, fish, or freshwater invertebrates when recommended rates are used.

21. **Is triclopyr one molecule away from Agent Orange?**

    The health effects of Agent Orange are linked to its dioxin contamination. Triclopyr does not contain toxic dioxin impurities so we do not need to be concerned about health effects of dioxins in the use of triclopyr.

    The molecule of triclopyr acid is structurally similar to the two herbicides in Agent Orange.

    - Agent Orange was an herbicide used extensively in the Vietnam war to defoliate large tracts of forest.
    - Agent Orange contained two active ingredients: 2,4-D and 2,4,5-T. Triclopyr acid is one atom different from 2,4,5-T and two atoms different from 2,4-D.
    - Triclopyr acid differs in an important feature. Triclopyr is based on a pyridine ring and 2,4,5-T is based on a phenol ring.

- This ring difference prevents dioxin impurities from forming during production of triclopyr.
- The principle health issue with Agent Orange was contamination with a highly toxic dioxin impurity (2,3,7,8- TCDD) formed during the synthesis of 2,4,5-T.
- Health effects observed in Airforce mixers, loaders, and sprayers; who experienced heavy occupational exposure to Agent Orange; have generally been ascribed to dioxin exposure.
- 2,4,5-T is now banned, largely because of unavoidable dioxin impurities formed during its production.
- Dioxin impurities do not occur in the synthesis of triclopyr because of the difference in the ring structure.
- There is no natural pathway for triclopyr to chemically convert to 2,4,5-T or form dioxins in the environment.

22. **How many of the triclopyr studies have been funded - in whole or in part - by Dow Chemical or one of its subsidiaries? What is the level of potential conflict of interest here?**

    Most of the studies required by EPA for the registration for triclopyr as an aquatic herbicide have been funded by its manufacturer. This is normal since companies typically spend 20-50 million dollars in testing to meet EPA registration requirements for aquatic herbicides. EPA has extremely rigorous testing standards called Good Laboratory Practices that the laboratories must comply with. This helps ensure quality results. Who else, besides the company selling the product would be willing to invest this sort of money in toxicity testing? However, government agencies and Universities often conduct their own field trials and other research and these published results are considered by the state when conducting risk assessments. For instance the University of Washington has published studies on using triclopyr to control purple loosestrife. The Washington Department of Ecology and the University of Washington are conducting research on the impacts of triclopyr (and other aquatic herbicides) on the smoltification of juvenile coho and chinook salmon.

23. **What does "half-life" mean and what is the "half-life" of triclopyr?**

    Half life is the period of time that must elapse for a pesticide to breakdown to ½ its original concentration. The half-life varies dependent upon where the triclopyr is found (i.e. water, hydrosoil, etc.) and other environmental factors. Half-lives for triclopyr and its breakdown products average six days or less in water and 8.4 days or less in sediment. (Citation: Letter to Kathleen Emmett, Dept. of Ecology, March 18, 2004: Comments on Environmental Impact Statement for Permitted Use of Triclopyr – Draft from Brian L. Bret, Ph.D.). Renovate 3™ has been shown to drop to non-detectable levels in 24 hours – 15 days (typically 3-7) based upon immunoassay testing completed during the 2003 field season.

24. **What does triclopyr "break down" into – are these elements harmful in any manner?**

Triclopyr's eventual, final metabolite is carbon dioxide (CO_2). To get there, it typically breaks down into trichloropyridinol or TCP, a compound that itself is far less stable than triclopyr in aquatic systems, as seen in aquatic field studies. TCP itself has a comparable level of toxicity as triclopyr and is frequently found at low concentrations in early sampling points in field studies. The methoxypyridine or TMP metabolite is rarely observed but also has a comparable level of toxicity as triclopyr and TCP.

25. **How long will the herbicide last in the lake water?**

In natural water, sunlight and microorganisms rapidly degrade triclopyr. Triclopyr concentrations decline sharply over the first several days after treatment. Residues should be more than 95% degraded and dissipated from treated water in 1-2 weeks following treatment with triclopyr.

