



NPDES Wastewater Unit
Attn: Gil Vazquez
State Water Resources Control Board
1001 I Street, 15th Floor
Sacramento, CA, 95814

RECEIVED

July 24, 2017

JUL 27 2017

DIVISION OF WATER QUALITY

RE: Notice of Intent for the General NPDES Permit for Residual Aquatic Pesticide Discharges from Algae and Aquatic Weed Control Applications for the Tahoe Keys Property Owners Association

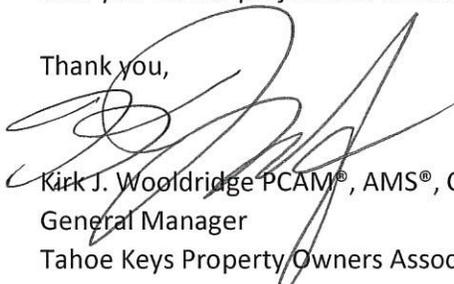
Mr. Vazquez,

Attached please find the Notice of Intent for the General NPDES Permit (NOI), associated Aquatic Pesticide Application Plan, and filing fee for the Tahoe Keys Property Owners Association (TKPOA). The TKPOA has been working with the Lahontan Regional Water Quality Control Board (LRWQCB) and Tahoe Regional Planning Agency on the Tahoe Keys West Lagoon Integrated Control Methods Test, which will utilize the three herbicides included in this NOI; Endothall, Penoxsulam, and Triclopyr.

In addition to this NOI, the TKPOA has submitted a separate Exemption Application package to the LRWQCB in order to comply with the region's regulations on the use of aquatic pesticides. The application is currently under review and will be starting the environmental review process this month.

If there is any further information you need for this NOI please let us know. We look forward to working with you on this project and would appreciate your timely response to this notice.

Thank you,



Kirk J. Woodridge PCAM®, AMS®, CMCA®, CCAM®, CHA®,

General Manager

Tahoe Keys Property Owners Association

356 Ala Wai Boulevard

South Lake Tahoe CA 96150

530-542-6444 Extension: 224

530-541-2521 FAX

kwooldridge@tahoekeyspoa.org

www.tahoekeyspoa.com

Attachments

Notice of Intent for the General NPDES Permit
Aquatic Pesticide Application Plan

Attachment E – Notice of Intent

**WATER QUALITY ORDER NO. 2013-0002-DWQ
 GENERAL PERMIT NO. CAG990005**

**STATEWIDE GENERAL NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
 (NPDES) PERMIT FOR RESIDUAL AQUATIC PESTICIDE DISCHARGES TO WATERS OF
 THE UNITED STATES FROM ALGAE AND AQUATIC WEED CONTROL APPLICATIONS**

I. NOTICE OF INTENT STATUS (see Instructions)

Mark only one item	A. <input checked="" type="radio"/> New Applicator	B. Change of Information: WDID# _____
	C. <input type="checkbox"/> Change of ownership or responsibility: WDID# _____	

II. DISCHARGER INFORMATION

A. Name Tahoe Keys Property Owners Association			
B. Mailing Address 356 Ala Wai Blvd			
C. City South Lake Tahoe	D. County El Dorado	E. State California	F. Zip 96150
G. Contact Person Kirk Wooldridge	H. E-mail address kwooldridge@tahoekeyspoa.org	I. Title General Manager	J. Phone 530-542-6444

III. BILLING ADDRESS (Enter information only if different from Section II above)

A. Name			
B. Mailing Address			
C. City	D. County	E. State	F. Zip
G. E-mail address	H. Title	I. Phone	

IV. RECEIVING WATER INFORMATION

A. Algaecide and aquatic herbicides are used to treat (check all that apply):

1. Canals, ditches, or other constructed conveyance facilities owned and controlled by Discharger.
Name of the conveyance system: _____

2. Canals, ditches, or other constructed conveyance facilities owned and controlled by an entity other than the Discharger.
Owner's name: _____
Name of the conveyance system: _____

3. Directly to river, lake, creek, stream, bay, ocean, etc.
Name of water body: Tahoe Keys West Lagoon

B. Regional Water Quality Control Board(s) where treatment areas are located
(REGION 1, 2, 3, 4, 5, 6, 7, 8, or 9): Region 6
(List all regions where algaecide and aquatic herbicide application is proposed.)

V. ALGAECIDE AND AQUATIC HERBICIDE APPLICATION INFORMATION

A. Target Organisms: _____
Curlyleaf Pondweed, Eurasian Watermilfoil, Coontail

B. Algaecide and Aquatic Herbicide Used: List Name and Active ingredients
Cascade - Endothall
Galleon SC - Penoxsulam
Renovate - Triclopyr

C. Period of Application: Start Date May 2018 End Date June 2018

D. Types of Adjuvants Used: None

VI. AQUATIC PESTICIDE APPLICATION PLAN

Has an Aquatic Pesticide Application Plan been prepared and is the applicator familiar with its contents?
 Yes No

If not, when will it be prepared? _____

VII. NOTIFICATION

Have potentially affected public and governmental agencies been notified? Yes No

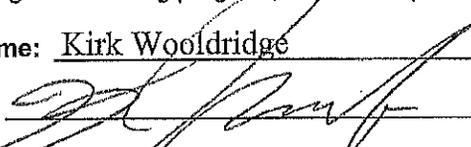
VIII. FEE

Have you included payment of the filing fee (for first-time enrollees only) with this submittal?
 YES NO NA

IX. CERTIFICATION

"I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment. Additionally, I certify that the provisions of the General Permit, including developing and implementing a monitoring program, will be complied with."

A. Printed Name: Kirk Wooldridge

B. Signature:  Date: 1/17/2017

C. Title: General Manager

XI. FOR STATE WATER BOARD STAFF USE ONLY

WDID:	Date NOI Received:	Date NOI Processed:
Case Handler's Initial:	Fee Amount Received: \$	Check #:
<input type="checkbox"/> Lyris List Notification of Posting of APAP	Date _____	Confirmation Sent _____

INSTRUCTIONS FOR COMPLETING NOI

WATER QUALITY ORDER NO. 2013-0002-DWQ GENERAL PERMIT NO. CAG990005

STATEWIDE GENERAL NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT FOR RESIDUAL AQUATIC PESTICIDE DISCHARGES TO WATERS OF THE UNITED STATES FROM ALGAE AND AQUATIC WEED CONTROL APPLICATIONS

These instructions are intended to help you, the Discharger, to complete the Notice of Intent (NOI) form for the Statewide General NPDES permit. **Please type or print clearly when completing the NOI form.** For any field, if more space is needed, submit a supplemental letter with the NOI.

Send the completed and signed form along with the filing fee and supporting documentation to the Division of Water Quality, State Water Resources Control Board. Please also send a copy of the form and supporting documentation to the appropriate Regional Water Quality Control Board (Regional Water Board).

Section I – Notice of Intent Status

Indicate whether this request is for the first time coverage under this General Permit or a change of information for the discharge already covered under this General Permit. Dischargers that are covered under Order No. 2004-0009-DWQ before effective date of this General Permit should check the box for change of information. For a change of information or ownership, please supply the eleven-digit Waste Discharge Identification (WDID) number for the discharge.

Section II – Discharger Information

Enter the name of the Discharger.
Enter the street number and street name where correspondence should be sent (P.O. Box is acceptable).
Enter the city that applies to the mailing address given.
Enter the county that applies to the mailing address given.
Enter the state that applies to the mailing address given.
Enter the zip code that applies to the mailing address given.
Enter the name (first and last) of the contact person.
Enter the e-mail address of the contact person.
Enter the contact person's title.
Enter the daytime telephone number of the contact person

Section III – Billing Address

Enter the information **only** if it is different from Section II above.

- A. Enter the name (first and last) of the person who will be responsible for the billing.

- B. Enter the street number and street name where the billing should be sent (P.O. Box is acceptable).
- C. Enter the city that applies to the billing address.
- D. Enter the county that applies to the billing address.
- E. Enter the state that applies to the billing address.
- F. Enter the zip code that applies to the billing address.
- G. Enter the e-mail address of the person responsible for billing.
- H. Enter the title of the person responsible for billing.
- I. Enter the daytime telephone number of the person responsible for billing.

Section IV – Receiving Water Information

Please be reminded that this General Permit does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code §2050 et. seq) or the Federal Endangered Species Act (16 U.S.C.A. §1531 et. seq). This General Permit requires compliance with effluent limitations, receiving water limitations, and other requirements to protect the beneficial uses of waters of the state. The Discharger is responsible for meeting all requirements of the applicable Endangered Species Act.

Additional information on federally-listed threatened or endangered species and federally-designated critical habitat is available from NMFS (www.nmfs.noaa.gov) for anadromous or marine species or FWS (www.fws.gov) for terrestrial or freshwater species.

- A. Check all boxes that apply. At least one box must be checked.
 - 1. Check this box if the treatment area is a canal, ditch, or other constructed conveyance system owned and controlled by Discharger. Print the name of the conveyance system.
 - 2. Check this box if the treatment area is a canal, ditch, or other constructed conveyance system owned and controlled by an entity other than the Discharger. Print the owner's name and names of the conveyance system.
 - 3. Check this box if the treatment area is not a constructed conveyance system (including application to river, lake, creek, stream, bay, or ocean) and enter the name(s) of the water body(s).

- B. List all Regional Water Board numbers where algacide and aquatic herbicide application is proposed. Regional Water Board boundaries are defined in section 13200 of the California Water Code. The boundaries can also be found on our website at http://www.waterboards.ca.gov/waterboards_map.shtml

Regional Water Board Numbers	Regional Water Board Names
1	North Coast
2	San Francisco Bay
3	Central Coast

Regional Water Board Numbers	Regional Water Board Names
4	Los Angeles
5	Central Valley (Includes Sacramento, Fresno, Redding Offices)
6	Lahontan (South Lake Tahoe, Victorville offices)
7	Colorado River Basin
8	Santa Ana
9	San Diego

Section V – Algaecide and Aquatic Herbicide Application Information

- A. List the appropriate target organism(s).
- B. List the name and active ingredients of each algaecide and aquatic herbicide to be used.
- C. List the start and end date of proposed aquatic algaecide and aquatic herbicide application event.
- D. List the name(s) and type(s) of adjuvants that will be used.

The Discharger must submit a new NOI if any information stated in this section will be changed. If the Discharger plans to use an algaecide and aquatic herbicide product not currently covered under its Notice of Applicability (NOA), and the algaecide and aquatic herbicide product may be discharged to a water of the United States as a result of algaecide and aquatic herbicide application, the Discharger must receive a revised NOA from the State Water Board’s Deputy Director of the Division of Water Quality before using that product.

Section VI – Aquatic Pesticide Application Plan

The Coalition or Discharger must prepare and complete an Aquatic Pesticide Application Plan (APAP). The minimum contents of APAP are specified in the permit under Section VIII.C, Limitations and Discharge Requirements, of the General Permit. The Discharger must ensure that its applicator is familiar with the APAP contents before algaecide and aquatic herbicide application.

If an APAP is not complete at the time of application, enter the date by which it will be completed.

Section VII – Notification

Indicate if you have notified potentially affected public and governmental agencies, as required under item VIII.B of the General Permit.

Section VIII – Fee

The amount of Annual fee shall be based on Category 3 discharge specified in section 2200(b)(9) of title 23, California Code of Regulations. Fee information can be found at http://www.waterboards.ca.gov/resources/fees/docs/fy1112fee_schdl_npdes_prmt.pdf.

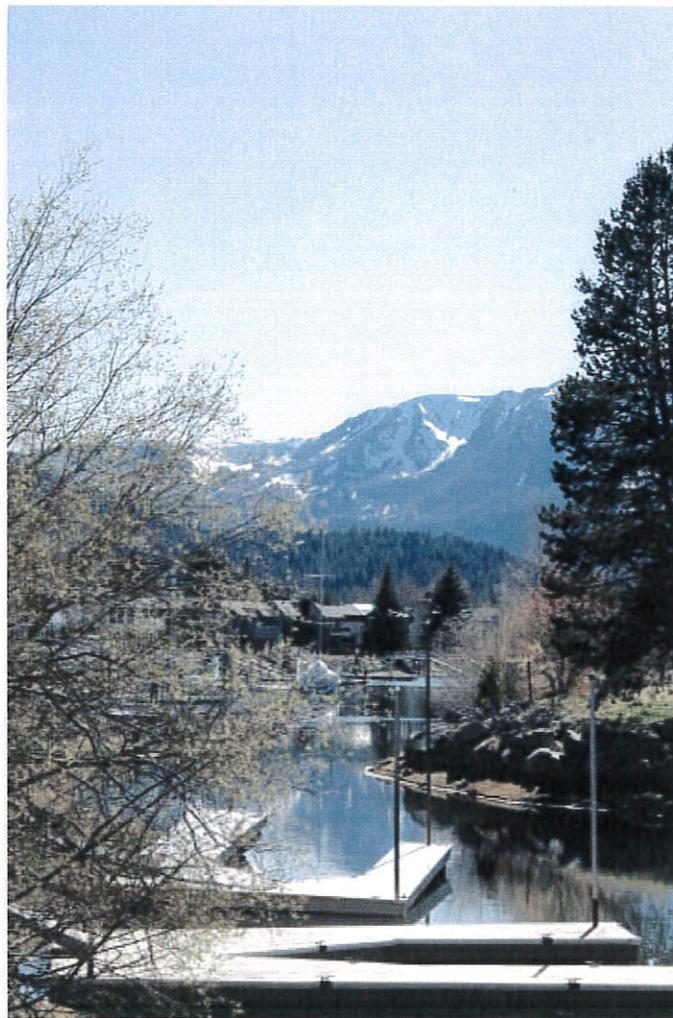
Check the YES box if you have included payment of the annual fee. Check the NO box if you have not included this payment. **NOTE:** You will be billed annually and payment is required to continue coverage.

Section IX- Certification

- A. Print the name of the appropriate official. The person who signs the NOI must meet the signatory and certification requirements stated in Attachment B Standard Provisions item V.B.
- B. The person whose name is printed above must sign and date the NOI.
- C. Enter the title of the person signing the NOI.

