AquaTechnex

# Hunts Point Integrated Aquatic Vegetation Management Plan

**October, 2001**

**Prepared for the Town of Hunts Point Washington**

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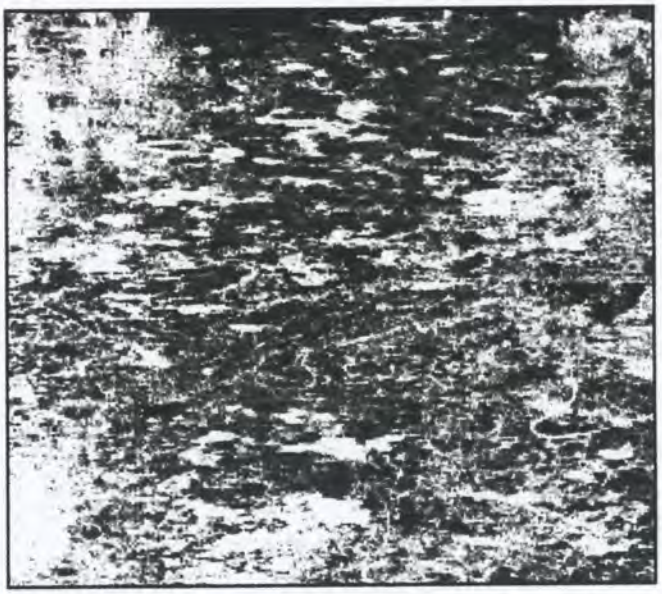
**Introduction**

Lake Washington is one of the most important water resources in Washington State. This 23,000 acre lake is about 22 miles long and has a maximum depth of 370 feet. Lake Washington is surrounded by the major cities in the state. Seattle occupies the western shoreline and the east side suburban cities occupy the eastern shoreline. The entire lake shoreline with little exception is developed as residential, marine commercial or park and open space. The residential areas on the lake are among the most expensive in the nation and these property owners are significant contributors to the City and County property tax rolls. Lake Washington has a direct connection to the salt waters of the Puget Sound through the Ship Canal and Ballard Locks. As such, it is home to an extensive fleet of both small and large recreational watercraft.

The lake is also a very important part of the aquatic ecosystems of the region. There are a number of rivers that run into the lake with important salmon runs. These fish enter the lake through a fish ladder at the Ballard Locks and migrate through the lake to their home tributaries. Many of these salmon species also utilize the lake as rearing habitat prior to transitioning to salt water and some species may spawn in portions of the lake. Some of these fish runs are listed by the National Marine Fisheries Service as threatened or endangered under the ESA.

Lake Washington has an important limnological history. This lake was severely polluted by waste from the developing communities in the early and mid 1900's. Phosphorus levels in the lake contributed to algae blooms that were both objectionable to the public and probably were toxic at times. The human health threat posed by the lake water quality and the degraded appearance of the water lead to the formation of the regional water pollution control efforts that are credited with the lake's comeback in the 1960's and 1970's. This lake is one of the few in the nation that has a long history limnologists can study. The data collected over this period of recover are included in the more famous cases that students of this discipline study today. With improved water clarity, aquatic plant life returned to the lake and the aquatic habitat in the system was also restored.



Eurasian Milfoil chokes the shallow waters of Lake Washington near Hunts Point mpacting most beneficial uses

Just as the benefits of this major investment were starting to become reality, the

invasive aquatic weed Myriophyllum spicatum, commonly known as Eurasian Milfoil, was discovered in the lake. The US Congress Office of Technology Assessment has recognized Eurasian Milfoil as a "harmful non-indigenous species" and the federal government has classified this weed as an invasive aquatic speci,es. The plant probably spread by boat trailer from British Columbia where it was discovered a few years earlier.

Eurasian Milfoil spreads rapidly once introduced to a water body. The plant can grow up to one foot per week and can reach the lake surface from depths of 20 feet or more. As it colonizes a lake, the plant will generally expand first in deeper water where there is little or no competition for space from native beneficial aquatic plants. The plants that establish auto fragment each fall and disperse further through the system. After 5 to 6 years, the plant can replace most of the native vegetation in the lake. The thick mats that form on the lake surface impact boating and swimming. There are also environmental concerns, as the plant will degrade water quality and aquatic habitat.

Eurasian Milfoil fragments have been spread from lake to lake by boat trailer. It is thought that the plant was introduced to Lake Washington in this fashion.

At the point this invasive weed was discovered in the lake about 1978, the state of Washington had no formal permit program for the regulation of aquatic plant management. In addition, there was a public reluctance to use key tools like aquatic herbicides because of the publicity recent events such as the use of "Agent Orange" in Southeast Asia and the DDT problems that were discovered in the late 1960's. While aquatic herbicides are subject to approval by the US EPA after extensive environmental review, they tend to get lumped in with these other pesticides by the general public and those groups that advocate for the reduction in pesticide use.

As Eurasian Milfoil started to expand beyond pioneering levels, shoreline property owners became alarmed. The dense weed beds that the plant forms are a menace to swimmers, there are a number of documented drowning deaths each year attributed to thick Eurasian Milfoil beds tangling the limbs of swimmers. Those that recreate in the lake started to see the impact the expanding weed beds posed to boating and fishing.

Many of these residents started to purchase and apply US EPA registered aquatic herbicides (and in some cases herbicides not approved for aquatic use) to protect their waterfront. At that point there was no permit system in the state. Environmental groups and local and state agencies became alarmed by the potential problems unregulated herbicide use might pose to the environment when applied by untrained homeowners. Cities like Seattle banned the use of aquatic herbicides within the City Limits. Agencies like the Department of Ecology developed permit programs and started to regulate the use of this tool in the management of these plants. The result of this uncoordinated approach to the management of this invasive species is that the weed expanded rapidly throughout the lake. By the mid 1980's and into today, the vast majority of the important littoral zone of Lake Washington is a monoculture of this harmful invasive submerged weed.

In addition to the problems this weed poses to human use of water resources like Lake Washington, it is now well understood that extensive Eurasian Milfoil beds significantly degrade water quality and aquatic habitat where they are present. Research performed by the US Army Corps of Engineers Aquatic Plant Control Research Program at various sites around the United States and the University of Washington in Lake Washington have documented severe reductions in water quality in dense milfoil beds. Water temperatures are elevated well beyond levels that are safe for trout and salmon species as sunlight is absorbed and converted to heat energy. Dissolved oxygen levels are severely depressed under these mats. Research has also shown that many other species of fish suffer from aquatic plant levels of this density as it affects predator/prey relationships. It is also known that dense milfoil beds concentrate migrating young salmon at the outside edges of the plant bed where they are more susceptible to predation. Species diversity also declines when a monoculture of an exotic like Eurasian Milfoil replaces beneficial native aquatic plants.

In retrospect, the citizens and agencies charged with the protection of Lake Washington should have responded to this early infestation of Eurasian Milfoil with a coordinated eradication program early on. Eurasian Milfoil is now on the State of Washington's Noxious Weed List. This list is made up of the species of plants that are exotic and invasive and are known to cause detrimental impacts on the environment. Eurasian Milfoil is classified by the Federal Government as an invasive aquatic species. Most states, including Oregon, list lakes contaminated with this biological pollutant on the 303d list of impaired waters.

Hindsight is said to be 20/20. It is clear however that Eurasian Milfoil has significantly altered the biological integrity of Lake Washington. The Lake Washington infestations have also facilitated the spread of this weed to many other lakes in the region, degrading them as well.

One of the problems in combating this weed is the size of Lake Washington and the multiple jurisdictions that overlap the lake. There are many cities and towns

that are responsible for the regulation and management of the shorelines. The Town of Hunts Point is one of these jurisdictions.

Hunts Point has had an active Eurasian Milfoil control program for a number of years. They participated in the Seattle METRO harvesting program in the 1980's. When that program dissolved, they relied on EPA registered aquatic herbicides to maintain safety along the shoreline for swimmers. This past year, their program was impacted by the Talent decision and the potential requirement for an NPDES permit to continue treatments.

The Town decided to use this year to step back and evaluate their program and develop a more integrated approach to the control of this invasive species. The logical approach to this evaluation was to use the Washington Department of Ecology's Integrated Aquatic Vegetation Management Planning process. The results of this evaluation are presented here as the Integrated Aquatic Vegetation Management Plan (IAVMP) for the waters of Lake Washington adjacent to Hunts Point, Washington.

*The Integrated Aquatic Vegetation Management Plan*

Integrated aquatic plant management planning is a process that helps develop a comprehensive control program that meets the needs of the citizens and the aquatic resource. Ecology's planning process has a number of steps that the lake group must complete to develop a meaningful plan. These steps are presented below along with the specific details necessary to move to the next step.

**Step One, Develop a Problem Statement**

Understanding the problem is the first step in any planning process. The Town of Hunts Point benefits in this regard because there has been an ongoing aquatic plant management program for a number of years. Using the past history of the efforts and field evaluations, the following Problem Statement has been developed for the purposes of this plan.

Eurasian Milfoil in Cozy Cove, Lake Washington

*It is clear that Eurasian Milfoil poses a significant threat to water users and the aquatic environment where it occurs. The waters of Lake Washington surrounding the Town of Hunts Point are heavily infested with this noxious invasive species. The vast majority of the residents of*

*Hunts Point own lake front property. The presence of this weed degrades their property values. The presence of this weed poses a threat to them and their children as they attempt to use their beaches for swimming. The presence of this weed hinders recreational uses of the water including boating and water skiing. The presence of this weed also severely degraded the biological integrity of the surrounding waters, a problem that impacts both the residents of Hunts Point and regional interests charged with maintaining water quality and aquatic habitat in the lake. The problem is Eurasian Milfoil, a harmful non-indigenous species.*

**Step Two, Identify Management Goals**

There are four basic strategies that an aquatic plant manager can select when dealing with an invasive aquatic species. It is critical that the manager determines which of these options is most appropriate for the situation they face. The various tools that managers have to combat invasive aquatic weeds fall into cultural, physical, biological, mechanical and chemical treatments. Managers can't effectively select and deploy these various tools until they understand what their management goals are. The four basic strategies are as follows.

Prevention is a strategy that attempts to identify a threat to important water body, like Lake Washington, and stop the pest before it arrives in the lake. This work involves public education, constant monitoring and rapid action if pioneering colonies are detected when introduced. Lake Washington is well beyond the ability to deploy this strategy. The weed is too wide spread within the lake for prevention efforts to be effective.

Eradication is another strategy that can be deployed to protect the environment from an invasive aquatic weed like Eurasian Milfoil. This technology is rather well developed for this weed. There have been a number of successful eradication projects that have been funded and performed under the Department of Ecology's Freshwater Aquatic Weed Program and the Corps of Engineers Aquatic Plant Management Program. The size of the lake and the infestation has a great bearing on the economics of this approach however. Lakes that are up to 500 acres in size have been treated in this fashion with excellent results. The size of Lake Washington probably makes this goal economically unfeasible in the short term however. Eradication of Eurasian Milfoil lake wide is well beyond the capabilities of the Town of Hunts Point and it's residents.

