Aquatic Plant Technical Assistance Implementation Plan - 1995 Field Season

Introduction

The Aquatic Plant Technical Assistance program was created to provide technical expertise within Ecology, other agencies, local governments, lakes groups and the general public regarding aquatic plant ecology, taxonomy, and management. The three main goals identified for this program are to:

- provide technical assistance and education on aquatic plant identification and management;
- evaluate plant community structures and the existence or potential for aquatic plant related problems in selected waterbodies; and
- assist with evaluating Freshwater Aquatic Weed Program grant applications.

This implementation plan addresses the goal of conducting site visits and the coinciding technical assistance goal. The plan details the three to four month field season. The remainder of the year will be spent researching and planning data collection, updating the database and herbarium collection, evaluating grant applications for Freshwater Aquatic Weed Program funding, conducting special projects such as assisting with the aquatic plant identification manual contract and making changes to the early infestation policy, and providing off-season technical assistance.

Flexibility is an integral part of this plan. Changes will occur if high priority requests for assistance are received from citizens or local government officials. (Priority is evaluated through communication with the requestor to determine the probability that the perceived problem is caused by an exotic invasive species. If so, the waterbody will be included as part of Task 2; if not it will be visited as time allows.) If new small exotic invasive plant populations are found the work schedule will be rearranged, and some site visits may be omitted, to provide time for containment efforts.

Tasks for the 1995 field season are described in the following four sections. The tasks are in general order of priority. However, the actual field visits will combine items from different tasks based on geographical proximity of the waterbodies.

by Jenifer Parsons
July 1995

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Task 1 - Revisit Selected Lakes with Invasive Plants

Return to the following lakes where invasive plant populations were discovered last year:

Wapato Lake, Chelan County (*Myriophyllum spicatum* - Eurasian water-milfoil)
Whitestone Lake, Okanogan County (*M. spicatum*)
Lelend Lake, Jefferson County (*Egeria densa* - Brazilian elodea)
Spencer Lake, Mason County (*Lythrum salicaria* - purple loosestrife)

Compare the population levels to those observed in 1994. Map the plant communities with a Global Positioning System (GPS) Unit and assess the situation for containment measures using proposed Early Infestation Project Implementation Plan criteria (Parsons 1995, in preparation). This will allow Ecology to directly contract divers to survey the lake vegetation and either do hand pulling or bottom barrier installation to control the weed population. After the diver survey, if the Ecology committee (the author and personnel from the Water Quality Financial Assistance Section) decide it will be feasible to attempt population eradication, the local government officials and lake residents will be advised of our plans and encouraged to take part in future control effort planning and implementation. Several inspections during and after the containment efforts will be required to assure quality work.

Task 2 - Surveys

Conduct field surveys in selected lakes that were not surveyed last year. Concentrate on areas of high public use and locations close to known infestations of exotic invasive plants. General areas of focus and candidate waterbodies are listed below.

- Verify suspected milfoil sightings not confirmed last year. Potential sites include:

  Goodwin Lake, Snohomish County
  Shoecraft Lake, Snohomish County
  Stevens Lake, Snohomish County
  Lake Whatcom, Whatcom County
  Banks Lake, Grant County
  Moses Lake, Grant County
  Spirit Lake, Skamania County
  Scooteney Reservoir, Franklin County
  Winchester Wasteway, Grant County
  Crater Lake, Grant County
  Billy Clapp Lake, Grant County
  Domke Lake, Chelan County
  Buffalo Lake, Okanogan County
  Curlew Lake, Ferry County

- Survey sloughs in the lower Columbia River to check for spread of *Myriophyllum spicatum, M. aquaticum* (parrot feather), *Cabomba carolineana* (fanwort) and *Egeria densa*, which are known from that area.