26. **Will triclopyr, be found in the sediment of lakes after treatment?**

Renovate3™ degraded in the sediment in a relatively short period of time

27. **What are the impacts that triclopyr could have on ground water?**

The limited mobility of triclopyr in soil, low absorption constant, and high rate of microbial and photolytic degradation in water and sediment would indicate that this compound would have little potential for the extensive mobility required to contaminate groundwater supplies. This assumption is supported by data collected by the US Geological Survey (USGS), as this federal agency has collected over 850 groundwater samples over a five-year period in the Pacific Northwest area and these samples have been examined for pesticide residues. Triclopyr has never been detected in any of the groundwater samples taken by the USGS, despite extensive use as an herbicide in this region in forestry applications over a 20-year timeframe.

28. **What will be the positive impacts of utilizing triclopyr to control Eurasian watermilfoil?**

Triclopyr (Renovate 3™) is selective to broad-leaved submersed aquatic plants such as Eurasian watermilfoil. Many native aquatic plants are not broad-leaved and are not significantly impacted by triclopyr. Significant reduction of Eurasian watermilfoil is a key component of improving and restoring the native aquatic plant community. If native species have less Eurasian watermilfoil to compete with they recover. There are additional benefits to the organisms that utilize these native species for food or shelter with the reduction of the Eurasian watermilfoil.

29. **What are the risks associated with a "Do Nothing Alternative" in lakes with Eurasian watermilfoil?**

Eurasian watermilfoil generally dominates the ecosystem to depths up to 20 feet (depending on the light conditions) and out-competes native submersed aquatic vegetation. The diversity of the aquatic vegetation community generally declines in Eurasian watermilfoil infested water bodies and this impacts the entire community within the lake. A plant such as Eurasian watermilfoil invades takes over and becomes a *keystone* species in a foreign environment/ecosystem. This changes and has negative impacts on the entire ecosystem.

30. **How can triclopyr kill only the milfoil and not other plants?**

Broad-leaf plants (dicots) have different biochemistry than monocots. Triclopyr affects the family of broad-leafed plants or dicots. Eurasian watermilfoil is a broad-leaf plant whereas most native aquatic plants are monocots and not susceptible to triclopyr.

31. **Is triclopyr a long term solution - or a short term fix?**

Eurasian watermilfoil is extremely difficult to eradiate. If diver hand pulling of Eurasian watermilfoil can be successfully accomplished in the water body after the triclopyr treatment to remove remaining milfoil, then the triclopyr treatment could offer some long-term results.

32. How will the die off of Eurasian watermilfoil plants in lakes after triclopyr treatment impact the lake?

Eurasian watermilfoil plants will slowly exhibit symptoms of herbicide damage (twisting of the stems due to the plant hormone (auxin-like) effect of triclopyr). The plants will gradually sink to the lake bottom and decompose. Systemic herbicides generally take a week to several weeks to entirely kill the plants so that you don't tend to get severe oxygen depletion that can sometimes occur when using contact herbicides. Native plants will fill in the areas left unoccupied by Eurasian watermilfoil.

33. **Are there any species "at risk" with the use of triclopyr?**

Broad-leaf aquatic plants, such as Eurasian watermilfoil, will be affected by triclopyr.

34. **Where else has triclopyr been used? Were any problems encountered with these applications – to the environment, fish, wildlife etc.?**

Renovate 3™ was labeled for use by the EPA in November of 2002. Prior to this triclopyr it had been used under an Experimental Use Permit as an aquatic herbicide since 1988 (for small test plots around the country). Additional field trials have been completed by researchers since 1984). A number of scientific papers by independent researchers have been published about field studies including studies in the Pend Oreille

River, Washington, and Lake Minnetonka Minnesota. Triclopyr has also been used for purple loosestrife control in Washington. In 2003 (Renovate 3™'s first field season after EPA registration) it was used in 27 states on hundreds of projects. There have not been any reported problems encountered with these applications.

