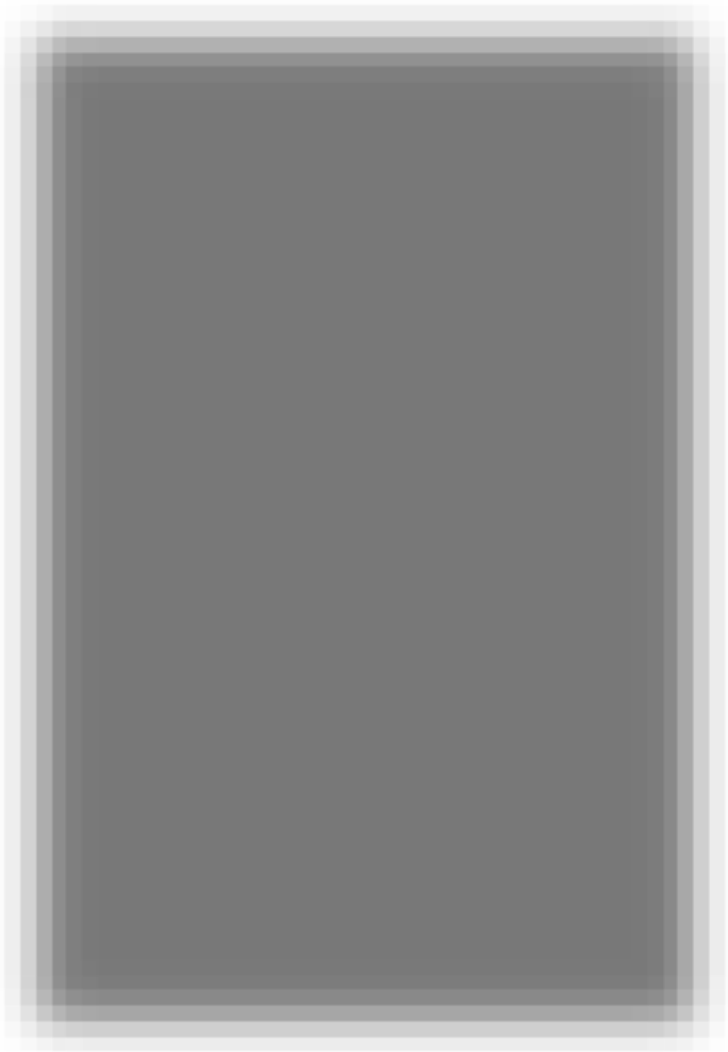
AMENDMENT 1
Aquatic Pesticide Application Plan

Application for Individual 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

for the

Tahoe Keys Lagoons Aquatic Weed Control Methods Test



February 28, 2022

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Tahoe Keys Lagoons Aquatic Weed Control Methods Test

Submitted to:

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EXECUTIVE SUMMARY: OVERVIEW OF AMENDMENT CHANGES

TKPOA submitted its Application for a Basin Plan Exemption (BPE), entitled Tahoe Keys Lagoons Aquatic Weed Control Methods Test Application to Test Combinations of Aquatic Weed Control Methods, to the Lahontan Regional Water Quality Control Board (Lahontan) on April 30, 2021. As part of April 2021 application, an Aquatic Pesticide Application Plan (APAP) was submitted as Appendix B.

Following the April 2021 APAP submittal, TKPOA prepared and submitted to Lahontan

on June 14, 2021 a revised Section 4, Monitoring and Reporting Program. This revised section included additional details on monitoring methods proposed for the CMT Project as well as a description of biological resources monitoring and evaluation.

This Amendment 1 to the APAP follows Lahontan approval of the CMT Project and NPDES Permit Order No. CA6202202 WDID 6A91701001 (NPDES Permit), with adoption of the Project Final EIR, including Appendix B, Mitigation Monitoring and Reporting Program (MMRP), all of which occurred January 13, 2022. Per NPDES Permit Section VI, Aquatic Pesticide Use Requirements, Subsection C. Aquatic Pesticide Application Plan (APAP), TKPOA must submit two APAP amendments and both amendments must be approved before an application event may occur. The first APAP amendment must be submitted within 45 days of approval of the NPDES Permit and the second at least 30 days prior to application of herbicides and rhodamine water tracer (RWT) dye.

This amendment contains updates identified in NPDES Permit Section VI.C. Changes are described in Table ES-1 below.

Table ES-1. Location of NPDES Required Amendments

NPDES Section No.	Requested Information	Amendment 1 APAP Section
VI. C. 1	The brand names of the aquatic herbicide products containing the endothall and triclopyr active ingredient formulations and RWT products to be used; the method by which they will be applied, including the calculated volume of herbicide that will be applied for each designated treatment area; and supporting data utilized to calculate volumes for application.	Section 5.1, Products to be Applied; Section 5.1.3, Example Calculations for Herbicide Volumes
VI.C.2	Plans to Prevent Sample Contamination	Section 5.2.3, Prevention of Sample Contamination
VI.C.3.a	Plans to prevent aquatic herbicide spill and for spill containment in the event of a spill.	Section 9.3, Measures to Prevent Spills and Spill Containment in Event of Spill
VI.C.3.b	Plans to ensure that the rate of application is consistent with the APAP and not to exceed proposed application rates specified in the APAP.	Section 9.4, Measures to Ensure Appropriate Use Rate
VI.C.3.c	The Discharger's plan for educating its staff and aquatic herbicide and Rhodamine WT applicators on how to avoid any potential adverse effects from the chemical applications	Section 9.1, Plan for Staff Training to Avoid Harm from Chemicals

NPDES Section No.	Requested Information	Amendment 1 APAP Section

VI.C.3.d	Plans to prevent aquatic herbicide migration to receiving waters adjacent to the main lagoon west channel entrance to Lake Tahoe and Pope Marsh downstream of Lake Tallac during treatment events.	Section 9.5, Plan to Prevent Migration of Herbicides
VI.C.3.e	Plans to respond to harmful algal bloom (HAB) outbreaks within treated areas following treatment events.	Section 9.6, Harmful Algal Bloom (HAB) Response Plan
VI.C.3.f	The decaying biomass of the invasive aquatic plants killed by the application may increase the biochemical oxygen demand in treatment areas and receiving waters. Measures and plans to ensure compliance with the Basin Plan DO water quality objective in treatment areas following the treatment event and receiving waters at all times must be developed and implemented.	Section 9.7, Plan to Respond to Decaying Biomass and Possible DO Reduction
VI.C.3.g	Measures to take in the event of an exceedance of receiving water limitations caused by the discharge of residual aquatic herbicides. Such measures must include, but are not limited to, ceasing the discharge, notifying Lahontan, and remedying the exceedance by implementing additional best management practices (BMPs) and control measures. The Discharger must take all reasonable steps to minimize or correct any non-compliance with this order resulting from aquatic herbicide and RWT discharges, including such as accelerated or additional monitoring as may be necessary to determine the nature, extent, and effect of the receiving water limitation exceedance.	Section 9.8, Measures to Take in Event of Exceedance of Receiving Water Limitations
VI.C.3.h	Measures to minimize sediment disturbance when installing and removing barrier curtains, installing and removing aeration diffusers and any other Project activities that disturb bed sediments in the Tahoe Keys Lagoons and Lake Tallac.	Section 9.9, Measures to Minimize Sediment Disturbance (Turbidity Curtain Installation/Removal)
VI.C.5	Proposed date(s) of treatment for each treatment area.	Section 9.10, Proposed Application Date

Additional changes to the APAP incorporated in Amendment 1 include the following: • Inclusion of Section 3.2.2, Proposed Change to CMT Sites 13, 14, and Lake Tallac Locations – Rationale and Basis (NPDES Permit Section VI.c.4)

- Amendment of Section 7.0, Description of the CMT Monitoring Program, to reflect the Revised Section 4, Monitoring and Reporting Program submitted on June 14, 2021 to Lahontan.
- Non-substantial formatting, grammatical, and other minor changes for consistency.

1.0 INTRODUCTION AND REGULATORY BACKGROUND

The Tahoe Keys Property Owners Association (TKPOA) has consulted with resource agency, regulatory agency, and other public, private, and non-profit stakeholders on various iterations of a project designed to test the use of Federal and California Environmental Protection Agency (EPA) approved chemical control methods as a means of managing the aquatic weed problem and meeting the objectives of its Waste Discharge Requirements (WDR) since 2014. Since 2016 TKPOA has prepared and submitted three comprehensive applications to the Lahontan Regional Water Quality Control Board (Lahontan) for an exemption to the Water Quality Control Plan for the Lahontan Region (Lahontan Basin Plan) prohibition on the use of pesticides:

1. January 17, 2017: Application for Exemption to the Basin Plan Prohibition on the Use of Pesticides for the Tahoe Keys West Lagoon Integrated Control Methods Test (ICMT).[1]
2. July 20, 2017: Amended Supplemental Application for Exemption to the Basin Plan Prohibition on the Use of Pesticides for the Tahoe Keys West Lagoon Integrated Control Methods Test (ICMT).
3. July 25, 2018: Tahoe Keys Lagoons Restoration Project – Application for Approval to Reduce Aquatic Invasive and Nuisance Plant Species

Each of these applications was accompanied by an application for a 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 (NPDES Pesticide Permit). An Aquatic Pesticide Application Plan (APAP) is a required component of the California State Water Resources Control Board (State Water Board) NPDES Pesticide Permit process for use of aquatic pesticides. The APAP developed in support of the 2017 exemption application (the ICMT) was revised in 2018 to reflect the project design of the 2018 exemption application (the Tahoe Keys Lagoons Restoration Project).

This APAP for the Control Methods Test (CMT) is based on the 2017 and 2018 APAPs but has been reviewed and revised again to ensure consistency with the Tahoe

Regulatory Planning Agency (TRPA) and Lahontan Regional Water Quality Control Board (Lahontan) Tahoe Keys Lagoons Aquatic Weed Control Methods Test Draft Environmental Impact Review/Environmental Impact Statement (DEIR/EIS). The CMT is similar to the previous projects proposed by TKPOA; however, it incorporates changes resulting from extensive reviews, discussions, and recommendations from TRPA and Lahontan staff in 2021. The CMT remains a small-scale pilot test to evaluate use of specific Federal and California EPA approved aquatic herbicides in combination with non chemical methods as a weed control strategy. The CMT is defined and analyzed in the July 2020 Draft Environmental Impact Report/Environmental Impact Statement (Draft EIR/EIS) for the Control Methods Test [Lahontan and Tahoe Regional Planning Agency

[1] A supplement to this application was submitted on July 20, 2017: Amended Supplemental Application for Exemption to the Basin Plan Prohibition on the Use of Pesticides for the Tahoe Keys West Lagoon Integrated Control Methods Test (ICMT)

(TRPA) 2020]. For a complete description of the CMT please see Chapter 2.0, Project Description and Alternatives of the Draft EIR/EIS (Lahontan and TRPA 2020), and the Basin Plan Exemption (BPE) Application (Tahoe Keys Lagoons Aquatic Weed Control Methods Test Project Application to Test Combinations of Aquatic Weed Control Methods).

This section provides background information on NDPES Pesticide Permit requirements, Lahontan's prohibition on the use of pesticides, and describes the contents of this APAP.

1.1 General State NPDES Pesticide Permit Requirements

The State Water Board on March 5, 2013 adopted a Statewide General NPDES Permit for Residual Aquatic Pesticide Discharges to Waters of the United States from Algae and Aquatic Weed Control Applications (General NPDES Pesticide Permit or General Permit). The General Permit identifies registered aquatic herbicides that may be used in waters of the US. The General Permit requires that dischargers seeking permit coverage submit an APAP with the permit application package to the State Water Board (Section II.C.3. Permit Coverage and Application Requirements, General Permit Application). When the General Permit application package and APAP are deemed complete, the Deputy Director of the State Water Board typically issues a Notice of Applicability allowing the discharger to apply aquatic pesticides in accordance with the requirements of the permit. However, after consultation and review of the initial application for a General Permit in June 2017, Lahontan determined that in this case an individual NDPES Pesticide Permit would be required for the Project. Under this permit condition, Lahontan will determine the acceptability of the herbicide(s) for use in the CMT.

On January 13, 2022, the Lahontan Board unanimously approved the application for a BPE, a NPDES Permit, and WDR for the CMT Project, including the application of herbicides.

1.2 Lahontan Regional Water Quality Control Board Exception to the Prohibition on the Use of Pesticides

Notwithstanding the widespread issuance and use of the General Permit for applications of aquatic herbicides and algaecides throughout California via other Regional Water Quality Control Boards since 2001, the Water Quality Control Plan for the Lahontan Region (Lahontan Basin Plan) prohibits the introduction of contaminants (including pesticides) in waters of Lake Tahoe at detectable levels. However, in 2014, an amendment to the Lahontan Basin Plan (Basin Plan Amendment) was approved by both Lahontan and the State Water Board. The Basin Plan Amendment provides criteria and procedures to apply for an exemption to the Lahontan Basin Plan prohibition of introducing aquatic pesticides into Lake Tahoe waters (see Lahontan Basin Plan, Section 4.1 Waste Discharge Prohibitions and Exemption Criteria for Aquatic Pesticide Use in the Lahontan Basin Plan). The Basin Plan Amendment has subsequently been approved by the Federal Environmental Protection Agency (EPA). In order to apply aquatic herbicides in the Keys lagoons, the criteria stated in the Basin Plan Amendment must be met, and

an approval must be obtained from Lahontan. The individual NPDES Pesticide Permit, (with APAP) is required as part of the overall process for obtaining an exemption under the Basin Plan Amendment.

On January 13, 2022, the Lahontan Board unanimously approved the application for a BPE, a NPDES Permit, and WDR for the CMT Project, including the application of herbicides.

1.3 Aquatic Pesticide Application Plan

This APAP directly addresses both the requirement under the NPDES Pesticide Permit approval process and the relevant Lahontan Basin Plan exemption conditions, including a Monitoring and Reporting Plan (MRP), developed in consultation with Lahontan. It satisfies criteria for use of aquatic herbicides and is a comprehensive description of proposed use of Federal EPA and California EPA/Department of Pesticide Regulation (CalEPA/DPR) registered aquatic herbicides, alone, and in combinations with specific “non-herbicide” tools [ultra-violet light (UV-C light) and Laminar Flow Aeration (LFA)]. Other non-herbicide methods may be employed as appropriate (hand-removal and bottom barriers).

The CMT will be implemented in several small (< 3-acre) test sites within the Tahoe Keys West Lagoon (also known as West Lagoon) and in three similar test sites in Lake Tallac (or one 2-acre site at the east end of Lake Tallac[2]). Two approved herbicides will be used in the CMT: either Endothall, Triclopyr, or florpyrauxifen-benzyl (ProcellaCOR®)[3] will be applied. Each of the approved aquatic herbicides will be applied alone in three “replicate” sites within the West Lagoon and one additional set of three endothall replicate sites

within Lake Tallac. Therefore, a total of nine (9) of the test sites will be used for testing herbicide alone.

In addition to these nine (9) sites, six (6) similar sites in the West Lagoon will be used in combination with ultraviolet (UV-C) light. These combination sites will require much less herbicide than the herbicide-only sites since part of the site will be treated with UV-C light. A similar set of three (3) sites will be designated as untreated control sites to compare the effects of the CMT.

The CMT utilizes three replicate sites for each type of treatment, and control sites, in order to provide replication needed for proper statistical analysis. The APAP describes: • the Keys lagoons, and the specific sites where aquatic herbicides will be applied; • the aquatic plants targeted for control;

- aquatic herbicides proposed to be used and associated comprehensive monitoring program and BMPs;
- rationale and justification for conducting the proposed CMT;

[2] See Section 3.2.2, Proposed Changes to CMT Sites 13, 14, and Lake Tallac Locations – Rational and Basis

[3] Florpyrauxifen-benzyl will only be used if approved by CDFA/DPR and, if approved, it would replace Triclopyr.

- containment, contingency and spill protection plans designed to protect Lake Tahoe and comply with NPDES permitting;
- seasonal pattern of flow of water in the lagoons;
- description of the CMT monitoring program including herbicide residues and biological monitoring for pre- and post-CMT project conditions;
- sample methods and guidelines;
- BMPs to be implemented to prevent mixing of herbicide between sites, and prevention of spills; and
- An MRP

2.0 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 West Lagoon, the East Lagoon, and Lake Tallac Lagoon. These three water features are considered the Keys lagoons, referred to throughout this APAP (Figure 1). Areas west and south of the development are under

the jurisdiction of the US Forest Service (USFS).

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 Keys lagoons including Lake Tallac is approximately 172 acres in size, or 0.3 square mile, a very small percentage of the surface area of Lake Tahoe, which is approximately 192 square miles. The Tahoe Keys are separated into the West Lagoon (113.6 acres), the East Lagoon (32.1 acres), and Lake Tallac (26.1 acres). The Keys lagoons have two narrow, direct connections to Lake Tahoe: the West Channel connects the West Lagoon, and the East Channel connects the East Lagoon. These channels provide the only direct boat access to Lake Tahoe from the Keys lagoons. Lake Tallac is periodically connected to the West Lagoon by a diversion structure (weir and gate) between the two water bodies. The west end of Lake Tallac also has an intermittent (seasonal) connection to Lake Tahoe via Pope Marsh during high water events. This connection can also be limited by a weir and gate structure.

Even though Lake Tallac has these situational connections to Pope Marsh and the West Lagoon, sections of Lake Tallac (e.g. the eastern end) can be hydraulically isolated from Pope Marsh. This isolation often occurs naturally during mid-summer low flows but can

also be achieved through use of physical barriers, such as impermeable turbidity curtains placed at the 15th Street culvert, or locations further east of 15th St.[4]

The Keys lagoons differ from Lake Tahoe in several ways (Table 1). The lagoons have shallow waters, approximately 20 to 30 feet at maximum depth (south of the West Channel) with an average depth of about 10 to 12 feet. Comparatively, Lake Tahoe is

1,645 feet at the deepest point with an average depth of 1,000 feet. The waters of the 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. Much of the Keys lagoons surface waters freeze for several months in the winter whereas Lake Tahoe never freezes apart from some accumulated ice cover at the shallow shorelines. The waters of the Keys lagoons are more turbid than the clear waters for which Lake Tahoe is famous. Lastly, the bottom layer of the Keys lagoons is composed of fine nutrient-rich 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.

There are no direct raw, potable surface water intakes located in or adjacent to the Keys lagoons. There are wells located within the lagoons that draw water from 150 to 430 ft. below the ground surface. The nearest surface, raw water/potable intake is in Lake Tahoe near Lakeside Marina, approximately 3.75 miles from the Tahoe Keys West Channel.

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	18-27°C	15-18°C
Volume (gal)	49×10^7	29×10^{12}
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 mile	12-22 miles
Plant Habitat	Entire Keys (95%)	Limited by energy effects and substrates
Water quality	Highly variable	Highly uniform
Urban Connectivity	Highly concentrated; high density	Diffuse and Patchy

[4] Note: The CMT includes herbicide applications ONLY in the Main Lagoon and Lake Tallac. No herbicides are proposed for use in the Marina Lagoon or in Lake Tahoe proper.

2.1 Beneficial Uses of the Tahoe Keys Lagoons

The Keys lagoons provide a range of multiple uses and ecosystem services, including: boating access to Lake Tahoe via the East Channel in the East Lagoon and via the West Channel in the West Lagoon; direct use of the waterways for motorized and non motorized recreation; fishing; birding; commercial and related businesses (East Lagoon); and aesthetic values including views of the waterways and of the surrounding mountains and Lake Tahoe. Not only do the invasive and nuisance aquatic plant infestations impair all these uses and services, they also affect the ecology of the lagoons by greatly suppressing the growth and abundance of desirable and beneficial native aquatic plants, and by impacting water quality and sediment conditions. Invasive and aquatic plant infestations may also indirectly stimulate harmful algal blooms (HABs). These infestations degrade suitable habitat for native fish, invertebrates, and waterfowl, and can pose harm to people and pets.

Overall, the unremitted growth and spread of invasive and nuisance aquatic plants in the lagoons adversely affect the water quality and ecosystems of the lagoons, and also threaten Lahontan Basin Plan identified beneficial uses of Lake Tahoe proper (UNR 2015- Chandra and Wittmann 2015). The results of the CMT will inform development and implementation of a comprehensive, integrated, and adaptive aquatic plant management plan for the Tahoe Keys that will significantly reduce detrimental impacts of invasive and nuisance aquatic plants and will reduce the threat of further spread of these plants into Lake Tahoe. The selectivity of the proposed herbicides for the target aquatic weeds, coupled with the physically targeted approach minimize impacts on non-target species.

The primary focus of the CMT is the West Lagoon, though there are test sites located in Lake Tallac (refer to Section 3.2.2). The West Lagoon contains the majority of private residences (700 individual private parcels) in the overall development and has many interconnected waterways and dead-end coves. The East Lagoon, connected to Lake Tahoe by the East Channel, contains both residences and commercial properties. This is the location of the Tahoe Keys Marina which is a (commercial and) separate business entity from the TKPOA. It is a privately owned and operated boat launching facility, and 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 conducting research activities on Lake Tahoe.

