

AMENDMENT 2

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



April 22, 2022

AMENDMENT 2
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

Submitted to:

Lahontan Regional Water Quality Control Board
2501 Lake Tahoe Blvd
So. Lake Tahoe, CA 96150

Submitted by



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

Prepared by

Dr. Lars Anderson

In association with



Sierra Ecosystem
Associates

Table of Contents

**1.0 FINAL TAHOE KEYS LAGOONS CONTROL METHODS TEST (CMT) SITE
SELECTION..... 1 1.1**

Review of the Site Selection Criteria with Regards to the CMT Site

Changes 8

3 1.2.1 Criteria #1: Replicate Sites..... 3

4 1.2.2 Criteria #2: Comparable Sites 4

4 1.2.3 Criteria #3: Separation 4

7 1.2.4 Criteria #4: Native Plants 7

7 1.2.5 Criteria #5: West Channel Distance 7

8 1.2.6 Criteria #6: Behind Turbidity Curtains 8

8

1.2 Total Volume of Herbicides Applied..... 8

1.3 Conclusion..... 9

**2.0 CURRENT AND PROJECTED HYDROLOGIC CONDITIONS FOR CMT
PROJECT APPLICATION OF HERBICIDES IN MAY/JUNE 2022 9 2.1**

National Pollutant Discharge Elimination System (NPDES) Permit

Requirements (Order No. CA6202201, WDID 6A91701001)..... 9 **2.2**

Hydrologic Conditions: Projections for Lake Tahoe Water Levels and Filling of the West
Lagoon 10 **2.3 Measuring and Reporting**

the Filling of the West Lagoon Prior to and During the Herbicide Applications.....	14	3.0 POPOSED APPLICATION DATES	16
--	----	--	-----------

List of Figures

Figure 1. Final Control Methods Test Treatment Sites.....	1
Figure 2. Final Control Methods Test Monitoring Locations	2
Figure 3. 2022 Comparison of Average Percent Species Composition Per Site (Original Site 14).....	5
Figure 4. 2022 Comparison of Average Percent Species Composition Per Site (Original Site 14).....	5
Figure 5. 2022 Comparison of Average Percent Target Species Composition Per Site (Original and New Site 14).....	6
Figure 6. 2021 Comparison of Average Percent Species Composition Per Site (Original and New Site 14).....	6
Figure 7. Spring 2022 Hydroacoustic Scan Data	7
Figure 8. Average Percent Species Composition Per Sample - Native Non-Target Species	8
Figure 9. Lake Tahoe Level Changes	11
Figure 10. CNRFC Seasonal Tracking of Actual Inflow to Lake Tahoe.....	12
Figure 11. Probabilities of Different Inflow Volumes Projected for May 2022.....	13
Figure 12. Comparison of Current Snowpack Water Conditions to Past 30-Year Average	14

13. SonTek-IQ Specifications.....	15
-----------------------------------	----

List of Tables

Table 1. Proposed Revised Site-Specific Acreages for Herbicide and Non-Herbicide Combination Treatments in the CMT.....	3 Table
2. Points Per Site.....	4 Table
3. Comparison of Original CMT Sites 13, 14, and Lake Tallac vs Proposed Site Changes	9 Table 4.
Preliminary Herbicide Application Schedule.....	16

Tahoe Keys Property Owners Association April 22, 2022 Aquatic Pesticide Application Plan (2022 Amendment 2)
Page ii

1.0 FINAL TAHOE KEYS LAGOONS CONTROL METHODS TEST (CMT) SITE SELECTION

The Final Tahoe Keys Lagoons Control Methods Test (CMT) Treatment Sites are shown in Figures 1 and 2 below, with acreages and treatments described in Table 1.

Figure 1. Final Control Methods Test Treatment Sites



Figure 2. Final Control Methods Test Monitoring Locations



Tahoe Keys Property Owners Association April 22, 2022 Aquatic Pesticide Application Plan (2022 Amendment 2)
Page 2

Table 1. 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	2.0
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:		38.9	15.7

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

The locations of the new CMT Sites 13, 14, 19, 20, and 21 have been selected to provide similar conditions to the originally proposed sites and also provide distance between CMT herbicide sites and the West Channel that connects the West Lagoon with Lake Tahoe proper.