- Survey lakes adjacent to the lower Yakima River. The US Bureau of Reclamation is planning a project near Parker and is concerned about noxious weed spread. Include (contingent upon access):

Oleys Lake
McWhorter Lake
Byron Lake (*M. spicatum* was found here last year)
Giffen Lake
Horseshoe Lake
Bos Lake
Round Lake
Morgan Lake

- Investigate additional lakes adjacent to the upper Columbia and Pend Oreille Rivers, as time allows. Concentrate on lakes in Okanogan, Ferry and Pend Oreille counties since many Stevens County lakes were surveyed last year as part of another project. Include:

  Palmer Lake, Okanogan County
  Twin Lakes, Ferry County
  Ellen Lake, Ferry County
  McGinnis Lake, Okanogan County
  Trout Lake, Ferry County
  Deep Lake, Stevens County
  Sullivan Lake, Pend Oreille County

- Check lakes below Potholes Reservoir. There is a patchy population of *M. spicatum* in Potholes, investigate some or all of the following lakes to look for its spread:

  Soda Lake
  Warden Lake
  Canal Lake
  Windmill Lake
  Long Lake
  Upper and Lower Goose Lake
  Morgan Lake
  Herman Lake

- Survey lakes on the Kitsap Peninsula to look for spread of *E. densa* and *M. spicatum* from Long Lake to nearby waterbodies:

  Kitsap Lake
  Wildcat Lake

Other lakes or regions will be added if requested or as time allows, or some may be deleted if higher priorities are identified. The survey technique is described in the Quality Assurance Project Plan (Appendix). Concurrent with the survey effort, contacts will be made with Washington Department of Fish and Wildlife biologists, local weed board personnel and interested citizens when I am in the various regions to discuss aquatic plant issues. In addition, the following elements will be collected

a) GPS data will locate any plant populations of special interest (weedy exotic and listed rare plants).

b) Special attention will be paid to looking for herbivorous aquatic insects, especially for the weevil *Euhrychiopsis lecontei* which is known to cause damage to *M. spicatum*. It will be helpful to know where the weevils occur naturally in the event that Freshwater Aquatic Weed Program money is used to develop a weevil rearing program, as is being proposed by Pend Oreille County officials. If the weevils or other insects appear to be

doing a significant amount of damage, the sampling technique will be modified to more carefully map the plant communities. This will serve as the first year of data for tracking population fluctuations in lakes with herbivorous aquatic insects.

c) Milfoil samples will continue to be collected for DNA analysis. However, the lab that conducted the tests last year may not be available this year. If not, we will try to contract with a local lab capable of conducting the analysis. Agencies from other states may be interested in working together to maximize efficiency. This possibility will be explored during the next few months.

d) Water and sediment samples will be collected for as many lakes as possible (based on logistical and budgetary constraints) for the following analyses:

- open water alkalinity using a field test kit,
- open water pH using a field meter,
- sediment particle size estimates,
- sediment percent organic matter and density analyzed by a lab, and
- sediment penetrability measured in the field.

It has been shown that these factors (along with trophic state) may influence *M. spicatum* growth. These data will aid in lake characterization and may help assess aquatic plant growth potential (see Quality Assurance Project Plan for details (Appendix)).

Task 3 - Confirm Rare Plant Sightings

Return to lakes where listed rare plant populations need to be confirmed. This includes:

Isabella Lake, Mason County
Clear Lake, Thurston County
Elbow Lake, Thurston County

Task 4 - Conduct In-Depth Community Analyses

Conduct a more in-depth plant community analysis on a few lakes to be monitored on a yearly basis. This analysis will consist of mapping plant communities with the GPS unit and doing sediment and water quality analysis as indicated in Task 2. Candidate lakes are:

Evergreen Lake and Quincy Lake, Grant County. DNA analysis revealed that Evergreen Lake has *M. spicatum*, but nearby Quincy Lake has only the native *M. sibiricum* (northern water-milfoil). These lakes will be studied to track and investigate reasons for the different plant communities.

As mentioned in Task 2, I would like to include mapping of lakes with well established milfoil and weevil populations. These lakes will be identified during the field season. Preference will be given to lakes included in the Lake Water Quality Assessment Program.

Schedule

The attached calendar contains a proposed schedule. All dates are tentative, subject to change based on weather, level of plant maturity, and the addition of other projects.

Budget

Cost estimates are as follows:

Lodging and per diem - approx. 42 days, average $66/day	$2,772
Travel - approx. 6,500 miles at $0.28/mile	$1,820
Laboratory	
DNA analysis (unknown at this time, as many samples as possible within this ammount)	$1,500
sediment - % organic matter approx. 50 samples at $31/sample	$1,550
water - alkalinity $150 for a kit to process 100 samples send 10 duplicate samples to the lab at $20/sample	$ 350