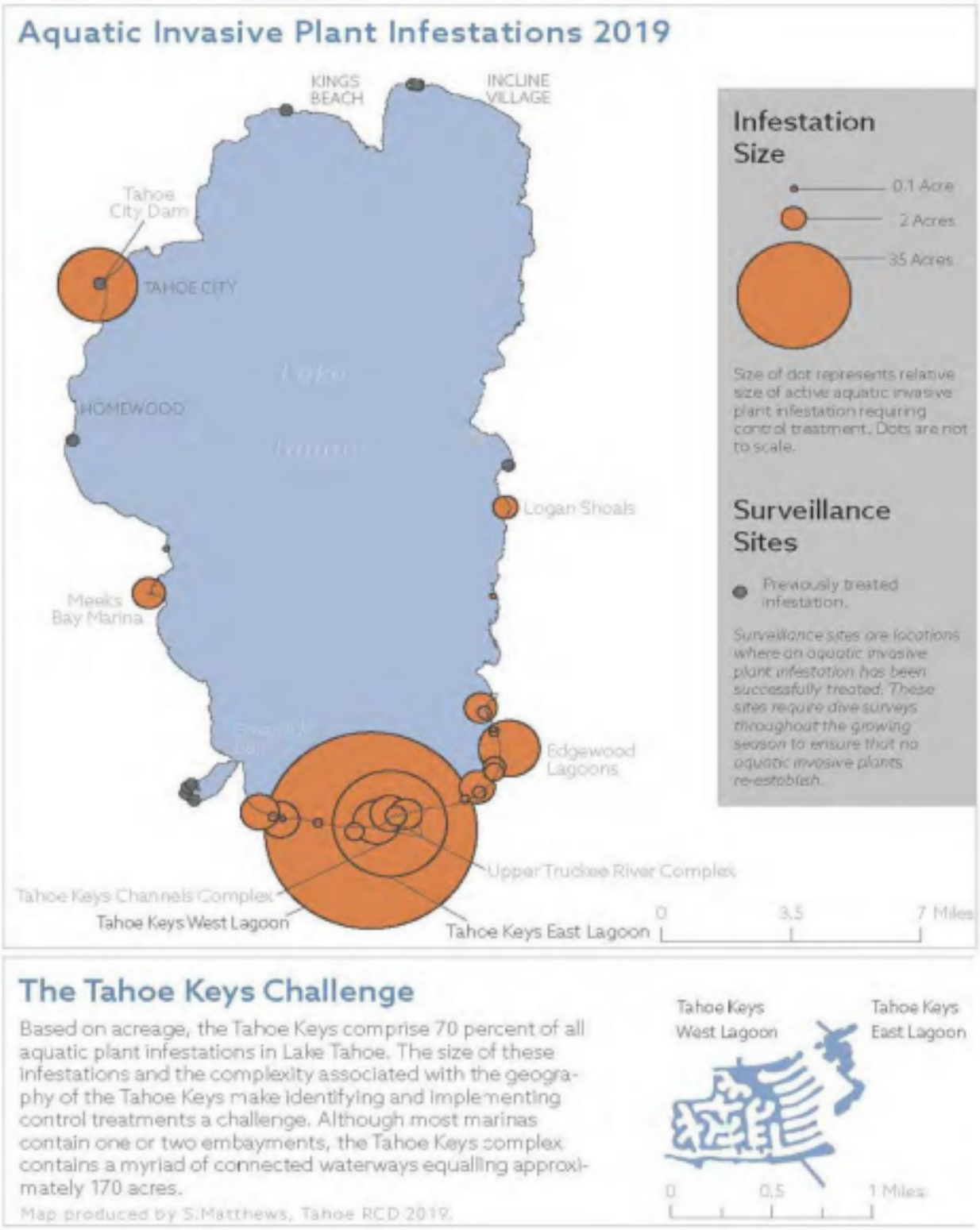
To limit the scope of the CMT, the East Channel and East Lagoon are *NOT* included, except for contingent water monitoring stations located outside the East Channel (see Figure 1). However, the similarities between the West Lagoon and East Lagoon suggest that results from the CMT would be applicable to similar infested sites within the East Lagoon.

2.2 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 40 years, and the resultant impacts on water quality and ecosystem services, many of the intended beneficial uses of the lagoons have become severely impaired. The current abundant growth of non-native plants provides habitat for non-native warm water fish and drives excessive variations in pH, dissolved oxygen (DO), and temperature. The excessive plant growth also contributes to sediment deposition and accretion as well as nutrient loading. The infestations also provide sources of continuing introductions of invasive and nuisance aquatic plants into Lake Tahoe near shore areas, small marinas, protected coves and Emerald Bay. These conditions and threats to Lake Tahoe are documented and described in the published report “Lake Wide AIS Implementation Plan” (UNR 2015). The highest priority action as stated in this report is the control of invasive aquatic plants in the Keys lagoons. The recent (2019) acreage of invasive aquatic weed infestations in Lake Tahoe and the Keys lagoons is shown in Figure 2.

Figure 2. Extent (acreage) of Invasive Aquatic Plants in Lake Tahoe and the Keys Lagoons



Source: Tahoe RCD, 2019

Surveys have shown that 85% to 90% of the available surface area in the lagoons is infested with invasive and nuisance aquatic plants (TKPOA 2019). These conditions have persisted for decades, in spite of intense 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 has not and 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. The increased presence of curlyleaf pondweed (CLP) (*Potamogeton crispus*) in near shore sites in Lake Tahoe attests to the growing threat to the lake ecosystem, as shown below in Figure 3. Although Eurasian watermilfoil and coontail have been the dominant weedy species since the 1980's, in 2003 small patches of curlyleaf pondweed were found in the West and East Channels. Perhaps most concerning is the steady increase in populations of curlyleaf pondweed, and its progressive establishment in Lake Tahoe nearshore areas. Figure 4 provides a synopsis of the expanding infestations (frequency of occurrence) of CLP from 2014 to 2021. During the past 6 years, curlyleaf pondweed has exhibited a **five-fold** increase in occurrence from about 10% to 52%. It is clear that the historic and current control tools have been insufficient to stem this threat to Lake Tahoe and to the ecosystem services within the Keys lagoons. This species has continued to spread within the Keys lagoons and has expanded its presence along the south shore; it has been identified within Elk Point Marina.

Figure 3. Composition of Curlyleaf Pondweed within the Lagoons Based on Survey Data Collected in July 2015, 2017 and 2020

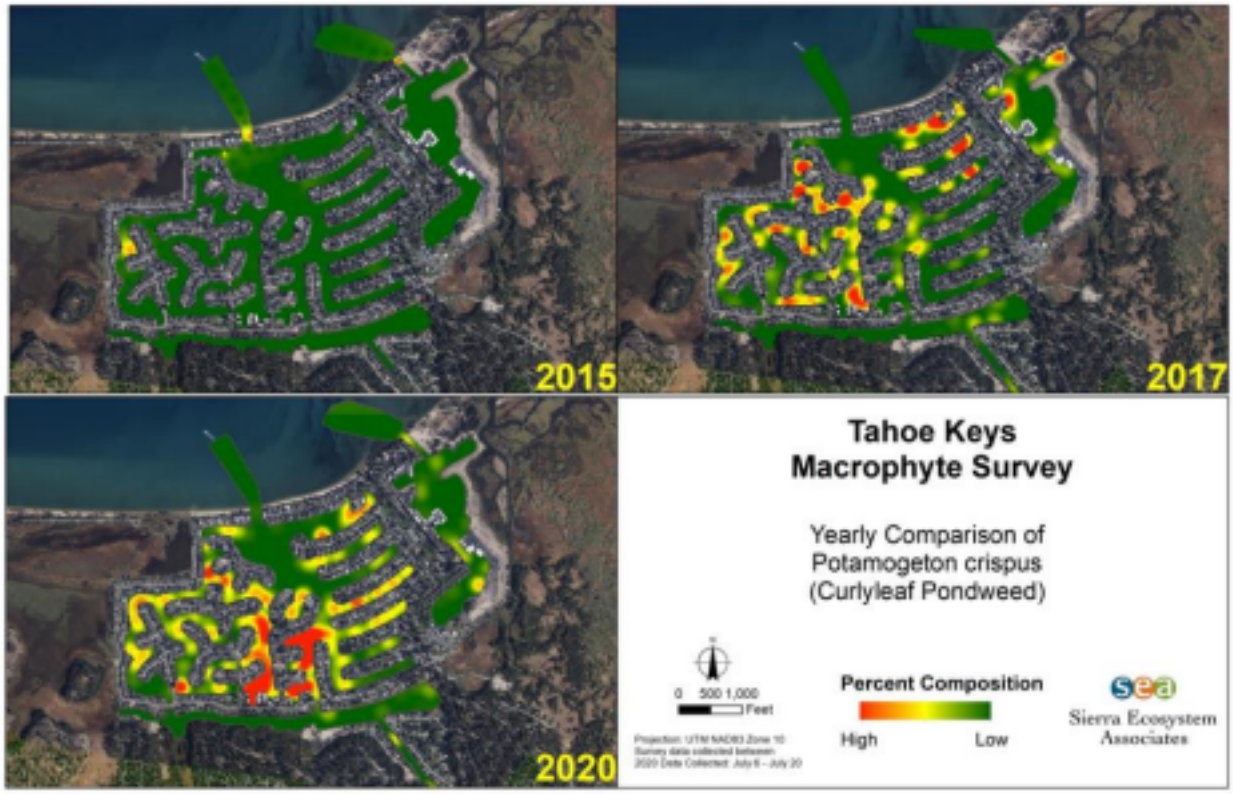
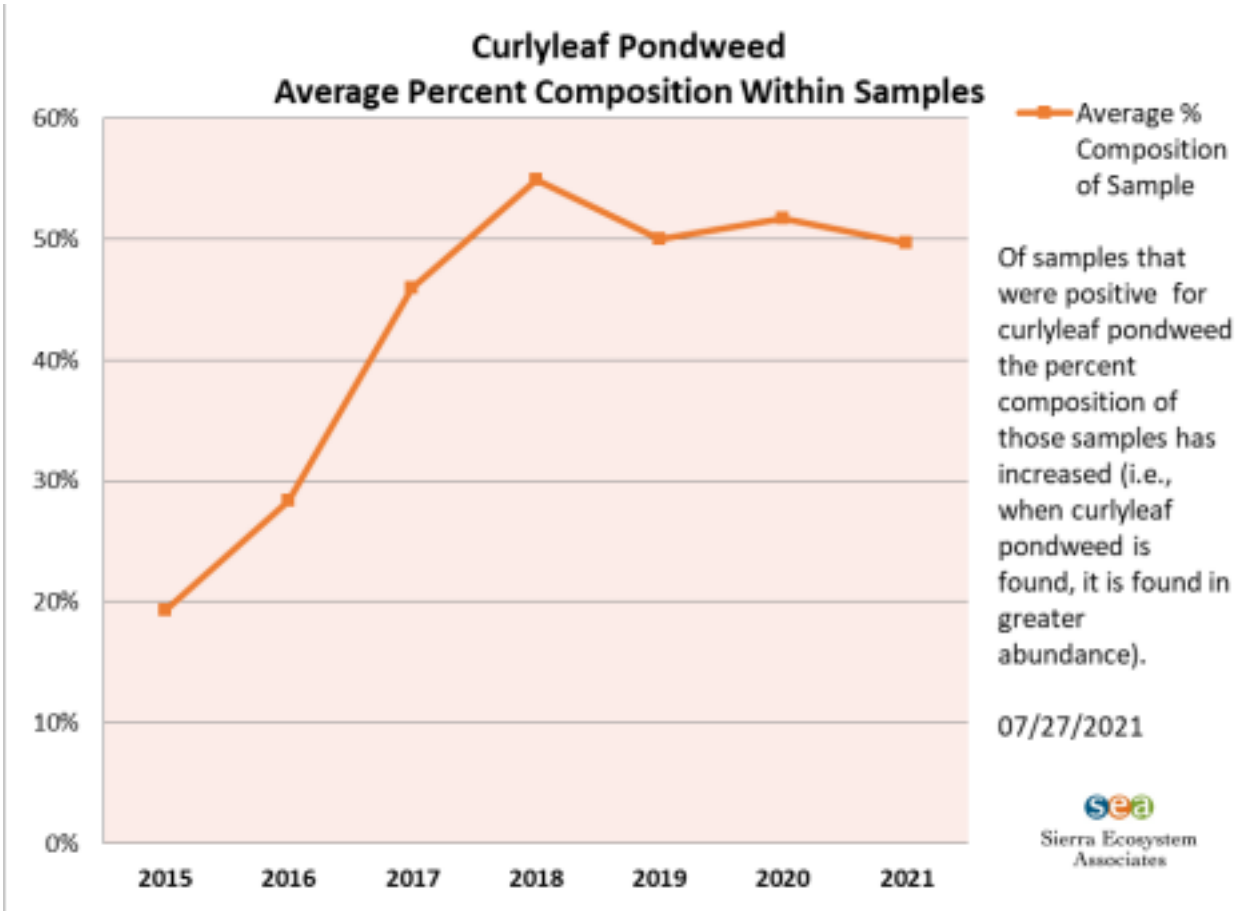


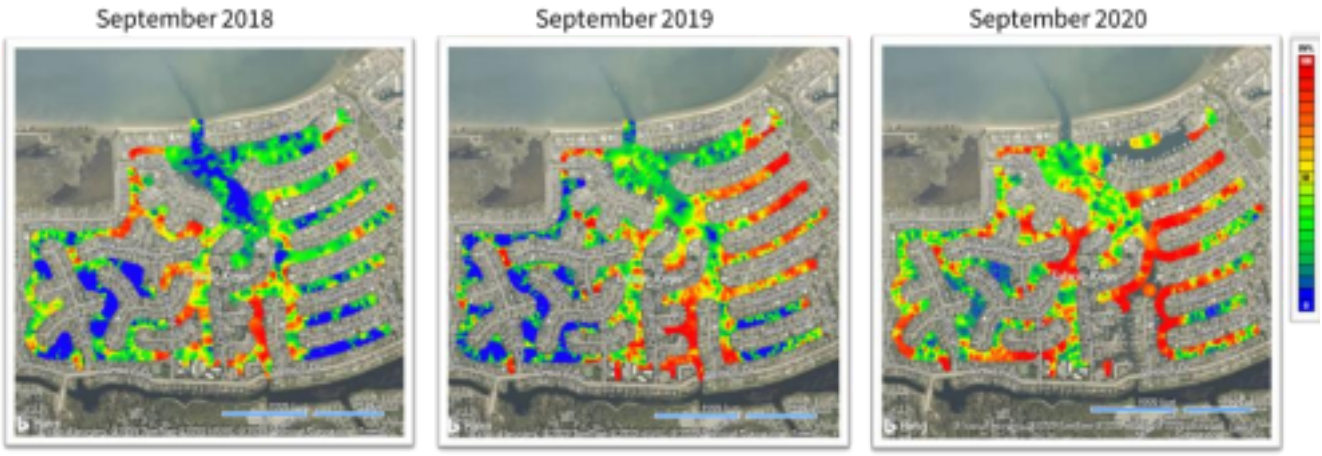
Figure 4. Yearly Frequency of Occurrence of Curlyleaf Pondweed in Keys Lagoons from 2014 to 2021



The continued presence of excessive aquatic plant weed growth in the Keys lagoons is due to several environmental conditions including nutrient rich sediment, stable, protected water with low energy (little wave action), and shallow water that provides sufficient light and temperatures that rise quickly in spring. Coupled with these conditions, the mechanical control method (harvesting) generates thousands of viable plant fragments that re-root and start a new infestation. This excessive growth, which persists throughout the summer during the period of high vessel traffic, will continue to threaten Lake Tahoe's ecosystem unless improved management methods are employed. Figure 5 displays hydroacoustic scans[5] of the West Lagoon taken in September 2018, 2019, and 2020. The graphic provides a snapshot of the increase in overall plant cover. In the graphic, red indicates that 100% of the water column contains plant matter, while blue indicates that 0% of the water column contains scan-detectable plant matter.

[5] Hydroacoustic scanning uses sonar technology to scan the water column of a water body to determine and record the average surface water temperature, presence of plant matter, plant height, and biovolume.

Figure 5. Main Tahoe Keys Lagoon Invasive and Nuisance Aquatic Plant Cover
(Hydroacoustic Scans September 2018, 2019, & 2020)



2.3 Aquatic Plant Control Methods Used Now and in the Past Years

The following section provides an overview of WDR-approved weed control activities. WDR-approved indicates the activity is included in TKPOA's existing WDR as an activity that TKPOA may undertake without any additional consultation or permitting with Lahontan. The WDR-approved activities undertaken by TKPOA have consistently included mechanical harvesting and the use of up to five (5) acres of bottom barriers. The WDR also direct TKPOA to employ best management practice measures to limit the spread of viable plant fragments during aquatic weed harvest operations. Consistent with this direction, TKPOA implements a robust fragment control program as part of its WDR
approved AIS control activities.

2.3.1 Mechanical Harvesting

The prohibition on the use of aquatic herbicides in the Tahoe Keys necessitated the use of alternative (non-chemical) aquatic weed management methods over the past 40 years. From the 1980's until 2021, the only management method routinely used was (and still is) diesel powered mechanical aquatic plant harvesters coupled with on-shore removal.
Harvesting is not a method for reducing overall aquatic weed growth. Rather, it is a management technique to maintain navigable waterways and other beneficial uses (e.g. contact and non-contact water recreation), including the objective of maintaining a minimum 3-ft hull clearance to minimize transport of weeds from the lagoons into Lake Tahoe by watercraft.

TKPOA's harvesting operations take place during the aquatic weed growing season. This ranges, depending on the winter snowpack and air temperatures, from as early as May through October, to as late as early July through October. During this time between three (3) to five (5) TKPOA-owned harvesters cut the tops of the plants (canopy) down to approximately a five-ft depth and attempt to 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 trucked to a compost site

outside

the Tahoe Basin. During the past 30 years, there has been a trend toward increasing mass of harvested weeds. Over the past few decades, the volume of weeds harvested has significantly increased from around 100 cubic yards (yds^3) in 1984 to more than 8,000 yds^3in 2020[6].

Effective harvesting of the lagoons is challenged by multiple factors. The cutting heads of harvesting machines 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. Because many coves and open water areas within the lagoons are greater than 10 feet deep, the harvesters leave rooted plants intact which readily re-grow in a week or two. Given these limitations, TKPOA estimates the harvesters remove only up to 50% to 60% of plant biomass in areas where they can operate. This method results is only partial, temporarily cleared sites. TKPOA has observed that 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 temporarily clearing navigation zones, the action of harvesting produces many thousands of plant fragments per harvested acre. A TKPOA 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 (TKPOA 2014). For Eurasian watermilfoil and coontail, even fragments as small as 2cm to 4cm can establish and proliferate into new infestations either in the Keys lagoons or in Lake Tahoe near shore areas. In addition, shoot fragments of curlyleaf pondweed can contain dozens of viable turions, each of which can sprout and establish new populations if they lodge on the bottom in suitable habitats. These fragments and turions (which can remain dormant for several years) increase the threat of infestation to Lake Tahoe proper, and also present a threat to other lakes if they are entrapped on boats and trailers leaving Lake Tahoe (Riis et al. 2006; Jianng et al. 2004; Barrat-Segretain and Bornette 2000; Barnes et al. 2013; Vander Zanden, M.J., J.D. Olden 2008, Brainard et al. 2021).

2.3.2 Fragment Capture

TKPOA has taken several steps (some in cooperation with others such as the League to Save Tahoe and TRPA) to reduce the movement of plant fragments to Lake Tahoe. They include: 1) invested in and deployed various new fragment collection devices including up to seven types of vessels dedicated to skimming fragments from the surface of the lagoons (skimmer boats); 2) installed and promoted “a boat backup station” just inside the west channel to encourage boats to reverse their props and release attached plants before exiting the Keys Lagoon to Lake Tahoe; and 3) in spring 2018, installed a “bubble curtain” and stationary collection bin (Seabin) at the West Channel in an attempt to

[6] Prior to 2017, there was no standard protocol for reporting the amount of weeds harvested per year, resulting in over reporting. Since 2017, TKPOA has adhered to a standard protocol for quantifying harvested weeds.

provide a physical barrier to fragment movement outside the lagoon. While these methods retain some fragments, other fragments escape and continue to threaten Lake Tahoe.

2.3.3 Other Non-Herbicide Methods

Since 2012, other types of non-chemical methods have been tested or observed in small, typically shallow areas within the Keys lagoons including hand removal, bottom barriers (both synthetic and natural fiber “jute”), and occasional dredging in the West and East Channels. In 2015, during dredging of the West Channel to improve navigation, aquatic plants were removed. Within one season, plants had become re-established, including Eurasian watermilfoil and curlyleaf pondweed. Use of bottom barriers has been permitted in localized areas up to a total of five acres; however, results have shown that re
infestation on top of the barriers frequently occurs.

3.0 DESCRIPTION OF THE TREATMENT AREAS

The CMT would be implemented only in the West Lagoon and Lake Tallac. No herbicides would be applied in Lake Tahoe proper or in the East Lagoon. Movement of applied aquatic herbicides into Lake Tahoe will be prevented by the following test location characteristics and proposed containment actions (see Section 5.0 and Section 6.0 for details for specific methods).

The following summarizes actions designed to prevent movement of herbicides into Lake Tahoe:

a) Use of mainly “dead-end” coves where water movement is stable for several

weeks demonstrated by previous Rhodamine Dye studies.

b) Net influx of water from Lake Tahoe into the Keys Lagoons during spring-to summer snow melt. The net influx results in an increase in the volume of 300 to 400 ac ft between May and late July.

c) Deployment of floating (surface to bottom) impermeable curtains located strategically to isolate areas containing treatment sites.

d) Distance of treatment sites from the West Channel, including avoidance of the large (19 acre) “diffusion zone” south of the West Channel (see Figure 11). e) Use of extensive monitoring for herbicide active ingredients and, where necessary, their known degradants in addition to use of real-time tracking with RWT dye as a surrogate to estimate movement(s) and dilution of dissolved herbicides. f) Contingency plans to respond to the occurrence of herbicide residues if their level(s) threaten to enter Lake Tahoe proper.

g) BMP and spill prevention protocols to ensure that only the permitted levels and amounts of herbicide will enter the specifically identified treatment plots.

For the originally proposed Lake Tallac “herbicide-only” sites, the proposed area is slightly less than one acre in order to: 1) fit them into the area east of and away from the direct influence of the primary stormwater inflow channel, and 2) provide space to differentiate treatment effects between the three (3) sites. The revised proposed Lake Tallac site (see Section 3.2) is approximately two (2) acres and is located on the east side of the lake
along the shoreline. This site is also behind the turbidity curtain and protected from the direct influence of the primary stormwater inflow channel that conveys runoff from upslope City of South Lake Tahoe neighborhoods.

Refer to Section 9.0, Description of BMP’s to be Implemented for additional discussion on prevention of herbicide migration.

3.1 Scale of Specific Treatment Areas

Although more than 90% of the 172-acre lagoons surface area supports dense growth of non-native and nuisance aquatic plants, the CMT involves application of herbicides among 15 discrete test sites: nine (9) separate small plots with herbicides alone (13.3 acres total) and six (6) plots with combinations of herbicides and UV-C light treatments

(10.4 acres total). Together, the total area to which herbicides will be applied is 16.9 acres. This is approximately 10% of the total surface area of the lagoons and Lake Tallac (172 acres). For the West Lagoon alone, the 12 herbicide sites there represent only 15% of the surface area. For Lake Tallac, the herbicide treatments are only 11% of the total area.

It is important to note that for the herbicide/UV-C (combination sites), herbicides are only applied to a small shoreline-to-dock area (3.6 acres total).

The herbicides selected are targeted for effective treatment of Eurasian watermilfoil

(*Myriophyllum spicatum*), curlyleaf pondweed (*Potamogeton crispus*), and coontail (*Ceratophyllum demersum*). Chapter 2.0, Project Description and Alternatives of the Draft EIR/EIS for the Control Methods Test (Lahontan and TRPA 2020), describes the proposed locations of test sites, including untreated "control" sites. The location of the CMT sites are listed below in Table 2 (Table 2-1 of the Draft EIR/EIS) and shown below in Figure 6 (Figure 2-4 in the Draft EIR/EIS).