Suppression is a weed control strategy that looks at the area to be managed and selected the correct mix of tools to reduce the population of the invasive weed to the lowest level possible and maintain it there. This technique is also well developed. The Washington Department of Ecology has conducted pilot programs on Loon Lake in Eastern Washington and Kress Lake in Western Washington where aquatic herbicides have been used to recover areas impacted by Eurasian Milfoil. In the Loon Lake Study, Ecology found that the use of Navigate Aquatic Herbicide significantly reduced the Eurasian Milfoil in the lake and maintain it there, had no impact on native aquatic plants and resulted in the recovery of many species

of native plants. They also noted a increase in species diversity. Kress Lake was treated with Aquathol and similar trends were noted. There have also been examples of biocontrol agents like triploid grass carp providing suppression of this weed, however there were impacts on native aquatic plants as well. Suppression is a weed control strategy that has an application for the waters around Hunts Point.

Native aquatic plants provide excellent habitat and do not generally interfere with beneficial uses. One of the objectives of the Town is to restore native plant communities in the waters off Hunts Point

Maintenance control of aquatic weeds is the last option managers have. This technique involved the use of control tools (herbicides, harvesters, other mechanical techniques, and biocontrol if appropriate) to maintain weed free conditions in high use areas. This technique is used throughout Lake Washington to manage Eurasian Milfoil. The City of Seattle Parks department has a program of aquatic plant harvesting and diver hand removal to clear beaches each year. Many marinas and community associations around the lake use harvesting or aquatic herbicides to reduce the impact of this weed in the areas they consider to be high use areas. The Town of Hunts Point has historically been included in this type of effort. While this activity has no long lasting impact on the Eurasian Milfoil populations in the lake, it does maintain open water in these high use areas during the summer months.

The Town of Hunts Point is interested in moving past maintenance control of Eurasian Milfoil in the waters surrounding it's political jurisdiction. Eurasian Milfoil has significantly degraded the biological integrity of the waters throughout Lake Washington over the past 20 years. The Town feels that it is time to start looking at methods and options that would allow for the recovery of the lake, or at least this portion of the lake to pre-invasion conditions. As such, the Town identifies Suppression and if possible local Eradication of this invasive aquatic weed and the recovery of native aquatic plant communities in the surrounding waters as it preferred management goal.

**Step Three, Involve the Public**

The Town of Hunts Point has had an ongoing Eurasian Milfoil control program since the early 1980's. This program involves the milfoil committee made up of shore line residents that report to the Town Council. The Town Council, as the

elected representatives of the residents, hold a hearing during regularly scheduled council meetings each spring to hear from the residents and to select and approve Eurasian Milfoil Control efforts that benefit the residents. The Town Manager then communicates the results of the meeting to all of the residents of the Community and assesses the residents for the annual Milfoil control program. The communications with the public for this year are attached as an appendix.

The Town Manager is Mr. Jack McKenzie. Jack has worked on aquatic plant management and water quality programs for a number of years as a employee of Ocean Shores prior to taking the position at Hunts Point. As there have been no treatments implemented in the waters around Hunts Point this year, the residents have regularly complained to the Town office and presented visual evidence of the impacts on the beneficial uses of the lake Eurasian Milfoil is causing now without control.

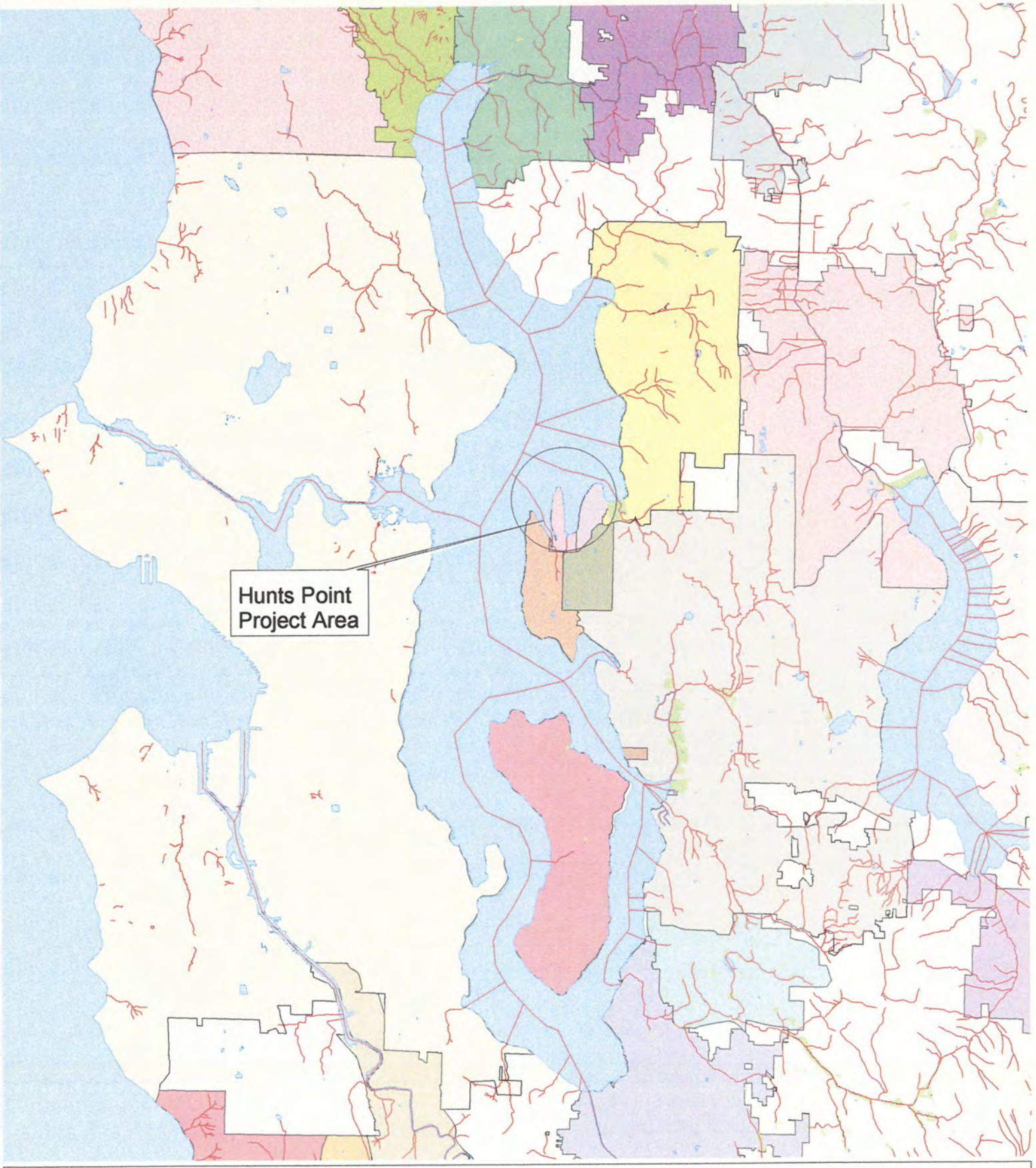
The ideas developed in this plan were presented at a special public hearing of the Town Council on October 16, 2001 at 7 pm. Comments were solicited on the options presented below and have been used to draft this plan. The plan was very well received during this meeting by the public that attended. At the end of the hearing , the Town Council passed a resolution adopting the plan as presented and directed the Town Manager to move forward to implement the plan.

As this plan is implemented, the public will continue to be informed and involved. There will be opportunities for the public to comment on any permit applications that are made to implement portions of this plan. There will be opportunities for the public to comment at pre season and post season informational meetings that will be used to update them on the progress of this mission.

**Step Four, Identify Water Body/Watershed Features**

Lake Washington is one of the largest lakes in the State of Washington. The lake was created by glaciers near the end of the ice age in North America. The Lake has a surface area of 22,951 acres. The lake has an extensive watershed that includes the Cedar River and Sammamish River drainage. The outlets of the lake have been substantially modified over time. In the early 1900's, the construction of the Mountlake Cut and the Ship Canal Cut to the Ballard Locks created a new point of discharge of the lake into the Puget Sound. The Cedar River flow was also modified in this time period to enter the lake at the south east corner. There is a watershed map presented on the following page that shows thin in detail. King County data shows that approximately 67% of the subbasin is currently developed as residential and that future land use will increase this to 72%.

The focus of this project site is a very small subsection of Lake Washington. The area of concern here are the waters and the littoral area adjacent to the Town of Hunts Point. The littoral zone in this vicinity is approximately 115 acres in size. While this is a small portion of the littoral zone of the lake, it is one of the few




**Lake Washington Watershed**

**Tributaries**

sheltered areas where there are expanses of shallow water. The vast majority of the littoral zone of the lake is on the open shorelines of the lake, areas that are narrow because of the depth contours of the lake. The shorelines in the project area are completely developed as single family residential homes. The vast majority of the shoreline provides recreational access to the water for the individual homeowners. There are numerous pier and dock assemblies along the shoreline.

There is additional information presented in the appendix on the watershed published by King County.

**Step Five, Identify Beneficial Uses**

The beneficial uses for this portion of the lake have both a regional and a local perspective.

The regional perspective is well summarized in the King County's Lake Washington Basin Narrative.