Aquatic Pesticide Application Plan

Application for Statewide General National Pollutant Discharge Elimination System Permit for Residual Aquatic Pesticide Discharges to Waters of the United States from Algae and Aquatic Weed Control at Tahoe Keys West Lagoon



Aquatic Pesticide Application Plan

Application for Statewide General National Pollutant
Discharge Elimination System Permit for Residual Aquatic
Pesticide Discharges to Waters of the United States from
Algae and Aquatic Weed Control at Tahoe Keys West
Lagoon

Submitted to



State Water Resources Control Board
Aquatic Pesticide NPDES Program
P.O. Box 100
Sacramento, CA 95812-0100

Submitted by



Tahoe Keys Property Owners Association
356 Ala Wai Blvd
South Lake Tahoe, CA 96150

Prepared by

Dr. Lars Anderson

In association with



Sierra Ecosystem
Associates

Table of Contents

1.0	Background Information	1
1.1	General State NPDES Permit.....	1
1.2	Lahonton Regional Water Quality Control Board (LRWQCB), Basin Plan Amendments.....	1
1.3	Aquatic Pesticide Application Plan (APAP).....	1
1.4	Description of the Tahoe Keys Lagoons	2
1.5	Beneficial Uses of the Tahoe Keys Lagoons	3
1.6	Conditions in the Tahoe Keys Lagoons	4
1.6	Aquatic plant control methods used now and in the past years	6
2.0	Description of the Treatment Site and Specific Treatment Areas	8
2.1	Scale of Specific Treatment Areas.....	8
2.2	Rationale and Basis for Site Selections	9
3.0	Description of Target Aquatic Plants to Be Controlled	11
3.1	Eurasian watermilfoil (<i>Myriophyllum spicatum</i>)	11
3.2	Curlyleaf Pondweed (<i>Potamogeton crispus</i> L.).....	12
3.3	Coontail (AKA "Hornwort") (<i>Ceratophyllum demersum</i>).....	13
4.0	Aquatic Herbicide Products Proposed for Use and Application Methods ..	15
4.1	Endothall (Aquathol K).....	17
4.2	Triclopyr (Renovate Liquid or OTF)	17
4.3	Penoxsulam (Galleon SC)	17
5.0	Rational and Justification for Conducting Demonstration Applications of Aquatic Herbicides for Aquatic Weed Management in the Tahoe Keys Lagoons	18
6.0	Containment and Contingency Control Structures Used to Control Movement to Receiving Waters	22
6.1	Pre-Herbicide Use of Impermeable Barriers	22
6.2	Contingency Monitoring and Mitigation of Potential Herbicide Residues .	22
6.3	Use of Rhodamine WT Dye to Provide Real-Time Movement Data	22
6.4	Herbicide Residue Monitoring	23
6.5	Use of Existing Well Water Carbon Filtration Systems	23
6.6	Use of Mobile Filtration System	23
6.7	Residue Breach Notification.....	23
7.0	Short term seasonal expectations	25

8.0	Description of the Monitoring Program.....	26
8.1	Data Collection	29
8.1.1	Plants	29
8.1.2	Herbicides	29
8.2	Monitoring Locations, Timing and Frequency	29
8.2.1	Plant Monitoring	29
8.2.2	Herbicides Monitoring	31
8.2.3	Sensitive Site Monitoring.....	32
8.3	In situ Measurements (Water Quality).....	32
8.4	Monitoring Records.....	32
9.0	Sample Methods and Guidelines (Preventing Sample Contamination).....	33
9.1	Sample Collection.....	33
9.2	Field Sampling Procedures.....	33
9.3	Sample Equipment Cleaning	33
9.4	Sample Preservation.....	33
9.5	Sample Packing and Shipping	34
9.6	Sample Preservation and Transportation.....	34
9.7	Chain of Custody (COC)	34
9.8	Field Sampling Kit (Water Samples for Herbicide Residues)	34
9.9	Laboratory Quality Assurance and Quality Control (QA/QC)	34
9.10	Reporting Procedures (Annual Reports) and Record Retaining	34
9.11	Emergency Situations (Exceeding/Locations of Residue; Spills)	35
9.12	Procedure to Prevent Sample Contaminations	35
10.0	Description of BMP's to be Implemented.....	36
10.1	Measures to Prevent Spills and Spill Containment in Event of Spill.....	36
10.1.1	Herbicide Mixing.....	36
10.1.2	Spills	36
10.2	Measures to Ensure Appropriate Use Rate	36
11.0	Examination of Possible Alternatives.....	38
11.1	No Action	38
11.2	Prevention and Use of Biological Control.....	38
11.3	Mechanical and Physical Methods.....	39

11.3.1 Harvesting	39
11.3.2 Diver-Assisted Hand Removal	39
11.3.3 Dredging and Removal of Plants and Spoils	39
11.3.4 Bottom Barriers	39
11.3.5 Rotovating	39
11.3.6 Dredging	39
11.4 Aquatic Herbicides	40
11.5 Use of the Least Intrusive Method of Aquatic Herbicide Application	40
11.6 Applying a Decision Matrix Concept to the Choice of Most Appropriate Formulation(s)	40
12.0 References	42

List of Figures

Figure 1. Overview of Tahoe Keys Lagoons 2
Figure 2. 2014 Occurrence and Density of Eurasian Watermilfoil in the Tahoe Keys Lagoons 5
Figure 3. 2015 Aquatic Plant Cover..... 6
Figure 4. Proposed Sites (Coves) for Use in Aquatic Herbicide Demonstration Herbicide Treatments 10
Figure 5. Life Cycles of Eurasian Watermilfoil and Curlyleaf Pondweed 14
Figure 6. Decision Criteria for Non-chemical Follow Up Actions 17
Figure 7. Summary of Herbicide Site Preparations, Containment and Contingency Plans 24
Figure 8. Proposed Monitoring Stations at Sites (Coves) for 2017 Demonstration Herbicide Application in the Tahoe Keys Lagoons 27
Figure 9. Contingency Herbicide Monitoring Sites and Tracks for 2018 Herbicide Demonstration Applications 28
Figure 10. Example of Plant Sampling Transects (Internal Lines) in Three of the Proposed Herbicide Treatment Sites 30
Figure 11. Example of Point Sampling for Plant Presence and Abundance 31

List of Tables

Table 1. Comparison of Environmental Conditions in Lake Tahoe and Tahoe Keys Lagoons 3
Table 2. Treatment sites and target weeds for herbicide demonstration study 8
Table 3. Proposed Demonstration Sites and Acreage..... 8
Table 4. Proposed Herbicide Products..... 15
Table 5. Proposed Demonstration Site Acreages, Herbicides, Application Rates (ppm), and Non-herbicide Follow-up Control Methods 16
Table 6. Comparison of Initial Herbicide (Applied) Concentrations with Potential Dilution/Dispersal Concentrations Based on “Available” Untreated Water Volumes (acre ft.) 41

List of Appendices

Attachment A: Overview (Vicinity) and Treatment Site Map
Attachment B: Pesticide (Herbicide) Application Log
Attachment C: Receiving Water Visual Observations Form
Attachment D: Receiving Water Physical Quality Form
Attachment E: Chain of Custody Form
Attachment F: Sample Bottle Label

1.0 BACKGROUND INFORMATION

1.1 General State NPDES Permit

The California State Water Resources Control Board on March 5, 2013 adopted a Statewide General National Pollution Discharge Elimination Systems (NPDES) Permit for Residual Aquatic Pesticide Discharges to Water of the United States from Algae and Aquatic Weed Control Applications (Permit). The General Permit also identifies registered aquatic herbicides that may be used with an approved Permit. The NPDES Permit requires that dischargers seeking permit coverage submit an Aquatic Pesticide Application Plan (APAP) with the permit application package to the State Water Resources Control Board (Section II.C.3. Permit Coverage and Application Requirements, General Permit Application). When the application package and APAP are deemed complete, the Deputy Director of the Water Board will issue a Notice of Applicability allowing the discharger to apply aquatic pesticides in accordance with the requirements of the permit.

1.2 Lahontan Regional Water Quality Control Board (LRWQCB), Basin Plan Amendments

Notwithstanding the widespread issuance and use of General NPDES permit for applications of aquatic herbicides and algaecides throughout California via other Regional Water Quality Control Boards since 2001, the Basin Plan for the Lahontan Regional Water Quality Control Board prohibits the introduction of contaminants (including pesticides) in waters of Lake Tahoe at detectable levels. However, in 2014, an amendment to this Basin Plan was approved by both the LRWQCB and the State Water Resources Control Board which provides criteria and procedures to apply for an exemption to the Basin Plan prohibition of introducing aquatic pesticides into Lake Tahoe waters. The Basin Plan Amendment has subsequently been approved by the US Environmental Protection Agency.

In order to apply aquatic herbicides in the Tahoe Keys lagoons, the criteria stated in the "Exemption to the Basin Plan" must be met, and an approval must be obtained by the LRWQCB. The issuance of an NPDES permit alone does not fulfill the regulatory requirements under the LRWQCB Basin Plan amendment, and thus the NPDES alone does not provide approval, in and of itself, to apply aquatic herbicides to the Tahoe Keys lagoons. However, the NPDES (with APAP) is required as part of the overall process for obtaining an exemption under the Basin Plan Amendment.

1.3 Aquatic Pesticide Application Plan (APAP)

This APAP directly addresses both the requirement under the NPDES approval process and the relevant Basin Plan Amendment exemption conditions and criteria for use of aquatic herbicides and is a comprehensive description of proposed use of EPA and CalEPA/DPR registered aquatic herbicides in selected, small scale demonstration sites within the Tahoe Keys West Lagoon (also known as Main Lagoon). The APAP describes

the project site, the treatment site, specific areas where aquatic herbicides will be applied, the aquatic plants targeted for control, aquatic herbicides proposed to be used and associated comprehensive monitoring program, best management practices (BMPs) and contingency plans to protect Lake Tahoe in order to meet and comply with the conditions of the General Permit, Section VII, Aquatic Pesticide Use Requirements, Aquatic Pesticide Application Plan. Only those herbicides currently approved within the General Permit are considered for use.

1.4 Description of the Tahoe Keys Lagoons

The Tahoe Keys is a multi-use development situated at the southern end of Lake Tahoe on approximately 372 acres of land. The development includes 1,529 homes and townhomes, marinas, and a commercial center. There are three primary man-made water features in the Tahoe Keys: the Main Lagoon, the Marina Lagoon, and Lake Tallac Lagoon. These three water features are considered the Tahoe Keys lagoons, referred to throughout this APAP. (Figure 1).

Figure 1. Overview of Tahoe Keys Lagoons



Note narrow connections to Lake Tahoe proper: West and East channels

The surface area of the water of the Tahoe Keys lagoons are approximately 172 acres in size, or 0.3 square miles, a very small percentage of the surface area of Lake Tahoe, which is approximately 192 square miles. The Tahoe Keys lagoons have two narrow, direct connections to Lake Tahoe: the West Channel connects the Main Lagoon and the East Channel connects the Marina Lagoon. These channels provide the only direct boat access to Lake Tahoe from the Tahoe Keys lagoons. Lake Tallac Lagoon is connected to the Main Lagoon by a dam between the two water bodies. The west end of Lake Tallac

Lagoon also has an intermittent connection to Lake Tahoe via Pope Marsh during high water events.

The Tahoe Keys lagoons differ from Lake Tahoe in several ways (Table 1). The Tahoe Keys lagoons have shallow waters, approximately 20 to 30 feet at maximum depth with an average depth of 12 feet. Lake Tahoe is 1,645 feet at the deepest point with an average depth of 1,000 feet. The waters of the Tahoe Keys lagoons are typically warmer than the water of Lake Tahoe during the spring and summer months, but can be cooler during the fall and winter months. Typically, much of the Tahoe Keys lagoons are frozen for several months in the winter whereas Lake Tahoe never freezes but the shallow shorelines have some accumulated ice cover. The waters of the Tahoe Keys lagoons are typically more turbid than the clear waters for which Lake Tahoe is famous. Lastly, the bottom layer of the Tahoe Keys lagoons is composed of fine sediments, a remnant of the past when the area was a marsh coupled with decades of accumulated organic matter from aquatic plant growth and decay due to seasonal senescence. This is in contrast to the coarse, decomposed granite and rocky areas often found at the near-shore and bottom of Lake Tahoe.

Table 1. Comparison of Environmental Conditions in Lake Tahoe and Tahoe Keys Lagoons

	Tahoe Keys Lagoons	Lake Tahoe
Mean Depth	10-12 ft	1,000 ft
Summer Temps	18-27C	15-18C
Volume (gal)	49 x 10 ⁷	29x10 ¹² (10 ⁵ th more!)
Sediments	Unconsolidated organic matter	Sand, rock with far less OM, highly variable
Light Field	10-15ft	60-70ft
Shoreline energy	Low, protected	High, unprotected
Bathymetry	Highly uniform	Extremely variable
Circulation	Restricted, "dead ends"	Unrestricted, dynamic
Nutrients	Moderate (N, P)	Ultra-low, N, P
Water inputs	2 channels (+runoff)	63 creek/river inputs
Wind fetch	Short, 0.4 miles	12-22 miles
Plant Habitat	Entire Keys (95%)	Limited by energy, substrate
Water quality	High variable	Highly uniform
Urban Connectivity	Highly Concentrated	Diffuse and Patchy

1.5 Beneficial Uses of the Tahoe Keys Lagoons

The Tahoe Keys lagoons provide boating access to Lake Tahoe via the East Channel in the Marina Lagoon and via the West Channel in the Main Lagoon. The waters of the Tahoe Keys Lagoons are used by the residents and visitors to the area for recreational boating, both by power boating and non-motorized boating and for recreational fishing. The aesthetic values of the Tahoe Keys lagoons include the waterways and views of the surrounding mountains and Lake Tahoe, which are key attractions for residents and visitors alike.

The Main Lagoon of the Tahoe Keys contains the majority of private residences in the overall development and has many interconnected waterways and coves. The Main Lagoon is controlled by 700 individual private property owners who belong to the Tahoe

Keys Property Owners Association (TKPOA). The TKPOA itself also has an ownership interest in the Main Lagoon.

The Marina Lagoon contains both residences and commercial space. This is the location of the Tahoe Keys Marina which is a separate entity from the TKPOA. It is a privately owned and operated boat launching facility which is the largest full-service marina at Lake Tahoe. The Tahoe Keys Marina provides boat services, fueling, mooring, boat storage, and launching services to the general public, Tahoe Keys property owners and renters, boat rental and charter and other recreational companies, marine construction companies, law enforcement, and agencies and universities for research activities on Lake Tahoe.

The three water bodies of the Tahoe Keys lagoons each have a connection to Lake Tahoe. The Main Lagoon has smaller lagoons and coves with residential docks and is connected to Lake Tahoe by the West Channel. The Tahoe Keys Marina Lagoon is connected to Lake Tahoe via the East Channel. Lake Tallac Lagoon normally discharges into Pope Marsh but also can drain into the Main Lagoon when gates located under Venice Drive are opened during flood conditions in Lake Tallac Lagoon.