Table 2. Proposed Site-Specific Acreages for Herbicides and Non-Herbicide Combination Treatments in the CMT[7]

Site Number	Treatment	Area (ac)	Herbicide Treated Area
1	Herbicide	1.5	1.5
2	Herbicide	1.5	1.5
3	Herbicide	2.1	2.1
5	Herbicide	2.2	2.2
8	Herbicide	1.6	1.6
9	Herbicide	1.5	1.5
10	Herbicide/UV-C Light	2.0	0.7
11	Herbicide/UV-C Light	1.6	0.5
12	Herbicide/UV-C Light	1.9	0.7
13	Herbicide/UV-C Light	1.7	0.6
14	Herbicide/UV-C Light	2.0	0.7
15	Herbicide/UV-C Light	1.2	0.4
16	Control	1.8	0.0
17	Control	2.2	0.0
18	Control	1.5	0.0
19	Herbicide	1.0	1.0
20	Herbicide	1.0	1.0
21	Herbicide	0.9	0.9
22	UV-C Light	1.5	0.00
23	UV-C Light	1.6	0.00
24	UV-C Light	1.8	0.00
25	LFA	4.1	0.00

26	LFA	6.1	0.00
27	LFA	2.7	0.00
	Total acreage:	41.7	16.9

Source: Table 2-1 of the Draft EIR/EIS
Note: The numbers 4, 6, and 7 are not used in the site numbering; there will be 24 sites Note: Total acreage does not include control site acreages.

[7] Table 2-1 from the Draft EIR/EIS. Acreages shown in Table 2, CMT Year 1 Proposed Treatment Activities, are rounded to the nearest tenth. The sites may be adjusted after biological survey in the spring prior to application, but the herbicide treated areas will remain (and not exceed) 16.9 acres.

Figure 6. Anticipated Locations of CMT Sites, Control Sites, and Curtain Barriers in the West Lagoon and Lake Tallac

3.2 Rationale and Basis for Site Selections

The following sections explain the basis for the selection of CMT treatment sites, including rationale for the original placement of CMT treatment locations, as well as for

the newly proposed locations and sizes presented in this APAP Amendment 1. Of note, final site selection will be identified in April 2022 (at least 30 days prior to anticipated herbicide application) and will be included in the second amendment of this document.

3.2.1 Overview of Rationale and Basis for Originally Proposed CMT Site Selections

Each herbicide-only test site shown in Figure 6 (above) has been selected to represent typical aquatic plant species distribution based on historic sampling and surveys, and each site within the West Lagoon is a “dead-end” cove. Use of dead-end coves 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 at least nine (9) sites are needed. Furthermore, the minimum size (area) for each site is at least 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. Because these parameters vary with depth in normal conditions, sites need to encompass typical bathymetric conditions in the Keys lagoons.
d) Sufficient size to minimize unusual conditions that may occur in 500 or 1,000 square feet. An acre (43,560 sq.ft.) typically encompasses variations of plant populations common with other sites of similar size in the Keys lagoons based upon historic physical point sampling.
e) Assignment of herbicides to treatment sites. Plant surveys conducted in the summer prior to the year of implementing the CMT will be used to initially determine which herbicides are applied to each site based on the relative abundance of the target species. For example, triclopyr and florpyrauxifen-benzyl (ProcellaCOR™) are particularly efficacious on Eurasian watermifoil; whereas endothall is effective on Eurasian watermilfoil as well as the other target species (Table 3). The final herbicide/site selections (either endothall, triclopyr, or florpyrauxifen-benzyl) will be determined following aquatic plant surveys conducted within approximately 14 days prior to applications of herbicides.

There are nine (9) test sites proposed for herbicide-only applications: three (3) sites will be assigned to each herbicide providing replications needed for proper statistical analysis. In addition, three (3) other sites are assigned as untreated “control” sites and six (6) other sites will be used to assess combinations of UV-C/herbicides. The control sites provide reference conditions by which the responses to the herbicides can be measured and quantified. The control sites monitoring also provide a baseline metric of “beneficial use conditions” for assessment over the subsequent two years. Water depths vary with seasonal snowpack 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. Quantity of herbicide used will depend upon total volume of water in the treated sites. However, the target herbicide final concentration will remain as provided in Table 3.

3.2.2 Proposed Change to CMT Sites 13, 14, and Lake Tallac Locations – Rationale and Basis

The locations of the new CMT Sites 13, 14, 19, 20, and 21 have been selected to provide similar conditions (as stated in Section 3.2.1) and also to provide distance between CMT herbicide sites and the West Channel that connects the West Lagoon with Lake Tahoe proper. At the time of the original site assignment, concerns about overall boat traffic and interference with “recreational” access were not primary issues; the main issue was placement of double curtain barriers to isolate CMT herbicide sites from the main part of the West Lagoon (and therefore from the West Channel). Additionally, subsequent to the original CMT site selections, the EIR/EIS and TRPA reviews pertaining to recreational vessel access became evident. Furthermore, practical issues related to general public access to the West Lagoon (not just TKPOA homeowners/boaters), and the need to secure the integrity of barrier curtains, prompted a re-examination of one site that required three sets of double curtains (original Site 14).

The following rationale supports APAP Amendment 1 proposed changes in the CMT sites:

- Review of July 2021 aquatic plant surveys shows more native *Elodea canadensis* in prior site 14 and more prevalence of curlyleaf pondweed (a major CMT target species) in the proposed site 14. This suggests that the proposed site 14 provide a better location for accomplishing the goals of the CMT while reducing the amount of herbicide needed to conduct the CMT project.
- Relocation of Site 14 would move the first herbicide treatment area farther from the West Channel connection with Lake Tahoe.
- The size of Sites 13 and 14 would be reduced (from approximately 2 acres each to

about 1 acre each) and two (2) sites would be removed from Lake Tallac; the size of Site 19 would increase (from 1 acre to 2 acres); this would result in a net reduction in total acreage to be treated with herbicides. Therefore, the total volume of herbicide to be applied during the CMT Project would be reduced.

- Relocation of Site 14 would also reduce the number of necessary turbidity curtains and the risk of barriers being breached or potentially leaking.
- Movement of Site 14 would improve the logistics of UV-C treatment of combination sites and further permit the use of a TKPOA ramp for launching for numerous monitoring activities associated with the CMT Project.
- Movement of Site 14 would reduce the number of docks blocked by turbidity curtains during the CMT project, thereby reducing recreational impacts during the herbicide testing portion of the CMT Project.

The new proposed sites 13, 14, 19, 20, and 21 are shown in Figure 7 below. Table 3 provides the revised acreages for the CMT Project treatment locations.

Figure 7. Revised Proposed CMT Treatment Site Locations

Table 3. Proposed Revised Site-Specific Acreages for Herbicide and Non-Herbicide Combination Treatments in the CMT

Site Number	Treatment	Area (ac)	Herbicide Treated Area

1	Herbicide	1.5	1.5
2	Herbicide	1.5	1.5
3	Herbicide	2.1	2.1
5	Herbicide	2.2	2.2
8	Herbicide	1.6	1.6
9	Herbicide	1.5	1.5
10	Herbicide/UV-C Light	2.0	0.7
11	Herbicide/UV-C Light	1.6	0.5
12	Herbicide/UV-C Light	1.9	0.7
13	Herbicide/UV-C Light	1.0	0.5
14	Herbicide/UV-C Light	1.0	0.5
15	Herbicide/UV-C Light	1.2	0.4
16	Control	1.8	0.0
17	Control	2.2	0.0
18	Control	1.5	0.0
19	Herbicide	2.0	1.0
20	Control	1.0	0.0
21	Control	1.0	0.0
22	UV-C Light	1.5	0.0
23	UV-C Light	1.6	0.0
24	UV-C Light	1.8	0.0
25	LFA	4.1	0.0
26	LFA	6.1	0.0
27	LFA	2.7	0.0
	Total acreage:	39.9	14.7

Note: The numbers 4, 6, and 7 are not used in the site numbering; there will be 24 sites
Note: Total acreage does not include control site acreages

Results of the changes on estimated herbicide volumes are shown in the Table 4 below.

Table 4. Comparison of Original CMT Sites 13, 14, and Lake Tallac vs Proposed Site Changes

Site	Prior L. Tallac	Proposed L. Tallac	Prior #14 Combo*	Proposed #14 Combo	Prior #13 Combo	Proposed #13 Combo	Total Reduction
Acres	3	2	2	1.1	1.3	1.0	
Est. Herbicide ac ft	45	30	3.5	2.35	3.05	1.85	
lbs. Endothall herbicide	243.9	162.6	18.97	12.74	16.53	10.03	
lbs. Difference		-81.3		-6.23		-6.5	**94.03**

Final sites shall be identified in April 2022 (30 days prior to application), following completion of pre-treatment macrophyte point sampling and hydroacoustic scanning, and shall be submitted to Lahontan for approval.

4.0 DESCRIPTION OF TARGET AQUATIC PLANTS TO BE CONTROLLED

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

4.1 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-ft 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 or from seeds (Thum and McNair 2018).

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.

Myriophyllum spicatum L.

4.2 Curlyleaf Pondweed (*Potamogeton crispus* L.)

Curlyleaf pondweed (*Potamogeton crispus L.)* is found in all 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, asexual 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; Turnage et al. 2018).

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

4.3 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

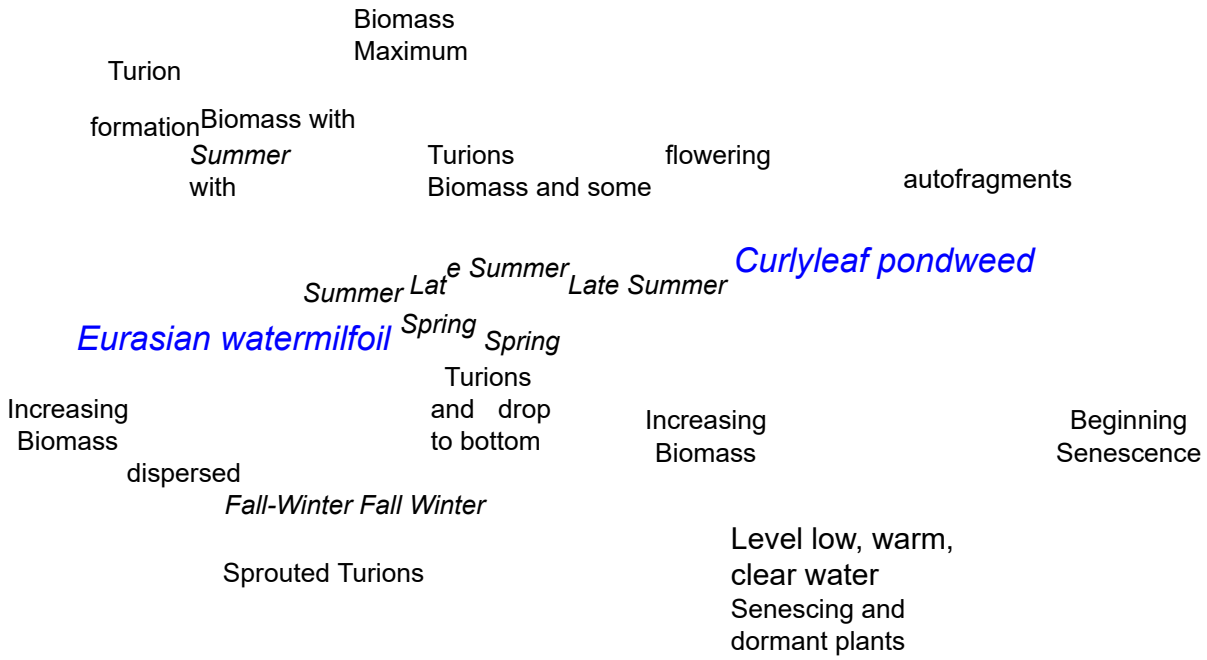
The life cycles of the three target plants differ in important ways and these differences can affect the strategies for management. All three plants undergo rapid growth in early to late spring when water temperatures exceed 12^{o}C. All three species can form new plant colonies from vegetative fragments 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 (CLP) 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, as shown in Figure 8 below. For both species, one of the most effective times for herbicide application is spring which can stop biomass production, control small,
sprouted CLP turions, and also prevent the production of new

turions. **Figure 8. Life Cycles of Eurasian Watermilfoil and CLP**

Early Summer:
Lake Level high,
cold water



Early Fall: Lake

5.0 AQUATIC HERBICIDE PRODUCTS PROPOSED FOR USE AND APPLICATION METHODS

Aquatic herbicides have been used effectively and safely in the United States, including California, for over 60 years to control and manage aquatic weeds in lakes, rivers, ponds, aquaculture production systems and irrigation systems. In California and other

western states, the same herbicides that are proposed for use in this test Project are being used effectively and safely to manage the same invasive/nuisance plants in similar settings. The use of aquatic herbicides is regulated by the Federal EPA and by individual states. In California, aquatic herbicides are regulated by the CalEPA/DPR. Only those aquatic herbicide products that have been reviewed extensively by the Federal EPA and CalEPA/DPR and have received a "registration" (i.e., approved label) can be applied to, or in, water to control aquatic vegetation.

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(s) (concentration(s)) of use, proper methods of application, proper equipment, protective clothing, and proper disposal of product containers after use. EPA and CalEPA/DPR labeling also provides specific limitations and compliance actions regarding uses in or near potable water, distances permitted to potable water takeouts, and water used for irrigation, swimming, or fishing. Products proposed must be applied only by a Certified Applicator (e.g., California Certified Applicator) and with an approved NPDES Pesticide Permit.

5.1 Products to be Applied

Two of the aquatic herbicides proposed for use in this APAP are fully registered (approved) by the Federal EPA and CalEPA/DPR *and* are included in the NPDES Pesticide Permit: 1) Endothall (Aquathol-K or Cascade®)[8] and 2) and Triclopyr (Renovate 3 and Renovate OTF)[9].

The third herbicide, florpyrauxifen-benzyl (ProcellaCOR™) has been approved by the Federal EPA (2018) and is under review by the CalEPA/DPR and is expected to be approved sometime in 2022. NPDES Permit NO. CA6202202 WDID 6A091701001 provides a reopener provision, should ProcellaCOR be approved by CalEPA/DPR, under which the permit may be reopened to add or modify requirements associated with the application of ProcellaCOR[10].

[8] Herbicide Labels and SDS sheets are included in Attachment 2 of this document. Aquathol-K and Cascade are equivalent products; Cascade is a newer label.
[9] Herbicide Labels and SDS sheets are included in Attachment 2 of this document.
[10] NPDES Permit Section VIII.C.1. Reopener Provisions (pg 21).

5.1.1 Rationale for Proposed Herbicide Use Rates (Targeted Concentration in Water)

The efficacy of aquatic herbicides depends on four variables: Concentration Exposure

Time (CET), *and susceptibility of the target plant*. The goal is to optimize CET for a given target plant *and specific conditions*. Furthermore, BMPs require that the *least amount (concentration) of herbicide be used to achieve the efficacy needed.* For the three targeted species in this APAP, published literature (including approved product labeling) coupled with on-site mesocosm studies have demonstrated that the maxium allowable levels for the proposed herbicide are not required. The primary conditions driving use of lower than maximum rate are the known susceptibilities of the target plants coupled with the long detention time (2 to 3 weeks) of dissolved materials within the proposed test sites based on RWT dye studies.

5.1.2 Proposed Herbicide Use Rates

Table 5 lists the proposed herbicides and the use rate proposed in the CMT. Herbicide only treatments will be made to a total of 9 sites (3 replicates per herbicide type). An additional six (6) sites will be UV-C/herbicide "combination treatment" (combo) sites in which only the near-shoreline (dock line to shore) area will be treated with herbicide. UV C light treatments will be made in the main (central) areas of these coves. Tables 2 and 3 and Figures 6 and 7 (see Section 3.0) show the specific treatment sites and acreages within the CMT area. Figure 9 shows how the combination treatments (herbicide and UV C light) will be made. The herbicide treated areas and associated water volume in these combination sites are small since the herbicide is only applied to a narrow band of water from the outside edges of the docks to the shore.

Table 5. List of Herbicide Products, Proposed Rates and Application Methods for Use in the CMT

Herbicide Active Ingredient (Product name)	EPA Reg. No. (All on Calif. General NPDES Permit)	Maximum allowable concentration (ppm)	Proposed Concentration (ppm)	Application Method (s)	Target Plants Controlled product labeling
Endothall (Aquathol-K) Contact type w/ some systemic characteristics (Cascade)	EPA Reg. No. 70506-176 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
Florpyauxifen benzyl (ProcellaCOR™) Systemic type	EPA Reg.No. 67690-79	0.050	**0.004-0.006**	Drop hoses	Eurasian watermilfoil Curlyleaf pondweed

*No Adjuvants will be used. Only products approved for use under the Lahontan Regional Water Quality Control Board NPDES permit will be used.
*All proposed rates are less than half the maximum allowable (see 5.1.1).

5.1.3 Example Calculations for Herbicide Volumes

For the application of general herbicide and RWT dye, for any active ingredient (solute) concentration in an aqueous solution, to achieve 1ppm requires 2.71 lbs per acre-foot (ac ft).

For example, to produce a 1ppm concentration in a 1-acre site that is 15 ft deep (=15 ac ft) would require: 2.71 X 15= 40.65 lbs. To produce 2.0 ppm requires 81.3 lbs.

For the CMT treatment sites, the volume (ac ft) of water will depend on the bathymetry (depth contours of the fingers and channels). Bathymetry of treatment areas will be determined by two methods:

- Hydroacoustic scans (sonar-scans that allow calculation of volume) • Physical depth measurements using a hand-held depth finder and calibrated pole in each CMT site. For herbicide only sites, measurements will be taken for the entire treatment area. For combination sites, measurements will be taken in the dock-to-shoreline zone[11].

For physical measurements, typically 50 to 60 measurements are taken to encompass the deep and shallow zones. Volume is then calculated based on the proportion of the site for deep areas (typically middle) and near shore areas.
Equations presented below shall be used to determine the correct amount of formulated herbicide product for each herbicide and combination treatment site:

- Cascade, or Aquathol-K - active ingredient (endothall, K salt) is 4.23 lbs/gallon. Therefore, a 15 ac ft combination site would require 19.22 gallons of product to achieve 2 ppm

  15 ac ft x 2.71 lbs/ac ft x 2 ppm = 19.22 gallons

- Renovate 3 - active ingredient (triclopyr) is 3.0lbs/gallon. Therefore, a 15 ac ft site would require 13.55 gallons of product to achieve 1 ppm concentration.

  15 ac ft X 2.71lbs/ac ft x 1 ppm= 40.65 lb ÷ 3 lb/gal= 13.55 gallons

- Renovate OTF - 10% active ingredient by weight (i.e., the product is 90% inert). Therefore, a 3 ac ft combination site would require 81.3 lbs of product to achieve 1 ppm concentration.

  3 ac ft X 2.71 lbs/ac ft x 1 ppm = 8.13 lbs ÷ 10% =81.3 lbs product

[11] For the combination sites, the total ac ft to which herbicides are applied will be relatively small compared to the volume of the entire site. For example, a typical combination site volume to which herbicides are applied would be 2.5 to 3.5 ac ft. Bathymetry will be determined 35-40 days before projected herbicide applications.

Please note, the actual final amounts of herbicides will be determined by the bathymetry used to calculate the volume of water to which herbicides are to be applied.

For RWT dye applications, the dye product is concentrated and the amount per liter is provided on the label. The same principles used for herbicide (bathymetric data/volume) will be used to calculate the amount of RWT dye product to produce a range of 5 to 10 ppb as a final target concentration.

5.2 Application Methods

5.2.1 Equipment Used for Applications

Because each application site is small (< 3 acres), liquid formulations will be applied from a boat-mounted tank mix system with direct pumping into drop (weighted) hoses that place the herbicide from mid-depth to the bottom. Granular formulations will be applied either by small powered granular spreader, or a powered airstream (blower) spreader connected to a bow-mounted hopper system. For herbicide/UV-C combination sites, applications will be with granular formulations and may be applied either by vessels or from dock/pier structures as appropriate for the site. These systems and equipment are commonly used and readily available commercially. All systems are calibrated using water (for liquid formulations) or “blank” granules for granular (pelletized) formulations. Only the amount of herbicide required for replicate test sites will be loaded on to boat(s).
Application vessels have GPS referencing equipment and are able to follow prescribed tracks for applications; application tracks are recorded for subsequent reporting. Tracks for applications will spaced to provide even distributions of herbicides within the treated site to achieve the target concentration(s).

5.2.2 Prevention of Cross Contamination During Applications

The application equipment is shut off after application in a specific site is complete and in the case of liquid formulations, hoses are reeled out of the water before traveling to another treatment site. Only one type of herbicide will be loaded on the application vessels for treatments of the three replicate sites for that herbicide. The placements of liquid or granular formulations at or near the bottom greatly diminishes the potential for “cross contamination” from the movement of application vessels to other sites because the herbicide isn’t injected into the upper surfaces where the boat hull or engine/water cooling intakes are located. Most applications for a <3-acre site will take approximately

45-60 minutes, which is not sufficient time for vertical mixing of the herbicide to occur within the water column; therefore, is it highly unlikely that herbicides will be in water contacting the vessel hull or engine cooling water intakes. Upon completion of treatment, the equipment will be rinsed with fresh water into the treatment site where applications had been made. These methods will prevent cross-contamination either outside the designated treatment site or between treatments sites with different herbicide type.

5.2.3 Prevention of Sample Contamination

During the pre- and post-application period in which herbicide active ingredients and degradants are being monitored (between May 1, 2022 and June 30, 2022 or until double turbidity curtains are removed), to avoid unwanted contamination and/or mixing, any field equipment used to collect samples will be washed between treatment sites and separate gear will be used for herbicide untreated sites (receiving water). Personnel will put on new gloves between sites and before the next round of data collection. Any actions that may compromise a sample or a sampling event will be logged, explained and signed by the person directing the sampling at the end of the event.

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

5.3 Application Timing, Duration and Sequence

5.3.1 Application Timing

In order to suppress and control the target plant populations in the treatment sites, herbicide applications will be made in early spring between May 1 and June 30, 2022, depending upon water temperatures, plant growth stages and water levels. Early May application (May 1 to May 30) would occur if: 1) the snowpack in winter/spring 2022 is below average; and 2) if mid-day water temperatures in target sites exceed 15 °C; and 3) if target plants have emerged and plant height or biovolume have been increasing for 14 days. Otherwise, applications will begin by June 15.