35. **Is it true that some native plants take over a year to recover from an application of triclopyr?**

Triclopyr is a selective herbicide which means that it generally targets the broad-leaved aquatic plants. Although there are few aquatic broad-leaved plants, there are others beside Eurasian watermilfoil. These species could be expected to be impacted by triclopyr. Eurasian watermilfoil is not thought to have viable seeds or other reproductive structures (besides fragments), whereas native aquatic plants have seeds, and sometimes tubers and other over-wintering structures. Even if the mature native plants are impacted by triclopyr, these plants should recover from their seeds or tubers the next season. Triclopyr treatment should enhance native plant growth since Eurasian watermilfoil crowds out native species. Removing Eurasian watermilfoil opens up niches that native species will fill. A study done in the the Pend Oreille River by the US Army Corps of Engineers with triclopyr documented that removing Eurasian watermilfoil markedly enhanced native plant growth in the treated areas.

36. **Can milfoil plants develop immunity to triclopyr?**

Short-term and long-term data collected by the U.S. Corps of Engineers Aquatic Plant Control Research Program (Vicksburg, MS) has not demonstrated that Eurasian watermilfoil is capable of developing immunity or "resistance" to triclopyr's mode of action. Work conducted by Dr. Kurt Getsinger and others with the Corps of Engineers indicates that "*control of this species is likely*" with appropriate dose regimes of triclopyr, which generally range from 0.5 to 2.5 ppm. The Corps of Engineers is particularly interested in the use of triclopyr to control milfoil for maintenance of waterways, as "*this herbicide shows a low order of toxicity to microbial communities and higher aquatic organisms and residue accumulation in sediment, shellfish, and fish is negligible**".

*Netherland, M. and Getsinger, K. 1992. Efficacy of triclopyr on Eurasian watermilfoil: Concentration and exposure time effects. J. Aquatic Plant Management 30: 1-5.

APPENDIX E GROUND WATER MONITORING PROTOCOLS (ECOLOGY)

Ground water monitoring protocol for in-lake applications of triclopyr

NOTE: This protocol shall be used if a permittee is applying triclopyr for the third time in a three year period (for submersed or floating-leaved plant eradication or control).

3 – 6 months prior to planned treatment

1. Identify all relevant wells within the county inventory within ¼ mile of the treatment area.
2. Choose at least one non-artesian well within ¼ mile of the treatment area to be the monitored well.
3. The well should be located within the hydrological path of the water body to be treated (for example, if the hydrology shows that any groundwater in an area is moving southwest, choose a well within ¼ mile southwest of your treatment area.
4. The well chosen should be no more than 50 feet deep (if no wells are available at this depth, no sampling is required).
5. Contract with a lab accredited through the Department of Ecology for triclopyr and TCP (triclopyr's breakdown product).

1 – 2 weeks prior to treatment

Follow laboratory protocols when taking a baseline water sample to be analyzed for triclopyr and TCP.

1 month after treatment

Follow laboratory protocols when taking a post-treatment water sample to be analyzed for triclopyr and TCP.

Prior to November 30th of the treatment year, report sampling results to Ecology as part of the annual report described in Special Condition S9.

APPENDIX F NOTIFICATION AND POSTING REQUIREMENTS (ECOLOGY)

S6. NOTIFICATION AND POSTING REQUIREMENTS

A. Ecology Notification Requirements

1. Pre- and post-treatment notification – For every week that treatment is planned, the Permittee(s) shall email information to Ecology on the form supplied in Appendix D. This form shall list the water bodies scheduled for treatment the following week. This form shall also detail the treatments that have taken place during the current week. The Permittee shall send the email to the appropriate Ecology regional office and Ecology headquarters no later than 5:00 pm on Friday of each week during the treatment season.

Central Regional Office, Yakima	(509) 575-2490	email: rlat461@ecy.wa.gov
Eastern Regional Office, Spokane	(509) 329-3400	email: kmer461@ecy.wa.gov
Northwest Regional Office, Bellevue	(425) 649-7000	email: tsho461@ecy.wa.gov
Southwest Regional Office, Lacey	(360) 407-6300	email: mhil461@ecy.wa.gov
Water Quality Headquarters, Lacey	(360) 407-6400	email: kelm461@ecy.wa.gov

2. Inspection Coordination Requirements

   a. At Ecology's request, each Permittee shall coordinate and schedule inspections with the appropriate Ecology regional staff.

   b. The agreed upon location and starting time for the inspection shall be on record in writing at Ecology.

   c. For inspections scheduled by the Ecology regional staff in Condition S6.A.2.a., the Permittee shall not treat unless Ecology staff are present or do not appear within 30 minutes of the scheduled and agreed upon start time, at the scheduled and agreed upon location.