1.6 Conditions in the Tahoe Keys Lagoons

The Tahoe Keys and Keys Marina were constructed in the 1960s on the Upper Truckee River Marsh by excavating the lagoons and capping the soil with sand to form stable building bases. In conjunction with construction of the Tahoe Keys, the Upper Truckee River was diverted to a channel on the east side of the Tahoe Keys Marina (USGS 2000).

Due to successive introduction, establishment and spread of non-native invasive aquatic plants, fish and invertebrates over the past 35 years, and the resultant impacts on water quality and ecosystem services, many of the intended beneficial uses of the lagoons described above are severely impaired. The current abundant growth of non-native plants provides habitat for non-native warm water fish and drive excessive variations in pH, DO and temperature. The excessive plant growth also contributes to sediment loading and provides sources of continuing infestations in Lake Tahoe near shore areas.

Recent aquatic plant surveys (2014, 2015) show the extent and density of excessive plant growth in the Tahoe Keys lagoons (Figures 2 and 3). In recent years, 85% to 90% of the available wetted surface in the lagoons are infested with invasive and nuisance aquatic plants. These conditions have persisted for decades, in spite of seasonal harvesting that has been the main weed control practice since the mid- 1980's. It is clear that continued reliance almost exclusively on harvesting operations will not provide sustainable improvements in aquatic plant management nor will it reduce the threat from the spread of viable plant fragments to near shore areas outside the Keys lagoons.

Although Eurasian watermilfoil and coontail have been the dominant weedy species since the 1980's, in 2003 a new non-native plant, curlyleaf pondweed, was found in the West and East Channels. This species has continued to spread within the Keys lagoons and

has expanded its presence along the south shore to State Line including areas in and offshore of the Ski Run Marina.

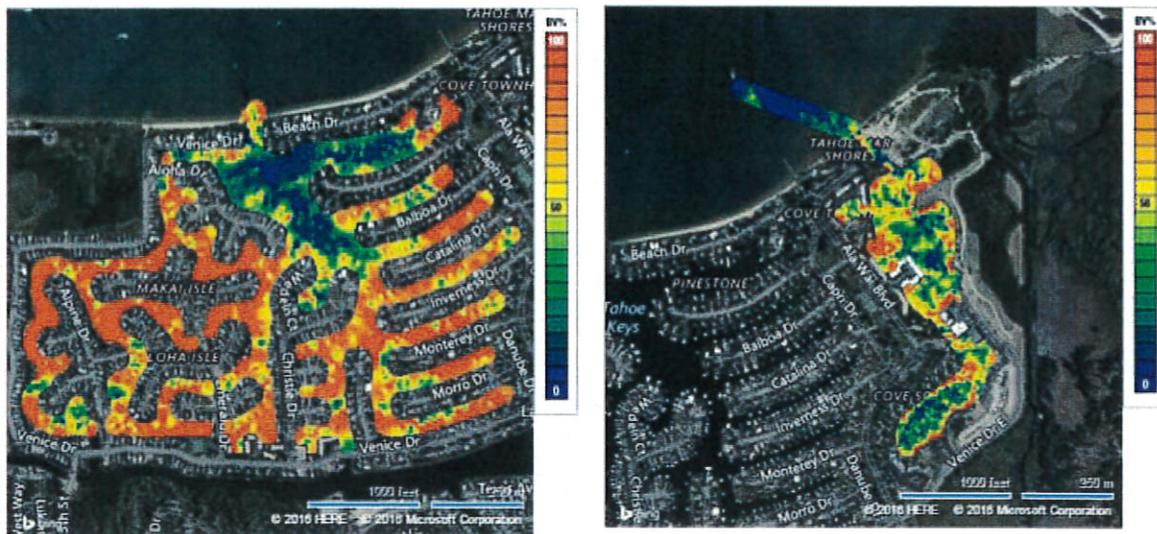
The continued presence of excessive aquatic plant weedy growth in the Keys lagoons is due to several environmental conditions including nutrient rich sediment, stable, protected water with low energy (little wave action), shallow water that provides sufficient light and warms quickly in spring. This excessive growth, which persists throughout the summer during the period of high vessel traffic, will continue to threaten Lake Tahoe habitat unless improved management methods are employed.

Figure 2. 2014 Occurrence and Density of Eurasian Watermilfoil in the Tahoe Keys Lagoons



*Red color indicates areas with 100 % Eurasian watermilfoil cover.

Figure 3. 2015 Aquatic Plant Cover



A. Main Lagoon

B. Marina Lagoon

1.6 Aquatic plant control methods used now and in the past years

The prohibition on the use of aquatic herbicides in the Tahoe Keys necessitated the use of alternative (non-chemical) methods over the past 35 years. From the 1980's until 2011 the only management method routinely used was (and still is) diesel powered mechanical aquatic plant harvesters coupled with on-shore removal. Each growing season for 4 to 5 months, 4 to 5 harvesters cut the tops of the plants (canopy) down to about 5 to 6 feet deep and collect the bulk of the cut materials on an on-board conveyor system. Cut plants are then transferred to shore-based trailers that transport the cut plants to a drying location before being transported to a compost site outside the Tahoe Basin. During the past 30 years, there has been a trend toward increasing mass of harvested weeds. Current harvests total over 10,000 cubic yards annually.

Harvesters have other limitations and constraints in addition to inefficiency in sustaining control and producing plant fragments. The machines cutting heads are too large to access shallow nursery areas behind docks and near-shore structures, nor can they access areas immediately adjacent to or beneath birthed boats that are tied to docks. Since many coves and open water areas within the lagoons are over 10 feet deep, the harvesters leave rooted plants intact which readily re-grow in a week or two. With these limitations, the harvesters probably only remove 50-60% of plant biomass in areas where they can operate. The net result is only partially, temporarily cleared sites while new plant growth is stimulated by the cutting actions of the harvesters. In addition, fish, and many invertebrates are physically killed or removed along with the plants during harvesting operations.

Even where harvesting operations are effective in clearing navigation zones, this action produces many thousands of plant fragments per harvested acre. A study conducted in 2014 documented from 2,500 to 4,000 fragments per harvested acre and the size

distribution that ranged from a few cm in shoot fragments to over a meter in many sites. For Eurasian watermilfoil and coontail, even fragments as small as 2 to 4 cm are viable and can propagate new infestations either in the Keys lagoons or in Lake Tahoe near shore areas.

Lastly, harvesting action is non-selective: both the targeted non-native and desirable native plants are removed. Therefore, this method is not compatible with the goal of encouraging growth and spread of desirable native plants, which can serve as suitable habitat for native fish and invertebrates.

Since 2012, other types of non-chemical methods have been attempted in small, typically shallow areas within the Tahoe Keys lagoons including hand removal, bottom barriers (both synthetic and natural fiber "jute"), and occasional dredging in the West and East Channels. It should be noted that in 2015, in preparations for dredging the West Channel to improve navigation, aquatic plants were removed. Within one season, plants had become re-established, including Eurasian watermilfoil and curlyleaf pondweed.

None of these physical or mechanical methods provided lasting weed management for more than one season at most and none were deemed feasible when considering the expansive of infested areas (about 160-170 acres) within the Tahoe Keys lagoons, nor were they deemed sufficient to meet the goals of the Integrated Management Plan (IMP).

In addition to feasibility and sustainability of methods, the constraints and associated risks to non-target species, negative impacts on water quality and potential impairment of beneficial species habitat from using only "alternative" large or small scale physical or mechanical removal methods arise from several concerns: 1) turbidity generated by physical disturbance of sediment which impedes visibility for divers and any hand removal efforts or dredging operations; 2) production of viable fragments that can be transported by vessels or wind; 3) extreme density and bulk of weeds which greatly impairs diver-assisted hand removal efficiency; 4) sediment bulk density and associated water management needed for large scale dredging; 5) hazardous conditions for divers due to high level of boat traffic; 6) transport and disposal of plant (and sediment) material; 7) increased carbon footprint and related air quality impacts from use of multiple diesel and gasoline powered equipment. While some alternative methods can be very effective in small, relatively isolated areas, their deployment as a sole means of management in the extensive and heavily vegetated Tahoe Keys lagoons is neither feasible nor effective in meeting the IMP goals and has unacceptable associated risks to the environment, non-target species and to Lake Tahoe.

For addition information on alternative methods considered please see Section 11: Examination of Possible Alternatives.

2.0 DESCRIPTION OF THE TREATMENT SITE AND SPECIFIC TREATMENT AREAS

The treatment site is the Tahoe Keys lagoon system. This site defines the treatment zone of potential aquatic herbicide movement. Lake Tahoe is not considered part of the treatment site as movement of applied aquatic herbicides into Lake Tahoe will be prevented by the following actions (see Figure 7 for summary of site preparation, monitoring, and containment actions):

- a) use of “dead-end” coves where water movement is stable for several weeks
- b) deployment of impermeable “bladder barrier” or other type at entrance to the West Channel
- c) extensive monitoring for herbicides and real-time tracking of RWT dye as a surrogate for dissolved herbicides

2.1 Scale of Specific Treatment Areas

Although over 90% of the 170 acre Tahoe Keys lagoons support dense growth of non-native and nuisance aquatic plants, this APAP describes intended applications of aquatic herbicides in 2018 to demonstrate efficacy and compatibility with beneficial uses in a total of 13.7 acres comprised of several small coves. The target plants within the coves are shown in Table 2.

The location of the sites listed in Table 3 are shown in Figure 4. The total area proposed for this demonstration study is approximately 8% of the total 172 acres within the Tahoe Keys lagoons (see Table 3 for individual site acreages).

Table 2. Treatment sites and target weeds for herbicide demonstration study

Water Body	Target Plants
Tahoe Keys lagoons. Nine separate sites (see site details in Figure 4)	Eurasian watermilfoil (<i>Myriophyllum spicatum</i>) Curlyleaf pondweed (<i>Potamogeton crispus</i>) Coontail (<i>Ceratophyllum demersum</i>)

Table 3. Proposed Demonstration Sites and Acreage

Site	Location	Size (acres)
1	Main Lagoon-Dead end	1.5
2	Main Lagoon-Dead end	1.35
3	Main Lagoon-Dead end	1.3
4	Main Lagoon-Dead end	1.45
5	Main Lagoon-Dead end	2.2
6	Main Lagoon-Dead end	1.25
7	Main Lagoon-Dead end	1.62
8	Main Lagoon-partial Dead end	1.5
9	Main Lagoon-Dead end	1.5

2.2 Rationale and Basis for Site Selections

Each site shown in Figure 4 has been selected to represent typical aquatic plant species distribution based on historic sampling and surveys, and each site is a “dead-end” cove which minimizes potential movement of herbicide toward untreated areas and provides maximum distances to the West channel. In order to obtain scientifically valid data on the herbicide efficacy and non-target effects of the treatments, each type of herbicide product must be applied to three similar sites (e.g. coves). To properly replicate herbicide treatments (three replicate sites per herbicide) for three products, a total of 9 (nine) sites are needed. Furthermore, the minimum size (area) for each site is 1.0 acre in order to encompass sufficient plant diversity and to allow for diffusion of the active ingredients. The minimum scale per site (1 acre) is based on the following criteria:

- a) Need to encompass typical plant species distribution including target species and desirable, native plants.
- b) Sufficient volume to expose target plants to a small, but operational use of the herbicides. Smaller sites (and volumes) often result in too rapid dilution of herbicides and would not represent conditions under which they would be recommended for use.
- c) Sufficient size and depth variations to assess effects of herbicides on water quality such as dissolved oxygen, pH, temperature, and turbidity. Since these parameters vary with depth in normal conditions, sites need to encompass typical bathymetric conditions in the Keys lagoons.
- d) In order to obtain similar conditions in replicate treatments sites, they need to be sufficiently large to minimize unusual conditions that may occur in 500 or 1000 square ft. In other words, an acre (= 43,560 sq.ft.) typically encompasses variations in common with other sites of similar size in the Keys lagoons.

There are nine (9) sites proposed for herbicide applications: 3 sites will be assigned to each herbicide providing replications needed for proper statistical analysis. In addition, three other sites are assigned as untreated “control” sites. The control sites provide reference conditions by which the responses to the herbicides can be measured and quantified. The herbicide to be used in each cove will be determined following aquatic plant surveys conducted in May 2018 but will be limited to those described in Section 4. The individual sites (coves) range from 1.3 to 2.2 acres. Water depths vary with seasonal snow pack and runoff; however typical depths during late May to early June range from 8 to 12 feet. Water depth and total water volume in each cove will be determined 10 days prior to herbicide application since rates of use depend upon total volume of water in the treated sites.

Figure 4. Proposed Sites (Coves) for Use in Aquatic Herbicide Demonstration Herbicide Treatments



Sites: 1 to 9 are herbicide application sites. Sites A-C are untreated "control" sites.

3.0 DESCRIPTION OF TARGET AQUATIC PLANTS TO BE CONTROLLED

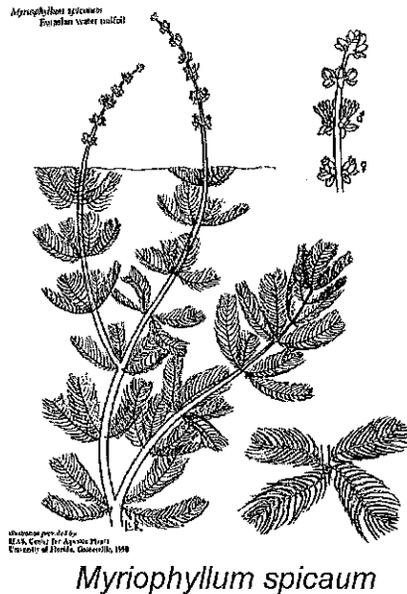
The following subsections describe the target plant species and their typical mode of reproduction and dispersal.

3.1 Eurasian watermilfoil (*Myriophyllum spicatum*)

Eurasian watermilfoil (*Myriophyllum spicatum* L.) is the most widespread aquatic nuisance plant in the United States. The plant can form a dense canopy at the surface of the water, out-competing other aquatic plants. Heavy infestations can lead to decreased levels of dissolved oxygen under the canopy and changes in pH, both of which can alter aquatic ecosystems by decreasing native species diversity.

Eurasian watermilfoil is an evergreen perennial plant which roots in sediment and grows completely underwater, typically at 15-foot depth but has been found as deep as 30 feet. The leaves are pinnately compound with 14 to 24 pairs of leaflets in groups of four at each stem node. Flowers form on short stems above the water surface and flowers produce up to four nutlets or seeds each. Eurasian watermilfoil can form numerous viable seeds which can disperse readily and can spread by forming new root crowns from rhizomes growing in the sediment.