To provide sufficient time for post-application water sampling for herbicide residues, application will be staggered between test sites by 60 to 90 minutes. Depending upon locations and conditions of target plants, the entire suite of herbicide applications may occur over a 5- to 7-day period. This window of application provides time for adequate monitoring preparations, contingencies for unanticipated equipment failure, weather, and “on-site” sampling. Herbicide applications will typically be made between 8 am and 5 pm local time.

5.3.2 Application Sequence

All “herbicide only” applications will be made first as they can be done with the least encumbrances from boats or, if determined appropriate, shoreline structures (e.g., docks, piers). All replicate applications for any one herbicide will be made on the same day. Typically, applications to sites farthest from the staging and launch location will be done first to minimize repeat traffic on the water. Herbicide application in combination herbicide/UV-C sites will be made after herbicide-only sites. Applications of endothall will be made before triclopyr (or florpyrauxifen-benzl).

For combination (UV-C/herbicide) test sites, granular or liquid herbicides will be applied to the near-shoreline (dock line to shore) area prior to UV-C treatments (Figure 9). This approach is necessary because the duration of UV-C treatments may be several hours or more and the presence of the UV-C equipment would likely interfere with herbicide applications.

The intent of the combination method is to assess the feasibility of optimizing two methods (herbicides and UV-C light exposure). Due to physical impediments of shoreline structures (primarily docks, piers, and unseen, submersed structures), UV-C treatment operations are problematic and may damage equipment. These narrow zones are well suited for localized herbicide applications because the products can diffuse around such structures and sustain needed contact periods for efficacious levels. The more open areas in the middle of the sites provide unobstructed access for the UV-C light exposure system. The net result is anticipated to be sufficient control using less herbicide than would be needed for an herbicide-only treatment of the entire site. Note that the herbicide zone is located between the outer dock lines and the shoreline, a small area representing about 10%-15% of the total site area and encompassing only about 5% percent of the total water volume (acft) in the site.

5.3.3 Application (Treatment) Duration

The herbicides have different projected required exposure times for efficacy ranging from 1 to 2 days for florpyrauxifen-benzyl to 2 to 4 days for endothall and 2 to 5 days for triclopyr. Typically, within 24 to 48 hours following applications, exposure to the active ingredients begins to decline as degradation, uptake and absorption by target plants occur. As a result of these dissipation characteristics, concentrations lower than effective levels would occur between 7 to 21 days post application depending upon the herbicide. For the purposes of the CMT, the maximum treatment duration (time during which target plants are exposed to efficacious levels) is 21 days to allow for variation in conditions. However, if residue sampling confirms that concentrations are below 100 ppb for endothall or 40 ppb for triclopyr, or below 0.1 ppb for florpyrauxifen-benzyl, the treatment duration will have ended. Thus, it is quite likely that the treatment duration for

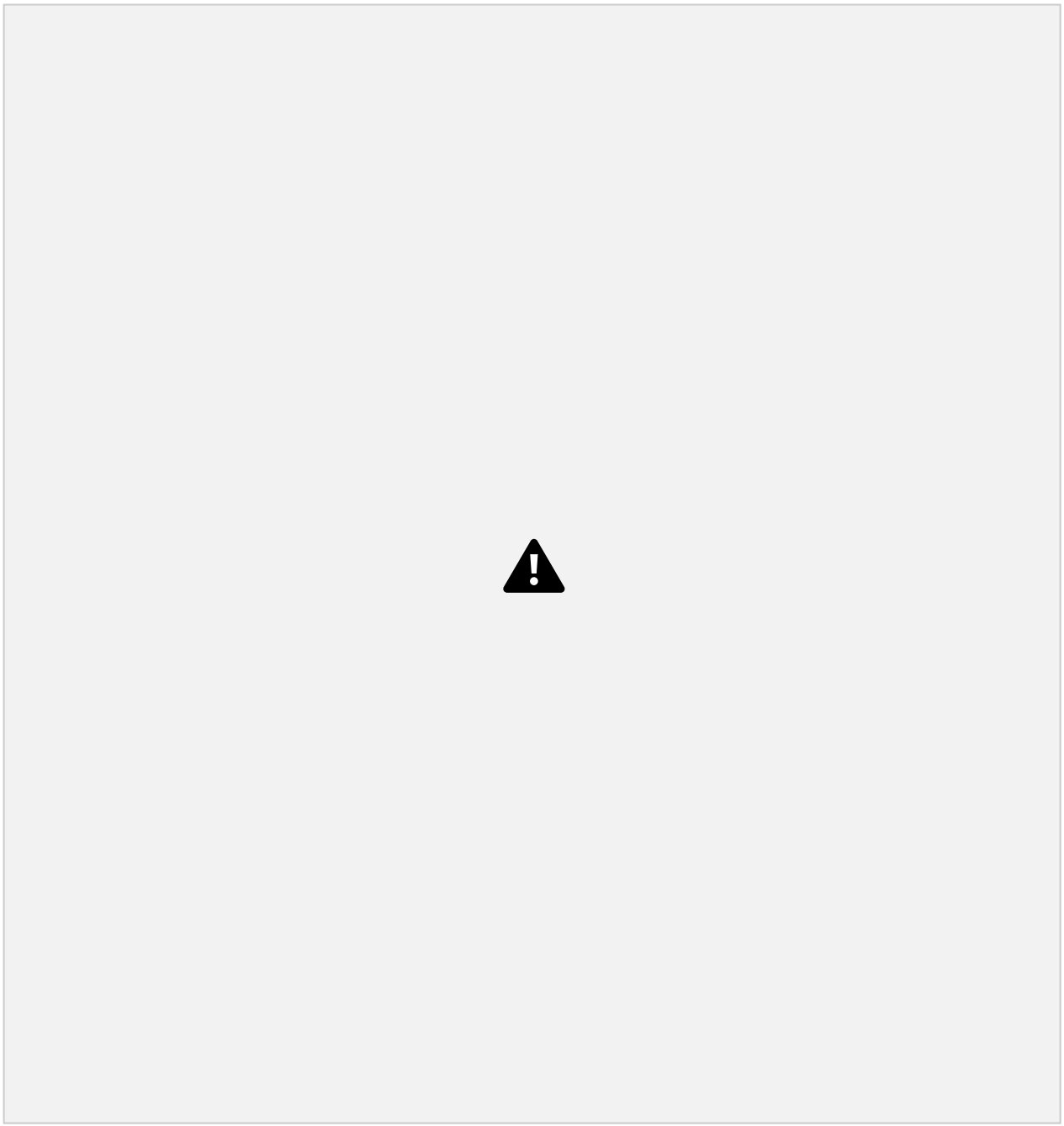
florpyauxifen-benzll will be less than 5 days based on its half-life.

Figure 9. Example of Typical UV-C/herbicide Combination Treatment Zones

5.4 Integration and Use of Follow-up Non-Herbicide Methods

As part of the CMT herbicide Year 1 treatments, efficacy monitoring, alternative sequential follow up control management actions may be taken based on the results of plant biovolume and abundance monitoring. Figure 10 [Figure 2-3 in the Draft EIR/EIS (Lahontan and TRPA 2020)] summarizes the options and the criteria for deploying each option, or for “no action”. This assessment will be made for each of the nine (9) herbicide only application sites and for the six (6) combination control sites (herbicide + UV-C light) as responses may differ due to differences in the herbicide modes of action and plant species distributions. Decisions 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 10. Decision Tree for Selecting Follow-up Control Actions Based on Monitoring of CMT Year 1 Treatments



5.5 Endothall (Cascade or Aquathol-K)

Endothall is a rapid-acting, contact type herbicide (with some systemic characteristics) applied as a liquid formulation or pelletized formulation directly to aquatic weed stands. The longer the contact time, the lower the concentration needed. For example, endothall typically requires a contact time of 12 hours at 4 ppm and 24 hours at 2 ppm for control of the target plants. It has some selectivity and has little effect on *Elodea* spp. at normal

applications rates of 1 to 3 ppm. Its residue in water is readily determined through sampling and immunoassays with results available usually in real-time for moderate

application levels and for detection of 5 ppb through laboratory analyzed samples.

5.6 Triclopyr (Renovate Liquid or solid, “OTF” formulation)

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 to 2.5 ppm for selective control of Eurasian watermilfoil. It has little to no effect on pondweeds, coontail or *Elodea* spp. so its use may “release” native plants (relieve from suppression by invasive plants), including native pondweeds and *Elodea candensis*. Triclopyr is readily monitored through water sampling and immunoassays (e.g., “FasTest”), which can provide results in 24 to 48 hours after samples are taken. More sensitive detection levels (1 to 5 ppb) are obtained from laboratory analyzed samples within 48 hours of sampling time.

5.7 Florpyrauxifen-benzyl (ProcellaCOR™)

ProcellaCOR™ is classified as a “Reduced Risk” pesticide by the Federal EPA, which is a first for ‘short exposure in water’ herbicides. It is used at extremely low rates for control of Eurasian watermilfoil (e.g., 2 to 4 ppb) and has been shown to be effective on newly sprouted curlyleaf pondweed turions (Anderson 2017). It has a very short half-life of only a few days and is the first non-copper herbicide for localized treatment without restriction on potable water consumption. See Heilman, M. (2018) (ICAIS meeting pdf) and Beets and Netherland (2018) for more information.

The Federal EPA registered this product in 2018 and stated that there are ‘no risks of concern to human health from any route of exposure.’ Additionally, there are ‘no risk concerns for non-target wildlife.

5.8 Rationale and Justification for Application of Aquatic Herbicides

The premise for initiating the CMT is that over the past 40 years, during which time no herbicides have been allowed in the Tahoe Keys lagoons, there has been no significant progress or improvement in sustainable management of the excessive invasive 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-herbicide” methods such as bottom barriers, 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 late spring and 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. The inadequacy of the *status quo* has become clear with the recent increased spread of curlyleaf pondweed, which was identified by the Tahoe Resource Conservation District in Lake Tahoe outside the West Channel in 2020. In addition, recent reviews and descriptions of the stages of invasive species infestations

and their management clearly point to the fact that earlier opportunities for eradication in the Tahoe Keys lagoons has passed, but that effective management practices can reduce ecological and economic threats (US Department of Interior 2021).

5.8.1 Advantages of Proposed CMT Herbicides

TKPOA has considered a wide range of potential costs and benefits associated with use of herbicides during CMT development. The desirable attributes of approved and effective aquatic herbicides include: 1) reduction in mid and late season biomass; 2) reduction in plant canopy height and reproductive capacity; 3) reduction or elimination of viable propagules that spread populations including seeds, turions, plant fragments, shoots, rhizomes, and root crowns; 4) selectivity to control primarily target species: curlyleaf pondweed, Eurasian watermilfoil, and coontail; 5) ability to control plants in, under, around and adjacent to docks and other structures that typically interfere with various mechanical or physical methods; 6) compared to non-selective mechanical methods, herbicides actually reduce risks to non-target animals (fish, invertebrates, waterfowl, pets and people, and harvester and boat operators); and, 7) reduced carbon footprint due to reduced need for ongoing harvester and fragment collection operations.

5.8.2 Optimizing CMT-Herbicide Use and Assessments.

TKPOA has also invested in extensive science-based cautionary and contingency evaluations of herbicide use related to application concentration, timing, and containment during development of the CMT. Findings from these studies have helped shape the CMT and include the following:

1. The optimal time to mitigate excessive aquatic weed growth is early to mid-spring when plants are beginning to re-grow (after winter). Plants are small and below the optimal height for efficient harvesting methods (see Figure 8).
2. Curlyleaf pondweed turions typically begin to sprout in late summer but remain small until spring, when they are susceptible to endothall. By controlling young sprouted turions in spring, the subsequent production of mature, turion-producing plants will be reduced.
3. The herbicides chosen have been shown to be effective on the target plants at rates (ppm) well below the maximum allowable on their registered labels (both Federal EPA and CalEPA/DPR). These results have come from laboratory, mesocosm and operational scale uses. The reason for efficacy at lower than maximum allowable rates is the (a) susceptibility of target plants; and b) retention time of water (2 to 3 weeks) in treated sites.
4. The short persistence (short “half-life”) of the herbicide active ingredients provides an acceptable safety buffer from incursion into Lake Tahoe proper and the return to beneficial use conditions by the end (duration) of treatments.
5. Previous studies using the surrogate RWT dye have shown that water movement from the West Lagoon toward the West Channel is negligible in spring to early summer, and that dissolved materials such as herbicides stay within the dead-end

coves for several weeks. This is reasonable because this is precisely when water from snow melt and spring storms fill Lake Tahoe and enter the Keys lagoons

through the West and East channels, producing a net "filling" effect into the dead end basins of the Main and East Lagoons, respectively. As the lake level rises, so does the water level in the Keys lagoons. This results in stable water conditions in the lagoons and provides a dilution effect from May to July as the volume of water in the lagoons increases (Figure 8).

6. Lake Tallac is not physically connected to Lake Tahoe, but rather is connected to the West Lagoon and Pope Marsh by weir gates. A stormwater inflow channel is located along the southeastern corner of the water body directing surface runoff from the City of South Lake Tahoe. As there is little movement within Lake Tallac after snowmelt, no physical barriers/curtains shall be placed between sites. Sites have been identified along the eastern portion of the waterbody to minimize impacts of inflow of stormwater and to provide enough space between sites to properly differentiate treatment effects.
7. Unlike the physical or mechanical methods, the herbicides chosen are selective: They control the unwanted target plants but will not affect *Elodea canadensis*, a beneficial native plant. They also target early stages of *Potamogeton crispus* growth (sprouted turions), which will have been produced the preceding late summer/fall period.
8. The location and concentration(s) of active herbicide ingredients can be readily monitored to determine dissipation and potential transport away from target application sites. Results of water sampling analysis are typically returned within 24 to 48 hours. In addition, the simultaneous application of Rhodamine WT dye provides an "early" warning surrogate for possible movement of herbicides from treated sites.
9. The CMT incorporates extensive, frequent water quality, efficacy, and herbicide residue monitoring coupled with contingencies to prevent movement of residues into Lake Tahoe, including installation of barriers at strategic points that will prevent herbicides from reaching the West Channel (see Section 6.0, Containment and Contingency Control Actions).
10. The results from the CMT will provide important information on optimal methods for sustainable control of invasive aquatic plants, which in turn, will provide the most effective protection for Lake Tahoe's unique ecosystem. The results will help inform strategies and methods for future control programs (Draft EIR/EIS 2020).

Taken together, the results of the 2011 and 2016 RWT dye studies (Anderson 2011 and Anderson 2016), coupled with well-established efficacy of the herbicides containing endothall, triclopyr, or florpyrauxifen-benzyl (ProcellaCOR™) in controlling the major target invasive and nuisance aquatic plants in the lagoons (Eurasian watermilfoil, curlyleaf pondweed and coontail), indicate that these products should be part of the fully integrated weed management program in the 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. Effective control of aquatic weed growth in spring also greatly reduces the production of reproductive and dispersal structures such as turions and seed and
reduces the likelihood of viable plant fragments that pose a threat to Lake Tahoe (Brainard 2021).

6.0 CONTAINMENT AND CONTINGENCY CONTROL ACTIONS

The following containment and contingency actions (CCAs) are designed to eliminate or minimize movement of applied herbicides from test sites. These physical containment methods include seasonal timing of herbicide applications; spatial distancing from the West Channel, installation of double, surface to bottom, turbidity curtains, and BMPs implemented during application of herbicides. These preventative measures will be accompanied by extensive monitoring of both the active herbicide ingredients and real time monitoring of RWT dye, which serves as a surrogate for dissolved herbicides. Any additional CCAs required as mitigation in the Final EIR/EIS or as stated in the NPDES permit for the CMT would also be implemented.

6.1 Tahoe Keys Lagoons Seasonal Water Patterns

Based upon general bathymetry, Keys lagoons hydrology, prior RWT dye studies and hydraulic conditions, there is a seasonal pattern regarding water flow between Lake Tahoe and the Keys lagoons as follows:

a) As snow melt occurs and the water in Lake Tahoe rises, water is “pushed” into the 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). The “end” of the lake filling, and consequently the end of net inflow to the Keys lagoons, varies from year to year and is dependent upon several environmental events such as timing and extent of snowpack, water content of snowpack, and melt rate of snow pack.
   Over the past four years, maximum lake levels occurred early to mid-June (See BPE Application Figure 6).
b) In fall, as lake level drops, there is net out-flow from the lagoons, which continues until mid-winter to late winter. Therefore, the water level in the lagoons is typically lowest in November and remains so until subsequent spring snowmelt runoff (Figure 8).
c) Due to lower water levels in the late summer/fall 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.

The features of the spring period provide optimal conditions for herbicide applications because herbicide effectiveness is best on new aquatic plant growth, which occurs in spring, and because this period of the season generally produces stable water inflow to the Keys lagoons, thereby reducing the likelihood of herbicide residues moving into Lake

Tahoe from the West Lagoon.

6.2 Landscape Features and Distance to Lake Tahoe and Water Takeouts

The geometry and bathymetry of the test sites provide a natural containment condition. The test sites are located in areas that are either quiescent, dead-end coves, or that are relatively isolated from any movement of water (e.g., Lake Tallac). In addition, the West Lagoon test sites are “downstream” from the normal spring/early summer influx of water into the Keys lagoons (Figure 7). In the spring/early summer, Lake Tahoe is rising, and

water is pushed into the lagoons, thus reducing or eliminating the potential for any water in the dead-end coves to flow toward the West Channel. Further discussion on hydrology of the Tahoe Keys lagoons can be found in Section 1.6.3 of the CMT Application.

Prior studies with RWT dye have substantiated conceptual understanding of West Lagoon test site containment. The RWT dye studies conducted in 2011 (Anderson 2011) and June, July, and August, 2016 (Anderson 2016) on the movement of RWT dye from barrier-enclosed sites and an open area (uncontained) site directly adjacent to the West Channel showed that: 1) deployment of barrier curtains can effectively contain dissolved materials (such as aquatic herbicides) and that barrier curtains can be deployed within one day; and, 2) dissolved materials (RWT dye) present near the West Channel in early June are highly unlikely to enter the West Channel and therefore will not pose a risk to Lake Tahoe. In summary, in order to reach Lake Tahoe, herbicide residues would have to travel (i.e., via diffusion/dilution and/or directly with water flow) out of a treated site, then to immediately adjacent “receiving water”, then through curtain barriers, and finally into and through a 19-acre “Diffusion Zone” south of the West Channel (Figure 13).

In addition to the “movement/diffusion” pathway described above, any residue that may possibly exit the West Channel would be subject to a much larger diffusion and dilution effect upon reaching Lake Tahoe, as well as further degradation during transit with increasing distance from the West Channel. Section 6.6 provides estimates of dilution effects due to waters surrounding and connected to test sites, as well as estimates based upon half-life of the herbicides, plus dilution, and of dilution effects between the West Channel and the nearest potable water takeouts.

6.3 Physical Separation of Treatment Site Areas Using Double Turbidity Curtains

The double turbidity curtains shall be installed prior (at least 48 hours) to herbicide treatment. Additional actions associated with the curtains include the following: • Notification of planned curtain installations will be made to homeowners by email and notices will be posted at the TKPOA offices, and on the TKPOA website 30 days prior to installation. Notices will include a map showing locations of curtains (See Public Notification section).

- All curtains will be flagged and have battery operated lights to warn vessels. • The physical integrity of the curtains will be monitored daily to note any breaches; any

breaches will be remedied within 2 hours of detection.

- Curtains will be removed within 14 to 21 days after beginning of treatment. At this point (days after treatment), concentrations are expected to be below efficacious levels due to degradation and uptake by target plants. Water samples will provide actual concentrations 48 hours before curtains are removed.

6.4 Use of RWT Dye to Provide Real-Time Movement Data

RWT dye will be applied during the applications in the herbicide-treated sites and the dye will be tracked to determine if it is moving outside the site into "receiving water" toward the West Channel. RWT dye may be injected at the location of other known herbicide

residue locations to assist in determining movement and dissipation. RWT dye will also be monitored daily within 3 feet outside the barrier curtain to determine if a breach occurs. If RWT is detected outside curtains that are installed adjacent to the "diffusion zone", samples will be taken the same day for herbicide analysis (Figure 13). If herbicides are detected within 3 feet outside the curtains located adjacent to the diffusion zone, this will trigger "Contingency Monitoring", and Lahontan will be notified within 24 hours of dye detection.

6.5 Contingency Monitoring and Mitigation of Potential Herbicide Residues

If herbicides are detected within the diffusion zone (Figures 13 and 14), then additional monitoring will take place in the West Channel daily and the following actions will be taken:

- In the extremely unlikely event herbicide residues are detected in the West Channel, the contingency sampling stations (Figure 16) in Lake Tahoe will be initiated. Samples will be sent for analysis daily and, if residues are found, Lahontan will be notified and contingencies for additional sampling will be discussed.
- Use of Existing Well Water Carbon Filtration Systems. Existing well water carbon filtration systems will be utilized to remove herbicide residues, in the extremely unlikely event they are detected in the well water system before water enters distribution systems in the Tahoe Keys.
- Use of Mobile Filtration System. A mobile (truck/trailer mounted) filtration system will be utilized to treat localized areas if herbicide residues exceed allowable label use.
- Residue Breach Notification. In any event, if herbicide residue is detected within 500 ft. of the West Channel, then Lahontan will be notified within 24 hours. See Figure 15 below for contingency monitoring and notification plan and Figure 16 for contingency monitoring sites.

6.6 Estimates for Degradation and Dilution of Herbicides from Treatment Sites

The CMT would apply herbicides at each of the designated sites within the zones isolated by the double turbidity curtains. The curtains would remain in place until at least 14 days after treatment. Table 6 and Figure 11 display the anticipated degradation of endothall, the herbicide that would be applied in the greatest concentration and that has the longest half-life, under two scenarios: 1) a 7-day half-life degradation period; and 2) a 5-day half
life degradation period. Figure 12 shows the anticipated degradation of florpyrauxifen benzyl based on a 2-day half-life. The degradation period of herbicides varies according to factors such as turbidity (i.e. exposure to light) and overall environment. The half-life of Triclopyr has been shown to range between 12 hours and 7 days (Getsinger et al. 2000). The half-life for florpyrauxifen-benzyl (ProcellaCOR™) is estimated to be as short as 8 to 12 hours. These degraded concentrations are expected to become further diluted during the treatment period due to: (1) dilution during filling of the West Lagoon; (2) diffusion into "receiving water" contained within the turbidity curtain boundaries; and, (3) upon removal of turbidity curtain, further dilution of any remaining residues as they enter, mix, and

traverse into the 19-acre "diffusion zone" south of the West Channel (a volume of approximately 200 ac ft) (Figures 13 and 14). The anticipated effect of degradations following 5- or 7- day half-lives on the herbicide concentrations is shown in Table 6.