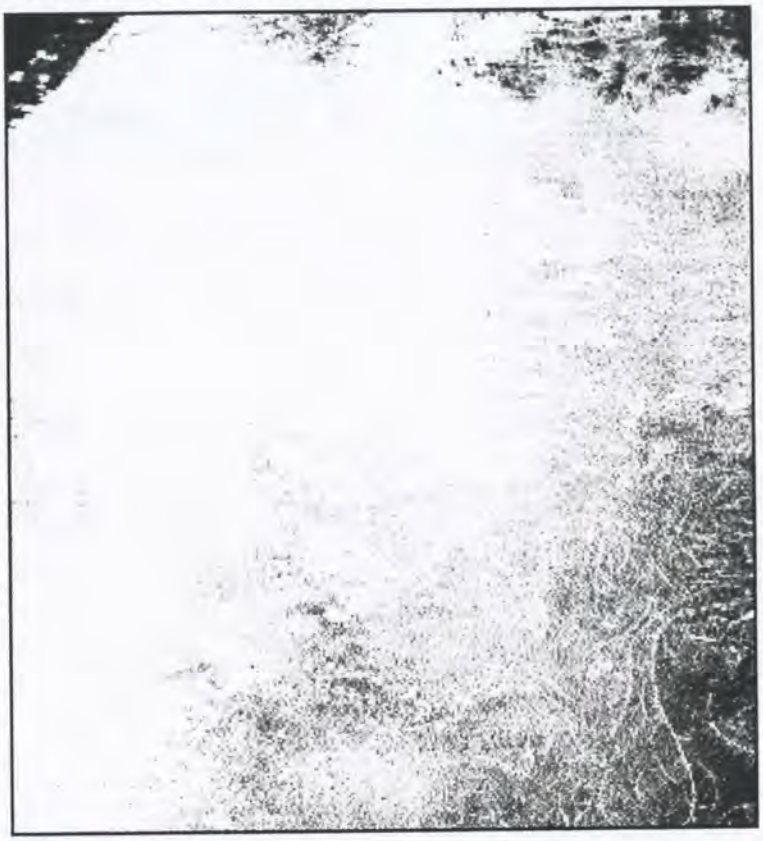
*"Lake Washington is a valuable resource to all residents of King County. The lake is the prime rearing habitat for juvenile salmon spawned in Cedar and Sammamish Rivers, provides multiple recreational opportunities, acts as a beautiful open space, and supports multiple resident fisheries. The hydrology, water quality, and habitat in and around the lake has been and continues to be severely impacted by intensive development in the basin. In recent years, natural runs of Lake Washington sockeye, coho, chinook salmon, and steelhead trout have declined precipitously. The reasons for these declines are not fully understood, but recent studies have focused on poor survival of sockeye in Lake Washington and predation of steelhead by sea lions. The water quality of the lake is largely dependent upon the high quality of water from the Cedar River and upon the control of pollutants that enter from direct drainages and Sammamish River. At this time, there is no unified fisheries and water quality management plan for Lake Washington. A number of jurisdictions surrounding the lake have implemented or are in the process of developing programs to reduce the amount of pollutants in stormwater runoff that enters the lake."*

This narrative focuses on the recreational and habitat benefits that occur lake wide. The majority of the cities and towns around the operate parks that allow the public to access and recreate on the water. These activities include boating, swimming, and fishing. The lake is the focus of Seattle premier festival each July and August. The Seattle Seafair has as it's highlight a series of hydroplane races the first weekend in August that generally attract from 300,000 to 500,000 people to the lake for the event. There are uncountable numbers of boats that utilize this lake for recreation and fishing.

There is a clear focus on the salmon issue here as well. A number of salmon runs have declined through the lake in the past few decades. Salmon move

through the lake to their tributary spawning sites each year in the summer and fall. The young salmon migrate back through the lake to the Ocean in the winter and spring depending on the species. Some species that utilize the lake spend up to a year in the waters of the lake before moving out to sea. The shoreline littoral regions of the lake are important rearing areas providing both food and shelter from predators. Clearly this is a beneficial use of this natural resource.

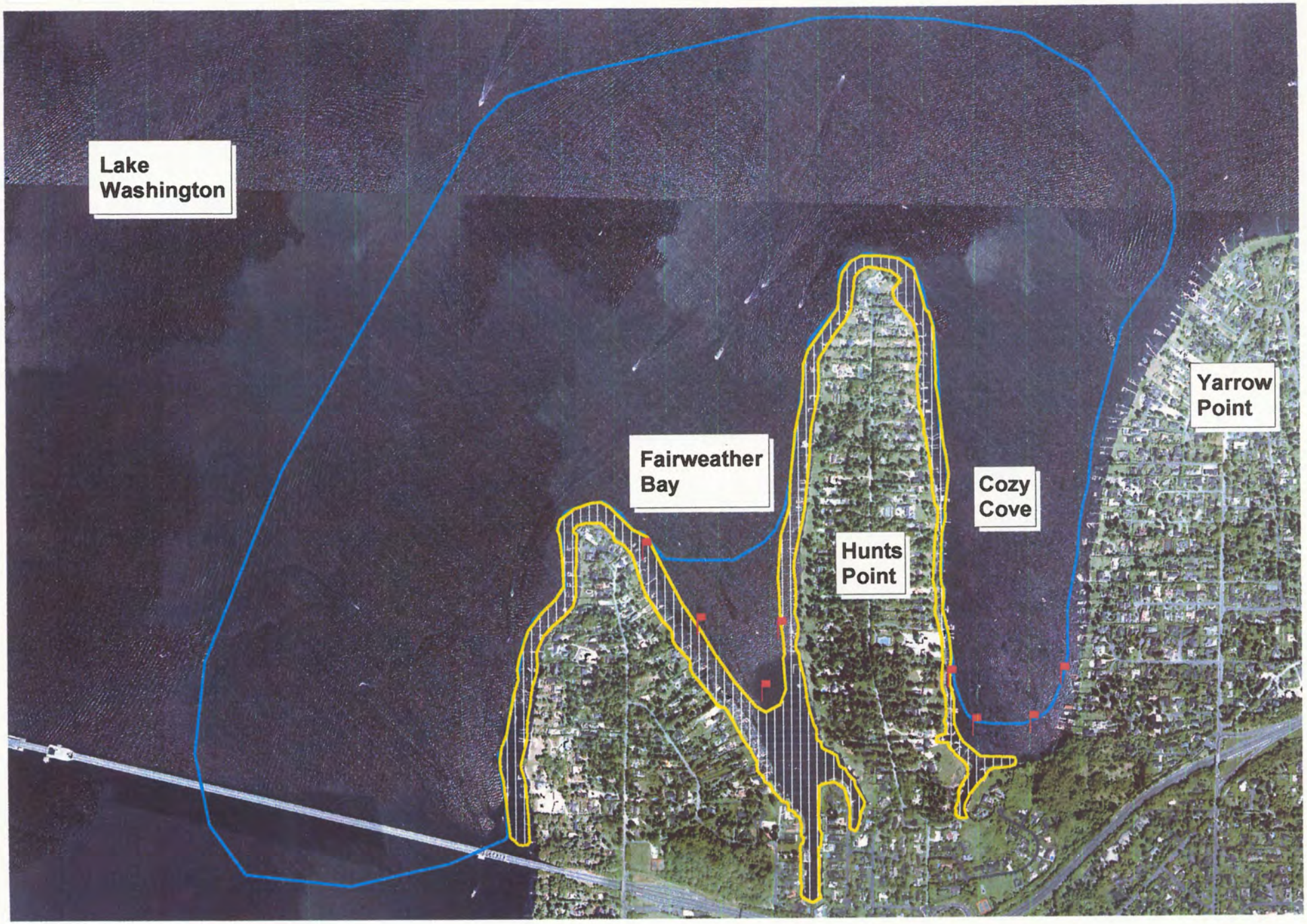
The Beneficial uses of the smaller area around Hunts Point can also be characterized. The primary beneficial uses that are available to the residents of Hunts Point are as follows. The lake shoreline presents an unparalleled opportunity for lakeside living. The value of the real estate reflects that. This real estate value in turn is an important contributor to the funding of government at both the local and county level through property tax assessments. The funds generated and provided to government from this tax source is directly related to the lake. If these properties did not front a lake such as Lake Washington, the monetary benefit to government would be much lower. The size of the lake and the access to the Puget Sound means that the residents can engage in a wide variety of boating from small pleasure craft to ocean going vessels. The waters adjacent to Hunts Point are used extensively for swimming and fishing as well.



Eurasian Milfoil impacts recreational use and is a threat to swimmers. It is also well known that water temperature and dissolved oxygen levels are seriously degraded under these thick mats.

On the following page, a map is presented that summarizes the beneficial human uses around Hunts Point. The map shows areas that are used for swimming by the lake residents. It also points out the areas that are generally used for boating by the residents of this area. There is a water ski course in Fairweather Bay. Residents of this area can conduct boating activities well beyond these waters as well.

It is also clear that the presence of an invasive aquatic species like Eurasian Milfoil has a detrimental effect on all of these beneficial uses. This weed has an obvious impact on the human uses of the water body as indicated elsewhere in this document. In the last few years there have been a number of drowning


Lake Washington
Fairweather Bay
Hunts Point
Cozy Cove
Yarrow Point
Recreational Areas:
No Wake Zone
Swiming Area
Water Ski Area

deaths directly attributed to swimmers becoming tangled in Eurasian Milfoil beds. Boating is impacted as the weed clogs water intakes and propellers on vessels of all sizes. The King County narrative presented above indicates that the declines in salmon populations can be partially attributed to "poor survival" in Lake Washington and notes that this decline started in the 1980's. This trend toward poor survival in the Lake matches the introduction and expansion of Eurasian Milfoil in the lake. It is clear that this weed alters habitat and water quality parameters critical to salmon survival. An ecosystem that has evolved over the thousands of years was significantly altered with the introduction, spread and formation of monocultures of Eurasian Milfoil in the past 20 years. It is probable that this event has had an impact on this beneficial species as well.

**Step Six, Map Aquatic Plants**

Mapping of the aquatic plant growth in this portion of Lake Washington was performed by Aquatechnex biologists in August of 2001. The mapping efforts were conducted through a combination of boat and diver survey in the waters adjacent to Hunts Point. The results were recorded using a combination of mapping over contour maps and DGPS data point collection.

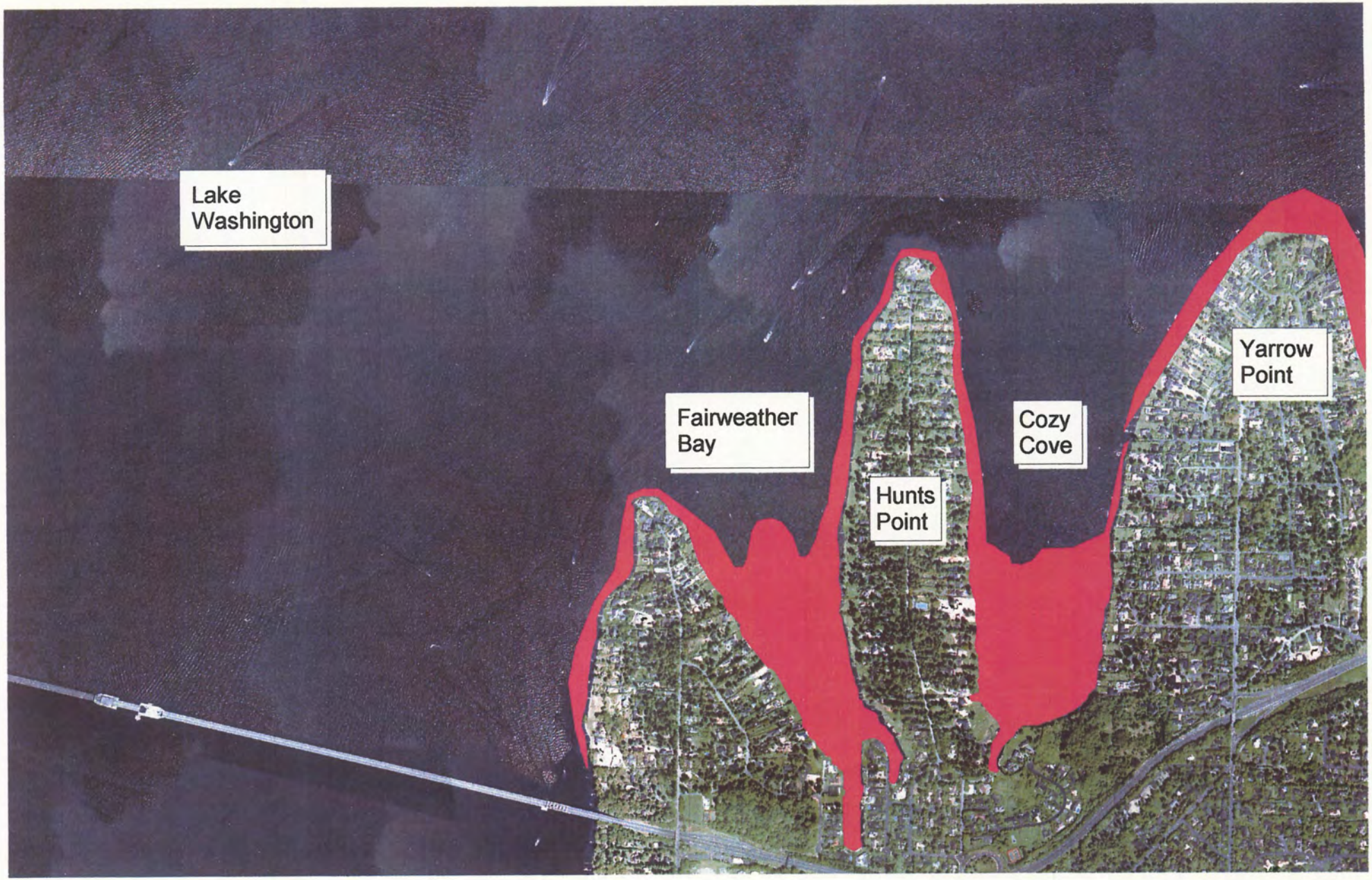
This information was assembled in ArcView GIS for analysis and presentation. There are a number of maps included in this report. These maps show the extent of the weed populations, the various water uses and there is a map of effective harvesting distances from boat ramps that is presented and discussed in the investigation of methods section.