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SAT/SUN
29 MEMORIAL DAY (OBSERVED)	30 MEMORIAL DAY	31	1	2	3 4
5	6	7	8	9	10 11
12	13 Leland Lake, other Peninsula lakes	14 FLAG DAY	15 →	16	17 18 FATHER'S DAY
19	20 Grant County	21	22 →	23	24 ST-JEAN (QUÉBEC) 25
26	27 Wapato/Whitestone Lakes	28	29	30 →	1 CANADA DAY (CANADA) 2
3	4 INDEPENDENCE DAY	5 Grant County	6	7 →	8 9
10 APMS meeting	11 Bellevue →	12 →	13	14	15 16
17 Lower Yakima	18	19 Scootenay Res.	20 →	21	22 23
24 Spencer Lake Isabella Lake	25	26 Chehalis River	27	28 Upper Columbia	29 30
31 Pend Oreille Areas	1	2	3	4 →	5 6
7 Lower Columbia	8	9	10 →	11	12 13
14 Clear Lake Elbow Lake	15	16 Leland Lake	17	18	19 20
21 Snohomish/Whatcom Counties	22	23	24 →	25	26 27
28 Wapato/Whitestone	29	30 →	31	1	2 3
4 LABOR DAY	5 Mapping project	6	7	8 WALPA Conference	9 10
11 Other (grace period)	12	13	14 →	15	16 17
18	19	20	21	22	23 24 ROSH HASHANAH begins at sundown
25 ROSH HASHANAH	26	27	28	29	30 1

JUNE JULY AUGUST SEPTEMBER

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APPENDIX

Aquatic Plant Technical Assistance
Final Quality Assurance Project Plan

Aquatic Plant Technical Assistance

Final Quality Assurance Project Plan

by
Jenifer Parsons
April 1995

Washington State Department of Ecology
Environmental Investigations and Laboratory Services Program
Ambient Monitoring Section

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Introduction

Aquatic Plant Technical Assistance Program

The Aquatic Plant Technical Assistance Program provides technical expertise for Ecology, other agencies, local governments, lakes groups and the public regarding aquatic plant ecology, taxonomy and management. An integral part of providing this technical assistance involves assessing the nature of aquatic vegetation within the state's waterbodies. This Quality Assurance Project Plan details the methods used in vegetation and waterbody characterization.

Aquatic Plant Data Review

Vascular plants and macroalgae are important components of aquatic ecosystems. They can have a profound affect on littoral zone water quality parameters such as temperature, dissolved oxygen, pH, and nutrient levels (Honnell *et al.*, 1993; Frodge *et al.*, 1990; Carpenter and Lodge, 1986; Carpenter, 1980). They also provide both structure and food for invertebrates, fish, and wildlife (Bettoli *et al.*, 1993; Newman, 1991). However, because aquatic plants, especially exotic invasive species, will respond to disturbances such as cultural eutrophication with increasing growth, they are often considered a nuisance (Rattray *et al.*, 1991, Welch and Kelly, 1990; Graneli and Solander, 1988). Management techniques have traditionally focused on how to control or extirpate nuisance aquatic plant growth. A related, less studied, approach is to apply knowledge of aquatic plant habitat requirements and community structures to management. A literature review revealed little information on broad scale plant community analyses, and some intriguing results from small scale studies on the influence of certain sediment and water quality characteristics (including pH, alkalinity, calcium carbonate, nutrients (phosphorus, nitrogen, carbon), and sediment organic matter, density and compaction) (Barko, 1985; Barko and Smart, 1986; Kadono, 1982). Collecting data on some of these physical parameters, along with aquatic plant species and distribution data, will help assess characteristics contributing to aquatic plant growth and the potential for excessive population levels. This will aid Ecology personnel in providing advise on managing waterbodies and plants to protect both the ecosystem and human defined beneficial uses (such as recreation, fisheries, waterfowl, and high water quality).

Objective

The three main goals of the Aquatic Plant Technical Assistance Program are to:

- provide technical assistance and education on aquatic plant identification and management;
- evaluate plant community structures and the existence or potential for aquatic plant related problems in selected waterbodies; and
- assist with evaluating Freshwater Aquatic Weed Program grant applications.

This Quality Assurance Project Plan will cover the following objectives relating to field research:

- observe and document aquatic plant communities (emphasizing those containing exotic invasive species);
- examine factors that may influence plant community structure; and
- incorporate results into plant management strategies.

Study Design

Site Selection

Sample sites will be determined each year based on the following:

- respond to requests from citizens or government officials, after determining from verbal descriptions of the situation that a site visit is warranted;
- confirm suspected populations of exotic invasive species; and
- survey additional areas based on proximity to existing known populations of exotic invasive species, availability of public access and frequency of use by the public.