3. The Permittee shall immediately notify the appropriate Ecology regional office if a spill of product(s) covered under this permit occurs into waters of the state, or onto land with a potential for entry into waters of the state. The Permittee shall notify the appropriate Ecology regional office when they are made aware of any of the following conditions occurring during or after a treatment:

   a. Any person(s) exhibits or indicates any toxic and/or allergic response as a result of the treatment.

   b. Any fish or fauna exhibit stress conditions or die within or downstream of the treatment area.

3. If the Residential and Business Notice explains the chemical **application schedule** for the whole season, and there is no deviation from that plan, no further Residential and Business Notice will be required for the rest of the season (unless a resident or business specifically requests further notification).

C. Camp Notification Requirements

1. Camps shall notify parents/guardians of campers in writing if a pesticide application is expected to occur during or within two weeks prior to their camper attending camp.

2. The written notification shall include:

   a. The name of the product being applied,

   b. The time period during which the treatment will occur,

   c. Any swimming or recreational advisories or restrictions as named in this permit or on the product label, and

   d. Camp contact information for further questions.

D. Posting Requirements

1. The Permittee shall post signs no more than 48 hours prior to the application of any products covered under this permit. (The Permittee shall use templates provided in Appendix F). No modifications of this template are allowed, except where Ecology has requested that the Permittee fill in label restrictions about the pesticide to be used.

2. The Permittee shall ensure that posted signs remain in place until the end of the period of water use restrictions.

3. The Permittee shall remove all old signs before a new treatment begins or before the end of the treatment season, whichever comes first.

4. The Permittee shall post warning signs in English and in the language commonly spoken by the community that uses the area.

5. Posting Privately or Publicly-Owned Shoreline Areas (excluding public access areas)

   a. The Permittee shall post **privately or publicly-owned shorelines** using the templates provided in Appendix F. No modifications of this template are allowed, except where Ecology has requested that the Permittee fill in label restrictions about the pesticide to be used.

b. For those applications containing a publicly accessible area,

   i. Post signs no more than 48 hours prior to an application

   ii. Place signs within 25 feet of any shoreline facing both egress and entrance of any boat launch on the water body that is within ½ mile of any treatment site. Boat launches also include sites commonly used as put-ins and take-outs for small, non-trailered watercraft. Check the Washington State Parks and Recreation Commission publication Public Boating Facilities in Washington State, second edition, 1988, to identify public accesses. Reference copies of this publication are available through the Washington State Library, King County Library, Gonzaga University Library, and Washington State University Library.

c. The Permittee(s) shall use good faith and reasonable effort to ensure that posted signs are secured and remain in place.

d. The Permittee shall post signs so they are secure from the normal effects of weather and water currents, but cause no damage to private or public property.

e. The Permittee is responsible for removal of all signs at the end of the treatment season. Biodegradable sign material may be used so that removal is not necessary.

f. The Permittee shall post signs in English and the language, if other than English, commonly spoken by the community that uses the area.

8. Posting on the Water

   a. The Permittee shall post buoys on the water when any of the following conditions are met for the treatment of submersed, floating, or floating-leaved plants:

      i. The product has recreational and/or fish consumption restrictions,

      ii. The water body is greater than one acre and/or more than 200 feet from the treatment area to the opposite shore, or

      iii. The entire shoreline has not been posted.

   b. Posted buoys shall have:

      i. Durable weather-resistant signs

      ii. Signs readable from two opposing directions

      iii. Signs positioned so they are completely out of the water

APPENDIX G PUBLIC NOTICE TEMPLATES (ECOLOGY)

The public notice must be published at least ***once*** each week for ***two*** consecutive weeks, in a ***single*** newspaper of general circulation in the county in which the chemical treatment is to take place.

Note: Submit the NOI and public notice to Ecology before the date of the first public notice.

Public Notice Template

_____ (Applicator or Government entity) (Phone number)_____ is seeking coverage under the NPDES Waste Discharge General Permit for aquatic plant and algae management.