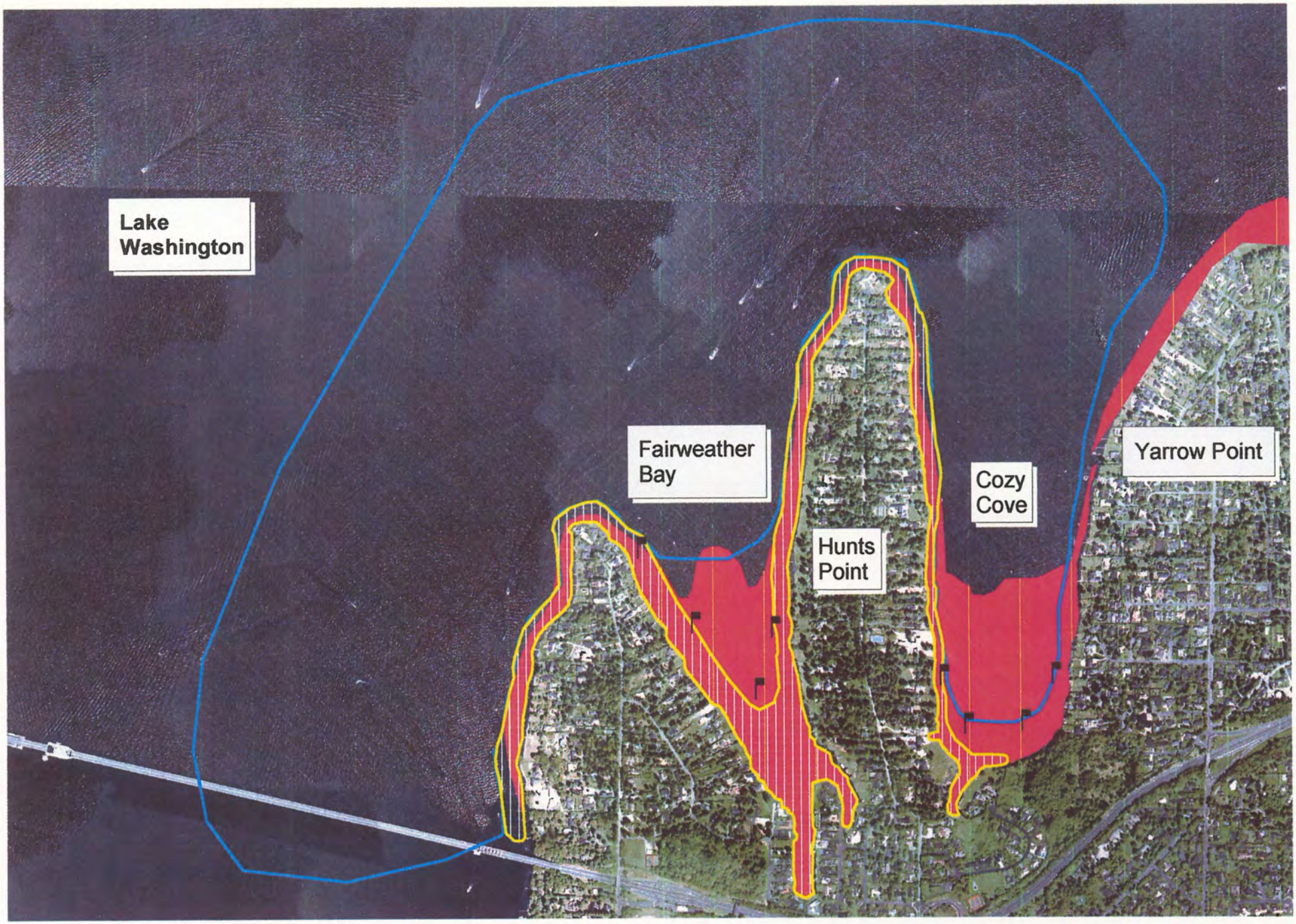
The GIS files will be used in an ongoing fashion as described in the action plan below.

**Step Seven, Characterize Aquatic Plants**

The aquatic plant communities in the waters adjacent to Hunts Point are shown visually on the following page. The aquatic plant communities in this vicinity extend from the shoreline out to the 19-foot contour of the lake. The dominant species present is Eurasian Milfoil, making up over 90 percent of the plant biomass. In water depths below 10 feet, the milfoil beds reach to the surface tapering off into deeper water. In the shallow waters inside the 10-foot contour the Eurasian Milfoil beds are on the surface and form dense mats.

There were very small patches of native plants observed in and around this area. Common Elodea is present as an under story in the Milfoil beds generally throughout the area in shallow water. A number of species of pondweeds were also observed in small patches including Potamogeton richardsonii, Potamogeton americanus, and Potomogeton illinoensis. These plants were distributed among the milfoil beds at a frequency that was too small to map. They also occur as an under story to the Eurasian Milfoil.


Lake
Washington
Fairweather
Bay
Hunts
Point
Cozy
Cove
Yarrow
Point
Dense Areas:
Dense Milfoil


Lake Washington
Fairweather Bay
Hunts Point
Cozy Cove
Yarrow Point
Hunts Point Features:
No Wake Zone
Swiming Area
Water Ski Area
Dense Milfoil

There were small patches of native and exotic water lilies present along the shoreline. Duckweed was also observed in the quiet waters in the back end canals of Fairweather Bay and Cozy Cove. In addition, there are scattered locations where the noxious wetland weed Purple Loosestrife was present in the adjacent wetlands.

Water temperature and dissolved oxygen levels were also noted within these weed beds and in the open water of Lake Washington. These two water quality parameters are considered by federal and state agencies to be very important to salmon and many other fish species. The Washington State Department of Ecology has in fact established water quality standards for these two parameters. These standards require a temperature of 17.5 degrees C (63.5 degrees F) for a one day maximum and 15 degrees C (59 degrees F) as a 7 day average in waters used by young salmon, Steelhead and Cutthroat Trout for rearing, They require 20.5 degrees C (68.9 degrees F) for a one day maximum and 18 degrees C (65.4 degrees F) for a seven day average maximum for non-migratory trout. They require 8 mg/l year round in Salmonid rearing waters and 7 mg/l year round in warm water fish habitat.

In the August survey, water temperatures within the Eurasian Milfoil beds in this vicinity of Hunts Point were elevated well beyond the water quality standards established by the Department of Ecology. Temperature reading ranged from 73 degrees F to over 85 degrees F in dense weed beds. This is a well known result of the weed mass converting sun energy to heat locally within the lake. Dissolved oxygen levels ranged from 8 mg/l at the surface down to 3 mg/l within the dense plant beds during the daylight hours. One profile was collected near dawn showing DO levels near zero through the weed bed, probably as a result of DO consumption during respiration. The waters within the Eurasian Milfoil beds around Hunts Point are degraded well below the Department of Ecology's water quality standards for temperature and dissolved oxygen.

In summary, the map shows that Eurasian Milfoil is the dominant component of the aquatic plant communities surrounding Hunts Point. The second map presented shows the impact of the weed on the human beneficial uses in the area. It also shows the littoral area of the lake in this vicinity that have been biologically degraded by the presence of Eurasian Milfoil.

**Step Eight, Investigate Control Alternatives**

Eurasian Milfoil was discovered in the United States in the mid 1940's in the Chesapeake Bay. It is presumed that the plant moved to our country in ballast water carried in the hull of shipping during World War Two. From that location, the plant spread down the Tennessee Valley Authority reservoirs and dispersed into the Midwest by boat trailer movement of fragments. It is thought to have jumped to the West Coast by boat trailer transport of fragments in the late 1960's. The weed was first discovered in British Columbia in the Okanogan River Basin. There is a direct hydraulic connection from Okanogan Lake down

the Okanogan River into the Columbia River in Washington State. By the late 1970's, Eurasian Milfoil had spread to many areas of the Columbia and by boat trailer into Lake Washington in the Seattle area and the Pend Oreille River in Northwestern Washington. The weed has in recent years started to appear in Idaho lakes.

As this plant has been a major aquatic weed problem in our country for a number of years, there has been a considerable amount of both research and operational control technologies developed to combat this weed. Prior to adopting a tool or mix of tools to target Eurasian Milfoil, each option should be studied with respect to the conditions and sites under consideration. A description of these methods is presented here.

*Cultural and Physical Methods*

There are a number cultural and physical methods that are very applicable to the control of Eurasian Milfoil.

Drawdown can be a very effective method of controlling Eurasian Milfoil. This aquatic weed does not produce a viable seed and the spread of the plant is primarily by fragmentation. Once the plant fragments root and establish, the weed will produce a fairly shallow root crown in the lake sediments. These roots anchor the plant and allow for the transport of nutrients from the sediments. The root crown is also very important in allowing the plant to over winter in colder climates. These root crowns can not survive a hard freeze however. While the water under ice is cold, it does not freeze all the way to the lake bottom. The water under the ice acts as an insulator and protects the milfoil root crowns from freezing.