Eurasian watermilfoil is very similar in appearance to the native aquatic species, northern watermilfoil (*M. sibiricum*) and hybridization between the two species can occur. Both species spread readily by stem fragments formed naturally by abscission from the main plant or by breakage caused by wave action or feeding by waterfowl. These species can travel in boat ballasts but introduction through the aquarium trade is also a contributor to its spread.

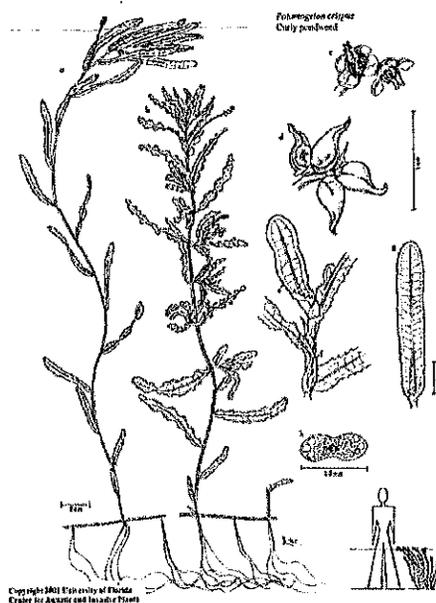


3.2 Curlyleaf Pondweed (*Potamogeton crispus* L.)

Curlyleaf pondweed (*Potamogeton crispus* L.) is found in all of the lower 48 states and is considered naturalized throughout this range. Curlyleaf pondweed is a rooted perennial with a fast growth rate. The plant stem is very thin and long and can entrap swimmers. Curlyleaf pondweed aggressively out-competes native submerged vegetation. The plant has wavy-edged leaves which are green early in the growing season and turn red at the water surface. The leaves are oblong, one to three inches long, and are in an alternate arrangement along the stem. Curlyleaf pondweed typically is found in more shallow waters at three to six feet depth but can be found in clear waters as deep as 20 feet.

Curlyleaf pondweed reproduces primarily by turions and rhizomes but can also spread by stem fragments or seeds. Turions are modified reproductive buds that form prior to plant senescence in early summer. Seed germination rates are low for this species. This species can overwinter with some green growth remaining above the sediment, thus giving these plants an advantage when temperatures rise and growth resumes in the spring. The spread is attributed to boating and fish hatchery activity (Stuckey 1979).

Curlyleaf pondweed forms dense mats at the water's surface which inhibits navigation and recreation. The dense mats limit light from reaching native vegetation and can inhibit oxygen exchange along the water column. These conditions reduce the populations of fish or aquatic invertebrates and can create conditions that promote mosquito habitat by removing predators and obstructing water flow.



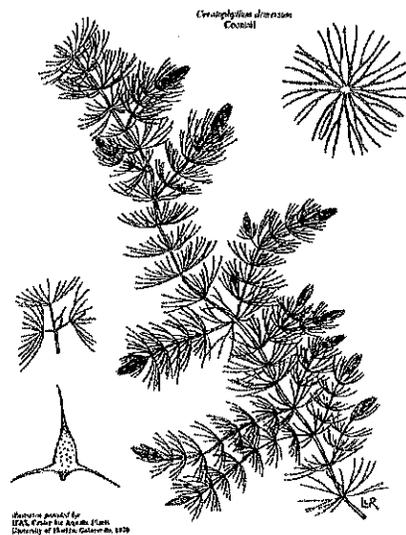
Potamogeton crispus

3.3 Coontail (AKA "Hornwort") (*Ceratophyllum demersum*)

Coontail (*Ceratophyllum demersum*) is a native aquatic plant that is found nearly world-wide and throughout California up to 6,500 feet in elevation. In natural areas, coontail is considered beneficial and provides food and shelter to other aquatic species. However, it can develop very dense mats which inhibit water flow, interfere with recreation, and promote mosquito habitat.

Coontail is a submersed plant that lacks true roots. It can exist as a free-floating plant or it can form modified stems and anchor itself to other aquatic plants. Young plants readily detach from soil.

Coontail plants have slender stems with single branches at nodes. The leaves are dark green, forked, with small-toothed margins. Coontail reproduces vegetatively, by stem fragments and turions, and by seed, although in cold water, plants produce few to no seeds (DiTomaso 2003).



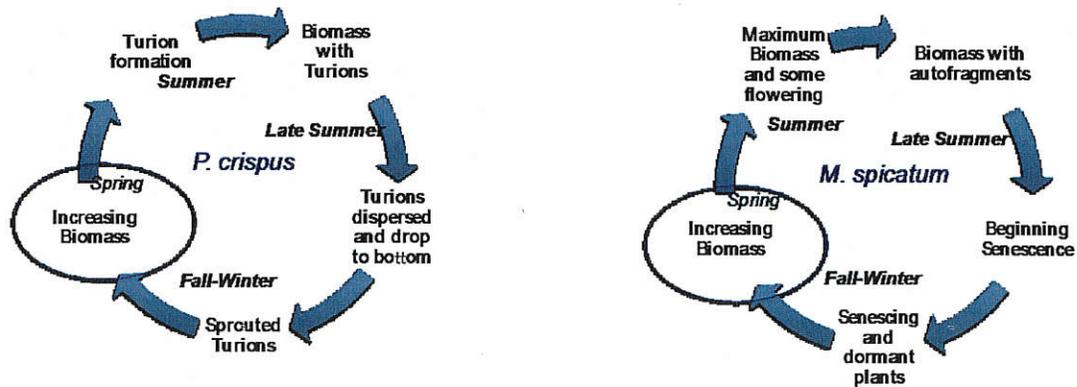
Ceratophyllum demersum

The life cycles of the three target plants differ in important ways and these differences can affect the strategies for management. All three plants undergo rapid growth in early to late spring when water temperatures exceed 12°C. All three species can form new plant colonies from vegetative fragments although Eurasian watermilfoil and coontail more readily proliferate from fragments as small as a few cm in length.

All three can form fruits with seeds but even though their germination is generally limited, the seed is long-lived. This means that a "seed bank" may persist for many years.

Curlyleaf pondweed's ability to form dispersive, vegetative structures called "turions" in spring provide the plant with a very effective dispersal mechanism during summer. A single shoot can form dozens of turions during spring and early summer. The turions typically sprout in early fall, root on the bottom and are ready for rapid growth the next spring. (See Fig. 5)

Figure 5. Life Cycles of Eurasian Watermilfoil and Curlyleaf Pondweed



For both species, one of the most effective times for herbicide application is spring which can stop biomass production and also prevent the production of turions in curlyleaf pondweed.

4.0 AQUATIC HERBICIDE PRODUCTS PROPOSED FOR USE AND APPLICATION METHODS

Aquatic herbicides have been used effectively and safely in United States, including California, for over 45 years to control and manage aquatic weeds in lakes, rivers, ponds, aquaculture production systems and irrigation systems. The use of aquatic herbicides is regulated by the US Environmental Protection Agency and by individual states such as the California Department of Environmental Protection's Department of Pesticide Regulation (CAL-EPA/DPR). Only those aquatic herbicide products that have been reviewed extensively by US EPA and CalEPA/DPR and have received a "registration" (i.e. approved) are allowed to be applied to, or in, water to control aquatic weeds.

The uses, approved sites, methods of applications, limitations and restrictions of use, and the targeted aquatic weeds of aquatic herbicides are specified by each product's labeling. Any uses must comply with the approved label. This includes appropriate rate (concentration) of use, proper methods of application, proper equipment, protective clothing and proper disposal of product containers after use. Labeling also provides specific limitations and compliance actions regarding uses in or on potable water, water used for irrigation, swimming, or fishing. Most products must be applied only by a Certified Applicator (e.g. California Certified Applicator) and with an approved NPDES permit.

The aquatic herbicide products proposed for use in this APAP are fully registered (approved) by USEPA and CalEPA/DPR and are included in the General NPDES (Permit) for Aquatic Pesticide Applications. Table 4 lists the aquatic herbicide proposed for use in the Tahoe Keys lagoons for the demonstration applications.

Table 4. Proposed Herbicide Products

Herbicide Active Ingredient (Product name)	EPA Reg. No. (All on Calif. General NPDES Permit)	Maximum allowable (ppm)	Proposed Use (ppm)	Application Method (s)	Target Plants Controlled product labeling
Endothall (Aquathol K) Contact type	EPA Reg. No. 70506-176	5.0	2.0	Drop hoses	Eurasian watermilfoil Coontail Curlyleaf pondweed
Triclopyr (Renovate liquid or OTF granular) Systemic type	EPA Reg. No. 67690-42	2.5	1.0	Drop hoses or granular spreader for OTF formulation	Eurasian watermilfoil
Penoxsulam (Galleon SC) Systemic type	EPA Reg. No. 67690-47	0.1	0.02	Drop hoses	Eurasian watermilfoil Curlyleaf pondweed

*No Adjuvants will be used. Products are approved for use under the General NPDES permit in California

Table 5. Proposed Demonstration Site Acreages, Herbicides, Application Rates (ppm), and Non-Herbicide Follow-up Control Methods

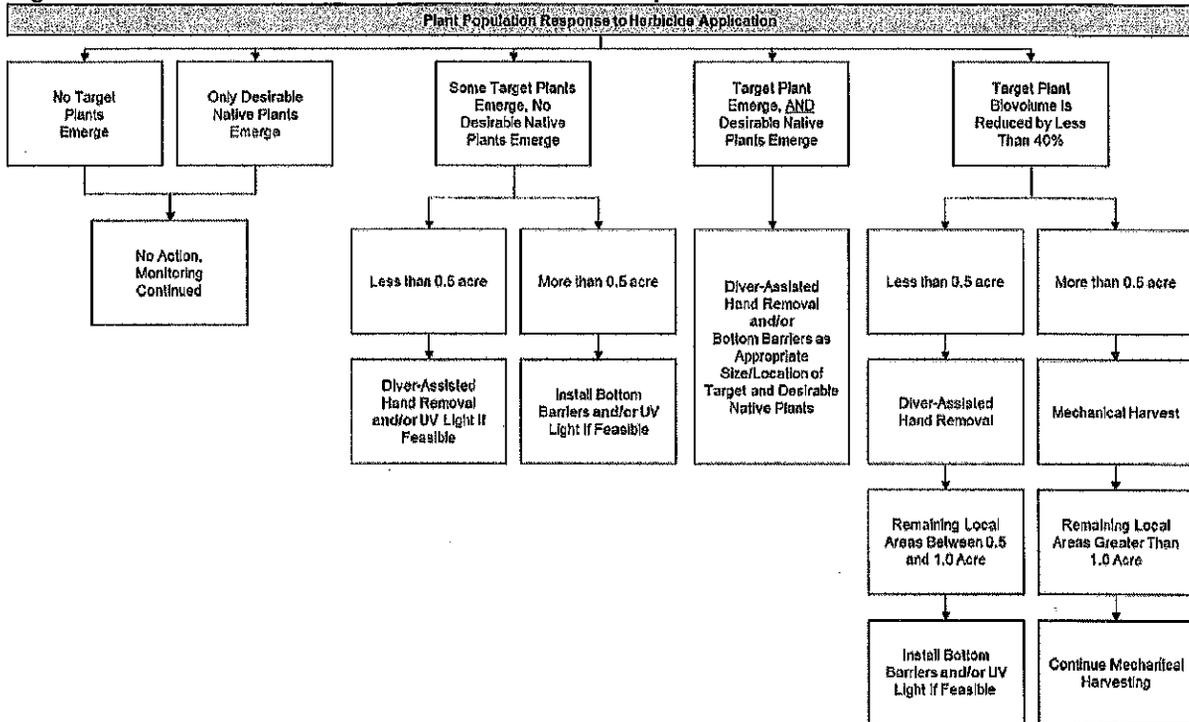
Sites	1	2	3	4	5	6	7	8	9	Total acres
Acres	1.5	1.35	1.3	1.45	2.2	1.25	1.62	1.5	1.5	13.67
Herbicides:										
Endothall	2.0							2.0	2.0	4.5
+bottom barrier	X							X	X	
+hand removal	X							X	X	
Triclopyr		1.0		1.0		1.0				4.05
+bottom barrier		X		X		X				
+hand removal		X		X		X				
Penoxsulam			0.02		0.02		0.02			5.12
+bottom barrier			X		X		X			
+hand removal			X		X		X			

Since each application site is small (<3 acres), liquid formulations will be applied from a boat-mounted tank mix system with direct pumping into drop hoses that place the herbicide from mid-depth to the bottom (Table 4). Granular formulations will be applied either by small powered granular spreader, or a powered air-stream (blower) spreader connected to a bow-mounted hopper system. These systems are commonly used and readily available commercially. All systems are calibrated using water (for liquid formulations) or “blank” granules for granular (pelletized) formulations.

Integration and use of follow-up non-herbicide methods. As part of the herbicide demonstration and efficacy monitoring, alternative sequential management actions may be taken based on the results of plant biovolume and abundance monitoring. Figure 6 summarizes the options and the criteria for deploying each option, or for “no action”. This assessment will be made for each of the 9 herbicide application sites since responses may differ due to difference in the herbicide modes of action and plant species distributions.

Decision for use of specific non-herbicide follow up methods will be driven by assessment of control (reduction) of target plants and response(s) of desirable, native plants.

Figure 6. Decision Criteria for Non-Chemical Follow Up Actions



4.1 Endothall (Aquathol K)

Endothall is rapid-acting, contact type herbicide applied as a liquid formulation directly to aquatic weed stands. It typically requires a contact time of 12 to 24 hours at 4 to 2 ppm, respectively for control of the target plants. It has some selectivity and has little effect on *Elodea* spp. at normal applications rates of 1-3 ppm. It's residue in water is readily determined through sampling and immunoassays with results available usually in real-time for moderate (application) levels to 24 to 48 hours for low level detection.

4.2 Triclopyr (Renovate Liquid or OTF)

Triclopyr is a systemic, selective herbicide that is either applied as a liquid or a solid (OTF). It is relatively fast acting (2 to 5 days) at concentrations of 0.5- 2.5 for selective control of Eurasian watermilfoil. It has little to no effect on pondweeds, coontail or *Elodea* spp so it is useful in "releasing" native pondweeds and *Elodea* spp. It is readily monitored through water sampling and immunoassays which can provide results in 24 to 48 hours after samples are taken.

4.3 Penoxsulam (Galleon SC)

Penoxsulam is a systemic, slow-acting herbicide that is generally applied as a liquid directed to or in water, or it can be used as a "draw-down" application on exposed canal or lake bottom. It is most effective when applied in spring when it can prevent early growth and prevent formation of flowers and turions (e.g. in curlyleaf pondweed).