(Lake Name)_____ (Acres) _____ Applicant_____ Location _____

(Lake Name)_____may be treated to control aquatic weeds and algae growth between (date) _____through (date) _____. The chemicals planned for use are: _____, _____, _____, _____, ... The total treatment area will not exceed ____acres.

The following information shall be included in the legal notice.

Any person desiring to present their views to the Department of Ecology regarding this application shall do so in writing within 30 days of the last date of publication of this notice. Comments can also be submitted on the SEPA documents for this project. Submit comments to: Department of Ecology, P.O. Box 47696, Olympia, WA 98504-7696, Attn: Water Quality Program, Aquatic Pesticide Permit Coordinator.

Any water use restrictions and or advisories will be posted near the treatment areas along the private shoreline and public access points. Copies of the application are available by calling the Water Quality Program, Aquatic Pesticide Permit Coordinator at _____.

DEPARTMENT OF ECOLOGY

Aquatic Treatment Email Form

Email to: _____

From: Company: _____

Cell Phone No: _____

Pre-Treatment Notification

Week of Treatment: _____

Water body name	County	Location where treatment will begin	Chemicals/products proposed for use	Targeted plants & algae	Proposed date & treatment start time

Additional Information: _____

Herbicide Treatment

Business and Residential Notice

Distribution Date: _____

_____ will be treated with the aquatic herbicide(s)/algaecide(s) on/or between _____.

Product(s) planned for use: _____

Active ingredient(s): _____

Location of Treatment(s):

_____

Treated and potentially affected areas will be sign posted the day of application. The signs will describe any water use restrictions or advisories.

If you are withdrawing water for potable or domestic water use, livestock watering, or irrigation, and have no alternate water source, please contact the applicator (name)_____ at ( ) _____or (e-mail) _____ to arrange an alternate water supply.

If you would like to request additional notification prior to treatment, or have further questions, please contact me using the information above.

This herbicide treatment is regulated under a permit issued by the Washington State Department of Ecology.

CAUTION

Fluridone (1-methyl-3-phenyl-5-[3-(trifluoromethyl) phenyl]-4(1H)- pyridinone) will be applied under permit to these waters on _____ to control aquatic vegetation.

There are no swimming or recreation restrictions or advisories when using this product.

Applicator to put additional label restrictions or advisories here:

Potable Water Restrictions:

Irrigation Restrictions:

Fishing Restrictions:

Stock Watering Restrictions:

For more information contact the applicator: _____
Phone number: (___)_____

Or the Department of Ecology at (___) _____

THIS SIGN SHALL REMAIN IN PLACE UNTIL 2 DAYS AFTER APPLICATION

CAUTION

Triclopyr TEA (Triethylamine salt of 3,5,6-trichloro-2-pyridyloxyacetic acid) will be applied under permit to these waters on _____ to control aquatic vegetation.

It has been advised that no swimming occur within the treated area during or for 12 hours following treatment.

Applicator to put additional label restrictions or advisories here:

Potable Water Restrictions:

Irrigation Restrictions:

Fishing Restrictions:

Stock Watering Restrictions:

For more information contact the applicator: _____

Phone number: (___) _____

Or the Department of Ecology at (___) _____

THIS SIGN SHALL REMAIN IN PLACE UNTIL 2 DAYS AFTER APPLICATION.

CAUTION

Diquat (Dibromide of 6, 7-dihydrodipyride (1,2-a:2',1"-c) pyrazinediium) will be applied under permit to these waters on _____ to control aquatic vegetation.

Use advisories: It has been advised that no swimming occur within the treated area during or for 24 hours following treatment.

Applicator to put additional label restrictions or advisories here:

Potable Water Restrictions:

Irrigation Restrictions:

Fishing Restrictions:

Stock Watering Restrictions:

For more information contact the applicator: _____
Phone number: (___) _____

Or the Department of Ecology at (___) _____

THIS SIGN SHALL REMAIN IN PLACE UNTIL 2 DAYS AFTER APPLICATION

Post-Treatment Notification

Week of Treatment: _____

Water body name	County	Chemicals/products used	Targeted plants & algae	Acres treated	Amount of product applied (lbs. or gallons)	Date treatment occurred

Additional Information: _____

Knowingly submitting false information shall result in permit termination.