Drawdown is a technique that can be used in any lake system where a control structure or dam allows the manager to manipulate water levels during the winter months. If the lake level can be lowered to expose Eurasian Milfoil root crowns, and there is a hard freeze during the drawdown period, this action will kill those exposed plants. Lake Chelan in central Washington is a good example where this technology has been effectively applied. This lake is over 100 miles long and very clear. Eurasian Milfoil was introduced by boat trailer from the infestations in the Columbia River a short distance away. The weed expanded rapidly throughout the lake and because of it's size, treatment options would be very expensive. The regulating agency has been able to draw down the lake in the winter to expose most of the shoreline to the 15 foot contour exposing the vast majority of the Eurasian Milfoil root crowns. As such, they have been able to control this weed lake wide with no expenditure for other management options.

Drawdown is a technique that can be applied when there is a control structure on the lake outlet that provides an opportunity to lower water levels in the winter months. There is also a need to factor in water management issues such as stor-

age or release needs of downstream water right holders.

As there is seldom if ever a hard freeze of the level that would control this weed in the Puget Sound Region, this method would probably provide minimal results throughout the lake in general in the Hunts Point area specifically. In addition, the Town of Hunts Point has no authority to manage water levels in Lake Washington.

Another important tool in this category is that of Bottom Barriers. These materials are designed to be placed over the Eurasian Milfoil beds and suppress them. Bottom or Benthic Barriers are materials that are negatively buoyant. They come from the manufacturer in rolls that are normally cut to the size of the plant infestation to be covered. These barriers are rolled over the milfoil beds and attached to the lake bottom with sandbags or pins. These barriers compress and smother the milfoil plants, effectively eradicating the plant from those areas where the barriers are placed. Texel manufactures one barrier system that is widely used in the Pacific Northwest. This material costs approximately $0.40-0.50 per square foot applied to the lake bottom. This included diver installation. Burlap bottom barriers are also effective in this effort, but they biodegrade over time. In some cases this is desirable. The cost is similar for this installation. Bottom barriers do not generally have a fit in large applications because of the cost (there are 43,560 square feet in an acre). They are very effectively deployed against smaller patches of this weed.

The Washington Department of Fish and Wildlife regulates the application of Bottom Barriers in Lake Washington. The Department has published a pamphlet titled "Aquatic Plants and Fish (Publication # APF-1-98) that outlines procedures for the installation of Bottom Barriers and serves at Hydraulic Permit Approval for this activity in many cases. Because of concerns for Sockeye Salmon, barrier applications in Lake Washington require additional oversight and prior approval by the Department prior to installation.

*Biological*

Biological control of Eurasian Milfoil is a desirable objective for researchers and operational aquatic plant managers. If a biological control agent that is target specific for this weed could be found, it would help solve the problem this weed poses. While there are biological control agents that have been identified, many are still in the research phase. A description of these is presented here.

The most common and well understood form of biological control for submerged aquatic weeds is the White Amur. This fish is native to the Amur River in Northern China and consumes aquatic vegetation as it's main source of food. Also known as the "Grass Carp", this fish is actually in the minnow family.

Grass Carp have been widely used in the United States since their discovery and introduction in the 1950's. Initially used in the southern US, the fish was used

without oversight or any type of permit program. One of the results of this has been that large areas of the South contain populations of this fish and that has had a negative impact on the aquatic environment. Some level of aquatic plant life is desirable from a fisheries and habitat standpoint. When over stocked or if natural reproduction leads to an increase in the fish population, all of the aquatic vegetation in the water body will be consumed and suppressed for years to come. After that discovery, this fish was widely banned throughout the US because of the potential negative impact on water resources.

Triploid Grass Carp are the most commonly used form of biological control in Washington State. The fish have a low feeding preference for Eurasian Milfoil however. This tool is not a good fit for Lake Washington.

In the 1980's, state and federal aquatic plant managers developed technologies to produce a sterile grass carp. This removed the threat that the fish would reproduce in the wild and allowed managers to think about stocking rates that could be used to manage aquatic weed populations without removing all of them. This allowed many states to develop permit programs and to introduce this tool where appropriate.

Grass carp do not have a high feeding preference for Eurasian Milfoil. Research conducted by the University of Washington to support the State of Washington's grass carp permit program found that most native aquatic plant species are greatly preferred as food over Eurasian Milfoil. As such, this fish is generally not recommended for Eurasian Milfoil control, especially when the levels of plant infestation are in the pioneering stage because the fish will consume beneficial native aquatic plants first. This causes damage to the native aquatic plant communities and does not impact the Eurasian Milfoil until the fish have removed all native plants from the lake system.

It is probable that the Washington Department of Fish and Wildlife would not permit the use of Grass Carp in Lake Washington. In addition, to impact the weed problems experienced in the Hunts Point area, fish stocking would have to be performed at rates that would impact all aquatic plants lake wide.

Researchers have also identified a number of insects and fungal pathogens that are target specific for Eurasian Milfoil. This type of Biocontrol, when fully developed, may present great promise in the management of Eurasian Milfoil.

The most well understood insect is a weevil discovered by the Vermont Department of Environmental Quality in the late 1980's feeding on Eurasian Milfoil plants that were severely damaged in one Vermont Lake. This weevil,

Euhrychiopisis lecontei, was collected and intensively investigated by the Department and university researchers funded by the Department. This work included laboratory investigation and confirmation that this weevil will impact Eurasian Milfoil. It also involved development of rearing techniques and stocking of a number of lakes in Vermont. Since that time, the study of this weevil has expanded as researchers in many other northern tier states have started to look at the potential for this organism to impact Eurasian Milfoil.

It is well understood by researchers that this insect can impact Eurasian Milfoil in the laboratory and at the plant level. There is little or no understanding currently how this insect impacts Eurasian Milfoil at the plant bed level. It is not known how long it takes the insect to build a population that will result in a significant reduction in Eurasian Milfoil and it is not known how lake productivity affects the ability of this insect to control Eurasian Milfoil within geographic regions (Creed, 2000). It is also thought that predation by fish on the insects can have a significant impact on their ability to control target plants. There has not to date been a well-documented case where adding to or augmenting weevil populations in a lake have significantly impacted Eurasian Milfoil populations. As researchers answer these questions, the operational use of this tool may become predictable to the point where operational use of the agent would be appropriate under the right conditions.

There are similar cases under study with a species of aquatic moth Acentria ephemerella. This moth was observed first in 1991on Cayuga Lake in New York State. The milfoil weevil was also discovered in this lake. These insects were studies as part of research to identify the reasons for a decline in the Eurasian Milfoil populations in this lake (Johnson et al. 2000). While it is understood that this insect will impact Eurasian Milfoil, efforts to augment populations have not resulted in operational control recommendations.

Lastly, there is a fungal pathogen that has been discovered by the US Army Corps of Engineers Aquatic Plant Control Research Program. This organism is specific for Eurasian Milfoil and in the laboratory has produced good information on its ability to control this weed. Attempts to commercialize the formulation have not yet matured however. There are problems posed by the need to register the agent as a biological pesticide under federal law and there are issues with shelf life and commercial production that are yet to be worked out. As such, this tool is not yet ready for operational use.

A few closing points to consider in the area of biocontrol for Eurasian Milfoil. The first is that there are not yet predictable tools available to target this weed. Research however is ongoing and project managers need to stay abreast of developments as a breakthrough may come that improves the predictability of the tool to an operational standpoint. Investment in these tools now can not guaranty an effective result. The second is that even if biocontrol agents become operationally effective, they can be used for suppression but not eradication. Populations of these organisms need some Eurasian Milfoil to survive. If they control the vast

majority of the milfoil in a lake, their populations die off and the plant will recover. This results in cyclical growth of the target weed. As such, they should normally be considered as part of an integrated approach.

*Mechanical Control Methods*

Mechanical control of aquatic weeds and Eurasian Milfoil in particular is well understood, as operational programs have been ongoing for years. The key tools and their application to Lake Washington are as follows.

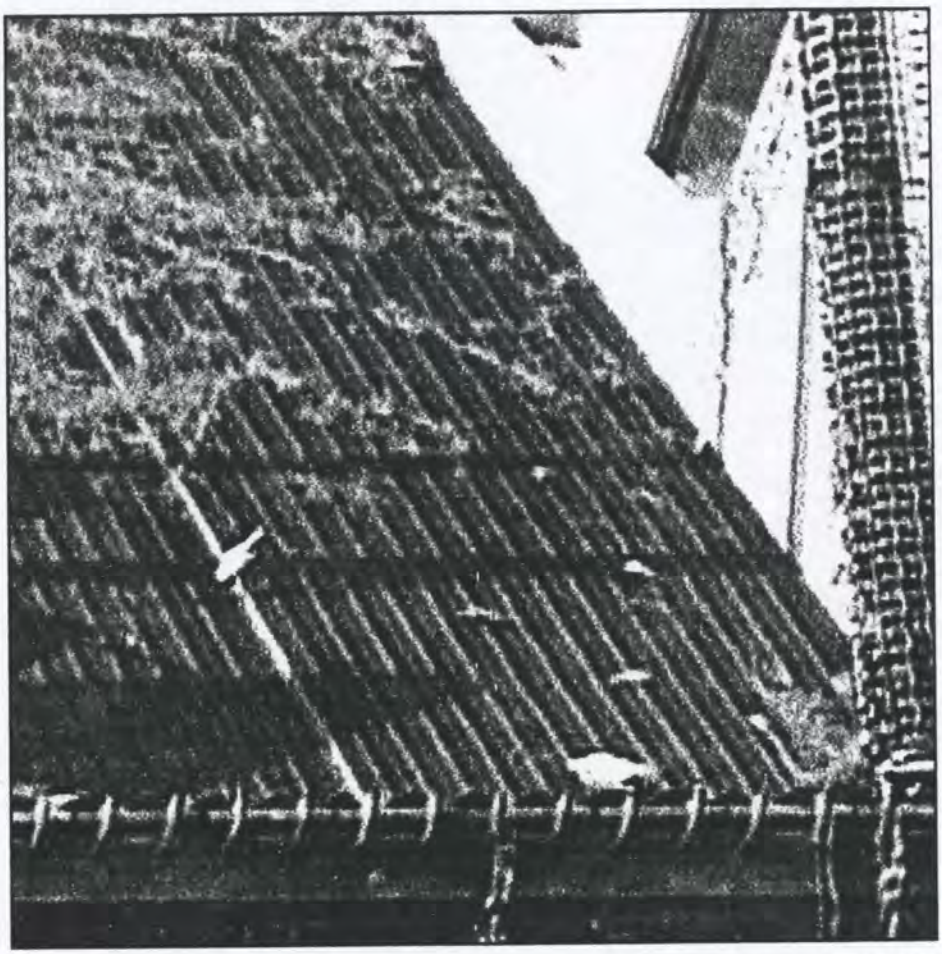
Aquatic plant harvesting is the primary method of aquatic weed control performed with mechanical systems in the United States. Harvesters are normally paddlewheel driven and have a cutting/collecting head on the front of the barge. Conveyors move the cut material for storage and off loading at the shore site. Harvesters are excellent tools for maintaining open water in high use areas.