Table 6. Expected Degradation of Herbicides Within Treatment
(Assumes NO Dilution within "Receiving Water")

			Half-life of 7 days	**Half-life of 5 days**
	Day	Hour	PPM Concentration: 7-day half life	PPM Concentration: 5-day half life
	Day 1	0	2.00	2.00
		24	1.81	1.74
	Day 2	48	1.64	1.52
	Day 3	72	1.49	1.32
	Day 4	96	1.35	1.15
	Day 5	120	1.29	1
	Day 6	144	1.1	0.87
	Day 7	168	1	0.76
	Day 8	192	0.91	0.66
	Day 9	216	0.82	0.57

	Day 10	240	0.74	0.5
	Day 11	264	0.67	0.43
	Day 12	288	0.61	0.38
	Day 13	312	0.55	0.33
	Day 14	336	0.5	0.29
	Earliest Date Curtains Might be Lifted			
	Day 15	360	0.45	0.25
	Day 16	384	0.41	0.22
	Day 17	408	0.37	0.19
	Day 18	432	0.34	0.16
	Day 19	456	0.3	0.14
	Day 20	480	0.28	0.125
	Day 21	504	0.25	0.11
	Latest Date Curtain Would be Lifted			

Figure 11. Expected Herbicide Degradation within Treatment Sites (Endothall Example)

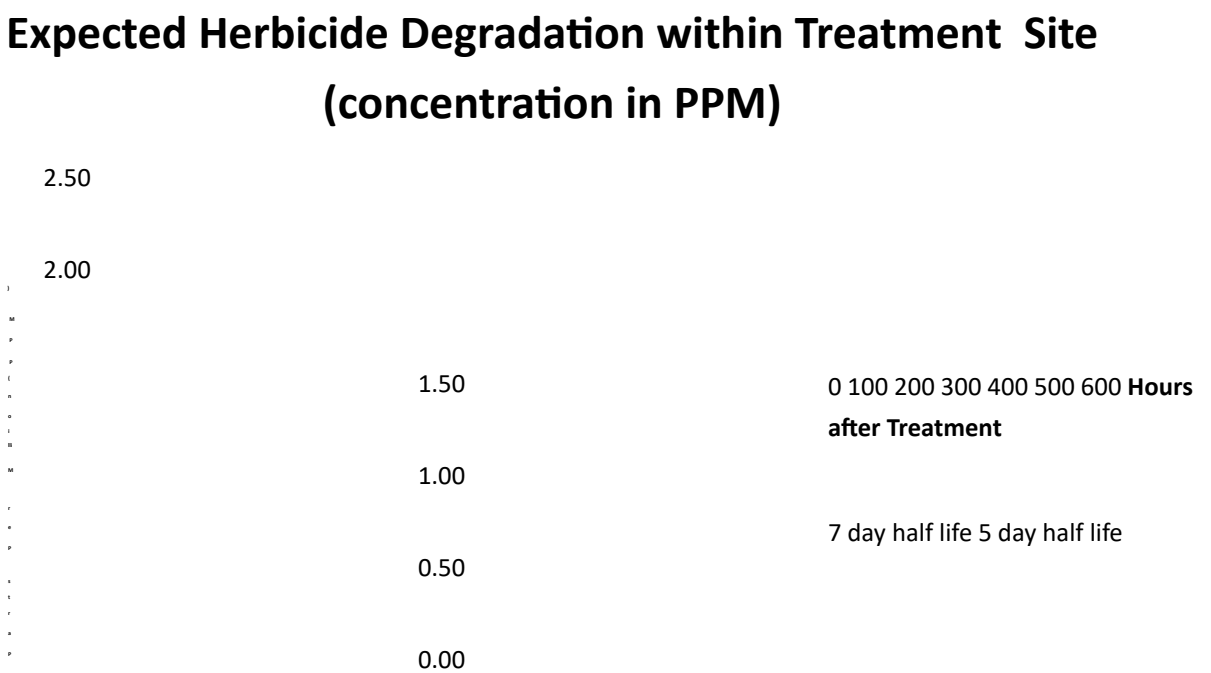
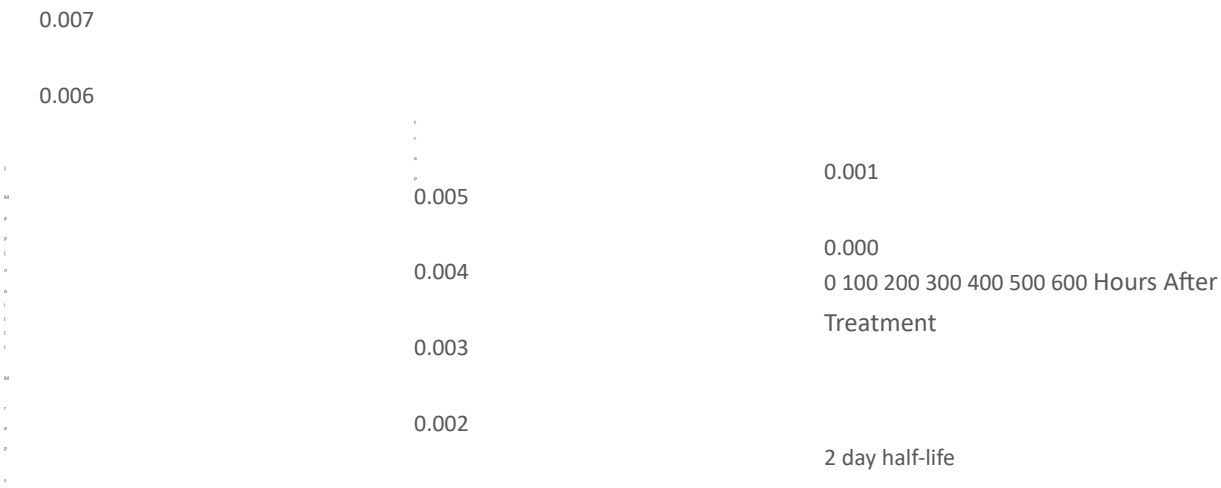


Figure 12. Expected Herbicide Degradation within Treatment Sites (florpyrauxifen-benzyl Example)



6.7 Dilution with Degradation Effects

The blue area in Figures 13 and 14 depicts the “receiving water” adjacent to the treatment sites and a cross-hatched, 19-acre (ca. 200 ac ft) receiving water “diffusion zone” that serves as a buffer between the small herbicide site applications and the West Channel. Before reaching this diffusion zone, herbicide residues would have to transit the barrier curtains and the receiving water immediately adjacent to the treatment sites. This is a total of approximately 40 acres, or about 400 ac-ft based on a 10-ft average depth.

To assess the potential for movement of herbicide, we calculated the concentration of herbicide that would be detectable when dissolved at various volumes of water *with no degradation*. For example, achieving 2 ppm concentration (the concentration proposed for application of Endothall) within a one-acre site that is an average of 10 feet deep (approximately 10 acre-feet of water) would require approximately 54 pounds of herbicide active ingredient (equivalent to approximately 15 liquid gallons)[12]. As this initial treatment concentration mixes with much larger volumes of water (e.g., "receiving water"), this quantity of product would become rapidly diluted below a level that is detectable. Table 5 describes the concentration that would result from direct application (and complete mixing) within 10 ac ft of water in 40 acres (400 ac ft) of "receiving water" within the West Lagoon, within the barrier curtains. ***Under no scenario would direct herbicide be applied anywhere but the treatment site, and therefore the concentrations in this table are simply to display the hypothetical concentration compared to volume of water within the lagoons.***

The Federal EPA reporting limit for endothall is 100 ug/l (100 ppb). As shown in Table 5, diffusion of herbicide within a one acre treated site (e.g. at 2 ppm) would reduce the concentrations in the receiving water volume by 600-fold even assuming no degradation (i.e. no half-life reductions during the diffusion/movement). If all 14 acres in the West Lagoon were treated at 2.0 ppm, and no degradation occurred, the residual reaching the West Channel would be approximately 47 ppb (parts per billion). For a single site treated at 2.0 ppm with double curtains in place for 14 to 21 days, which is at least 2 to 3 half lives, significant degradation would occur. For example, if just 2 half-lives occurred from the time of treatment until residues actually reached the northern edge of the "diffusion zone" (West Channel), the anticipated herbicide concentration levels would be in a range of 0.75 parts per billion. This assumes no degradation during the transit from the removal of curtains to the West Channel. However, Rhodamine WT dye studies show this transit could take several weeks, adding another 2 to 3 half-lives. The scenario with additional degradation during transit from barriers through the 19-acre diffusion area would result in concentrations at the West Channel at approximately 0.2 parts per billion. If all sites (14 acres) in the West Lagoon were treated at 2.0 ppm (Table 7, last column), and degradation resulted from 4 half-lives, the anticipated level at the West Channel would be about 0.9 ppb.

[12] To achieve 1 ppm of concentration for any of the proposed herbicides requires application of 2.71 pounds of herbicide active ingredient for each ftac ft of water.To convert pounds to gallons (in the case of application of a liquid herbicide), we assumed approximately 3.5 pounds per gallon.

For Lake Tallac, the receiving water is about 200 ac ft (20 acres at 10 feet deep). Dilution of treatment of 2.0 ppm without degradation would result in receiving water levels of about 10 ppb. With 2 half-lives occurring within the treatment sites, the result would be 2.5 ppb. With a total of 4 half-lives, the result would be 0.62 ppb.

For applications at 1.0 ppm Triclopyr, these concentrations would be about half those

listed in Table 7. For 6 ppb application of florypyrauxifen-benzyl, with a 2-day half-life, concentrations would be 1.5 ppb after 48 hours, and 0.008 ppb in 7 days.

Table 7. Concentration Under Various Dilution and Degradation (half-life) Scenarios

Scenario: Application of herbicide active ingredient at 2.0 ppm.				
Volume of Water	**Treatment site:** No Dilution Active Ingredient Concentration (e.g. endothall) (PPM)	**West Channel- No Degradation:** Diffusion-Dilution in 60-acre "Receiving Water" (Based on total receiving water of 600 ac ft including "Diffusion zone") (PPB)	**West Channel** *Assuming 2 half-life degradation and Diffusion Dilution within treatment site before barrier removed* (PPB)	**West Channel** Assuming additional 2 half-lifes during transit from treatment site to channel. (PPB)
1 -acre treatment site (approximately 10-acre feet of water based on average 10-ft depths)	2	3.0 ppb	0.75 ppb	0.19 ppb
	2	6.0 ppb	0.5 ppb	1.25 ppb
2-acre treatment site (average 10-ft depths)	2	47.0 ppb	3.7 ppb	0.92 ppb
14 acres (all herbicide treatments site in West Lagoon) assumed treated at 2.0 ppm				

Figure 13. Summary Map Showing Treatment Sites and "Receiving Water" Adjacent to Treatment Sites and Receiving Water in the "Diffusion Zone"

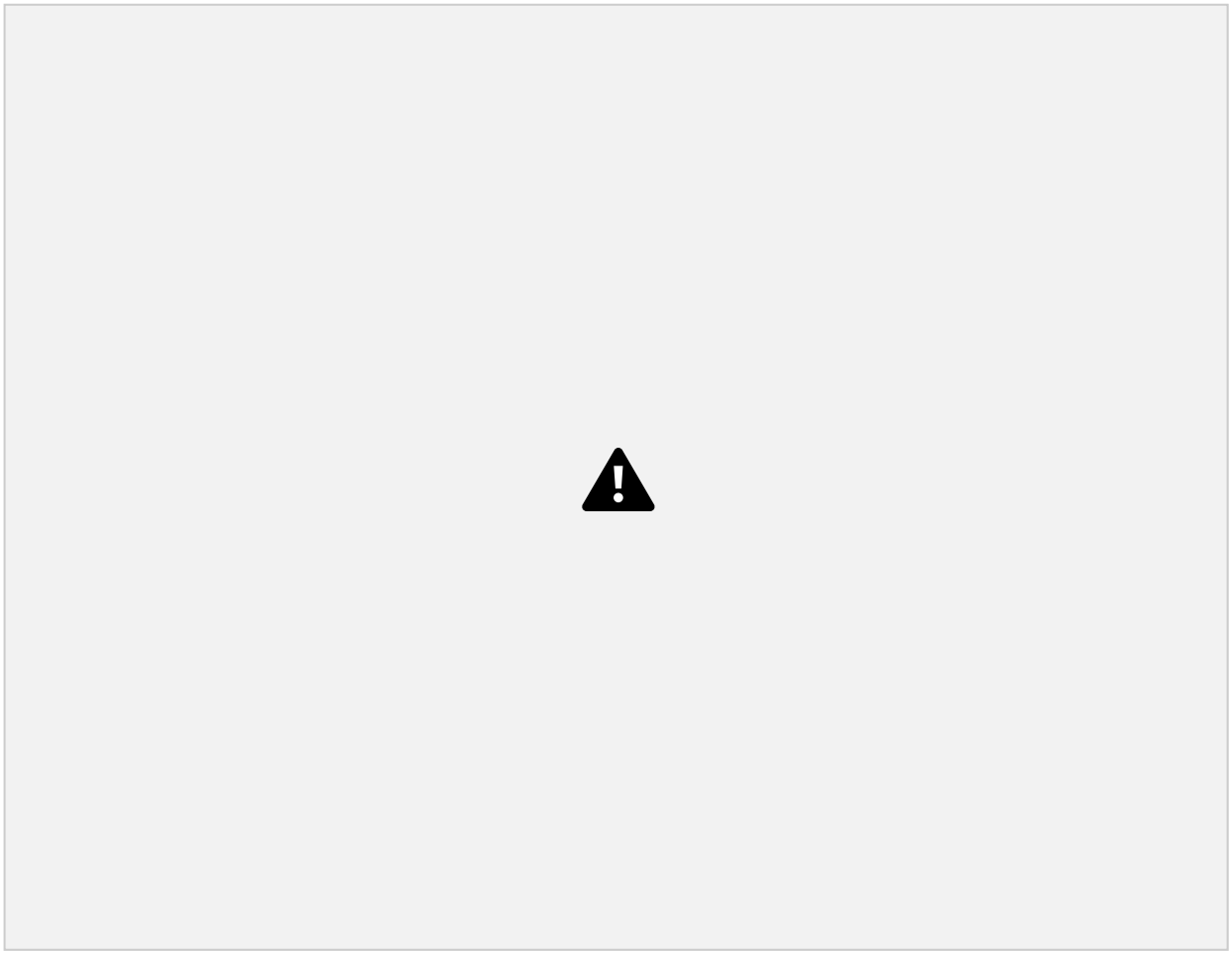
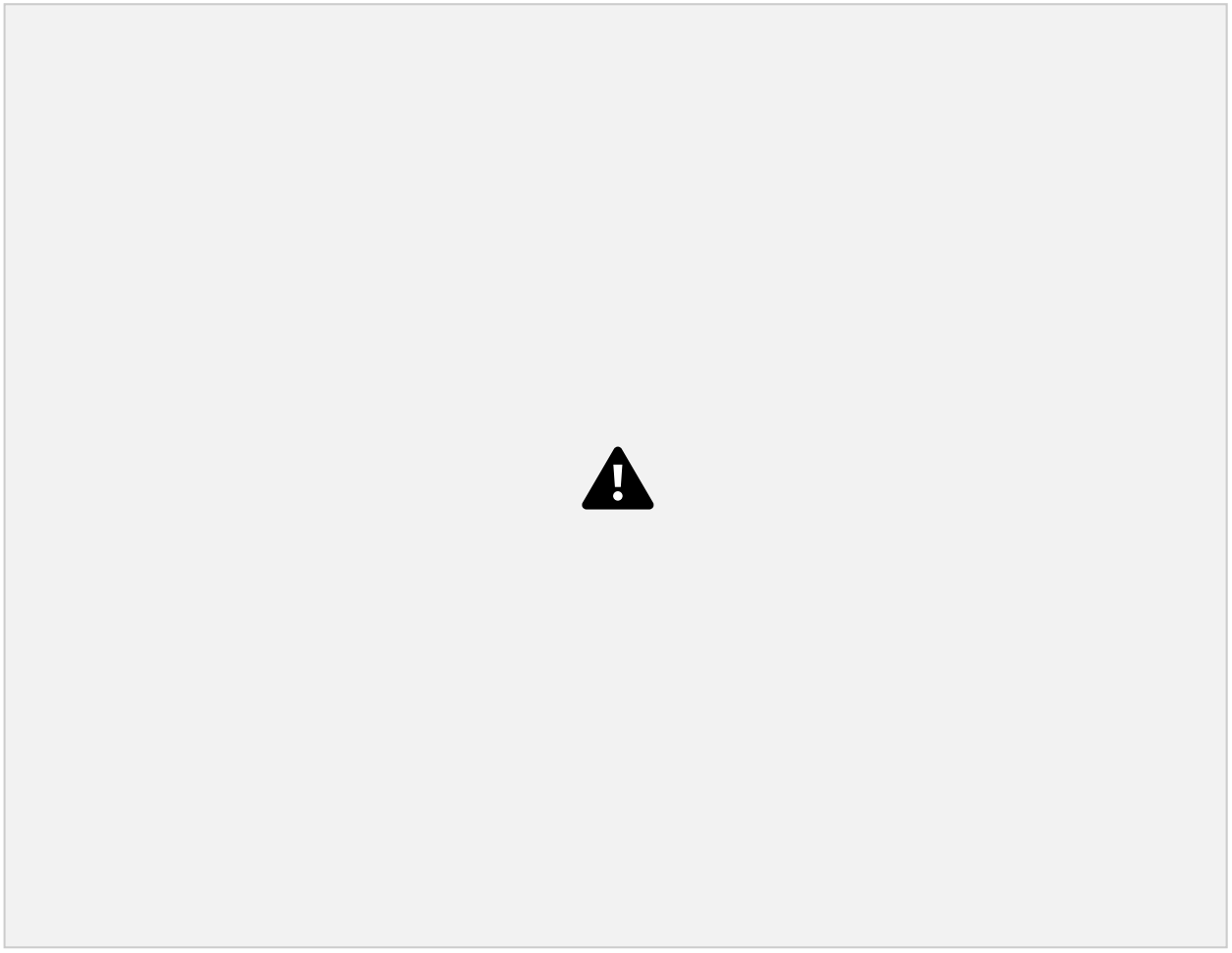


Figure 14. Summary Map of Showing Treatment Sites and "Receiving Water" Adjacent to Proposed Treatment Sites and Receiving Water in the "Diffusion Zone" (New Sites 13, 14, 19, 20 and 21)



To summarize, herbicide residues are highly unlikely to reach the West Channel, and any movement of herbicides would be further mitigated through a series of protections and CMT Project test conditions:

1. Physical separation of treatment site areas using double turbidity curtains. 2. Degradation of herbicide during the treatment period (14 to 21 days), and any during any potential transit out of the treated sites to the large 190 ac ft “diffusion zone”).
3. Any levels reaching the West Channel will be subject to further degradation and dilution (in West Channel volume of about 800 ac ft) during transit.
4. Extensive monitoring (herbicides and RWT dye).

These conditions effectively eliminate the potential for detectable herbicide exiting the West Channel *and* reaching water intakes in Lake Tahoe. The nearest surface, raw water/potable intake in Lake Tahoe is near Lakeside Marina, approximately 3.5 miles from the Tahoe Keys West Channel.

6.8 Application Process

The herbicide application process involves three major steps: site preparation, application of approved herbicide, and monitoring.

6.8.1 Site Preparation

1. Confirm depth contours (bathymetry) to determine total volume of water to be treated in each specific site.
2. Acquire pre-treatment aquatic plant samples and water samples (establish sampling stations using buoys, GPS or other landmarks).
3. Assign herbicide treatments to sites (i.e. coves) based on target plant presence. 4. Implement property owner advance communications plan and install signage notifying intent to apply herbicides (72 hours before application date). 5. Notify Lahontan and TRPA of application date, sites and herbicides intended to be applied (7 days before application date).
6. Deploy impermeable turbidity barrier curtains at strategic locations to help prohibit movement of herbicide toward West Channel that connects with Lake Tahoe (Figures 6 and 7).

6.8.2 Apply Approved Herbicide

1. Load only the single, sufficient herbicide for the replicated sites to be treated (staging).
2. Calibrate herbicide application equipment (water is used for liquid formulations; blank pellets are used for granular formulations).
3. Confirm and deploy safety gear and spill containment equipment in compliance with herbicide labeling.
4. Confirm herbicide type, rate and placement based upon current water depths and volume of water in each site.
5. Prepare and inject RWT dye (surrogate) to follow potential herbicide movement: Either mix with liquid herbicide or applied (injected near bottom) when granular formulations are used.

6.8.3 Monitor RWT Dye, Herbicide and Degradants

1. Confirm completeness and correct deployment of sampling kits (Section 8.7). 2. Prepare and use sampling COC forms, sampling equipment, GPS device, labeled sample bottles and storage for samples as appropriate (coolers with ice and other preservatives as appropriate); secure refrigerator space.
3. Monitor, in real time, level and movement of RWT dye using calibrated field fluorometers. Monitoring will be at least daily in receiving water adjacent to treatments sites, and 3 feet from outside of containment curtains beginning 24 hours after application.

4. Conduct post treatment water sampling for herbicide active ingredient within treated sites: 48 hr, , 7 DAT, 14 DAT, 21 DAT[13], 30 DAT, 60 DAT, 90 DAT, and/or until herbicide is no longer detected in two (2) subsequent sampling events at least 48 hours apart[14].
5. Conduct post treatment water sampling for degradants: 48 hr, 7 DAT, 14 DAT, 21 DAT and/or until degradants are no longer detected in two (2) subsequent sampling events at least 48 hours apart.
6. Preserve, store, and ship samples for analysis of herbicide and degradants, including properly competed COC forms (see Section 8.0).
7. Maintain COC copies in secure location.

[13] Basin Plan Exemption and NPDES permit requirement; additional sampling is voluntary. [14] NPDES Attachment E, Table E-1 indicates that chemical/residue analysis shall at a minimum occur for post-event monitoring no more than seven (7) days apart must be analyzed and reported. The TKPOA proposed 48-hour sample at each herbicide location will determine if the applied herbicide mixed to the desired concentration.