5.0 RATIONAL AND JUSTIFICATION FOR CONDUCTING DEMONSTRATION APPLICATIONS OF AQUATIC HERBICIDES FOR AQUATIC WEED MANAGEMENT IN THE TAHOE KEYS LAGOONS

The premise for initiating the proposed aquatic herbicide demonstration study is that over the past 30 years, during which no herbicides have been allowed in the Tahoe Keys lagoons, there has been no significant progress or improvement in sustainable management of the excessive aquatic plant growth. In fact, the long-term records of harvesting actions show that the problem has increased over the past several decades in spite of increased harvesting and in spite of attempts to apply other "non-chemical" methods such as bottom barriers and localized hand removal and even larger scale dredging in the West and East channels. The general conditions of the lagoons provide ideal habitat for prolific plant growth with abundant light, nutrients in the sediment, and near-optimal water temperatures for most of the summer months.

Furthermore, continuation of the *status quo* will not reduce the risk of plant fragment production, dispersal and spread of invasive aquatic plants into Lake Tahoe proper. There is abundant evidence that this has already begun with the continuing spread of curlyleaf pondweed within in the Tahoe Keys lagoons *and* in Lake Tahoe.

The alternative methods reviewed and/or attempted are provide here with summaries of their feasibility, efficacy and practical use and limitations.

- a) The use of bottom barriers has produced inconsistent, expensive, and temporary efficacy and this is a non-selective method since both invasive and native beneficial plants are covered. This method is also problematic due to high boat traffic and limited areas of practical use. It may have useful applications in small areas and in areas where successful use of aquatic herbicides has reduced biomass sufficiently.
- b) The use of hand pulling and/or diver assisted suction removal has most applicability in small, shallow infestations (e.g. under 1 acre) **and** primarily in low plant density (low biomass) conditions. Until and unless other methods are used to reduce the high density and biomass within the Keys lagoons, this method has limited practicality in the 150+ infested acres of the Keys lagoon systems. Note: Once herbicide applications have reduced biomass sufficiently, then this method could be very useful if employed regularly and with proper timing.
- c) Dredging (sediment and associated plant removal) has been used in the following sites in the Tahoe Keys lagoons and other near-shore marinas at Lake Tahoe: Tahoe Keys channels, Elk Point Marina, Fleur de lac, Ski Run. In none of these operations did sustained management or reduction of aquatic plant biomass persist for more than a few to several months. For example, aquatic plants returned to the West and East Channels within 6 months following dredging operations. At Elk Point Marina, populations of invasive Eurasian water milfoil and native Elodea recolonized the entire marine within one year. Furthermore, Elk

Point Marina now supports new populations of invasive curlyleaf pondweed for the first time, as of July, 2016), a year after dredging operations. Therefore, the actual, local experiences with dredging have been unsuccessful in providing more than a few months relief from the negative impacts of aquatic weeds and at each site, unacceptable levels of aquatic weeds still persisted within one season or less. These examples include scales of only a few acres in relatively confined sites and yet still did not provide sustainable management. Therefore, it is unreasonable to assume that applying dredging operations to a far more diffuse and widespread scale of the Tahoe Keys Main lagoon would result in improved, sustained aquatic weed management. Furthermore, the complexity and extent of physical structures (piers, pipes, bulkheads) within the Tahoe Keys lagoon systems presents serious hazards and risks for dredging operations as well as infrastructural components.

- d) Mechanical rotovating produces thousands of viable fragments that must be thoroughly collected so they do not spread. In the process, rotovating also destroys the integrity of the benthic habitat to depths of 10 to 15 inches because the rotating tines physically tear up the sediment to those depths. This benthic sediment layer provides essential habitats for invertebrates, microbial populations and supports the growth rooted native plants such as Elodea, leafy pondweed, Richardson's pondweed, water buttercup. (NOTE: The herbicides proposed for this demonstration project do not physically or chemically impair the benthic habitat and thus leave it in tact to facilitate the growth of desirable native rooted plants, invertebrates and normal functioning of the microbial populations once the invasive and nuisance aquatic plant population have been reduced.) Rotovating impacts are inconsistent with the overall goal of restoring and conserving habitat for native species.
- e) Several Federal EPA and California EPA-approved herbicides have been used successfully to control Eurasian watermilfoil, curlyleaf pondweed and coontail in both lake and flowing water habitats throughout the US. The concentration of active ingredients of these herbicides in the waters in which they are used can be determined by sampling: results of analysis are typically available usually within 24 or 48 hours of sampling. Thus, the location and concentration(s) of active ingredients can be readily monitored to determine dissipation and transport away from target application sites.
- f) Assessment of herbicide movement. Results of tests conducted in 2011 using the fluorescent water soluble dye Rhodamine WT in typical Tahoe Keys lagoon coves showed that the dye remained within "dead end" coves for several weeks after applications that were made in late spring. Thus, the dye "surrogate" for aquatic herbicide dissipation did not migrate to the channels that connect the Tahoe Key lagoons with Lake Tahoe when applied in late spring. However, dissipation and movement of the dye applied in fall was more rapid (few days to two weeks) and did result in transient, low level detection just outside the Keys West Channel. Additional Rhodamine movement and dissipation studies were conducted in 2016. The results of these studies showed that early June injections near the West

Channel did not result in net movement out of the Keys Main Lagoon; whereas injection near the West Channel in late June/early July did result in transient movement into the Channel and toward opening into the Lake Tahoe. Mid-summer Applications of Rhodamine WT were made in two small dead end areas that have been separated (contained) using double curtains. The results showed that over a two week period, only about 1% of the total RWT had moved from the injection site. When the double barriers were removed, residual RWT move only about 1,000 ft outside the original contained area. RWT levels were only 15 to 25 ppt (parts per trillion). Although these double curtains are effective in restricting movement of dissolved materials (i.e. RWT), the primary mitigation against movement of herbicides out of the Keys is the installation on an impermeable "bladder" type barrier at the West Channel. (See Containment and Contingency discussion in paragraph 6 below). The monitoring protocol and sampling sites are designed to provide both real time estimates of movement (RWT as a surrogate) and actual levels of the herbicides in the water inside and outside the treatment zones. (See "Monitoring" section.)

- g) In contrast to mechanical harvesting methods, which produce many thousands of viable fragments and actually stimulates plant growth, the proposed herbicides will not produce viable fragments and will also significantly reduce the need for subsequent mechanical harvesting throughout the growing season. The spring application timing provides optimal conditions to reduce subsequent biomass to non-problematic levels in plant density, plant canopy height and biomass. Furthermore, by controlling growth in early spring and summer, the potential for plants to produce seeds, turions, or overwintering capacity is greatly reduced thus reducing the ability of the plants to reestablish in the subsequent year. The gradual diminution of biomass production coupled with reduced reproductive capacity will also result in reduced need for annual use of aquatic herbicides, especially when management is integrated with other non-chemical methods such as spot-diver assisted hard removal and bottom barrier placement.
- h) The desirable attributes of approved and effective aquatic herbicides include: 1) Reduction in mid- and late season biomass, reduction in plant canopy height and reproductive capacity; 2) reduction or elimination of viable propagules (seeds, turions, plant fragments, shoots, rhizomes, and root crowns) that spread populations; 3) selectivity to control primarily target species: curlyleaf pondweed, Eurasian watermilfoil, and coontail; 4) ability to control plants in, under, around and adjacent to docks and other structures that typically interfere with various mechanical or physical methods; 5) compared to violent, non-selective mechanical methods, herbicides actually reduce risks to non-target animals (fish, invertebrates, waterfowl, pets and people, and harvester and boat operators); 6) reduced carbon footprint due to reduced need for harvester operations.
- i) Taken together, the results of the 2011 dye studies coupled with well-established efficacy of the herbicides containing endothall, triclopyr, or penoxsulam in controlling the major target invasive and nuisance aquatic plants in the Keys

(Eurasian watermilfoil, curlyleaf pondweed and coontail) suggest that these products should be part of the fully integrated weed management program to control these aquatic plants in the Tahoe Keys lagoons. Furthermore, there are multiple advantages of using these types of herbicides in early spring when plant growth is beginning. Applications of herbicide at that time will primarily affect curlyleaf pondweed and overwintering Eurasian watermilfoil and prevent accumulation of dense biomass and tall canopy height.

The completion of the proposed aquatic herbicide demonstration study will provide important and relevant information on which the LRWQCB can, in part base its review of subsequent proposed uses of aquatic herbicide in the Tahoe Keys lagoons.

6.0 CONTAINMENT AND CONTINGENCY CONTROL STRUCTURES USED TO CONTROL MOVEMENT TO RECEIVING WATERS

There are no direct raw, potable water intakes located adjacent to the Tahoe Keys lagoons. There are wells located within the lagoons that draw water from 150 to 430 ft. below the ground surface. The nearest raw water/potable intake is in Lake Tahoe near Lakeside Marina, approximately 4 miles from the Tahoe Keys West Channel. Since the Main Lagoon has a direct connection to Lake Tahoe via the West Channel, precautionary steps will be taken to reduce likelihood of: (1) herbicide movement toward the West Channel; and, (2) to prevent movement of herbicide out of the West Channel.

The Containment and Contingency Actions (CCA's) are multilayered and are driven by both herbicide residue monitoring and monitoring of Rhodamine WT (RWT) dye as a surrogate for the herbicides, and are supported by studies conducted in June, July, and August, 2016 on the movement of RWT from barrier-enclosed sites and an open area (uncontained) site directly adjacent to the West Channel (Attachment A). These studies showed that: (1) deployment of barrier curtains can effectively contain dissolved materials (such as aquatic herbicides) and that they can be deployed within one day; and, (2) dissolved materials (RWT) present near the West Channel in early June is highly unlikely to enter the West Channel and therefore will not pose a risk to Lake Tahoe. The use of an impermeable barrier at the West Channel adds further protections to Lake Tahoe.

The CCA's described below constitute a robust set of adaptive, protective and precautionary methods that together ensure protection of the beneficial uses of Lake Tahoe as well as waters within the Tahoe Keys Main lagoon and Lake Tallac Lagoon.

6.1 Pre-Herbicide Use of Impermeable Barriers

Prior to herbicide applications, a "bladder" type or similarly effective impermeable physical barrier will be installed at the entrance to the West Channel. This will protect Lake Tahoe from receiving detectable levels of the three herbicides. The barrier will remain in place until no herbicide residues are detected outside the immediate application zone.

6.2 Contingency Monitoring and Mitigation of Potential Herbicide Residues

If herbicides are detected within the West Channel, then additional monitoring stations will be sampled outside the Keys in Lake Tahoe and monitoring will continue south and north of the barrier.

6.3 Use of Rhodamine WT Dye to Provide Real-Time Movement Data

Rhodamine dye will be applied during the applications in the coves nearest to the channels and the dye will be tracked to determine if it is moving toward the West Channel. Rhodamine dye may be injected at the location of other known herbicide residue locations to assist in determining movement and dissipation.

6.4 Herbicide Residue Monitoring

Water samples will be taken pre- and post-herbicide applications to determine levels of active ingredients (See Monitoring Protocols Section 8). In the event herbicide residues are detected in the West Channel, the contingency sampling stations in Lake Tahoe will be initiated.

6.5 Use of Existing Well Water Carbon Filtration Systems

Use existing well water carbon filtration systems to remove herbicide residues before water enters distribution systems in the Tahoe Keys.

6.6 Use of Mobile Filtration System

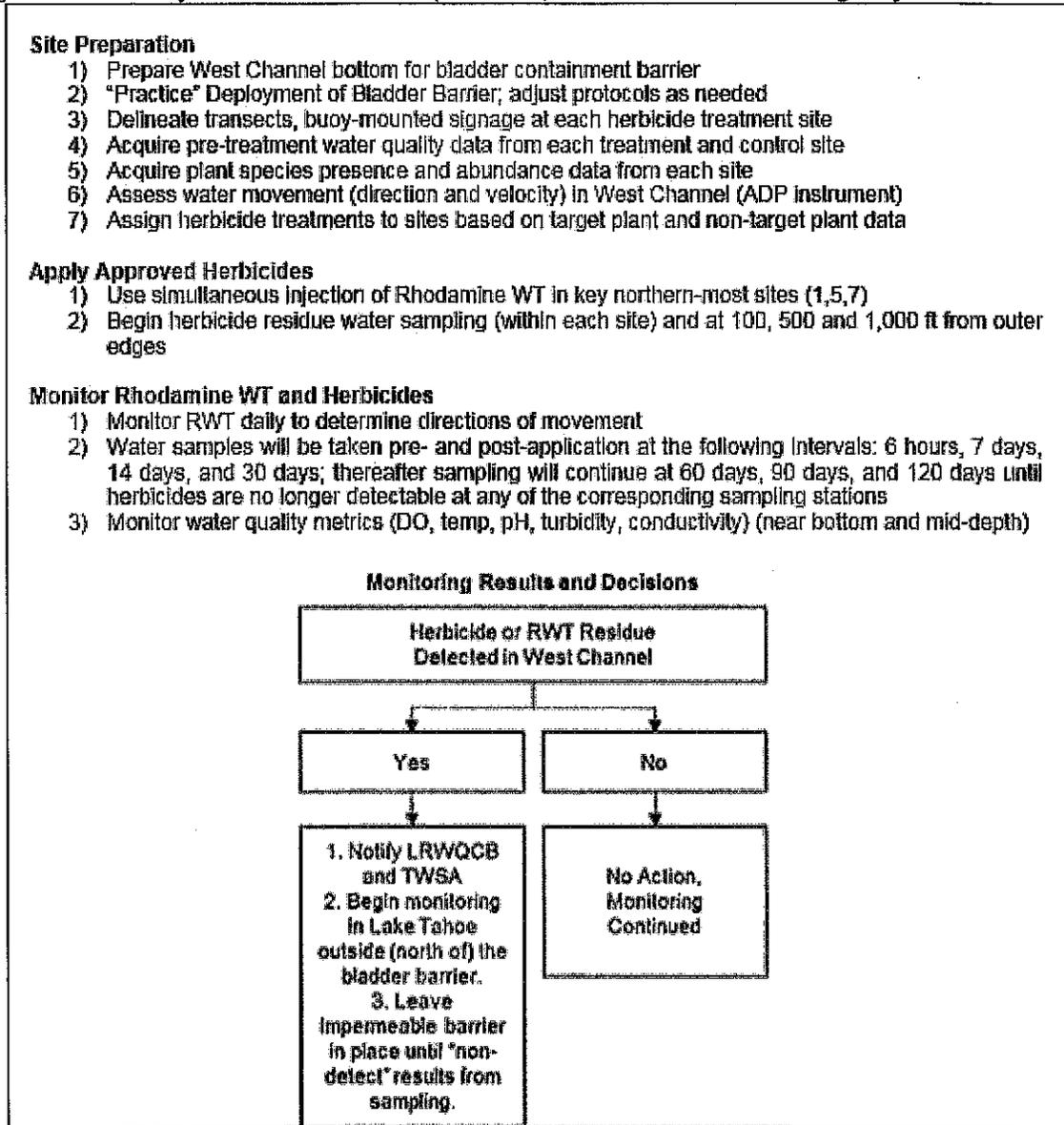
Use of mobile (truck/trailer mounted) filtration system to clear localized areas if herbicide residues exceed allowable label use.