Harvesters are limited by the distance they have to transport cut material. The more time spent transporting, the less time can be spent harvesting. As such, harvesting operations are more effective when working close to a boat ramp or public access site. All mechanical techniques are essentially materials handling operations. The material in this case is the weeds, they have to be cut, loaded on the harvester, unloading to a shore transport system and unloaded again at a disposal site. Aquatic plant harvesting operations should never be applied to pioneering colonies of Eurasian Milfoil. This weed is spread by fragmentation and harvesting operations do not get all of the plant fragments. In addition, Eurasian Milfoil grows back much faster than do most native aquatic weeds, so harvesting has a tendency to select for Eurasian Milfoil and actually speed up the development of a monoculture of this weed. Harvesting is much more applicable once Eurasian Milfoil has spread throughout the lake and there is a need to clear beaches and boat ramps for use by the public.

Aquatic plant harvesters can provide effective maintenance control. They are severely limited in many areas of Lake Washington because of transport distances to shore off loading sites.

Harvesting can provide some removal of nutrients from the lake. Phosphorus and nitrogen are tied up in the plant biomass. As they are cut and removed,

those nutrients are exported from the system. Whether this removal provides any long term benefit is a function of the rate these nutrient are running back into the system. Harvesters can have a negative impact as well. The Wisconsin DNR documented the removal of 33 percent of the young of the year fish from a study lake during harvesting operations targeting Eurasian Milfoil. They also noted significant removal of invertebrates. University of Florida biologists documented up to 50 percent removal of young fish from harvesting operations in Hydrilla beds. Because of the degraded water quality conditions in dense milfoil beds, it is not known how young salmon would be affected by harvesting operations. It is probable however that near the edges or in less dense milfoil beds, some young salmon would be collected during harvesting operations resulting in direct mortality. Impacting a listed species would lead to potential legal issues.



Small fish and insects are also removed from lakes during harvesting operations. The impact of this can be significant.

Harvesting costs generally run about $600-900.00 per acre. Given the transport distances here, these cost would rise considerably.

Rotovation is another mechanical technology that has been developed specifically for Eurasian Milfoil Control. Rotovators are essentially large underwater rototillers. Eurasian Milfoil plants form a dense root crown in the lake sediments that is fairly shallow. This root crown provide the source of regrowth each spring and allows the plant to over winter. Rotovation tills the lake sediments in infested areas and dislodges the root crowns of the plant. As the entire plant is destroyed, regrowth does not occur as is the case with harvesting or mowing the plants. Again, Rotovation should not be used to attack pioneering colonies of this weed. This technique produces fragments that can accelerate the spread of the weed. Once the plant is widely distributed, rotovation provides a longer term

method of control than harvesting.

The Department of Ecology on Lake Washington used Rotovation in a demonstration project in the late 1980's to target this weed. The results with the particular piece of equipment used were short lived and there were concerns about suspending sediments that may be contaminated.

Rotovation Costs average about $1,800-2,400.00 per acre depending on the complexity and density of the weed beds.

Diver dredging is another technique that is used to control Eurasian Milfoil. This technique was developed by the British Columbia Ministry of the Environment in the late 1970's. Our biologists performed the first diver dredging work in the United States in 1984 on the Potomac River for the US Army Corps of Engineers Aquatic Plant Control Research Program. That effort lead to the development of operational tools for this type of work. Diver dredging systems are generally modified gold dredge pumps that a diver uses to suction dredge the plant material and root crowns to a collection basket on the support vessel. A diagram of a diver dredging system is presented here. Diver dredging has an application to the Lake Washington situation.

*Chemical*

Chemical control technologies are the most widely used method of aquatic plant management operational control efforts deployed in the United States. These materials undergo intensive studies for environmental compatibility and have to demonstrate that they can be used with little or no impact to non-target aquatic species and water use by human prior to their registration by the US Environmental Protection Agency. The EPA registration is required before a company can bring an aquatic herbicide to market. Each product must also go through re-registration on a regular basis where additional studies are required. The materials that are registered by EPA when used in accordance with their labels can safely control target aquatic weeds.

In some cases, the use of an aquatic herbicide can impose water use restrictions. If registration data finds that there is a small potential for some impact or injury when the material is applied, the water use restriction insures that those impacts will not occur. Most herbicides affect some aspect of the biology of plants such as photosynthesis. As animals don't normally have many of the processes that herbicides attack there is generally a wide range of safety between the levels that might be applied to a lake and those that might impact an animal such as a fish. The most common water use restrictions involve the use of the treated water for irrigation. As terrestrial plants can be affected by herbicides, there can be a short interval between application and use of the water for irrigation to insure the herbicide is broken down prior to coming in contact with terrestrial weeds. In other cases, the use of treated water for human consumption might be limited for a short period of time until the herbicide dissipates or is broken down.

There is a considerable federal research effort focused on the use of EPA registered aquatic herbicides to recover lake and river habitat lost to invasive aquatic weeds like Eurasian Milfoil. There have been great strides made in the understanding of how to apply these technologies to remove an invasive weed like Eurasian Milfoil and allow the recovery of native aquatic plants. It should also be understood that the Eurasian Milfoil being targeted has a much greater potential to damage the aquatic environment than do herbicides that are used to control them.

Aquatic herbicides can be broken down into two types, contact and systemic. For the purposes of this discussion, we will present those materials that are generally used to target Eurasian Milfoil in lake systems.

There are two contact herbicides that can play a role in the management of Eurasian Milfoil.

Aquathol K and Aquathol Granular are contact herbicides that are very effective in suppressing Eurasian Milfoil. This herbicide active ingredient contains only carbon, hydrogen and oxygen. As such it is very compatible with the environment as it breaks down after affecting the target weeds. Aquathol is a contact herbicide, which means that it will fairly rapidly control the parts of the weed it comes in contact with. It can be used to burn the plants down to the lake sediments. Contact herbicides can remove and kill the portions of the plant in the water column that would fragment and spread. Contact herbicides will not however translocate and control the root systems. As such, they play a role in managing and removing vegetation under maintenance programs in high use areas. Aquathol can also be used to target pioneering colonies to remove plant material from the water column that would fragment and spread. There is a restriction on the use of water from the treatment area for domestic purposes for up to 14 days, a 7 to 14 day restriction on use of the water for irrigation and a fish consumption restriction of three days in the treatment area. Aquathol comes in a liquid or granular formulation and application costs per treated acre range from $450.00 to $550.00 depending on water depth.

The Washington Department of Ecology and the Washington Department of Fish and Wildlife in cooperation with Cerexagri (the manufacturer of Aquathol) conducted a two year trial at Kress Lake in Cowlitz County during 2000-2001. This test was used to field validate results of concentration exposure time studies that were performed by the US Army Corps of Engineers Aquatic Plant Control Research Program in prior years. These studies indicated that Aquathol could be used to significantly reduce and selectively target Eurasian Milfoil. Applications were made to Kress Lake in 2000. Ecology staff evaluated the plant communities pre and post treatment in 2000 and post treatment in 2001. The results of this effort showed that this herbicide can be used to treat this noxious weed and increase species diversity in the treatment area. For more information contact Kathy Hamel at the Department of Ecology.

Another contact herbicide that is used to maintain high use areas free from aquatic weeds such as Eurasian Milfoil is Reward. This product has a shorter irrigation restriction than Aquathol. As it too is a contact, it is most useful in the role of controlling vegetation in high use areas and preventing spread by plant fragments. Costs per acre for this material are in the $250.00-$275.00 range.

When using contact herbicides, there is a need for careful monitoring of plant recovery and ongoing treatment. Systemic herbicide are more commonly used to target Eurasian Milfoil because they are more selective and translocate controlling the entire plant.

The most useful systemic aquatic herbicide for targeting pioneering colonies of Eurasian Milfoil are 2,4-D based products. Aquakleen and Navigate are two brand names of these granular materials. This herbicide is fully cleared for aquatic use and has a few unique properties. It is a broadleaf herbicide, meaning that it is effective against members of class of plants and does not have any impact on monocots or members of the grass family of plants. Eurasian Milfoil is one of the very few aquatic plants that are members of the broadleaf family of plants and most native aquatic plants are members of the monocot or grass family. As such, applications of this herbicide will specifically target Eurasian Milfoil and will not impact native aquatic plants. It can then be used to selectively remove the Eurasian Milfoil from a lake. It will translocate and kill the entire plant. As such, it provides much longer-term control than will a contact herbicide. These compounds have restrictions on the use of treated water for domestic and irrigation purposes. The label requires that levels of the herbicide in the water drop to below the drinking water tolerance prior to using the water from the treatment area for these purposes. This normally happens in from 24 to 72 hours, so the restriction is very short lived. The cost per acre for this type of application is from $500.00 to $550.00.

Aquatic herbicides plan an important role in the management of invasive aquatic species in Washington State. Technologies that are target specific for Eurasian Milfoil can effectively eradicate this weed and restore native aquatic plant communities.

This product has been shown to be very effective at the reduction and removal of Eurasian Milfoil from Washington Lakes with no impact and actual recovery of native aquatic plant communities in the treatment areas. A study performed by the Washington Department of Ecology followed the impacts of this herbicide in large-scale applications on 1,250 acre Loon Lake north of Spokane Washington. The applications had a major impact on the Eurasian Milfoil present in the lake reducing the populations to a fraction of the pre treatment levels. Native plant

coverage and species diversity both increased dramatically in the year of the study and in the years post treatment. There was no year of treatment impacts noted on non-target aquatic vegetation. For more information contact Kathy Hamel with the Washington Department of Ecology.

Sonar is another very effective systemic herbicide that is target specific for Eurasian Milfoil. This product is very unique in that it places no water use restrictions on the water body other than an irrigation precaution. Sonar has a drinking water tolerance (a level that is legal in delivered drinking water) of 150 parts per billion and the application rates to control Eurasian Milfoil are in the 10 to 15 part per billion range. Sonar is systemic and we have eradicated this weed from a number of smaller lakes in the Northwest using this product. It does have one drawback however. Sonar has to remain in contact at these low rates with the target plant for up to 6 weeks. In very large lakes where the Eurasian Milfoil distribution is spotty this is often a problem as the material will dilute from the treatment area. Barrier curtains have recently been developed to isolate treatment areas and apply the herbicide. Costs per acre for Sonar treatments can be much lower than the AquaKleen/Navigate option, but conditions at the treatment site need to be evaluated prior to designing a treatment protocol.

There is one additional herbicide that may gain registration this year. Renovate is another systemic herbicide that is target specific for Eurasian Milfoil. The lake managers should review this material and costs when EPA finalizes registration and the material is available for sale.

The application of aquatic herbicides in Washington State is heavily regulated to protect the aquatic environment. There is a programmatic Environmental Impact Statement that has been issued by the Washington Department of Ecology for the aquatic herbicide permit program. This EIS has been updated in recent years at the direction of the Legislature. In Washington State, all aquatic herbicides are classified as "Restricted Use" materials. This means that they can only be sold to and applied by commercial applicators that hold current licenses issued by the Washington Department of Agriculture with an aquatic endorsement.