Figure 15. Decision Chart for Monitoring Contingency Plan for CMT

Rhodamine WT Monitoring:
Movement is detected 100
feet away
from treatment site

Continue real time monitoring

<u>No residues found</u>
Continue normal

Increased herbicide sampling to match RWT occurrence

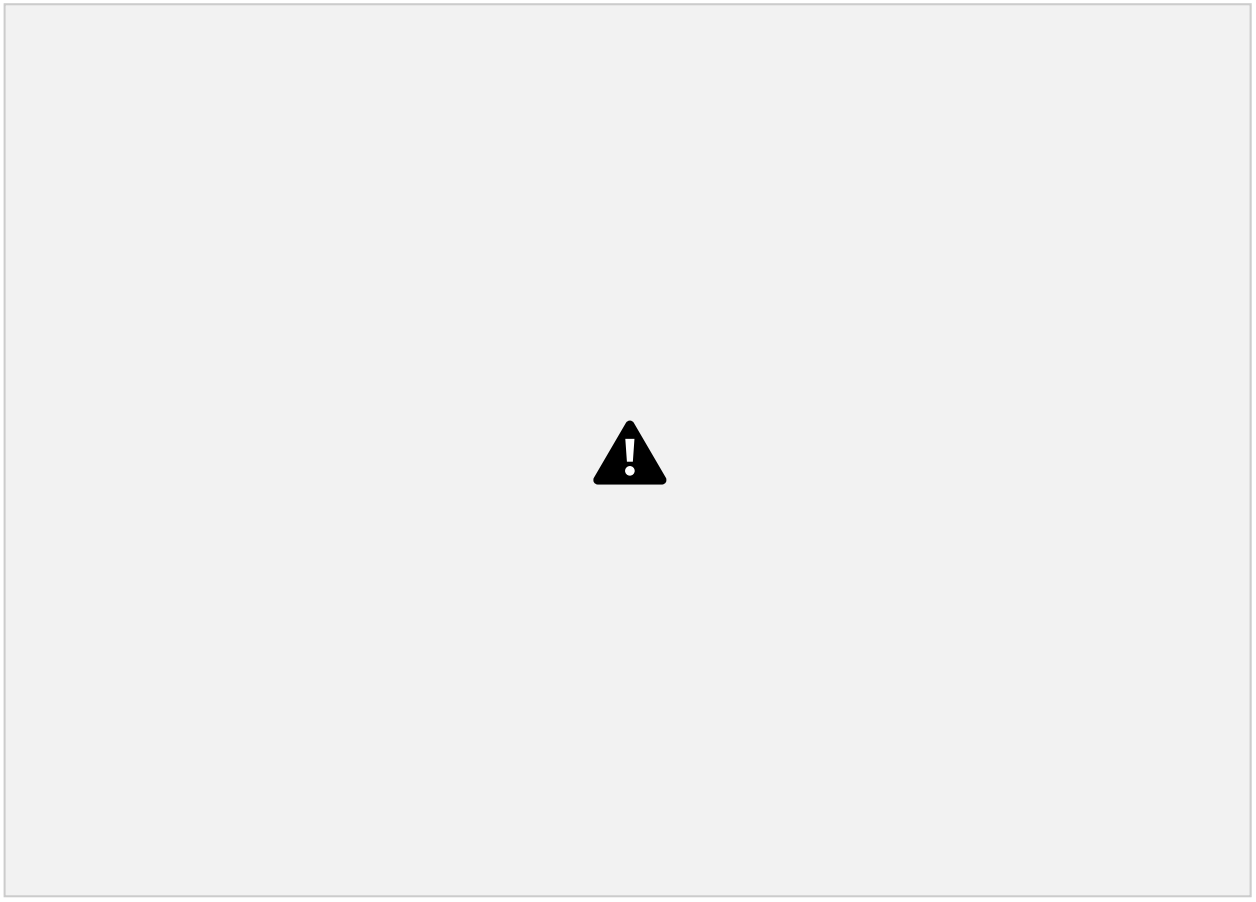
Expedite shipping and analysis of samples (24 hr turnaround)

<u>Residues found</u> Continue sampling where RWT is detected

monitoring

<u>RWT and Herbicide detected within 500 feet of West Channel:</u>
Notify Lahontan and Stakeholders
Commence monitoring in Lake Tahoe (Nearshore) with 24 hr turn around (Figure 6)

Figure 16. Contingency Herbicide Monitoring Sites for CMT (NPDES Attachment C) [15]



Note: These sites will only be sampled if herbicide residues are detected in the “Diffusion Zone” sampling stations.

[15] Per NPDES Permit No. CA6202202 WDID 6A091701001, Section II.B “the discharger must monitor at the locations specified in the Discharger’s APAP and LMCAP and, if applicable, the “Contingency Monitoring Locations in Lake Tahoe” map in Attachment C to demonstrate compliance with the receiving water limitations, discharge specifications, and other requirements in this Order. If monitoring locations are revised in response to revised treatment area locations reported per section VI.C.4 of this Order, the Discharger must reflect such revised monitoring locations on the map submitted per section VI.C.4 of this Order.”

7.0 DESCRIPTION OF THE CMT MONITORING PROGRAM

The monitoring program has several objectives:

a) Determine the target and non-target plant occurrence and abundance within the Keys lagoons and specifically within the treatment sites (e.g., coves). b) Determine the level, movement, and dissipation of herbicide active ingredients during and following their use in the treatment sites.

c) Provide data on half-life of herbicide degradants using the CMT. d) 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.

e) Determine the efficacy and relative selectivity of herbicide treatments within the test locations.

f) Provide data that will be used in determining the potential integration of aquatic herbicides with other management methods as presented in the TKPOA Integrated Aquatic Weed Management Plan (IMP) (Final EIR/EIS 2022).

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 Keys lagoons?

4. What are the levels and persistence of herbicide degradants?

5. Does the discharge under this permit result in residues exceeding receiving water limitations?

Records of Monitoring will include:

1. Date(s) and time(s) of turbidity curtain installation and removal.
2. Date(s) and time(s) of application(s).
3. Location of application (treatment sites).
4. Name of applicator.
5. Type and amount of aquatic herbicide used.
6. Application and site details: area, water depth, water volume, method of application, start and finish time, rate or concentration of aquatic herbicide applied. 7. Visual monitoring assessment for signs of spillage or equipment malfunctions 8. Certification that the applicator followed the APAP.

This section describes the pre- and post-treatment monitoring methods, informational goals of the monitoring, duration of the monitoring, quality assurance practices that will be used, and reporting requirements. Monitoring and reporting for the CMT will include tracking the herbicide concentrations and movement and herbicide degradants. Monitoring pre-, during, and post-CMT will include evaluation of water quality parameters (including herbicides residues and degradants) and evaluating effects on target plants and non-target species, primarily non-target plants and benthic macroinvertebrates (BMI's). Prior to CMT treatments, surveys, including point sampling (Madsen 1999), will be conducted in the spring of the same year to confirm growth stages of the target plants

and their relative abundance. To assess the efficacy of treatments, TKPOA, at regular intervals, will conduct hydroacoustic and physical (point) sampling to determine the extent and composition of aquatic plants in the Tahoe Keys lagoons. Data collection will include digital photos to aid in documenting effects on both the target plants and non-target plants. The combined survey information will determine the appropriate herbicides to use at each site and provide the basis for allocation of CMT treatments to replicate sites. This approach acknowledges that plant populations change yearly with changing environmental conditions (e.g., lake levels and interactions among the target and non
target plants). For example, the relative abundance and frequency of occurrence of *Potamogeton crispus* (curlyleaf pondweed) has increased during the past 5 years; whereas, the frequency of occurrence of *Myriophyllum spicatum* (Eurasian watermilfoil) and *Ceratophyllum demersum* (coontail/hornwort) has remained fairly constant.

The reference (baseline conditions) for these effects will be derived from pre-CMT monitoring as well as conditions in untreated “control” sites. In addition to evaluation of CMT effectiveness, monitoring also provides metrics to determine if and when potential effects on pre-CMT “beneficial” uses occur and when those conditions are returned to pre-CMT status, which will be assessed by a qualified biologist.

The monitoring and reporting described in this section are based on consultations with Lahontan and TRPA staff. Due to the complexity of monitoring as well as the types of monitoring, the descriptions of methods and specific frequencies of sampling are provided in summary CMT treatment/monitoring tables within the body of Section 7.1, Monitoring Sequence by Year: Summary of Monitoring Approaches.

7.1 Monitoring Sequence by Year: Summary of Monitoring Approaches

To determine the efficacy of the herbicide treatments and combined testing with UV-C light treatments, and how long the herbicides remain active in the treatment areas, a detailed monitoring program has been developed for all three years of the Project. The details of methods are provided in Section 7.2.

7.1.1 Year 1 Monitoring

Effects of CMT are expected to be most immediately observed in Year one and, therefore, most intensive monitoring will occur during the first year. The follow conditions will be assessed:

- Determine the target and non-target plant occurrence and abundance, and relative selectivity of herbicide treatments within the treatment and control sites.
- Determine the movement and dissipation of herbicides from the treated sites following applications by high frequency sampling of a large number of sites.
- Determine compliance with water quality Basin Plan objectives such as dissolved oxygen, pH,

temperature, turbidity, conductivity, and concentration or residue levels of herbicides and their degradants inside and outside the treatment sites, and HAB conditions.

- Assessment of benthic macroinvertebrates (BMI).
- Results of continued standard harvesting operations outside the CMT sites[16].

For Year 1 methods, late-spring pre-Project monitoring will include the following monitoring parameters: BMI, hydroacoustic scanning, water quality monitoring (continuous, standard, and grab samples), and point sampling. Adjustments in numbers and locations may be made 21 days prior to herbicide application based on environmental factors and plant composition. Hydroacoustic scans and physical depth measurements will be used to calculate water volume in each proposed herbicide and combination site in order to determine the amount of herbicide to be applied.

Following application, monitoring for herbicide active ingredients and water quality parameters will take place at each of the 15 sites as well as specific locations outside the CMT sites as detailed in Table 8 and Table 9. The proposed monitoring locations for collecting data within the West Lagoon are shown in Figure 16. Herbicide residue is not anticipated to move more than 1,000 ft from the application sites based on previous dye studies conducted within the lagoons (Anderson 2011, 2016). However, the comprehensive and extensive monitoring program has been designed to further evaluate herbicide movement within the Keys Lagoons and to ensure that no herbicide residue reaches Lake Tahoe proper.

Remaining test sites (i.e., UV-C only and LFA-only) will have similar monitoring during CMT Year 1, as detailed in Table 10 and Table 11 including:

- Pre-Project monitoring via BMI sampling, hydroacoustic scanning, water quality monitoring, and point sampling; and
- Comprehensive ongoing monitoring via hydroacoustic scanning, water quality monitoring, and point sampling.

All samples will be taken in duplicate following Good Laboratory Practices (GLP). Details of sampling, documentation, shipping and recording are addressed in later sections.

7.1.2 Year 2 Monitoring

Monitoring in Year 2 will focus on tracking aquatic plant populations to determine follow up treatments necessary for control, and their effectiveness. LFA-only treatments and monitoring will continue as described for Year 1.

During Year 2, the use of non-herbicide control methods such as bottom barriers, diver assisted removal, and UV-C “spot” treatments may be employed. Non-herbicide follow up treatments will be assessed using the same monitoring approach as Year 1, except that sampling for aquatic herbicide residues will not be included. Follow-up treatment monitoring, outside of normal monitoring shown in Tables 8 through 11, are shown in

Table 12 and Table 13. Monitoring stations will be set up as indicated in Figures 17, 18 21, and 22. The following monitoring will be included:

[16] Monitoring for continued harvesting operations would include: the amount (tons) or weed mass removed, amount (sqft) of fragments skimmed and removed from lagoons, and vessel hull clearance.

- Determine the target and non-target plant occurrence and abundance, and relative selectivity of herbicide treatments within the treatment and control sites. • Determine compliance with water quality Basin Plan Objectives such as DO, pH, temperature, turbidity, conductivity, and HAB conditions.
- Results of continued standard harvesting operations outside CMT sites. • Assessment of BMI.

Plant species and abundance will be monitored according to Section 7.2.1, Plants (Including Target and Non-Target Species).

7.1.3 Year 3 Monitoring

Monitoring in Year 3, similarly to Year 2, will focus on tracking aquatic plant populations to determine follow up treatments necessary for control, and their effectiveness. During Year 3, the use of non-herbicide control methods such as bottom barriers, diver assisted removal, and UV-C “spot” treatments may be employed. Non-herbicide follow-up treatments will be assessed using the same monitoring approach as Year 1, except that sampling for aquatic herbicide residues will not be included.

Follow-up treatment monitoring, outside of normal monitoring shown in Tables 8 through 11, are shown in Table 12 and Table 13. Monitoring stations will be set up as indicated in Figures 17, 18, 21 and 22. The following will be monitored:

- Determine the target and non-target plant occurrence and abundance, and relative selectivity of herbicide treatments within the treatment and control sites. • Determine compliance with water quality Basin Plan Objectives such as DO, pH, temperature, turbidity, conductivity, and HAB conditions.
- Results of continued standard harvesting operations outside CMT sites. • Assessment of BMI.

Note that following the final BMI assessments, the conditions of BMI compared with pre CMT conditions will be reviewed by qualified biologists to determine if pre-CMT conditions have been achieved (or improved).

7.1.4 Monitoring Actions for Each CMT Treatment Type.

The tables below summarize the proposed monitoring actions for each of the CMT treatments. During the Fall of Year 3, collected data will be evaluated by a qualified biologist to determine if recovery to pre-project conditions has been achieved. Following this evaluation, the qualified biologist will prepare a report identifying if recovery was

reached.

Table 8. CMT Monitoring Details – Herbicide Only Treatment[17]

Activity	Monitoring Variable	Monitoring Method	Compliance
Treatment			
Herbicide Application		Anticipated 1-day application for each replicate of herbicide; total 5-7 days; applications will be staggered to provide adequate monitoring logistics (post-treatment sampling) • last day of application for each herbicide is 0 DAT	-Product Label; posttreatment monitoring schedule
Group B Method(s) (Bottom Barriers/Diver Assisted Hand Pulling/ UV-C) --- Please refer to Group B Methods Tables			--
Treatment Associated Actions			
Turbidity Curtain Install	Turbidity	YSI Monitoring (2-3 days)	WQO
Turbidity Curtain Removal	Turbidity	YSI Monitoring (2-3 days)	WQO
Monitoring			
BMI	Taxa/Diversity/Tolerance	Ponar Grab & D-Net • Pre-treatment sample (April/May) • 2 samples per site (1 mid-channel & 1 nearshore)	BPE/AA, Bio. Recovery
Hydroacoustic Scanning	Plant Biovolume & Height	Lowrance HDS Live 7 • Scans to be completed 2x per month • Scans to be collected until early-November • Outsourced lab analysis	Research
Point Intercept Sampling	% Species Occurrence; Relative abundance	Point intercept sampling • to begin 14 DAT after herbicide application and end early November • double tined rake used to collect samples • 30 - 40 samples per acre • points every 100-200ft along transect (sampling to start 14 DAT then every 21 days through 90 DAT)	BPE/AA, Bio. Recovery
Continuous Water Quality Monitoring	DO/pH/°C	miniDOT Data Loggers • data recorded hourly; • downloaded weekly	NPDES, MMRP
Standard Water Quality Monitoring	DO/pH/ °C/SPC/FNU/ORP	YSI ProDSS • start 3 DAT • pre-treatment sample • collect 3x weekly between the hours of 11am-2pm and intermittently until 30 DAT, then weekly to 60 DAT • data from S/M/B separately logged	NPDES, MMRP

Nutrient Grabs	TP, OrthoP, TN, TKN	Composite grab sample (S/M/B) • collected weekly • pre-treatment sample • 3 DAT (herbicide) intermittently through at least 30 DAT • Outsourced lab analysis	WQO, Research
HAB Sampling	Visual>TP & Algae>Toxins	Visual triggers for grab samples: TP, key cyanobacteria present, cyanotoxins samples • follow existing TKPOA protocols	NPDES, MMRP
Treatment Specific Monitoring			
Active Ingredient (Water)	Herbicide Residues	Composite grab sample (S/M/B) • 3 samples inside site/3 samples outside site • collected pre-treatment, 2, 7, 14, & 21 DAT • samples to be analyzed by outsourced lab with reporting results within 48 hours	NPDES, BPE/AA, MMRP
Degradants (Water)	Herbicide Degradants	Composite grab sample (S/M/B) • 3 samples inside site/3 samples outside site • collected pre-treatment, 2, 7, 14, & 21 DAT • samples to be analyzed by outsourced lab with reporting results within 72 hours	NPDES, BPE/AA, MMRP

[17] Table abbreviations used: (S/M/B): surface/mid/bottom; composite: water sample from S/M/B combined to form one sample; YSI ProDSS (digital multiprobe instrument); BPE: Basin Plan Exemption Application; AA: Anti-Degradation Analysis; WQO: Basin Plan Water Quality Objectives; MRP: Monitoring and Reporting Program; NPDES: National Pollutant Discharge Elimination System.

Activity	Monitoring Variable	Monitoring Method	Compliance
Herbicide (Sediment)	Residue/Degradants	Ponar Grab • 2 samples per site • 1 pre-project sampling event and 1 sampling event at 21 DAT and 1 sampling event in CMT Year 3	NPDES, BPE/AA, MMRP
RWT Dye Movement (Receiving Water)	RWT Dye	Field fluorometer • continuous flow-through cuvette • 1 site adjacent to treatment site (red diamonds on Figure 16) • 3 times per week for until RWT dye is no longer detectable	NPDES, BPE/AA, MMRP
RWT Dye Movement (Outside turbidity curtains)	RWT Dye	Field fluorometer • continuous flow-through cuvette • Sites directly outside curtains to monitor movement of herbicides (yellow diamonds on Figure 17) • begin 2 DAT and occur every 48 hours until 14 DAT or until RWT dye is no longer detectable	NPDES, BPE/AA, MMRP
Well Water	Herbicide	50 mL samples 2x each sample day • begins 2 DAT after application and will occur every 48 hours until 14 DAT •May continue to 16 DAT and/or 18 DAT if necessary •If 3 wells in operation, number of samples would equal 6 per day	NPDES, BPE/AA, MMRP

Table 9. CMT Monitoring Details – Combination Test (Herbicide/UV-C)

Activity	Monitoring Variable	Monitoring Method	Compliance
Treatment			
Herbicide Application		Anticipated 1-day application for each replicate of herbicide; total 5 to 7 days; applications will be staggered to provide adequate monitoring logistics (post-treatment sampling) • last day of application is 0 DAT	--
UV-C Application		Anticipated 28-day application • start at 2 to 3 DAT after herbicide application	--
Group B Method(s) (Bottom Barriers/Diver Assisted Hand Pulling) -- Please refer to Group B Methods Tables			--

Treatment Associated Actions

Turbidity Curtain Install	Turbidity	YSI Monitoring (2 to 3 days)	WQO
Turbidity Curtain Removal	Turbidity	YSI Monitoring (2 to 3 days)	WQO
Onset Logger Installation	N/A	Installation for real-time monitoring of DO, pH, and temperature	--
Monitoring			
BMI	Taxa/Diversity/Tole rance	Ponar Grab & D-Net • Pre-treatment sample (April/May) • 2 samples per site (1 mid-channel & 1 nearshore)	BPE, Bio. Recovery
Hydroacoustic Scanning	Plant Biovolume & Height	Lowrance HDS Live 7 • scans to be completed 2x per month • Scans to be collected until early-November • Outsourced lab analysis	Research
Point Intercept Sampling	% Species Occurrence; Relative abundance	Point intercept sampling • to begin 14 DAT after herbicide application and end early November • double tined rake used to collect samples • 30 to 40 samples per acre • points every 100-200ft along transect (sampling to start 14 DAT then every 21 days to November)	BPE/AA, Bio. Recovery
HAB Sampling	Visual>TP & Algae>Toxins	Visual triggers for grab samples for TP, Algae, cyanotoxins • follow existing TKPOA protocols	NPDES, MMRP
Herbicide Specific Monitoring			
Continuous Water Quality Monitoring	DO/pH/°C	miniDOT Data Loggers • data recorded hourly; • downloaded weekly	NPDES, MMRP
Standard Water Quality Monitoring	DO/pH/ °C/SPC/FNU/ORPs	YSI ProDSS • start 3 DAT (herbicide)	NPDES, MMRP

Activity	Monitoring Variable	Monitoring Method	Compliance
		• pre-treatment sample • collect 3x weekly between the hours of 11am-2pm until end of UV-C treatment • data from S/M/B separately logged	
Nutrient Grabs	TP, OrthoP, TN, TKN	Composite grab sample (S/M/B) • collected weekly • pre-treatment sample • 3 DAT (herbicide) through at least 30 DAT • Outsourced lab analysis	WQO, Research
Active Ingredient (Water)	Herbicide Residues	Composite grab sample (S/M/B) • 3 samples inside site/3 samples outside site • collected pre-treatment, 2, 7, 14, & 21 DAT • samples to be analyzed by outsourced lab with reporting results within 48 hours	NPDES, BPE/AA, MMRP
Degradants (Water)	Herbicide Degradants	Composite grab sample (S/M/B) • 3 samples inside site/3 samples outside site • collected pre-treatment, 2, 7, 14, & 21 DAT • samples to be analyzed by outsourced lab with reporting results within 72 hours	NPDES, BPE/AA, MMRP
Herbicide (Sediment)	Residue/Degradant s	Ponar Grab • 2 samples per site • 1 pre-project sampling event and 1 sampling event at 21 DAT and 1 sampling event in CMT Year 3	NPDES, BPE/AA, MMRP
RWT Dye Movement (Receiving Water)	RWT Dye	Field fluorometer • continuous flow-through cuvette • 1 site adjacent to treatment site (red diamonds on Figure 17) • 3 times per week for until RWT dye is no longer detectable	NPDES, BPE/AA, MMRP
RWT Dye Movement (Outside turbidity curtains)	RWT Dye	Field fluorometer • continuous flow-through cuvette • Sites directly outside curtains to monitor movement of herbicides (yellow diamonds on Figure 16) • begin 2 DAT and occur every 48 hours until 14 DAT or until RWT dye is no longer detectable	NPDES, BPE/AA, MMRP
Well Water	Herbicide	50 mL samples 2x each sample day • begins 2 DAT after application and will occur every 48 hours until 14 DAT •May continue to 16 DAT and/or 18 DAT if necessary •If 3 wells in operation, number of samples would equal 6 per day	NPDES, BPE/AA, MMRP
UV-C Specific Monitoring			
Continuous Water Quality Monitoring	DO/pH/°C	Onset Data Loggers • data recorded hourly; • downloaded weekly	NPDES, MMRP
Standard Water Quality Monitoring	DO/pH/ °C/SPC/FNU/ORP	YSI ProDSS • start 12 DAT (UV) • pre-treatment sample • collect 3x weekly between the hours of 11am-2pm until 60 DAT • data from B, M, S separately logged	NPDES, MMRP

Nutrient Grabs	TP, OrthoP, TN, TKN	Composite grab sample (S/M/B) • collected weekly • pre-treatment sample • 12 DAT (UV) through at least 60 DAT • Outsourced lab analysis	WQO, Research