6.7 Residue Breach Notification

In any event, if herbicide residue is detected within 1,000 ft. of the West Channel, the LRWCQB will be notified within 24 hours.

The Containment and Contingency Decision Plan is summarized in Figure 7.

Figure 7. Summary of Herbicide Site Preparations, Containment and Contingency Plans



7.0 SHORT TERM SEASONAL EXPECTATIONS

Based upon general bathymetry, prior Rhodamine dye studies and hydraulic conditions, there is a seasonal pattern regarding water flow as follows:

- a) As snow melt occurs and the water in Lake Tahoe rises, water is "pushed" into the Keys lagoons and water level there also rises. This leads to a net inflow during late spring through mid-summer (as long as the lake proper is rising)
- b) In fall, as lake level drops, there is net out-flow from the lagoons which continues until mid-winter-late winter. Therefore, the water level in the lagoons is typically lowest in November and remains so until subsequent spring runoff.
- c) Due to low levels in the late summer in the lagoons, this time can be used for efficient hand removal of plants and potentially other non-herbicide controls as part of the integrated management program.
- d) The "end" of the lake filling, and consequently the end of net inflow to the Tahoe Keys lagoons varies from year to year and is dependent upon several environmental events such as timing and extent of snow pack development, water content of snow pack, and melt rate of snow pack.

These features of the spring period provide optimal conditions for herbicide applications because their effectiveness is best on new growth which occurs in spring and because this period of the season generally produces stable water inflow to the Keys lagoons and helps retain herbicide residues within the lagoons.

8.0 DESCRIPTION OF THE MONITORING PROGRAM

The monitoring program has several objectives:

- a) Determine the target and non-target plant occurrence and abundance within the Tahoe Keys lagoons and specifically with the treatment sites (e.g. coves). This is accomplished using point sampling method with physical pole-mounted rake
- b) Determine the level, movement and dissipation of herbicide active ingredients during and following their use in the treatment sites. This is done by taking pre- and post-application water samples (midwater and near bottom) within each site and at distances of 100, 500 and 1,000 ft from the edge of the "outer" edge of the treated site.
- c) Provide data pertaining to compliance with water quality limits and other parameters such as DO, pH, temperature, turbidity and concentration (residue levels) and movement of herbicide outside the treatment sites. These metrics are determined using a calibrated YSI logger instrument.
- d) Determine the efficacy and relative selectivity of herbicide treatments within the demonstration locations. This is assessed using both hydroacoustic scanning and physical point sampling.
- e) Provide data that will be used in determining the potential integration of aquatic herbicides with other management methods. This is accomplished by deploying non-chemical methods such as diver assisted hand removal or bottom barriers in selected sites *after herbicide applications* and comparing the efficacy of these combined methods with herbicide treated sites that are not subsequently subjected to other methods.

Figure 8. Proposed Monitoring Stations at Sites (Coves) for 2017 Demonstration Herbicide Application in the Tahoe Keys Lagoons

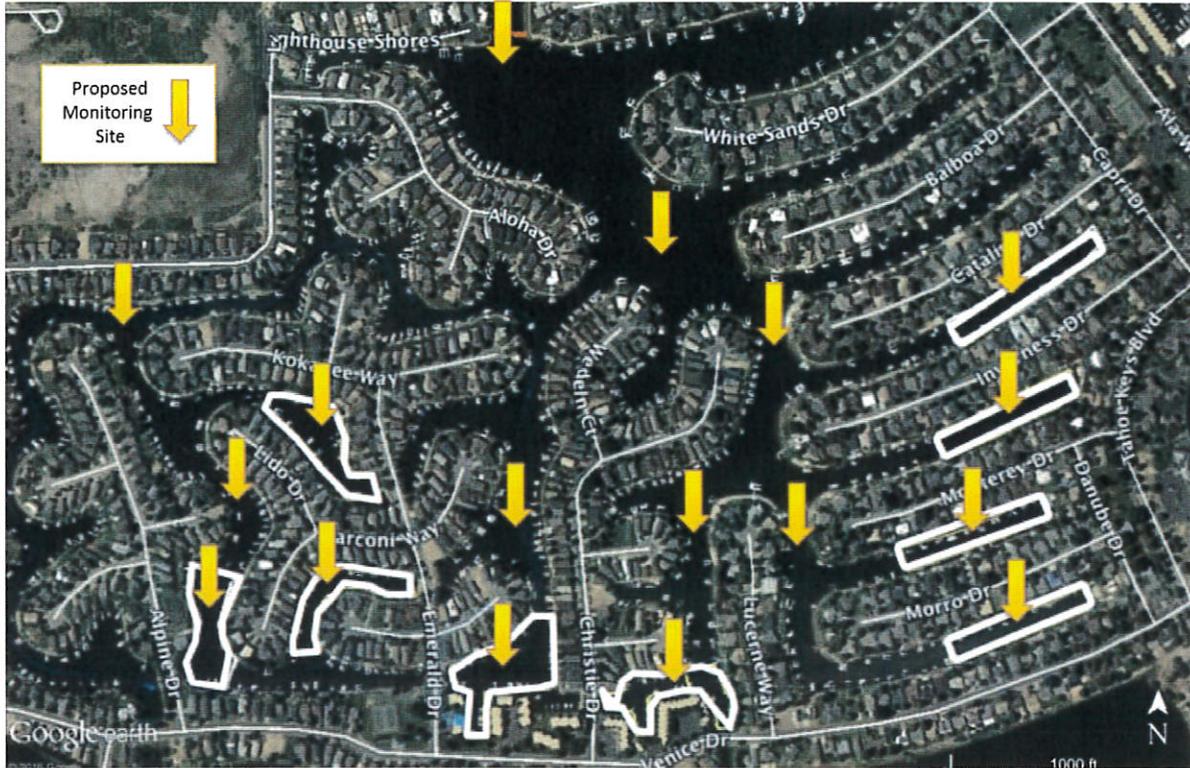
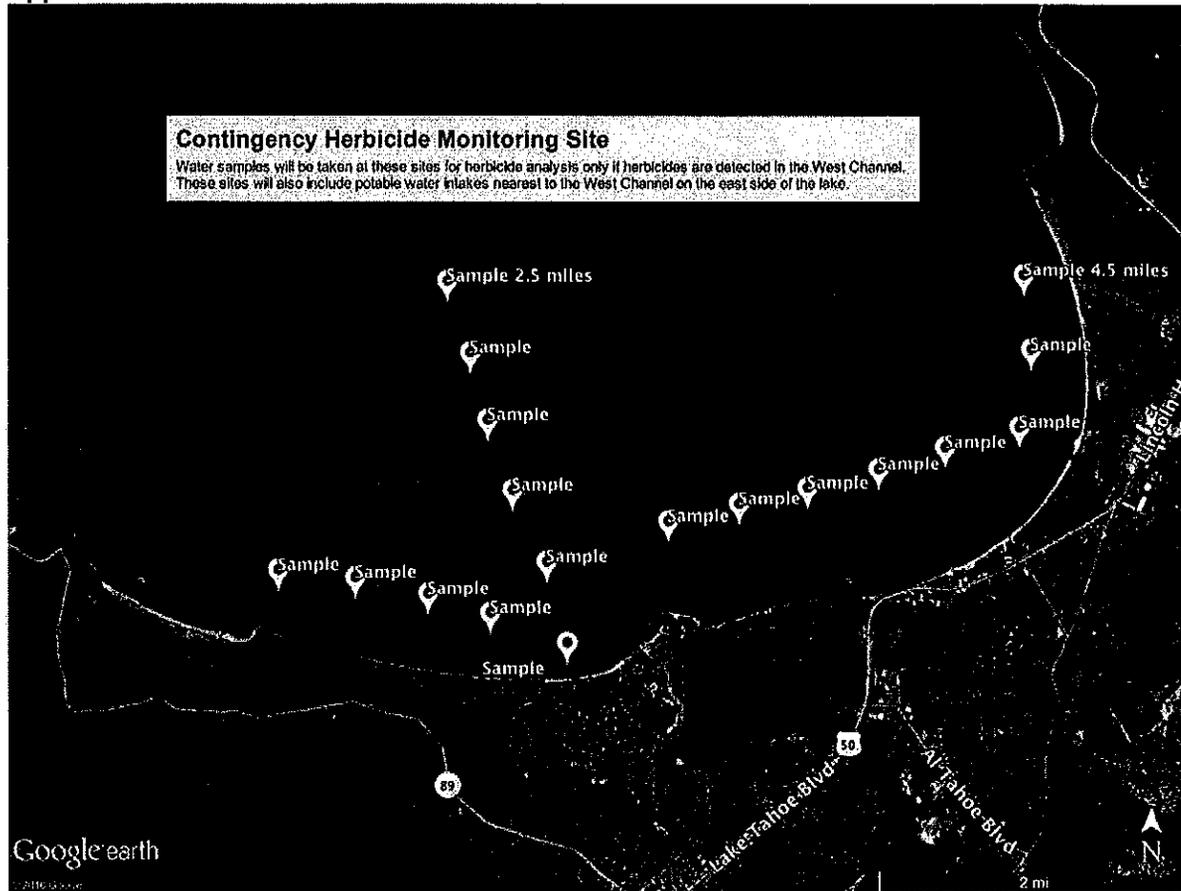


Figure 9. Contingency Herbicide Monitoring Sites and Tracks for 2018 Herbicide Demonstration Applications



Lake Tahoe monitoring sites. These sites will only be monitored if herbicide residues are detected in the West Channel.

In summary, the Monitoring Program addresses these key questions:

1. Will the herbicides control the target plants?
2. What effect do the herbicides have on non-target plants and animals?
3. Will the herbicide concentrations and their location remain within the limits of the target treated area and within the Tahoe Keys lagoons?
4. Does the discharge under this permit result in residues exceeding receiving water limitations?

Records of Monitoring will include:

1. Date(s) of application(s)
2. Location of application (treatment sites)
3. Name of applicator
4. Type and amount of aquatic herbicide used.
5. Application and site details: area, water depth, water volume, method of application, start and finish time, rate or concentration of aquatic herbicide applied.
6. Visual monitoring assessment (e.g. spillage, proper site)
7. Certification that the applicator followed the APAP

8.1 Data Collection

8.1.1 Plants

At the end of 2017 growing season (approximately September 30, 2017) TKPOA will conduct a final seasonal hydroacoustic and point-sampling survey to determine the extent and composition of aquatic plants in the Keys lagoons. This information, coupled with prior 2017 plant surveys will help identify the appropriate herbicide(s) for use in the spring of 2018. Similar plant surveys will be conducted in Spring 2018 to confirm growth stages of the target plants and their relative abundance.

All surveys will be GPS referenced and plant distribution and biovolume maps will be generated for each treatment site and for the entire Tahoe Keys lagoons. From the point sampling (physical samples), species will be identified and digitally photographed so that effects on both the target plants and non-target plants can be documented.

8.1.2 Herbicides

Water samples will be taken pre- (background) and post-herbicide application at fixed sampling stations (see Section 8.2 for locations and frequency) at the surface (15- 25 cm below surface), mid-depth and 25 cm from the bottom. Pre-application samples will be taken within 24 hr. before applications are made. All samples will be documented and handled according to prescribed methods (EPA). (See Section 9.0 below)

8.2 Monitoring Locations, Timing and Frequency

8.2.1 Plant Monitoring

The 2018 surveys will be conducted bi-weekly (twice per month) beginning May 2018. By comparing results of the 2018 plant surveys in the treatment sites and untreated sites the efficacy and other effects (e.g. non-target effects on plants) will be determined. Hydroacoustic scans will be made along two parallel transects in each herbicide-treated area and in similar untreated (control) sites. The scans will provide an estimate of biomass by determining "biovolume" as well as plant canopy height. Canopy plant height will be used to estimate "vessel hull clearance". This metric, as well as biovolume and relative abundance of plants will be used to compare efficacy of the herbicide applications compared to untreated sites and to sites managed by harvesting, bottom barriers or diver-assisted hand removal. To determine relative abundance and presence/absence of plants, physical point samples will be taken along the same transects at 100 to 200 ft. intervals. This will provide from 30 to 40 point samples in each site. Example of proposed sampling transects are shown in Figure 10. Along each transect, samples will be taken mid-channel and at approximately right angle (toward the shore) within 3 to 6 ft. from the edge of the shore, or at 2 to 4 ft. depths. This sampling array provides assessments of plant biomass and abundance (pre- and post-herbicide application) in both the main open areas of the site as well as near the shoreline adjacent to piers and floating docks. In

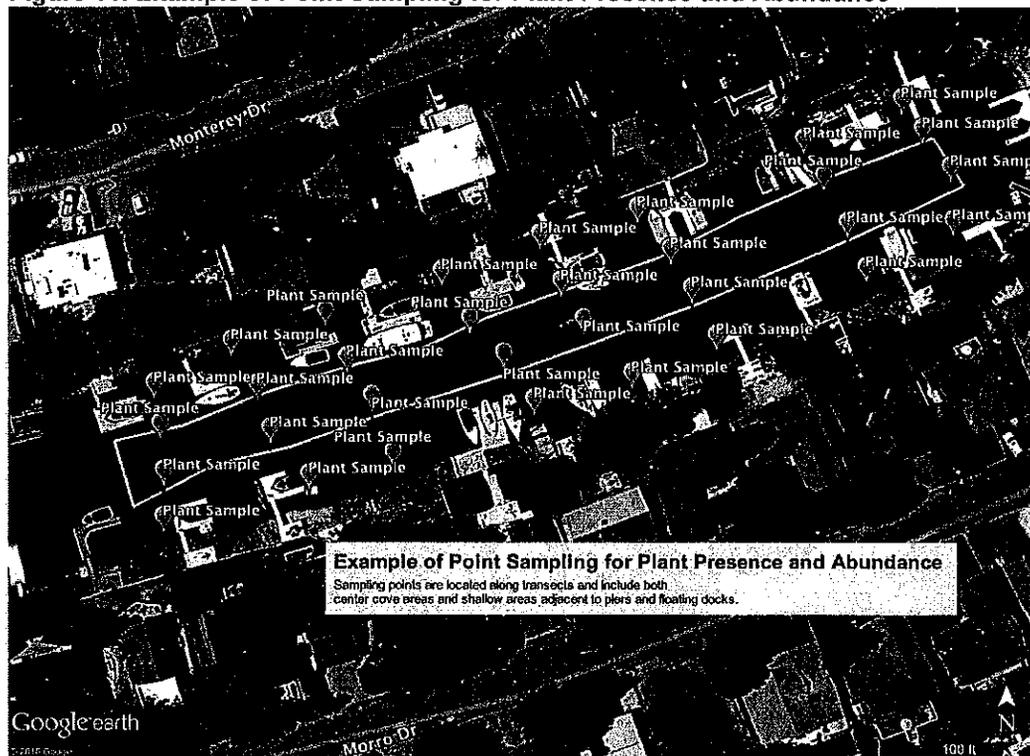
less linear sites, transect contours will follow shoreline shape but will still include the main channel and areas near piers and floating docks. Figure 11 provides an example of the total array of plant sampling points.