There is also a site specific permit application that is required prior to the application of EPA registered materials to Washington State waters. This application goes to the regional office of the Department of Ecology. Based on what is proposed and the comments received from various other interested agencies, the permit is issued, conditionally issued or denied.

The Washington State Legislature has recognized the impact of state and local regulation on the management of invasive aquatic weeds like Eurasian Milfoil. In legislation passed in 1996, RCW 90.48 directed the Department of Ecology to insure the issuance of permits to control invasive aquatic weeds that are on the state noxious weed list. This law further directs Ecology to insure that the permit process is not used to burden weed control efforts. This law also amended the state and all local shoreline ordinances to exempt the management of nox-

ious aquatic weeds from any permitting requirement under those regulations. The Legislature amended these laws because they were significantly impacting the ability of local governments and lake residents ability to protect their water resources. A permit is still required to apply these materials.

It should be noted that the use of aquatic herbicides in the Western United States (including Washington) has been impacted by a ruling from the US Ninth Circuit Court of Appeals this past spring. In the case of Headwaters vs. Talent Irrigation District, the court found that a National Pollution Discharge Elimination System (NPDES) permit could be required when aquatic herbicides were applied to waters of the US. As no such permit exists, both EPA and the States are in the process of reviewing this and determining how to proceed with respect to issuing a general permit. The US EPA delegates responsibility for NPDES permitting in Washington State and is working to develop a national policy in this regard that states should follow. More will be known about the need for an NPDES permit and the requirements of the permit if issued in the next few months.

**Step Nine, Specify Control Intensity**

The community of Hunts Point has been living with the negative impacts of Eurasian Milfoil for almost 20 years now. The rest of Lake Washington has suffered in a similar fashion. This weed has caused a significant impact on both human and natural beneficial uses of the lake and the waters adjacent to Hunts Point as has been outlined in the sections above in this report.

The operations to date have been maintenance levels of control that have to be performed yearly. Permitting for this type of work has been impacted by the potential need for an NPDES and Ecology's desire to use an integrated approach to management of aquatic plants. As such, maintenance control is ruled out as an option for this site.

The option of prevention is also ruled out for this site. Eurasian Milfoil is a major problem system wide and even inhabits upstream lakes like Sammamish. Even if eradication was economically feasible for Lake Washington at the present, infestations in Lake Sammamish would contribute fragments to re-colonize the lake.

The control intensity that is appropriate for these important waters is suppression with a goal of restoring native aquatic plant communities in Cozy Cove and Fairweather Bay. This control intensity is driven by the fact that all of the beneficial uses in this area are severely impacted by Eurasian Milfoil. In addition, the weed has for the past 20 years severely degraded the biological integrity of the littoral zone of the lake including this area. The impacted waters do not meet Ecology's water quality standards for temperature and dissolved oxygen. It is time to start thinking about removing this invasive weed from this lake and restoring the native aquatic plant communities. The technologies exist to do this

on a local or lake wide basis and that is the appropriate goal for this IAVMP.

In addition to the suppression and eradication locally of Eurasian Milfoil, the goal of this IAVMP is to restore native aquatic plant communities in the littoral zone adjacent to Hunts Point. Native aquatic plants provide the habitat that aquatic organisms in this region have evolved to live with and interact with. This habitat has been removed from the lake by Eurasian Milfoil. In addition, native aquatic plants are generally not weedy in nature. As they recover into these degraded portions of the lake replacing the suppressed Eurasian Milfoil, they will not interfere with human use of the water to the degree that Eurasian Milfoil does.

**Step Ten, Choose Integrated Treatment Scenario**

As the control intensity has been defined as suppression of Eurasian Milfoil and recovery of native aquatic plant communities in the mapped areas of Lake Washington. Tools that will accomplish these objective are then the ones that should be deployed until this objective is met.

First, there are tools that can be ruled out here because they will not help to meet the goal of the IAVMP.

Biological controls are not appropriate here. The only operational tool that is allowed for use at any level in Washington State is the Triploid Grass Carp. This biocontrol agent is not appropriate for the reasons outlined in the section above for use in Lake Washington. Other biocontrol agents have not yet reached a point where the technology can be operationally deployed. As this program evolves and if science provides other operational biocontrol agents specific for Eurasian Milfoil, they should be incorporated in this ongoing program as appropriate.

Mechanical control technologies could provide for suppression levels under certain circumstances. The performance of aquatic plant harvesting operations is directly related to the distance that the harvester has to transport the cut vegetation. An analysis of the application of harvesting technologies to the Hunts Point area shows minimal promise for cost effective results.

The attached map shows the location of the two closest shore unloading sites to the Hunts Point area. There is a Seattle Parks Department boat ramp located at Magnuson Park and a Kirkland Parks Department boat ramp located in the downtown area as mapped. The Corps of Engineers HARVEST model was used to predict the effectiveness of various harvesting treatment scenarios. Given the typical equipment mix that contractors have available in Washington State, the optimum operating distance from the shore unloading site is under 1,500 feet. This results in a per acre performance rate of up to 1.5 acres harvested per day. The maximum effective radius for operations was predicted to be about 5,000 with a production rate of under 0.25 acres per day. That radius is displayed on

1 Mile Harvesting Zones

Kirkland Boat Launch

Magnuson Boat Launch

this map. As there are no sites to operate in the proximity of Hunts Point, this option would be prohibitive. In addition, aquatic plant harvesting operations generally select for Eurasian Milfoil as this weed can recover from harvesting at a much faster rate than native aquatic weeds.

As the goal of this project is to suppress the Eurasian Milfoil to very low to eradication levels and allow the recovery of the native aquatic plants in this area, tools that provide selective control of this weed should be selected. This means that a selective systemic herbicide should be used in the first years of the implementation of this plan.

Granular Navigate or AquaKleen, and Sonar are the tools that can provide these results.

Sonar would be the preferred option in a smaller lake system, but the water exchange in this area may preclude that without the use of a barrier curtain. Barrier curtain technology was very effective in isolating treatment areas in Shoecraft Lake in 2000. Treatments with the herbicide were made inside this barrier, the Eurasian Milfoil was eradicated and no herbicide levels of significance were found outside the barrier. As there are a large number of vessels in this area and there is a six to eight week contact time required for treatment that would mean isolating those vessels from the main lake for this period of time. The community would have to agree to this prior to the deployment of this barrier.

There will be a new formulation of Sonar Granular that is coming to market in late 2001 called Sonar Precision Release. This technology is designed to allow this herbicide to remain in contact with target weeds in large lake systems and flowing water. This granular may allow for the use of this product in the backwaters of the bays and should be considered when more is known about the performance of that product.

Navigate or AquaKleen (trade names) may be a better fit here. These products are granular materials with a short contact/exposure time requirement. They are systemic herbicides that are target specific for Eurasian Milfoil. They have already demonstrated to Ecology that they can reduce to near removal Eurasian Milfoil in large lake system while having no impact on native aquatic plants. The Department of Ecology's own research at Loon Lake showed that this technology can remove the Eurasian Milfoil while letting native aquatic plants thrive. This technique has also been documented to significantly increase in species diversity.

These produces should be applied to the infested areas of the littoral zone under a carefully thought out treatment program with this goal in mind. The first year of this effort would target all infested acres as mapped here. There would be complete pre and post treatment assessments of the aquatic plant community made as part of this treatment protocol. The sampling protocol would involve overall mapping of the plant communities to document the reduction in Eurasian

Milfoil and the recovery of the native plant communities. This would include specific sampling sites where species diversity, density and biomass would be collected and analyzed. Water quality parameters critical to fish such as temperature and dissolved oxygen would be monitored both in the Eurasian Milfoil beds and in open water sites. This information would be used to track the probable increase in water quality that would result from removal of the Eurasian Milfoil.

After the first year's treatment results were known, the second year treatment efforts would be developed. There should be a significant reduction in the populations of Eurasian Milfoil in the treatment area. A second year's application of this product would be made to target that growth. Monitoring and sampling would be repeated using the same protocols and sampling stations and additional maps would be developed. Water quality parameters critical to fish such as temperature and dissolved oxygen would be monitored both in the Eurasian Milfoil beds and in open water sites. This information would be used to track any increase in water quality that resulted from removal of the Eurasian Milfoil.

By the third year of this effort, the Eurasian Milfoil populations in the treatment area will be dramatically reduced. Monitoring of the zone would be performed do locate and treat (spot treat with herbicides or diver removal) remaining or new Eurasian Milfoil plants. It may be that native aquatic plants begin to pose a weed problem along the shorelines in this time frame. Selective removal of plants in shallow water could be performed using chemical, mechanical or physical methods. Water quality parameters critical to fish such as temperature and dissolved oxygen would be monitored both in the Eurasian Milfoil beds and in open water sites. This information would be used to track any increase in water quality that resulted from removal of the Eurasian Milfoil.

By the end of the third year, the Eurasian Milfoil present in this portion of Lake Washington should be near eradication levels. While fragments could drift back into this area, an aggressive program of treating them as outlined here would not allow them to establish and expand. The goal of suppression would be complete. As there would be remaining Eurasian Milfoil colonies elsewhere in the lake, fragments would move back into these recovered native aquatic plant communities. Over the next few years continued monitoring and targeting of this invasive weed would result in maintaining the goal of suppression.

An ongoing evaluation of any new tools target specific to Eurasian Milfoil would also be a goal of this action plan. When new tools come on line, they should be adopted as appropriate.

The results of this effort would also demonstrate a potential technology to recover Lake Washington to pre Milfoil conditions. This project should be considered as a pilot project with that objective in mind.

From an environmental standpoint, there is valid concern about any aquatic plant management activities in Lake Washington because of potential Salmon

impacts. It is also clear that the Eurasian Milfoil itself has had a major impact on these fish. The Governor's Salmon Recovery Program specifically acknowledges this and focuses agency action on the management of invasive species. The approach of doing nothing to manage this weed has an environmental cost that is probably much higher than the approach proposed here. The Washington Department of Ecology has developed a programmatic Environmental Impact Statement that indicates this approach can be implemented with minimal to no impact on salmon. The water quality in the treatment areas is depressed to the point that Salmon can't use them in many cases anyway. While there may be concerns expressed as this approach goes through the permit process, it is the best solution for this situation. The Department of Ecology's own research in Eastern Washington and other operational results in Western Washington have documented the desired results can be achieved repetitively.

**Step Eleven, Develop Action Plan**

The action plan for the suppression of Eurasian Milfoil in Hunts Point should be considered as both an operational program to improve water quality and habitat in this portion of the lake and as a Pilot/Demonstration Project that local and state resource agencies can look to as an example of how to move forward.