Macrophyte Data

The objective for vegetation data collection is to document species richness and distribution within the waterbody. The method used is that recommended by other aquatic plant ecologists in this region (Warrington, 1994; Sytsma, 1994). With this method, a small boat is used to circumnavigate the littoral zone during the growing season (unless either the waterbody size or access limits restrict the survey extent). Sample collection sites are selected en route when a different plant or habitat type is observed. A species list is made from samples gathered using a weighted rake, hand pulling or from visual observation. The plants are identified on site if known, or are collected for later identification to the lowest taxonomic group possible (see Parsons, 1995, for a list of plant identification references). The depth and, if possible, a visual sediment description are recorded. Vegetation cover/distribution data is noted for each species using a subjective numeric value based on the following descriptions:

1 - few plants, <5% cover
2 - plants more numerous, 5-20% cover
3 - plants may form dense patches, 20-50% cover
4 - thick, nearly monospecific growth, 50-80% cover
5 - thick growth, 80-100% cover

The cover values are difficult to assess in situations of poor water clarity. In this case, estimates are based on the relative quantity of plants retrieved with the rake. After the

waterbody has been surveyed, a summary species list is created and a whole lake distribution value is assigned to each species based on the following similar criteria.

1 - few plants observed, only in 1 or a few places, rare in the waterbody
2 - few plants, but widely distributed
3 - plants in scattered sometimes dense patches, co-dominant with other plants
4 - thick, nearly monospecific patches, the dominant plant
5 - thick growth, nearly or completely ubiquitous, a pattern usually restricted to exotic invasive species

When unique species are found, they are preserved for the herbarium collection maintained at the Ecology Headquarters Building in Lacey. Samples of *Myriophyllum* (milfoil) species are collected for a permanent record. When identification to species is difficult, milfoil samples are sent to the University of Minnesota for DNA analysis (using randomly amplified polymorphic DNA (RAPD) markers (Olfelt, 1994).

Water Quality and Sediment Data

Table 1 lists the parameters to be recorded during field visits, with the precision limits and the analytical method used.

Water quality samples will be collected in open water to minimize the diel influence macrophytes have on these values. Littoral zone sediment samples will be collected using a coring device. The core depth will be standardized after performing field trials early in the season. Sediment penetrability will also be measured in the littoral zone. Frequency of sediment sample collection will vary between waterbodies depending on site homogeneity, budget and time constraints.

Table 1: Summary of water quality and sediment analysis

Parameter	Method	Precision	Field Replicates
Alkalinity	Hach field test kit using Phenolphthalein and a digital titrator	± 10 mg/l	10%
pH	field meter/electrode	± 0.1 SU	10%
Secchi depth	measured to 0.1 m	± 0.1 m	10%
sediment % organic matter	EPA method 160.4, 160.3	± 1 mg/kg	10%
sediment density	weigh a known volume	± 1 mg/ml	10%
sediment penetrability	measure with an impact penetrometer (Coley *et al.*, 1994)	± 1 cm	10%

Quality Control

The macrophyte distribution and density data is inherently imprecise. This is due to differences in microsite habitat and rates of plant maturity, which will cause some plants to be overlooked if the site is visited only once. With waterbodies for which return visits are warranted, the data will be verified and improved. Correct macrophyte identification is verified using several means. In the case of milfoil species, DNA analysis is used to confirm presence of *M. spicatum* and *M. sibiricum*, and a specimen from each lake is kept in the herbarium collection. In the case of plants I am unfamiliar with, they are first cross-keyed (keyed using different references). If they key consistently to the same species, they are labeled and preserved in the herbarium collection. At the end of the field season all plants for which identification was questionable are taken to the University of Washington Herbarium where they are compared to known specimens with the assistance of the collections manager. In cases where identification is still uncertain the specimen is sent to a national expert on that particular taxon who provides his or her opinion on the identification.

Blind standards will be used to test the accuracy of the Hach Alkalinity Test Kit against the results from Manchester Laboratory. Ten percent of alkalinity, pH, sediment organic matter, density, and penetrability samples will be duplicated to test field variability. The penetrometer follows a new design and has been tested only on soft lake sediment (Coley *et al.*, 1994). I will make several duplicate readings on various types of sediment in the beginning of the field season to document the variability of readings.

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