Figure 10. Example of Plant Sampling Transects (Internal Lines) in Three of the Proposed Herbicide Treatment Sites



Hydroacoustic scans will be made along the linear transects and point samples will be taken at 100 to 200 ft. intervals along the same linear transects to determine relative abundance and condition of plants. Similar transects will be sampled in all treatment and control sites.

Figure 11. Example of Point Sampling for Plant Presence and Abundance



The above is an example of typical sampling transects in an herbicide (or control) site showing locations of each point (green markers) to be physically sampled for aquatic plant species presence and abundance.

8.2.2 Herbicides Monitoring

Sampling station locations will be established at four locations within each treatment site (cove): two mid-site (i.e. middle of the cove) and one each on either side of the site (cove), and at least five sampling locations will be established outside the treated site at approximately 100 ft. linear intervals. The provisional locations of sampling sites are shown in Figure 8. The final locations of the “outside” sample stations will be adjusted based on the final application site locations. In addition to sampling locations within and near (but outside) the treated sites, additional sample stations will be established in the following areas: immediately adjacent (and on the lagoon side) of the West Channel; at the mouth of the West Channels and at 0.25 mile to 0.5 mile intervals extending from the channels in three directions: East, West and North (Figure 8). Water samples will be taken pre- and at the following post- application intervals: 6 hours, 24 hours, 72 hours, 7 days, 14 days, and 30 days; thereafter, sampling will continue at 60 days, 90 days, and 120 days until herbicides are no longer detectable at any of the corresponding sampling stations.

In the event that residues above those allowable by US EPA are detected in samples from the 30-day sampling, or if at any time residues are detected adjacent to the channels,

the sampling will continue an additional 6 days and will include all sensitive sites (See 8.2.3)

8.2.3 Sensitive Site Monitoring

Additional sampling will be conducted at three locations of concern: (a) Well water intake in the Tahoe Keys; (b) mouth of Emerald Bay; (c) 3 stations within 100 ft. and from raw water intakes near Lakeside and Round Hill plus Kingsbury GID's intakes at 30 ft. depth and raw water discharges at pumping facilities at Lakeside and Roundhill and Kingsbury GID's water suppliers. Samples will be taken 24-hour pre-application and at 48 hour intervals thereafter for 14-days for a total of 8 sampling events. Samples will be analyzed for active ingredients in herbicides applied as part of this demonstration study.

8.3 *In situ* Measurements (Water Quality)

At three locations within each site (1 mid, 2 near shore) pre- and post-applications, real time water quality sampling will be conducted using a calibrated, logging device for the following parameters: Dissolved oxygen (DO), pH, temperature, turbidity, and conductivity. Sampling will continue for 30 days after applications in both treatment sites (coves) and similar untreated "control" sites; real time monitoring 3 days each week (typically Monday, Wed., Fri.), mid-day (11 am to 2 pm) at mid-depth.

8.4 Monitoring Records

All monitoring activities and results will be recorded in both hard copy and digitally and will include:

- a) Date, GPS referenced location
- b) Individual's name who performed the sampling and /or measurements
- c) Dates analyses were performed if not real-time data (herbicide residue)
- d) Laboratory and/or individual who performed analysis
- e) Results of real-time measurements and other sampling analyses.

9.0 SAMPLE METHODS AND GUIDELINES (PREVENTING SAMPLE CONTAMINATION)

This section provides descriptions and methods and guidelines for obtaining various samples as part of compliance with the permit and to ensure consistency in sampling activities

9.1 Sample Collection

Samples will be taken both within and outside treatment sites and inside representative, untreated sites in a manner that will provide a basis comparing pre-, post- applications conditions and compare conditions in treated sites and untreated sites. Sampling for herbicide residues will be done using a battery powered, bilge pump system connected to flexible hose so that sample depth can be adjusted according to monitoring protocols. Between sampling stations and between separate depths, flow will be continued for 30 seconds to ensure that the water at the prescribed depth is correctly collected.

Samples will be placed in pre-labeled bottles and each label will document the date and time of sampling and coded for location by site and within –site position. Durable labels and marking ink will be used.

9.2 Field Sampling Procedures

All sample actions will be documented a field log books that record each sample date, time, and coded location (by site). At the conclusion of the sampling period the primary sampling staff will sign and date the page on which the records were written.

9.3 Sample Equipment Cleaning

All sampling equipment will be washed with clean tap water between sampling stations and events. The 12-volt (bilge pump) sampling system will be flushed for 1 min with clean tap water between sampling stations and separate sampling systems will be used for the untreated (“control”) sites and the herbicide-treated sites.

9.4 Sample Preservation

As necessary water samples (bottles) will be immediately place in coolers on ice or dry ice and kept out of sunlight until they are transferred to cold (frozen or refrigerated) storage or are shipped for analysis. The specific preservation methods will be tailored to fit the EPA recommended protocol for each type of active ingredient. Most preservation methods require freezing and blocking from light and use of amber glass bottles with Teflon-seal screw on lids. When delays in shipping are necessary, samples will be frozen at -8 C and will be shipped frozen by overnight mail or will be physically picked up and delivered for analysis at certified laboratories.

9.5 Sample Packing and Shipping

All samples will be shipped to certified laboratory for analysis either the day of sampling or at prescribed intervals thereafter.

9.6 Sample Preservation and Transportation

As necessary, samples will be shipped frozen with either ice packs or dry ice with required labeling for shipping.

9.7 Chain of Custody (COC)

At shipping or storage and at any transfer of samples, Chain of Custody form will accompany samples and will list the sample identification (code), number of samples and will be signed by both the recipient and provider of the samples. A copy of the COC forms will be retained by TKPOA in secure files on TKPOA property.

9.8 Field Sampling Kit (Water Samples for Herbicide Residues)

Each sampling kit will consist of the following:

1. Correct sampling bottles or other containers for the samples.
2. COC forms
3. Field collection forms (to record sampling activity)
4. Sample labels and appropriate permanent marker pens
5. Ice packs and/or dry ice and insulated container for sample bottles
6. Appropriate sampling devices (e.g. battery operated pump for water samples)
7. Non-powdered plastic or nitrile gloves
8. Back up portable GPS unit
9. Plastic (e.g. Ziploc) storage bags for samples and COC forms

9.9 Laboratory Quality Assurance and Quality Control (QA/QC)

All laboratory analyses will be performed by a certified laboratory per permit specifications. Laboratory precision and accuracy will be monitored and documented by a series of laboratory-generated quality control samples. For samples analyzed by immunoassay a separate set of coded duplicate samples will be analyzed by alternative by equally or more sensitive methods. These confirmation samples will represent 5% of total samples taken during a treatment season.

9.10 Reporting Procedures (Annual Reports) and Record Retaining

Interim progress reports will be provided to LRWQCB by August 30 and October 30 2017. An annual report for each reporting period of January 1 to December 31 will be prepared and submitted to the Lahontan Regional Water Quality Control Board by March 1, 2018.

The Interim Report will contain the following information:

1. Summary of results (narrative, tables, graphs, charts) to date, which includes monitoring data collected to date and efficacy data.
2. Description of problems, solutions or other issues that occurred and that may affect permit compliance.

The Final Report will contain the following:

1. Executive Summary that discusses overall results, issues concerning compliance or violations of the Permit and effectiveness of the APAP.
2. Summary of monitoring data, including improvements or degradation in water quality as a result of the use of the aquatic herbicides.
3. Discussion of BMP's used and recommendation for improvements.
4. Final map showing location of each herbicide application
5. Amount and type (product) of aquatic herbicide used
6. Detailed table showing sampling locations (GPS referenced) and associated results by date and site.
7. Summary of aquatic herbicide application logs

9.11 Emergency Situations (Exceeding/Locations of Residue; Spills)

The discharger (Permit holder) will report any event that constitutes non-compliance with the Permit, hazardous condition or adverse impact related to the permitted action as follows:

- a) Orally within 24 hours (to LRWQCB)
- b) Written report within 5 days of the time the discharger becomes aware of the non-compliance.

9.12 Procedure to Prevent Sample Contaminations

Vessels and personnel used to apply aquatic herbicide will not be used to collect monitoring samples. Personnel responsible for sample collection and monitoring will not be allowed to handle or come in contact with personal protective equipment (PPE) used by applicators and by anyone handling aquatic herbicide containers. During prescribed sampling, sampling equipment will be washed between treatment sites and separate sampling gear will be used for un-treated (control) and treated sites (e.g. water pumps, collection hoses).

Sampling personnel will change gloves between sites and before the next round of sampling begins. Any actions that may compromise a sample or sampling event will be logged and explained and signed by the person directing sampling at the time of the event.

10.0 DESCRIPTION OF BMP'S TO BE IMPLEMENTED

TKPOA has established the following Best Management Practices (BMP) to ensure that all aquatic herbicides are used in a safe, effective manner.

10.1 Measures to Prevent Spills and Spill Containment in Event of Spill

Applicators will follow all instructions, precautionary steps and appropriate handling procedures for each herbicide according to its label.

10.1.1 Herbicide Mixing

Applicators will take on board and mix only the amount of herbicide needed for each site. Application equipment (hoses, connections, pumps) will be checked for proper function before herbicides are loaded on board. Applicators will have on-board access to and training in use of absorbent materials including kitty litter and absorbent "pillows".

10.1.2 Spills

Any spills will be cleaned up according to label instructions and all equipment and materials used to clean up any spills will be properly disposed of consistent with federal and state requirements. In the event of a spill into the water, the location will be immediately documented and geo-referenced with GPS lat/long and time of spill which will be provided to the LRWQCB within 24 hours of the incident.

10.2 Measures to Ensure Appropriate Use Rate

The BMPs listed here ensure that proper use rate is achieved:

- a) Site Scouting. Qualified staff will perform site inspections and review plant surveys to confirm species present and condition of the site. If conditions are suitable and plant conditions are appropriate for the herbicide(s) to be used, the application will be made.
- b) All applications will be made in accordance and compliance with the current herbicide labeling and in accordance with regulations and conditions of the EPA, CalEPA, LRWQCB, and TRPA.
- c) Applications made by qualified applicator certificate holders (QALs). Applications will only be made by applicators that hold current valid QAL's from CADPR and are trained annually in the safe handling, mixing, application, storage and transport of aquatic herbicides. These qualified applicators will be hired by the discharger. The application staff under the direction of the QAL have knowledge on proper equipment loading, selection of application equipment, calibration and use so that spills are minimized and the precise application rate are used according to the label.
- d) Discharger's plan to educate staff and herbicide applicators on how to avoid any potential adverse effect from herbicide applications. As a condition of the

contract, the discharger shall receive written documentation and verification of training of applicator and any staff used in this project. These documents will be in possession of the discharger before any application is made and shall be made available to staff of the LRWQCB at least 30 days before applications are made.

- e) Planning and coordination with water users in order to minimize impacts during application. No applications will be made outside the Tahoe Keys lagoons and no applications will be made within 1,000 feet of the channels that connect the Tahoe Keys lagoons with Lake Tahoe proper. Due to the concerns of some water suppliers who pump raw water directly from Lake Tahoe (but not the Tahoe Keys treatment sites), the discharger will hold a workshop and informational meeting with representatives of the Tahoe Water Suppliers Association (TWSA) at least 45 days before applications are made. Through TWSA, water customers will be informed of the application plan and dates of application. Establishment of water sampling (monitoring) stations will be made in consultation with TWSA and specific water suppliers so that proper monitoring of intake water is accomplished.
- f) Prevention of fish kills. All precautions provided on the label regarding potential indirect fish kills will be adhered to including limiting the total area to be treated so that precipitous declines in dissolved oxygen (DO) will not occur. Specifically, the proposed sites are well separated and together constitute approximately only 6% of the total infested surface area of the Tahoe Keys lagoons. Monitoring includes assessing DO in the treated areas three times per week for 30 days following applications.

11.0 EXAMINATION OF POSSIBLE ALTERNATIVES

This demonstration project is designed to provide a representative operational evaluation of the potential for safe and effective inclusion of aquatic herbicides in a fully integrated management plan for the Tahoe Keys lagoons. Although the herbicides proposed for use have been very effective in similar aquatic weed infestations, they have never been applied for control of aquatic weeds in the Tahoe Keys lagoons. However, several alternative methods and strategies have been either used regularly (harvesting) or have been tried more recently (bottom barriers and diver assisted hand removal).

The following subsections briefly outline and discuss alternative types of methods that either are in use or have been considered but found infeasible for a variety of reasons

11.1 No Action

With no action, the established populations of non-native aquatic plants and prolific growth of coontail would rapidly further degrade the beneficial uses of the Tahoe Keys lagoons by:

- a) blocking recreational uses of all kinds.
- b) creating undesirable habitat for waterfowl and native fish.
- c) degrading water quality through depressing DO, creating daily extreme fluctuations in pH, DO, and temperature.
- d) creating habitat for mosquitoes and related human health risk of arthropod borne diseases such as West Nile Virus.
- e) continued and increased source of further infestations in Lake Tahoe.
- f) creating stagnant water conditions, which would result in malodorous conditions that would degrade property values, discourage tourism and reduce revenue derived from home owners, seasonal renters and daily visitors to the South Shore.

11.2 Prevention and Use of Biological Control

Prevention actions have been in place for the past 6 years through the Vessel Inspection program that has been effective in stopping the introduction of additional invasive species.

Biological control for all three target species has been considered. Research and published reports for other sites show that at present no host-specific biological control agents are available and proven effective in the highly urbanized, high boat-traffic area like the Keys. The only biological control agent with proven efficacy against submersed aquatic plants is the grass carp or "white amur". However, this fish is non-native and is prohibited for use in waters that are connected natural watersheds (CDFW). In addition, the grass carp is a non-selective herbivore and thus will consume desirable native plants.