The key steps necessary to implement this plan in each of the coming years are as follows:

*2001*

1. Adopt the IAVMP presented here and submit to the Department of Ecology for Approval (cost assumed by Town of Hunts Point)

2. Submit an application to the Washington Department of Ecology to help fund the implementation of this plan by November 1st. (Cost assumed by Town of Hunts Point, estimated to be under $300.00 for application and copy charges)

3. Follow the NPDES permit process and submit an application to perform the treatment work prescribed in the plan. (Cost unknown as Ecology has not yet determined NPDES cost structure)

Costs for 2001 depend largely on the NPDES fee structure when developed.

2002 (assumes DOE grant application is successful or Town funds the ongoing work if DOE grant is not approved in 2001)

1. Develop sampling protocols and sampling locations to document pre and post treatment aquatic plant coverage and compliance with NPDES requirement (not yet known). Collect pre treatment data in June. The cost of the sampling protocol development and pre treatment sampling is estimated at $3,000.00.

2. Treat up to 75 acres of Lake Washington with Navigate/AquaKleen in June, follow up with second spot treatment of up to 25 acres if necessary. Maximum treatment cost of $50,000.00 for treatments assuming a per acre cost of $500.00.

3. Perform NPDES required sampling, costs unknown at this point because Ecology has not developed protocols or requirements

4. Perform post treatment water quality and aquatic plant community analysis, estimated cost $3,000.00.

5. Develop year end report summarizing operations and results. Estimated costs $500.00

6. Apply to Ecology for financial assistance for 2003 efforts and begin to explore alternative funding sources such as Invasive Plant funds, Aquatic Habitat Recovery or Salmon Recovery Funds, Lake Management or Special District formation, Town of Hunts Point Funding. (Ecology looks more favorably on proposals from groups that can carry on these efforts as Ecology funding is use up)

Costs for 2002 are estimated at $56,500.00 plus sales taxes. Additional costs may be necessary to cover Ecology NPDES monitoring requirements. An estimate of $10,000.00 should provide a more than adequate budget for sample collection and lab monitoring.

*2003 (assumes DOE grant application is successful or Town funds the ongoing work if DOE grant is not approved in 2001)*

1. Collect pre treatment data in June. Develop treatment plan to target Eurasian Milfoil remaining in the treatment area. The cost of the sampling protocol development and pre treatment sampling is estimated at $3,000.00.

2. Treat up to 50 acres of Lake Washington with Navigate/AquaKleen in June. Maximum treatment cost of $25,000.00 for treatments assuming a per acre cost of $500.00.

3. Perform NPDES required sampling, costs unknown at this point because Ecology has not developed protocols or requirements

4. Perform post treatment water quality and aquatic plant community analysis, estimated cost $3,000.00.

5. Develop year end report summarizing operations and results. Estimated costs $500.00

Costs for 2003 estimated at $31,500.00 plus NPDES costs Ecology may impose.

*2004*

1. Monitor the littoral zone for Eurasian Milfoil and spot treat where it occurs. Estimated costs $10,000.00 maximum. Provide maintenance control in swimming areas as necessary for problem aquatic weed growth.

2. Conduct early and late summer Eurasian Milfoil monitoring, finalize report on the results of the suppression/eradication efforts for Ecology and close Pilot/Demonstration Project

3. Continue suppression efforts in the years to come.

4. Re-evaluate problem plants and plant infestation levels, review control options and note any new tools available, evaluate how new tools or different control options would fit the current need and adjust the program as required.

**Town of**
*Serving Our Residents*
**Hunts Point**

3000 Hunts Point Road
Hunts Point, Washington 98004
425.455.1834 fax 425.454.4586
www.ci.hunts-point.wa.us

October 3, 2001

Terry McNabb
Aquatechnex, Inc.
P.O. Box 118
Centralia, WA 98531

RE: Milfoil Treatment in Hunts Point Waters

Dear Terry:

Based upon available records the Town of Hunts Point has been treating the waters around the Town for milfoil since 1989. Due to the difficulties with permitting and the uncertainty caused by the decision of the 9th District Court of Appeals on the need for NPDES permits we did not apply treatment in 2001.

Enclosed are copies of the limited amount of correspondence on milfoil control that we have issued in the last couple of years. The Council Minutes are those that contain reference to milfoil control.

I am attempting to set up a public meeting at a Special Town Council Meeting during the week of October 15th. It will probably be on either the 16th or 18th since the Planning Commission has a regularly scheduled meeting on the 17th and will be using the facilities. Our Council Meetings start at 7:00 P.M.

You can expect to hear from me in the next day or so on a firm date.

Sincerely,

Jack V. McKenzie
Town Administrator

Town of
Serving Our Residents
Hunts Point

3000 Hunts Point Road
Hunts Point, Washington 98004
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June 26, 2001

# NOTICE

**On July 22nd you were sent an invoice to cover the cost of an herbicide application to control Eurasian milfoil in the waters of Lake Washington around the Town of Hunts Point.**

**On July 25th Aquatechnex, the applicator of the herbicide, notified us that a permit had not been issued by the Washington State Department of Ecology. The permit was not issued as a result of a recent decision by the United States Court of Appeals for the Ninth District that seemed to indicate a need for the issuance of a National Pollution Discharge Elimination Permit. Based upon concerns raised by this decision the State DOE has suspended permit issuance.**

**Without the application permit from the State Aquatechnex cannot apply the herbicide this year. We hope that over the next few months that the situation will be resolved and that we will be able to resume our milfoil control efforts next year.**

**Please ignore the invoice for the milfoil control fee that you just received. If you have already made payment a refund will be issued on August 7th.**

**We appreciate your patience in getting this matter cleared up.**

**Thank you.**

**Jack V. McKenzie**
**Town Administrator**

# Town of Hunts Point

3000 HUNTS POINT ROAD / BELLEVUE, WASHINGTON 98004 / (425) 455-1834 FAX (425) 454-4586


August 9, 2000

Mr. Steve Johnson
Seattle Times
Fax: 206-453-0449

Dear Steve:

In response to your voice mail, here are the original documents on Milfoil spraying. I would appreciate a positive article, as I do my best as volunteer Mayor to keep 99% of the residents happy. The other 1% must have contacted you.

In Summary, Hunts Point has sprayed for milfoil since 1989. Milfoil is an underwater weed that grows from the shallows of lakes, to the surface during August. The spray retards the growth of milfoil before it blooms and spreads. Milfoil makes swimming nearly impossible, attracts geese, causes swimmers itch, tangles up in boat props and clogs boat water intake valves, causing overheating.

It does not hurt fish or DOE would never have approved the product. Last year DOE increased the area where we have to post signs to a ¼ mile. This impacts a few homes on Yarrow Point that are not sprayed, but within ¼ mile of the spray area. Any resident on Hunts Point can opt to not have their waterfront treated, and about 2 of 145 waterfront homes are not treated by request.

The spray may drift 15-20 feet, but not a ¼ mile. The postings on Yarrow Point are what caused the problem, as those residents wanted to swim and water lawns in the summer heat, but didn't due to the new posting requirements by DOE. I don't believe that Yarrow Pt Homes would ever be affected, but they were posted by requirement.

Hunts Point has a great relationship with Yarrow Point and we will have a better milfoil communication plan for next year as noted in the e-mails. We apologize for any misunderstandings to unhappy residents

Thanks,

Fred McConkey
Mayor, Hunts Point

Town of
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Hunts Point

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Hunts Point, Washington 98004
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October 3, 2001

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Aquatechnex, Inc.
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Sincerely,

Jack V. McKenzie
Town Administrator

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Hunts Point

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www.ci.hunts-point.wa.us

October 17, 2001

Terence M. McNabb
President
Aquatechnex
P.O. Box 118
Centralia, Washington 98531

RE: IAVMP and Milfoil Control Grant

Dear Terry:

Thank you for the excellent presentation at last night's Town Council Meeting. Your program was informative and provided a high level of knowledge about aquatic herbicides and their uses to the Council members and the residents in attendance.

As you witnessed, the Council wishes to proceed with the completion of the Integrated Aquatic Vegetation Management Plan for Hunts Point waters. They also authorized the preparation of a grant application to fund a demonstration project to bring Eurasian milfoil under control.

Please let me know how we can help with the production of the grant application.

Best regards,

Jack V. McKenzie
Town Administrator

STATE OF WASHINGTON }
COUNTY OF KING }

## AFFIDAVIT OF PUBLICATION

**PUBLIC NOTICE**

Tom Meagher, being first duly sworn on oath that he is the Legal Advertising Representative of the

## Eastside Journal

a daily newspaper, which newspaper is a legal newspaper of general circulation and is now and has been for more than six months prior to the date of publication hereinafter referred to, published in the English language continuously as a daily newspaper in King County, Washington. The Eastside Journal has been approved as a Legal Newspaper by order of the Superior Court of the State of Washington for King County.
The notice in the exact form annexed was published in regular issues of the Eastside Journal (and not in supplement form) which was regularly distributed to its subscribers during the below stated period. The annexed notice, a

NOTICE OF SPECIAL COUNCIL MEETING

was published on SUN., 10/7/01

The full amount of the fee charged for said foregoing publication is the sum of $ 24.75 at the rate of 12.50 per inch for the first publication and N/A per inch for each subsequent insertion.

Tom Meagher
Legal Advertising Representative, Eastside Journal

Subscribed and sworn to me this 9th day of OCT 20 01

Michelle A. Jackson
Notary Public for the State of Washington
Residing in Sammamish, Washington

MICHELLE A. JACKSON NOTARY PUBLIC STATE OF WASHINGTON COMMISSION EXPIRES 01-01-02

P.O. No.
Cost of publishing this notice includes an affidavit surcharge.

# NOTICE

SPECIAL COUNCIL MEETING
The Town of Hunts Point Town Council will hold a special meeting on Tuesday, October 16, 2001, at 7:00 P.M. to hear a presentation on the Integrated Aquatic Vegetation Management Plan. The meeting will be held at Hunts Point Town Hall, 3000 Hunts Point Road, Hunts Point, WA.
Linda Longmire
Deputy Clerk/Treasurer
#815348 Published in the Eastside Journal October 7, 2001

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Linda Longmire
Deputy Clerk/Treasurer
#815348 Published in the Eastside Journal October 7, 2001

TOWN OF HUNTS POINT

# SPECIAL COUNCIL MEETING

Tuesday, October 16th, 2001 7:00 P.M.
Town Hall

To Discuss

# MILFOIL CONTROL

# &

# Integrated Aquatic Vegetation Management Plan

# TOWN OF HUNTS POINT

## SPECIAL
## COUNCIL MEETING AGENDA

**Tuesday, OCTOBER 16, 2001**
**7:00 P.M.**

**********

## I. CALL TO ORDER

## II. INTEGRATED AQUATIC VEGETATION MANAGEMENT PLAN

1. Presentation by Terry McNabb of Aquatechnex, Inc.
2. Public Comment
3. Council Action to Adopt the Integrated Aquatic Vegetaion Management Plan

## III. ADJOURNMENT

***Council may add and take action on other items not listed on this agenda***