Table 10. CMT Monitoring Details – LFA Only

Activity	Monitoring Variable	Monitoring Method	Compliance
Treatment			
Laminar Flow Aeration (LFA) - Will run continuously through duration of CMT			
Group B Method(s) (Bottom Barriers/Diver Assisted Hand Pulling) -- Please refer to Group B Methods Tables			
Treatment Associated Actions			
N/A	N/A	N/A	N/A
Monitoring			
BMI Sampling	Taxa/Diversity/Tolerance	Ponar Grab & D-Net • Pre-treatment sample (April/May) • 2 samples per site (mid-channel & nearshore)	BPE/AA, MMRP, Bio. Recovery
Hydroacoustic Scanning	Plant Biovolume & Height	Lowrance HDS Live 7 • scans to be completed 2x per month • Scans to be collected until early-October • Outsourced lab analysis	BPE, Bio. Recovery
Point Intercept Sampling	% Species Occurrence; Relative abundance	Point intercept sampling • Pre-treatment, mid-summer and fall sampling event • double tined rake used to collect samples • 12 samples per acre	BPE/AA, Bio. Recovery
Continuous Water Quality Monitoring	DO/pH/°C	Onset Data Loggers • data recorded hourly; • downloaded weekly	NPDES, MMRP
Standard Water Quality Monitoring	DO/pH/ °C/SPC/FNU/ORP	YSI ProDSS • collect 2x monthly between the hours of 11am-2pm from April to November • data from S/M/B separately logged	NPDES, MMRP
Nutrient Grab Samples	TP, OrthoP, TN, TKN	Composite grab sample (S/M/B) • collected twice annually (spring and fall) • Outsourced lab analysis	WQO, Research
HAB Sampling	Visual>TP & Algae>Toxins	Visual triggers for grab samples for TP, Algae, cyanotoxins • follow existing TKPOA protocols	NPDES, MMRP
Treatment Specific Monitoring			
Muck Depth	Muck Depth	Handheld depth sounder	Research

Table 11. CMT Monitoring Details – UV-C Only

Activity	Monitoring Variable	Monitoring Method	Compliance
Treatment			
UV-C Application(s) - Group A			
Group B Method (Bottom Barriers/Diver Assisted Hand Pulling) -- Please refer to Group B Methods Tables			
Treatment Associated Actions			
Harvesting			WDR
Monitoring			
BMI Sampling	Taxa/Diversity/Tolerance	Ponar Grab & D-Net • Pre-treatment sample (April/May) • 2 samples per site (mid-channel & nearshore)	BPE/AA, MMRP, Bio. Recovery
Hydroacoustic Scanning	Plant Biovolume & Height	Lowrance HDS Live 7 • scans to be completed 2x per month • Scans to be collected until early-October • Outsourced lab analysis	BPE/AA, Bio. Recovery
Point Intercept Sampling	% Species Occurrence; Relative abundance	Point intercept sampling • to begin 14 DAT after first treatment and continue to 9/1/2021 every 14 days • for second treatment, will begin 14 DAT after first treatment and continue every 14 days until 11/4/2021 • double tined rake used to collect samples • 30 to 40 samples per site • points every 100 to 200ft along transect	BPE/AA, Bio. Recovery
Continuous Water Quality Monitoring	DO/pH/°C	Onset Data Loggers • data recorded hourly; • downloaded weekly	NPDES, MMRP
Standard Water Quality Monitoring	DO/pH/ °C/SPC/FNU/ORP	YSI ProDSS • start 14 DAT (UV) • collect 3x weekly between the hours of 11am to 2pm until 60 DAT • data from S/M/B separately logged	NPDES, MMRP
Nutrient Grab Samples	TP, OrthoP, TN, TKN	Composite grab sample (S/M/B) • collected weekly • 14 DAT (UV) through at least 60 DAT • Outsourced lab analysis	WQO, Research
HAB Sampling	Visual>TP & Algae> Toxins	Visual triggers for grab samples for TP, Algae, cyanotoxins	NPDES, MMRP
Treatment Specific Monitoring			
N/A	N/A	N/A	N/A

Table 12. Group B: Spot Treatments of Diver Assisted Hand Pulling and/or Bottom Barriers Monitoring[18]

Activity	Monitoring Variable	Monitoring Method	Compliance
Treatment			
Diver Assisted Hand Pulling - Spot Treatment (Group B)			
Bottom Barriers - Spot Treatment (Group B)			
Treatment Associated Actions			
Turbidity Curtains (Install and Removal)	Turbidity	YSI real-time monitoring: • Pre-installation monitoring; • visually monitor surface turbidity, alter pace or procedures if turbidity increases; • 24- hours after installation, monitoring complete if greater than 10% pre-installation measures at 48 hours; • Measure turbidity upon removal of curtain (~ 1 hr after removal).	WQO, BPE/AA, NPDES, MMRP, Bio. Recovery
Bottom Barrier (Install and Removal)	Turbidity	YSI real-time monitoring: • Pre-installation monitoring; • visually monitor surface turbidity, alter pace or procedures if turbidity increases; • 24-hours after installation, monitoring complete if greater than 10% pre-installation measures at 48 hours; • Measure turbidity upon removal of curtain (~ 1 hr after removal).	WQO, BPE/AA, NPDES, MMRP, Bio. Recovery
Treatment Specific Monitoring			
Turbidity associated with diver assisted hand pulling	Turbidity	• Measure turbidity daily prior to start • Visually monitor surface turbidity; if turbidity seems high or at request by Lahontan or TRPA (in the field) grab a turbidity measurement • Measurements to be gathered at 12pm and at end of day	WQO, BPE/AA, NPDES, MMRP, Bio. Recovery

[18]The following monitoring activities will continue in Years 2 and 3 of Group A method application: BMI, hydroacoustic scanning, point sampling, continuous and standard water quality, and HAB. Table above identifies additional monitoring that would be required if spot treatments of diver assisted hand pulling and bottom barriers were used following Group A methods.

Table 13. Group B: UV-C Spot Treatment(s) Monitoring[19]

Activity	Monitoring Variable	Monitoring Method	Compliance
Treatment			
UV-C Spot Treatment (Group B)			
Treatment Associated Actions			
N/A	N/A	N/A	N/A
Monitoring			

BMI Sampling	Taxa/Diversity/Tolerance	Ponar Grab & D-Net • Pre-treatment sample (April/May) • 2 samples per site (mid-channel & nearshore)	BPE/AA, MMRP, Bio. Recovery
Hydroacoustic Scanning	Plant Biovolume & Height	Lowrance HDS Live 7 • scans to be completed 2x per month • Scans to be collected until 60 DAT • Outsourced lab analysis	BPE, Bio. Recovery
Point Intercept Sampling	% Species Occurrence; Relative abundance	Point intercept sampling • pre-treatment sample • to begin 14 DAT after first treatment and continue every 21 days • double tined rake used to collect samples • 30 to 40 samples per acre • points every 100 to200ft along transects perpendicular to the shoreline	BPE/AA, Bio. Recovery
Continuous Water Quality Monitoring	DO/pH/°C	Onset Data Loggers • data recorded hourly; • downloaded weekly	NPDES, MMRP
Standard Water Quality Monitoring	DO/pH/ °C/SPC/FNU/ORP	YSI ProDSS • start 14 DAT (UV) • pre-treatment sample • collect 3x weekly between the hours of 11am 2pm until 60 DAT • data from S/M/B separately logged	NPDES, MMRP
Nutrient Grab Samples	TP, OrthoP, TN, TKN	Composite grab sample (S/M/B) • collected weekly • pre-treatment sample • 14 DAT (UV) through at least 60 DAT • Outsourced lab analysis	WQO, Research
HAB Sampling	Visual>TP & Algae>Toxins	Visual triggers for grab samples for TP, Algae, cyanotoxins	NPDES, MMRP
Treatment Specific Monitoring			
N/A	N/A	N/A	N/A

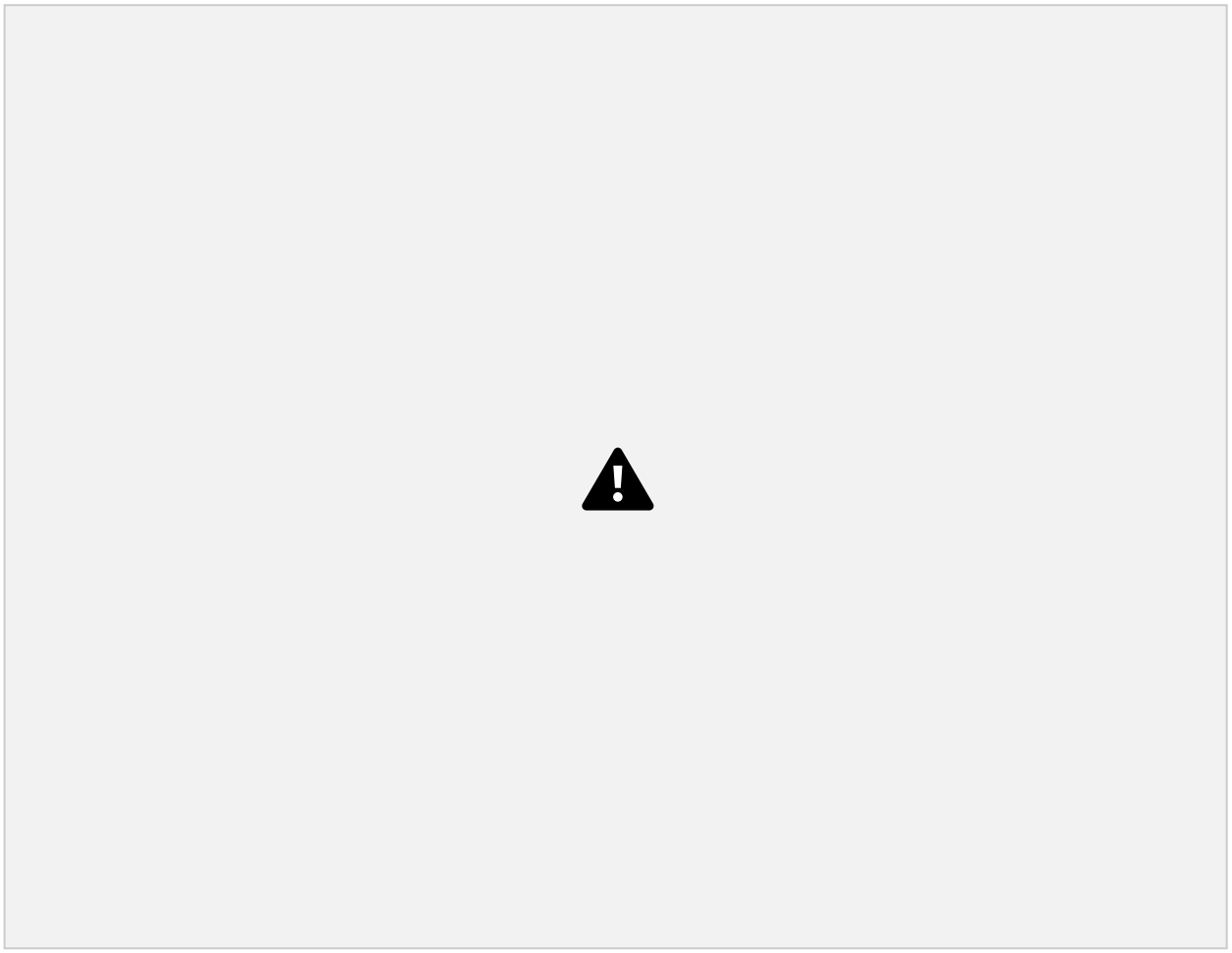
7.2 Monitoring Methods and Guidelines

This section describes specific methods, sites, and equipment that will be used to accomplish the monitoring objectives and monitoring actions outlined in Section 7.1 and those identified in Tables 8 through 13. It is subdivided by the type(s) of monitoring. In all methods and protocols, GLPs are applied including proper calibration of instruments and equipment; documented training of staff; documentation of sample collections, storage, handling, shipping; and protections against cross-contamination of samples.

[19] The following monitoring activities will continue in Years 2 and 3 of Group A method application: BMI, hydroacoustic scanning, point sampling, continuous and standard water quality, and HAB. The above-described monitoring would replace Group A Years 2 and 3 (2023 & 2024) monitoring for the duration of the UV application, then return to Group A monitoring after completion.

Figure 17 and 18 shows the locations of each CMT treatment site, monitoring locations, locations of double turbidity curtains, and contingency monitoring sites south of the West Channel.

Figure 17. Proposed CMT Project and Monitoring Stations[20] (NPDES Attachment C)[21]

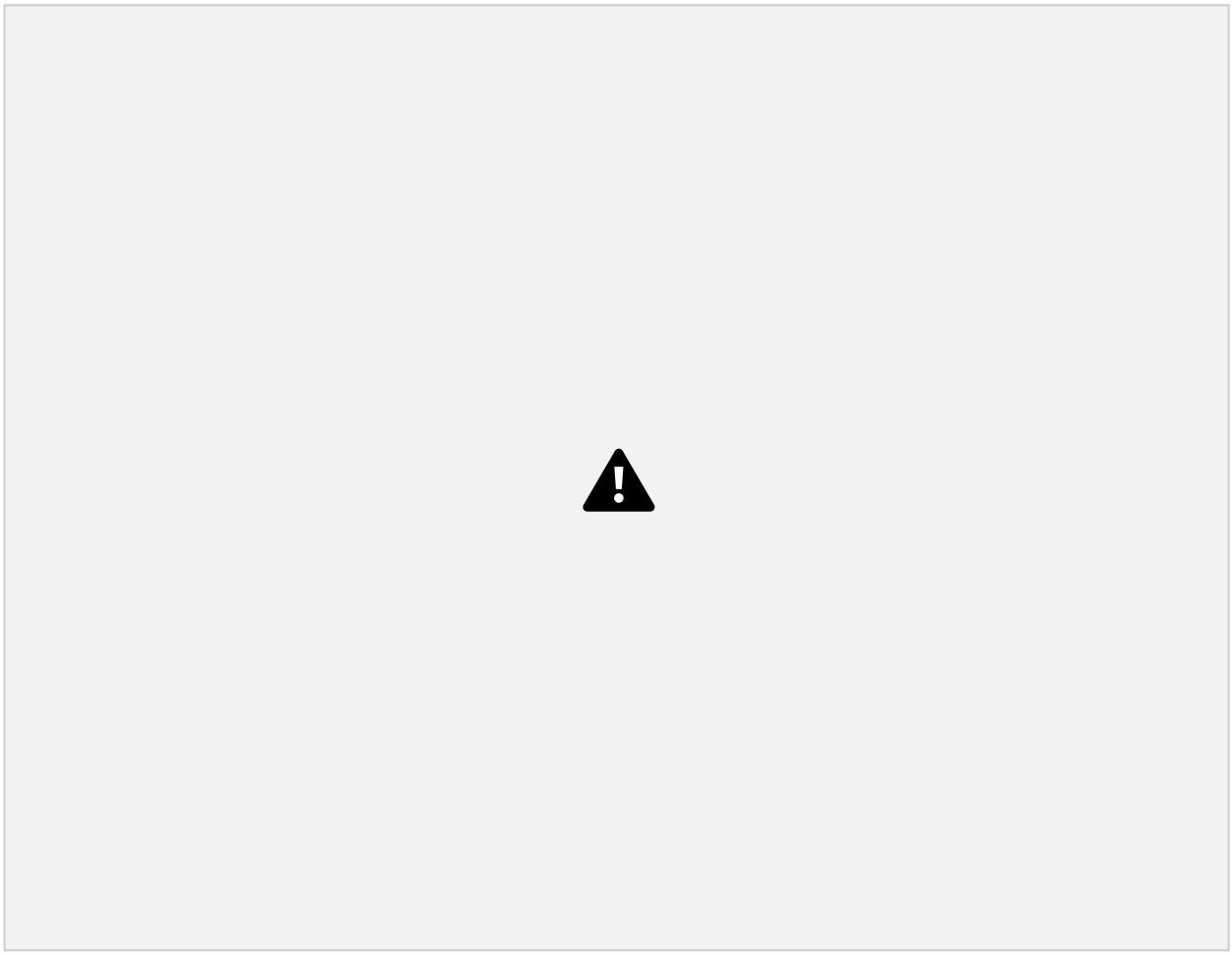


[20] For herbicide and combination sites, herbicide samples will be taken at indicated water quality monitoring locations (3 inside treatment site and 3 outside).

[21] Per NPDES Permit No. CA6202202 WDID 6A091701001, Section II.B "the discharger must monitor at the locations specified in the Discharger's APAP and LMCAP and, if applicable, the "Contingency Monitoring Locations in Lake Tahoe" map in Attachment C to demonstrate compliance with the receiving water limitations, discharge specifications, and other requirements in this Order. If monitoring locations are revised in response to revised treatment area locations reported per section VI.C.4 of this Order, the Discharger must reflect such revised monitoring locations on

the map submitted per section VI.C.4 of this Order."

Figure 18. Proposed New CMT Project and Monitoring Stations



7.2.1 Plants (Including Target and Non-Target Species)

Methods described below provide quantifiable metrics to determine if CMT objectives for reduction in impacts of target plant are achieved and what, if any, effects occur on non target plants over the CMT project period. Hydroacoustic (sonar-type transducer instrument) surveys will be conducted every two weeks starting in spring of the treatment year and continuing until mid-October. Additionally, point surveys will be conducted according to Tables 8 through 13 to determine both native and non-native species absence and presence. For Year 1 methods, results in the treatment sites and untreated control sites will be compared to determine the efficacy of the aquatic herbicide treatment, non-target effects, duration of control, and level to which native and non-native aquatic plants re-establish in the habitat. For Years 2 and 3, treatment sites will be assessed to determine the level of efficacy of the prescribed treatments and determine what follow up actions, if any, are needed for the following year.

7.2.1.1 Plant Biovolume and Plant Height

Hydroacoustic scans will be made using a Lowrance HDS Live 7 scanning device attached to a boat that will move along two parallel transects in each treatment and

control

site, or in a manner that generates inclusive scans. The hydroacoustic scan system is a fine-grained (essentially continuous) metric that provides biovolume and canopy height. The device pings the bottom (and existing plants) multiple times per second. Since the scans will be conducted pre/post/ in all CMT sites at 14-day intervals, the numbers of data points generated (i.e., n= sample points) are enormous. The digitized data obtained are then uploaded to third party service company that generates maps showing biovolume (i.e., percent of scanned volume occupied by aquatic, submersed vegetation) and the height of the plants. This method has become a standard for efficiently assessing aquatic herbicide efficacy (Madsen and Wersal 2018; Ferrell et al. 2013). Canopy height will be reported as the estimated vessel hull clearance, or the depth of the water that allows unimpeded passage of boats. Vessel hull clearance is one of the measurable objectives used for the CMT. This metric, as well as biovolume and relative abundance of plants, forms the basis to determine efficacy of the CMT Year 1, Year 2 and Year 3 (DEIR/EIS approved Group A and Group B methods, respectively) compared to baseline (pre-CMT condition and untreated control) levels.

7.2.1.2 Species Identification and Relative Abundance

To determine relative abundance and presence or absence of plants, physical point samples will be taken at intervals along the same transects as the hydroacoustic sampling (Madsen and Wersal 2018; Madsen1999). To determine the presence or absence of the plants at the treatment areas and the control areas, plant surveys will be conducted after 14 days after treatment (DAT). Preferably plant monitoring will occur after water quality results indicate that pesticides used have degraded to level acceptable for water quality beneficial uses. Then plant survey samples will be conducted 14 DAT then every 21 days.

The “point sampling/point transect” method is described in the paper by Madsen, 1999 cited in the APAP. The plant survey is conducted using a double sided “thatch” rake (20 in. wide) attached to a telescoping pole inserted vertically to the bottom. The rake is rotated 360 degrees and carefully lifted up to the surface so that the rake head (w/ plants present) can be examined, and each species identified and recorded. The sampling provides an estimate of relative abundance among all species and is generally reported as a percent presence: For example, if 10 samples are taken and curly leaf pondweed is only detected in 5, then it has frequency of 50%[22].

Plant surveys will be collected on a transects of between 100 ft to 200 ft intervals following the edge of the water. Then perpendicular angle to the water’s edge four surveys points, one on sides of the water’s edge within 3 to 6 ft from the shore, with two additional survey points in the middle of channel. An example of proposed sampling transects is shown in Figure 19. Along each transect, samples will be taken mid-channel and at approximately right angles toward the shore within 3 to 6 ft of the edge of the shore and at 2 to 4-ft depths. Figure 20 provides an example of the total array of plant sampling points. In less linear sites, transect contours will follow shoreline shape, but

will still include mid-channel and areas near piers and floating docks. For each CMT site this protocol will result in 30 to 40 separate point samples per sampling date. Thus, a total of 90 to 120 samples for

[22] Note that with multiple species, they could ALL be present in all samples which would results in a frequency of 100% for each.

each treatment type for each sampling event will be used to compare with controls and pre-CMT conditions. These data provide the following: (a) relative abundance; (b) presence/absence of species; (c) condition of species.