11.3 Mechanical and Physical Methods

11.3.1 Harvesting

This is the current primary method and though effective in creating temporary navigation, creates fragments and is not capable of depressing regrowth or reducing inaccessible locations that persists as nurseries for continue infestation.

11.3.2 Diver-Assisted Hand Removal

This has limited scope scale and is impractical for any significant, sustainable reduction in the 150 to 160 acres that are infested with invasive aquatic plants.

11.3.3 Dredging and Removal of Plants and Spoils

This method has been attempted within the Tahoe Keys channels and other small marinas around Lake Tahoe and has failed to provide effective control longer than a few months. (See Section 5.1 c in this APAP.)

11.3.4 Bottom Barriers

This may have localized utility but currently is limited to 5 acres near docks and cannot be deployed in high boat traffic areas. These are a part of the current management program and it is anticipated that several bottom barriers will be deployed in 2017 and 2018. These also may be integrated as part of an integrated use of aquatic herbicides to prevent regrowth in areas treated with herbicides. The proposed demonstration project will provide data that will help determine if bottom barriers and herbicide uses can be used effectively together (i.e. sequentially in alternative years). Thus, they may be suited for localized applications but will not provide sustainable control of aquatic plants in more than 80-90% of the infested areas.

11.3.5 Rotovating

This method has serious limitations and serious non-target impacts on the benthic organisms and water quality. Its use in other lakes is being reviewed but at this time it is not a feasible approach.

11.3.6 Dredging

Although this method theoretically could remove most of the vegetation in the lagoons it would completely destroy benthic habitat, remove native plants and is likely to produce very high turbidity for several weeks to months due to the unconsolidated sediments in most of the lagoons.

11.4 Aquatic Herbicides

These products have proven safety and efficacy and utility in lakes, ponds, reservoirs, streams, irrigation canals, flood control channels and wetland sites against the same target aquatic plants that are creating negative recreational and environmental impacts in the Tahoe Keys lagoons.

The current amendments in the LRWQCB Basin Plan provide an avenue to consider the uses of these products. This is the one proven, widely used, tool that currently is not part of the integrated management program for the Tahoe Keys lagoons. The results obtained in the proposed demonstration study will provide science-based data that is Tahoe Keys-specific. The results will help regulatory agencies in their review and evaluation of the benefits and limitations of these tools as part of the integrated plan to sustainably manage aquatic weeds in the Tahoe Keys lagoons.

11.5 Use of the Least Intrusive Method of Aquatic Herbicide Application.

Discharger and contracted applicators will use the most recent and best technologies to apply the proposed herbicide in the demonstration areas to minimize non-target effects and to ensure safe, accurate use of herbicide products. These methods include GPS tracking, hydroacoustic sensing systems to determine site volume (bathymetry) and optimal timing based upon plant canopy height and biovolume and herbicide delivery systems that direct the herbicide into the targeted sites accurately.

11.6 Applying a Decision Matrix Concept to the Choice of Most Appropriate Formulation(s)

The proposed aquatic herbicides are available in several formulate products including liquid and various granular (pelleted) products that are deployed on the bottom where plants emerge. The following decision points and metrics are used to tailor the product, timing of application, rate of applications and optimize control of target plants while minimizing off-target impacts. The result is a prescriptive approach designed to provide optimal control and minimize the amount of herbicide used while fully integrating all feasible tools and methodologies. The three aquatic herbicides selected, and the proposed rates and formulations were chosen to optimize management and control of the target aquatic weeds (Eurasian watermilfoil, curlyleaf pondweed and coontail) while minimizing effects on non-target plants. The following conditions and criteria were considered as part of the decision:

- a) Plant species present in demonstration area (non-target vs. target species)
- b) Establishment of threshold treatment conditions (plant growth stage)
- c) Physical conditions (water movement, wind, total water volume)
- d) Method of application
- e) Duration and rate of application
- f) Potential risks to humans and the natural environment
- g) Contingency planning and monitoring access

- h) Shown efficacy of herbicide on target plants
- i) Ease of use and handling requirements
- j) Minimize interference with beneficial uses: recreation, habitat

Table 6. Comparison of Initial Herbicide (Applied) Concentrations with Potential Dilution/Dispersal Concentrations Based on "Available" Untreated Water Volumes (acre ft.)

Herbicide	Initial Concentration	Total Volume of water for 3 sites (ac.ft.)	Dispersed Concentration (assuming only 1,000-acre ft. available)*	Dispersed Concentration (assumes 1,500-acre ft. available)*
Aquathol K	2.0 ppm	45	0.09 ppm	0.06 ppm
Renovate 3	1.0 ppm	40	0.04 ppm	0.027 ppm
Galleon	0.02 ppm	41	0.00082 ppm	0.00055 ppm

*These are potential concentrations that might reach the West Channel assuming uniform dispersal and dilution from nine sites *and the total amount of each herbicide applied is not degraded, bound or taken up by target plants during dispersal and dilution process.*

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Aquatic Pesticide Application Plan

Application for Statewide General National Pollutant Discharge
Elimination System Permit for Residual Aquatic Pesticide
Discharges to Water of the United States from Algae and Aquatic
Weed Control at Tahoe Keys West Lagoon

Attachment A

Overview (Vicinity) and Treatment Site Map



Aquatic Pesticide Application Plan

Application for Statewide General National Pollutant Discharge
Elimination System Permit for Residual Aquatic Pesticide Discharges
to Water of the United States from Algae and Aquatic Weed Control at
Tahoe Keys West Lagoon

Attachment B

Pesticide (Herbicide) Application Log

AQUATIC PESTICIDE APPLICATION LOG

Date of Application:		Application Area			
Location:		Surface Area:			
Application Start Time:		Volume:			
Application End Time:		Treatment Area			
Applicator Name:		Surface Area:			
		Volume:			
Discharge Gates or Control Structures		**Attach a map showing application area, treatment area, immediately adjacent untreated area, and other information used to calculate dosage and quantity of each pesticide at each application site.			
Name:					
Date Closed:					
Time Closed:					
Date Opened:					
Time Opened:					
Calculations to Determine:					
Opening and Closures:					
Dosage and Quantity Information for Each Pesticide Used					
Application Details					
Plot #	Area	Depth	Product	Quantity	Rate
APAP Certification					
I, _____, (print name) certify that the APAP has been followed.					
Signature: _____ Date: _____					

Aquatic Pesticide Application Plan

**Application for Statewide General National Pollutant Discharge
Elimination System Permit for Residual Aquatic Pesticide Discharges
to Water of the United States from Algae and Aquatic Weed Control at
Tahoe Keys West Lagoon**

Attachment C

Receiving Water Visual Observation Form

RECEIVING WATER VISUAL OBSERVATION FORM

Background Monitoring Parameters (u/s or at treatment area up to 24 hours or at time of treatment)					
Monitoring Date:		Location:			
Sampled By:					
Monitoring Area Description (pond, waterway, channel...)					
Site Conditions/Appearance of Waterway	present	absent		present	absent
Floating or suspended matter:			Visible films, sheens, or coatings:		
Discoloration:			Fungi, slimes, objectionable growths:		
Bottom deposits:			Potential nuisance conditions:		
Aquatic life:					
Weather Conditions/observations:					

Event Monitoring Parameters (immediately adjacent to treatment area after application)					
Monitoring Date:		Location:			
Sampled By:					
Monitoring Area Description (pond, waterway, channel...)					
Site Conditions/Appearance of Waterway	present	absent		present	absent
Floating or suspended matter:			Visible films, sheens, or coatings:		
Discoloration:			Fungi, slimes, objectionable growths:		
Bottom deposits:			Potential nuisance conditions:		
Aquatic life:					
Weather Conditions/observations:					

Post Event Monitoring Parameters (collected in the treatment area within one week post application)					
Monitoring Date:		Location:			
Sampled By:					
Monitoring Area Description (pond, waterway, channel...)					
Site Conditions/Appearance of Waterway	present	absent		present	absent
Floating or suspended matter:			Visible films, sheens, or coatings:		
Discoloration:			Fungi, slimes, objectionable growths:		
Bottom deposits:			Potential nuisance conditions:		
Aquatic life:					
Weather Conditions/observations:					

Aquatic Pesticide Application Plan

**Application for Statewide General National Pollutant Discharge
Elimination System Permit for Residual Aquatic Pesticide Discharges
to Water of the United States from Algae and Aquatic Weed Control at
Tahoe Keys West Lagoon**

Attachment D

Receiving Water Physical Quality Form

Receiving Water Physical Quality Form

Background Monitoring Parameters (u/s or at treatment area up to 24 hours or at time of treatment)				
Location:		Date:		
Sampled by:				
Physical Sample (3ft below surface or mid depth if <3ft)	Temperature ² (°F)	pH ² (number)	Turbidity ² (NTU)	Electrical Conductivity ² (µmhos/cm)
Chemical Sample (3 feet below surface or mid depth if <3ft)	Active Ingredient (µg/L)	Nonylphenol (µg/L) ³	Hardness (CaCO ₃) ⁴	DissolvedOxygen(mg/L) ²
GPS latitude and longitude coordinates:				

Event Monitoring Parameters (Immediately adjacent to treatment area after application)				
Location:		Date:		
Sampled by:				
Physical Sample (3ft below surface or mid depth if <3ft)	Temperature ² (°F)	pH ² (number)	Turbidity ² (NTU)	Electrical Conductivity ² (µmhos/cm)
Chemical Sample (3 feet below surface or mid depth if <3ft)	Active Ingredient (µg/L)	Nonylphenol (µg/L) ³	Hardness (CaCO ₃) ⁴	DissolvedOxygen(mg/L) ²
GPS latitude and longitude coordinates:				

Post Event Monitoring Parameters (within treatment area within one week after application)				
Location:		Date:		
Sampled by:				
Physical Sample (3ft below surface or mid depth if <3ft)	Temperature ² (°F)	pH ² (number)	Turbidity ² (NTU)	Electrical Conductivity ² (µmhos/cm)
Chemical Sample (3 feet below surface or mid depth if <3ft)	Active Ingredient (µg/L)	Nonylphenol (µg/L) ³	Hardness (CaCO ₃) ⁴	DissolvedOxygen(mg/L) ²
GPS latitude and longitude coordinates:				

Aquatic Pesticide Application Plan

Application for Statewide General National Pollutant Discharge
Elimination System Permit for Residual Aquatic Pesticide Discharges
to Water of the United States from Algae and Aquatic Weed Control at
Tahoe Keys West Lagoon

Attachment E

Chain of Custody Form

Aquatic Pesticide Application Plan

**Application for Statewide General National Pollutant Discharge
Elimination System Permit for Residual Aquatic Pesticide Discharges
to Water of the United States from Algae and Aquatic Weed Control at
Tahoe Keys West Lagoon**

Attachment E

Chain of Custody Form

Chain of Custody (COC)

The COC record will be used as physical evidence of sample custody and transfer or transportation records. The sampler will complete a COC record to accompany each sample shipment from the field to the laboratory. The COC will specify (1) Name of person physically taking the field sample (2) time, date, location of sample collection, (3) specific and unique sample number, (4) requested analysis, (5) required turn-around-time; (6) time and date of sample transaction between field and laboratory staff, (7) preservative or preservation methods, if any, and ((8) name of receiving party at the laboratory.

Corrections to the COC will be made by drawing a line through, initialing, and dating the error, and entering the correct information. Erasures are not permitted. Upon receipt of the samples, laboratory personnel will review sample documentation, verify correct containers were used, check that samples were received within holding time, verify proper field preservation, and measure the temperature of a representative sample. The laboratory sample receiver documents this information and notifies the Senior Chemist of anomalies. Upon verification of the number and type of samples and the requested analysis, a laboratory representative will sign the COC, indicating receipt of the samples. The Senior Chemist will review the COC and sample documentation and notify the client of anomalies.

The COC record form will be completed in duplicate. Upon sample delivery, the original copy will be left with the laboratory or by any recipient of the sample, and a copy will be kept by the sampler, three-hole punched (if for a binder), and placed in the field logbook.

Aquatic Pesticide Application Plan

**Application for Statewide General National Pollutant Discharge
Elimination System Permit for Residual Aquatic Pesticide Discharges
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Tahoe Keys Lagoons**

Attachment F

Sample Bottle Label

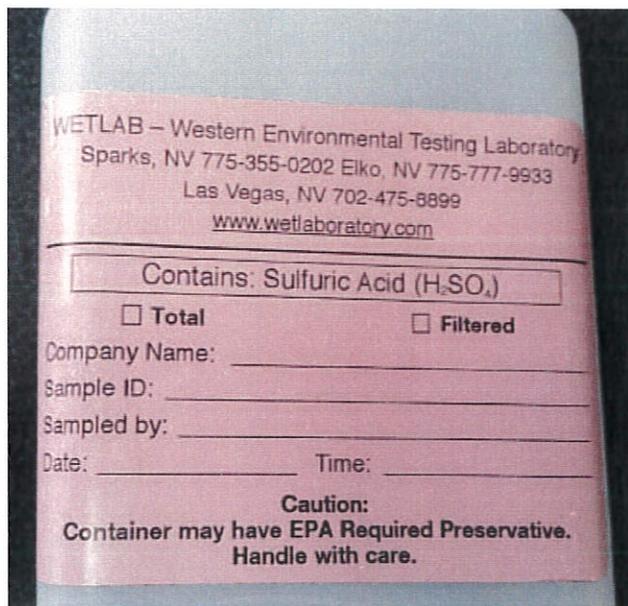
Sample Label

Prior to sampling, a water resistant label will be completed with waterproof ink and will be affixed to the appropriate container. The label will contain the following information on the specific project:

- (1) Unique Tahoe Keys IMP Project Sample ID), the unique individual sample ID (i.e. TKPOA Herb. Sample No. XXXX)
- (2) Date, time, the sample was collected.
- (3) Depth (ft or m) from surface where sample was collected
- (4) Initial of sampler collector

Sample Collection Record: For each sampling event, a log of samples collected will be generated that lists by TKPOA ID number for each sample taken. The Record will be signed by the person sampling each day and retained in a sample record notebook.

WETLAB- Western Environmental Testing Laboratory Sparks, NV 775-355-0202 Elko, NV 775-777-9933 Las Vegas, NV 702-475-8899 www.wetlaboratory.com	
Contains: Sulfuric Acid (H ₂ SO ₄)	
<input type="checkbox"/> Total	<input type="checkbox"/> Filtered
Company Name: _____	
Sample ID: _____	
Sampled by: _____	
Date: _____ Time: _____	
Caution: Container may have EPA Required Preservative. Handle with care.	



NOTE: The final sample bottle label used for the monitoring and reporting program put forth in the Aquatic Pesticide Application Plan may differ from that shown above. The label shown is an example of a previously utilized label for 2016 water quality sampling.