Figure 19. Example of Plant Sampling Transects

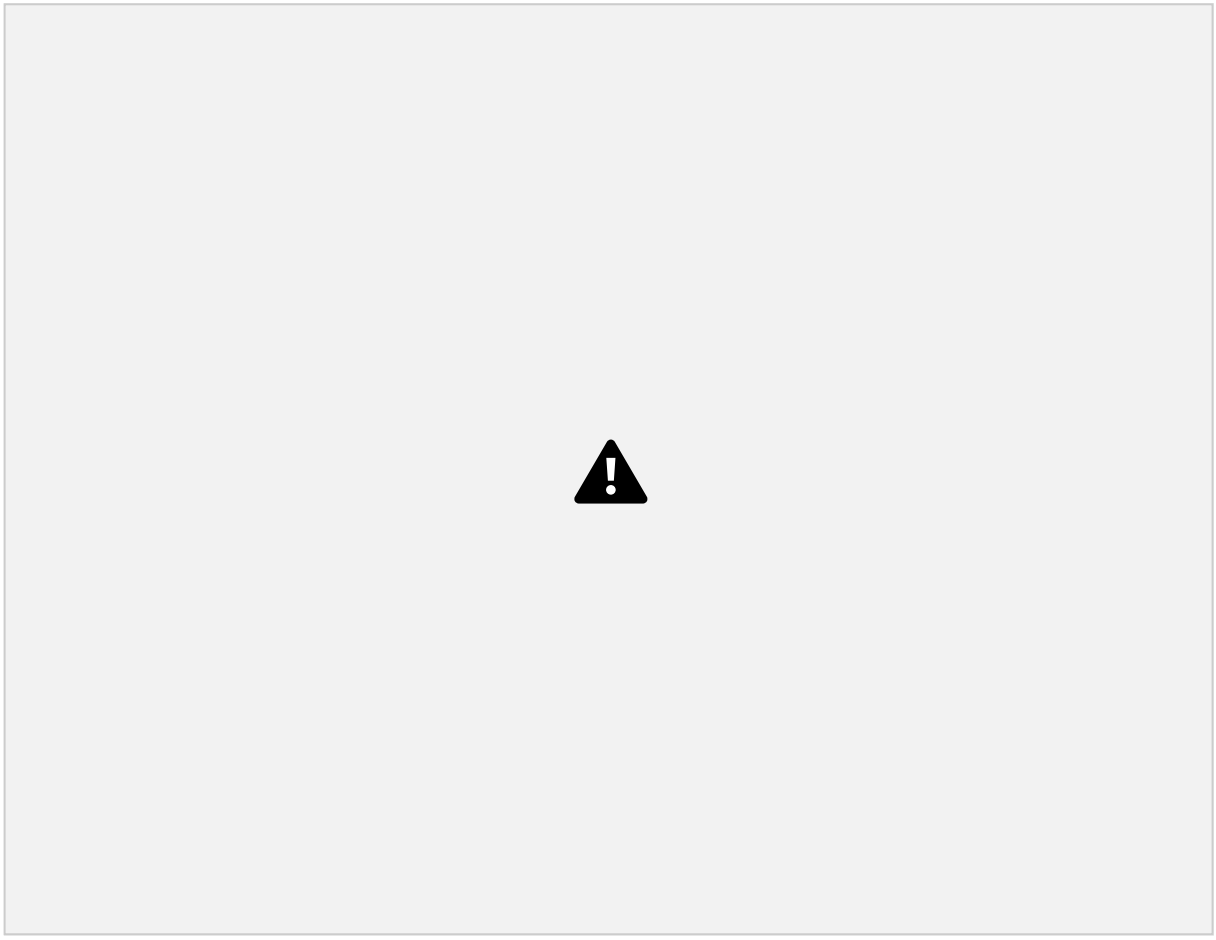
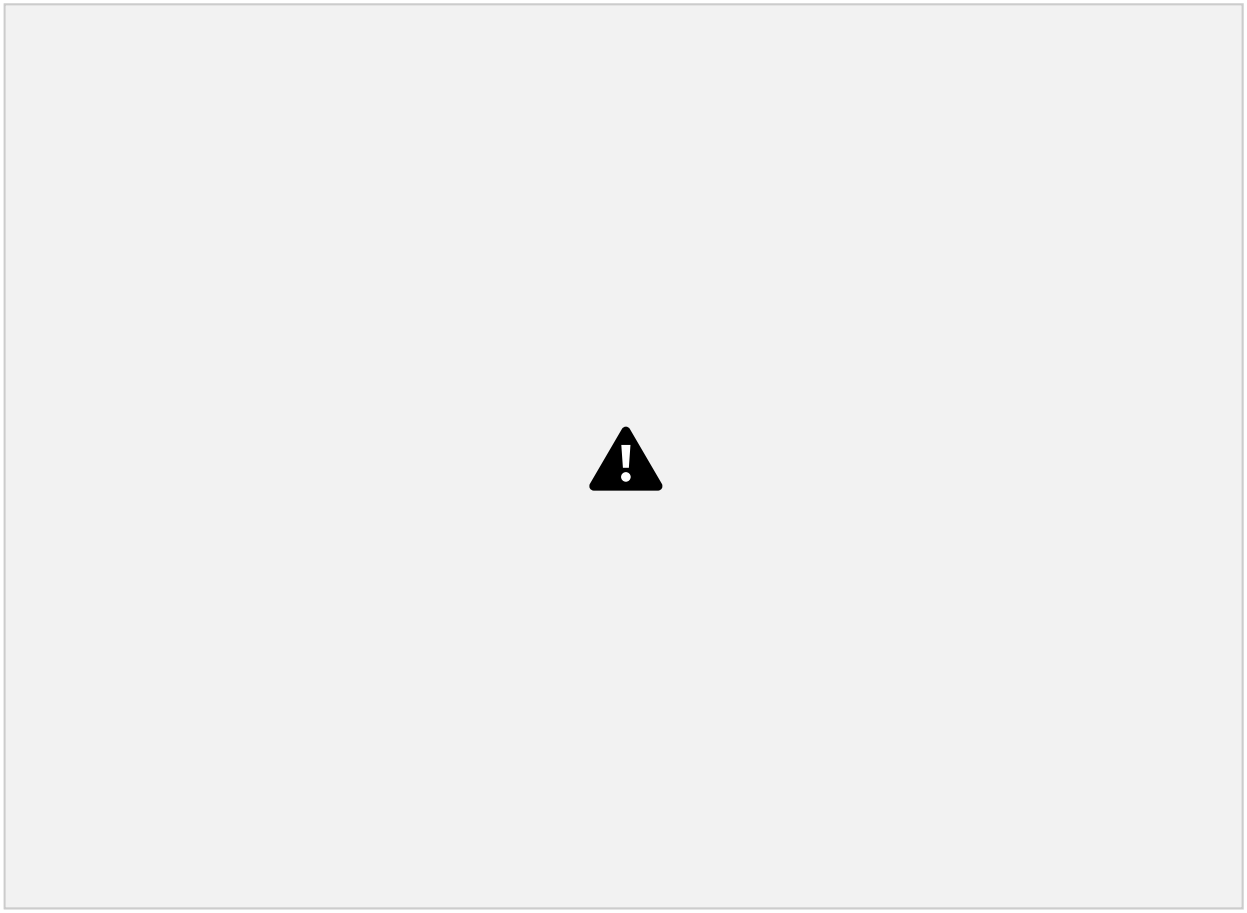
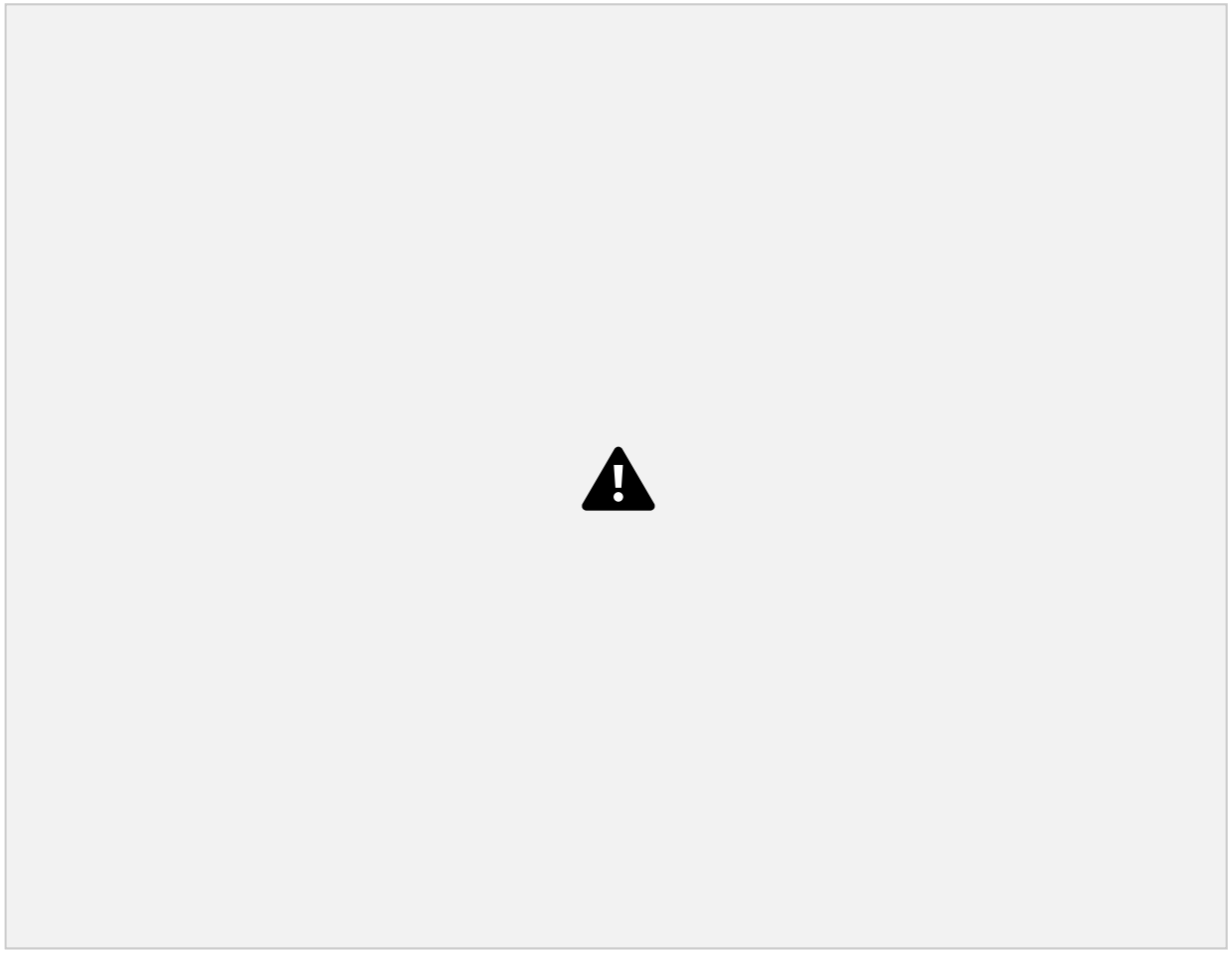


Figure 20. Example of Point Sample Array



Figures 21 provides an example of the distribution of sampling locations per site, primarily six (6) per treatment site (3 inside site and 3 outside site). NPDES sites inside the double turbidity curtains are also included in the six (6) total. Herbicide and herbicide/UV-C combination sites are shown in Figure 7.

Figure 21. Examples of Proposed Sampling Locations for Each Treatment



7.2.2 Water Quality

As stated in Section 3.1.1.5, Water Quality, of the Draft EIR/EIS, water quality impacts

are a primary concern of the proposed CMT Project, and include a variety of potential effects to physical, chemical and biological components in the Tahoe Keys lagoons. These issues are identified in the Draft EIR/EIS in Section 3.1.1.5 as WQ#1 - #7 (i.e., temperature, turbidity, weed fragments, pH, DO, total phosphorus, and total nitrogen). Although only 24% of the Tahoe Keys lagoons are proposed to be treated during the CMT[23], some beneficial effects on water quality constituents can be expected in and near treatment areas. Potential adverse impacts to water quality due to the proposed Project are expected to be largely short-term during in-water preparation for, demobilization from, and application of treatments during the aquatic weed control tests.

Tables provided in Section 7.1 provide water quality monitoring methods, timing, and frequency during Years 1 through 3 of the CMT.

[23] The Tahoe Keys lagoons includes approximately 172 acres. The CMT proposes a total of 24 sites with stand-alone or combination treatments of herbicide, laminar flow aeration, and ultraviolet light on approximately 46.9 acres, located entirely in the Main Lagoon and Lake Tallac.

7.2.2.1 Standard Water Quality Monitoring

Standard water quality, as defined in this APAP Amendment 1 and described in the tables in Section 7.1, are typically measured using a multiprobe detector such as a calibrated YSI ProDSS. The measurements are made on a regular frequency with data collected from the surface, mid-depth, and surface within the water column. Measurements will be made pre-treatment within 48 hours before treatment, excluding LFA treatments that will run continuously during the duration of the CMT Project[24]. Measurements during and after herbicide applications will begin 72 hours post-treatment and occur three (3) times per week (Monday, Wednesday, and Friday) between the hours of 11am – 2pm for at least 30 DAT. Measurements during UV-C application will occur 21 days after the day 1 of treatment and will occur every 14 days.

The water quality sampling will be conducted using a calibrated, hand-held logging device for the following parameters: DO, pH, temperature, turbidity, redox, and conductivity. Figures 17 and 18 shows the proposed distribution of sampling locations for standard water quality and grab sampling. Final sampling locations will be GPS located and compiled on a map prior to start of treatments in Year 1.

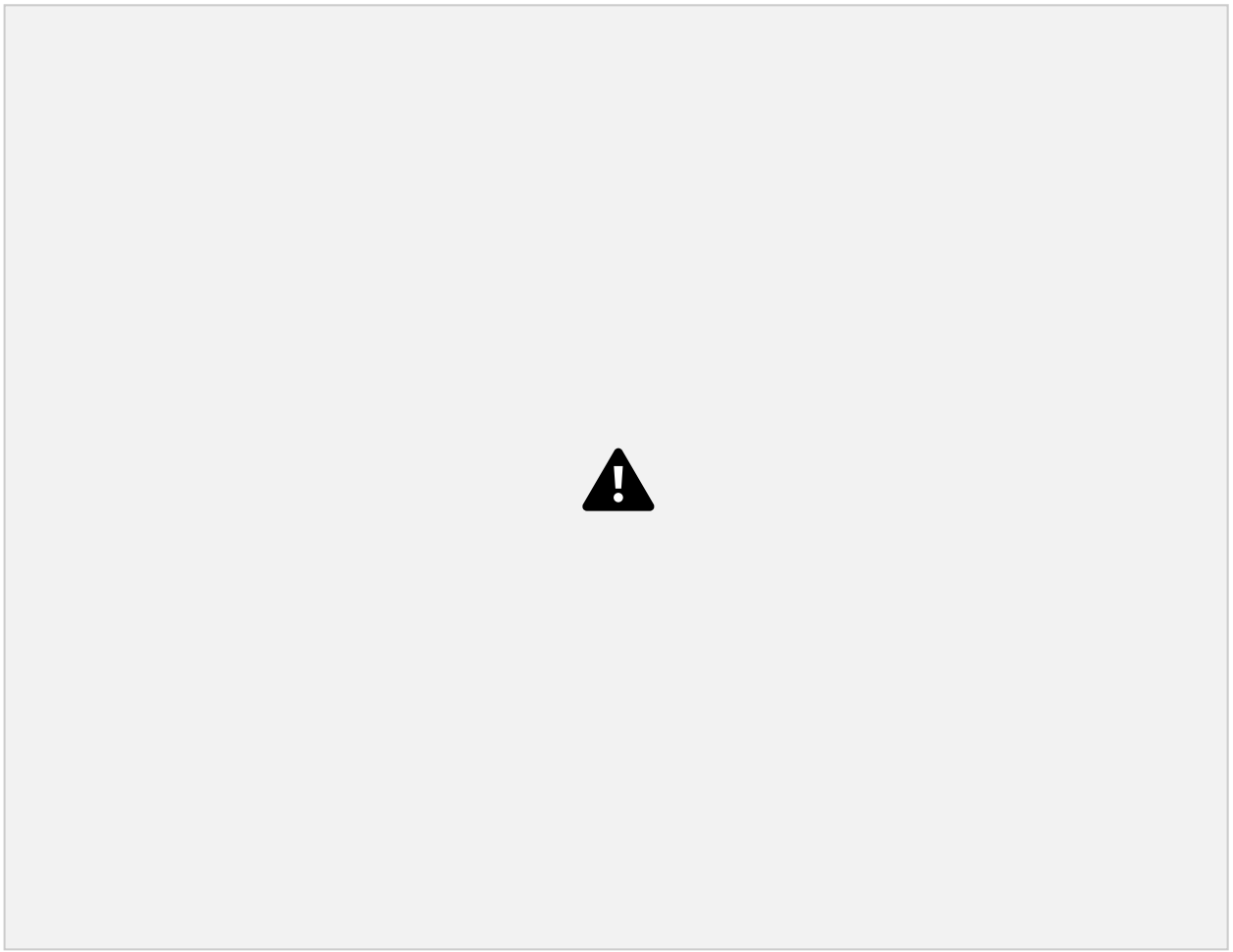
7.2.2.2 Continuous Water Quality Monitoring

Continuous monitoring of DO and temperature will be collected to track diurnal changes in the water column. Photosynthesis and respiration affect both DO and pH. Since CMT treatments are expected to reduce plant biomass, this may affect DO. Therefore, to assess impacts of CMT treatments on these biologically driven water quality changes, hourly logging devices (miniDOT loggers) will be deployed near the bottom and surface in each CMT site. Data logged will be downloaded weekly. These data will supplement the standard water quality measurements made using the hand-held multiprobe instrument (YSI) and provide information pertaining to mitigation (if needed) for low DO. Mitigation is detailed in Table 14.

Temperature data will provide evidence for potential diurnal, vertical water turnover that can be driven by “sinking” of cooling water from night to dawn. Figures 22, 26, and 27 show the proposed locations of the hourly loggers measuring DO and temperature. As shown in the figure, loggers (2) will be placed attached to an anchored buoy or dock (Figure 26) within the treatment area, one near the surface of the water column and one near the bottom.

[24] LFA has been running continuous since 2018 at site 26 and therefore there is no pre-treatment sampling.

Figure 22. Example of Proposed Location of Data Loggers



7.2.2.3 Grab Samples

Nutrient grab samples will be collected from the treatment sites, three (3) from inside a treatment area and three (3) from outside a treatment area. Samples will be collected from the surface, mid-depth, and bottom of the water column and then will be compiled into a composite sample. For herbicide and combination sites, composite grab samples will be collected beginning 72 hours post-treatment and will continue weekly until at least 30 DAT. Additionally, UV-C-only sites will be sampled beginning 14 days after the initial treatment and subsequently every 14 days until 60 DAT. LFA-only treatment sites will be sampled twice annually (spring and fall). Monitoring is outlined in Tables 8 through Table 11.

7.2.3 Cyanobacteria and HAB Monitoring

Cyanobacteria, or blue-green algae, are naturally occurring photosynthetic prokaryotes that can be found in almost all bodies of water. These organisms are considered to be dominant primary producers on Earth, contributing more than 25% of photosynthesis worldwide. Cyanobacteria are true bacteria, often unicellular. However, they have the ability to grow into large colonies that may be visible to the naked eye, often referred to

as a HAB (UC Berkeley 2006, Frontier 2015). TKPOA has monitored cyanobacteria and HABs since 2017.

HAB monitoring for the CMT Project will follow existing TKPOA sampling and monitoring methods. Monitoring will include visual inspection for presence of algae, then sampling for total phosphorus and cyanotoxins if algae is detected. Please refer to Section 9.6, HAB Response Plan for further details.

7.2.4 Herbicide active ingredient residues and degradants

This section provides an overview of both water and sediment samples that will be used to measure active ingredient herbicide residues and degradants. The methods, timing and frequency of monitoring for herbicide active ingredients in CMT herbicide sites are shown in Table 8 and 9.

7.2.4.1 Water Sample and Analysis for Active Ingredients

Water samples will be tested for herbicide residues using Enzyme Linked Immuno Sorbent Assay (ELISA) or gas chromatograph testing. Samples taken as part of CMT Year 1 for herbicide degradants will be analyzed by EPA approved methods using a certified laboratory, or as required by Lahontan in the Monitoring and Reporting Plan (MRP). As previously stated, TKPOA continues to work with Lahontan to complete the MRP and to incorporate all CEQA, NPDES, and any other monitoring requirements for the Project.

For CMT herbicide sites, sampling stations will be established for herbicide active ingredient at one location within each treatment site. Samples will be taken pre- and at

the following post-application times: 2 DAT, 7 DAT, 14 DAT and 21 DAT (or until two consecutive sample analyses are non-detect within 48 hours of each other)[25]. At each CMT site for each sampling event, a composited water will be sampled in duplicate as follows: samples of equal volume from near the surface (15 to 30 cm below surface), mid depth, and 25 to 30 cm from the bottom will be mixed (combined) to form a composite sample. Duplicate composite samples will be saved, preserved and shipped for analysis. Three composite samples (in duplicate) will be taken within each treated area (cove) for each sampling time, and three (3) composited samples taken outside the treated site (see Figure 17 and 18). It is anticipated, based on past dye studies, that by 48 hours herbicides will have mixed in the water column. Pre-application samples will be taken within 24 hours before applications are made. All samples will be documented and handled according to prescribed methods (EPA 2013, 2016a, 2016b), including fully documented Chain of Custody (COC).

The provisional locations of sampling sites are shown in Figure 16. This sampling protocol will be followed at all CMT-herbicide sites. No monitoring for herbicides will be conducted in the control sites.

[25] Proposed laboratory detection limits for herbicide degradants and active ingredients are 0.05 ppm for endothall and triclopyr.

In addition to sampling locations within and near (but outside) the application sites, contingency sampling stations will be established in the following areas: immediately adjacent to (and on the lagoon side of) the West Channel; at the mouth of the West Channel; and, to the east and west of the West Channel. In the unlikely event that herbicide residues are detected within 500 ft of West Channel, then the contingency sampling will be conducted. If residues are detected at the West Channel, then sampling will be started within 24 hours at sites 0.25 mile to 0.5-mile intervals extending from the channel in three directions: East, West and North (Figure 16). Samples will also be taken at the three TKPOA water wells according to the schedule shown in Table 8 and 9.

Table 14. Mitigation Monitoring

Parameter	Trigger	Monitoring	Mitigation
Herbicide	Herbicide detected outside turbidity curtains and near west channel	Water quality, herbicide active ingredients and degradants monitoring at sites indicated in Figure 4-6.	
DO	• DO below 5 mg/L • DO in comparison to control sites is not more than 10% lower than control site(s). If control site's pH is lower than water quality objectives	Regular DO monitoring, both logger data collection and standard water quality monitoring with hand-held YSI.	• Aeration • Biomass removal

HAB/Total Phosphorus	• Phosphorus in the water column must be higher than both the water quality objectives in the Basin Plan and the control sites • Cyanobacteria indicators must be at Tier 1 or higher and be a higher concentration than at the control sites	Application of Lanthanum Mo • Visual monitoring for presence of algae • Sampling for total phosphorus and presence of microcystins, anatoxin a, and cylindrospermopsin	Modified Clay (LMC)

7.2.4.2 Degradant Sampling and Analysis

Water samples taken for degradant analysis will be collected from one site for each herbicide as summarized in Tables 8 and 9. Samples will be taken pre- and at the following post-application times: 2 DAT, 7 DAT, 14 DAT and 21 DAT (or until two consecutive sample analyses are non-detect within 48 hours of each other)[26]. Sampling will continue at 30 and 60 DAT if degradants are detected in the prior sampling.

The migration monitoring will be used to detect for a migration of pesticides outside of the treatment area. The APAP's description and additional information was added to this portion of the monitoring plan and are required to be implemented for the project.

There will be different methods used to monitor for herbicide migration:
- First, detection process is a real time detection of Rhodamine dye.
- Second, water samples will be collected for analysis by a laboratory.

Further details regarding dye monitoring can be found below in Section 7.2.6, RWT Dye.

[26] Proposed laboratory detection limits for sediment herbicide degradants and active ingredients is 0.05 ppm for endothall and triclopyr.