1.1 Review of the Site Selection Criteria with Regards to the CMT Site Changes

During the EIR/EIS process, selection of Control Methods Test (CMT) test sites was

based on the criteria below, including:

Tahoe Keys Property Owners Association April 22, 2022 Aquatic Pesticide Application Plan (2022 Amendment 2)
Page 3

Three sites per type of treatment
to provide
statistical comparison of efficacy
and
environmental monitoring data

- 1) Comparable sites, including
size,
shape, and target plant
presence
- 2) Separation of sites to
provide for
isolated treatments
- 3) Reduce potential impact to
desirable
native plants
- 4) Distance from the West
Channel
- 5) Within isolatable zone
using double
turbidity curtains



1.2.1 Criteria #1: Replicate Sites

The new Site 14 sustains the requirement for a replicate site. Furthermore, the change in Lake Tallac acts as a fourth replicate for herbicide only sites treated with endothall.

1.2.2 Criteria #2: Comparable Sites

The New Site 14 is more similar in size and shape to other combination treatment sites and has all target plant species represented. On April 18, 2022, TKPOA consultants Sierra Ecosystem Associates (SEA) and Dr. Lars Anderson conducted a pre-project survey of Site 13, original Site 14, new Site 14, and Lake Tallac. Table 2 provides a breakdown of the number of samples collected from Sites 13, 14 (original and new), and 19 (original and new).

Table 2. Points Per Site

Site	Number of Points
Site 13	15
Original Site 14	29
New Site 14	28
New Site 19	21

Figure 3, 4 and 5 below provides a comparison between the original Site 14 and the new Site 14 with regards to the average percent species composition per site. As reflected in the figure, the new Site 14 has a good distribution of target species.

Figure 3. 2022 Comparison of Average Percent Species Composition Per Site (Original Site

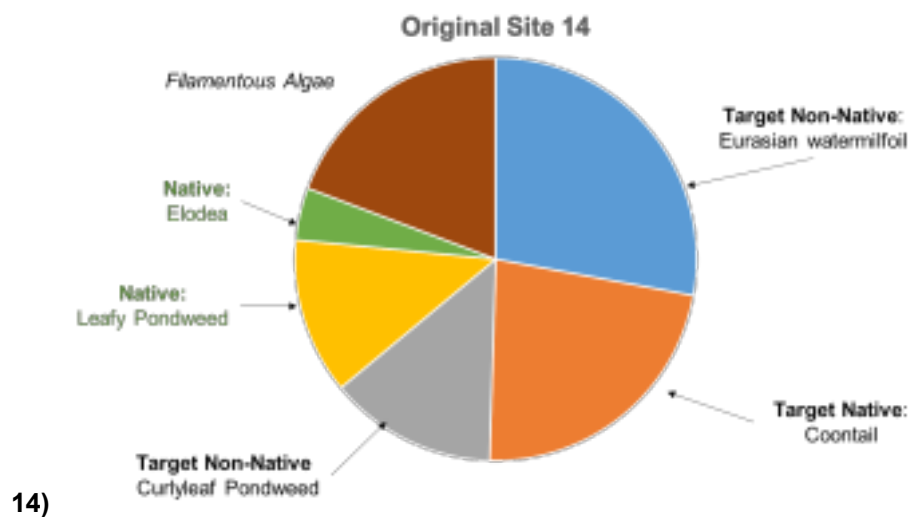
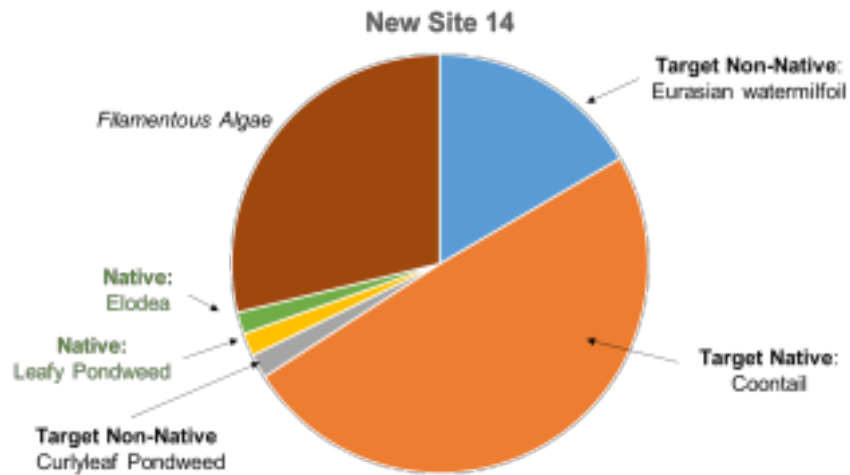


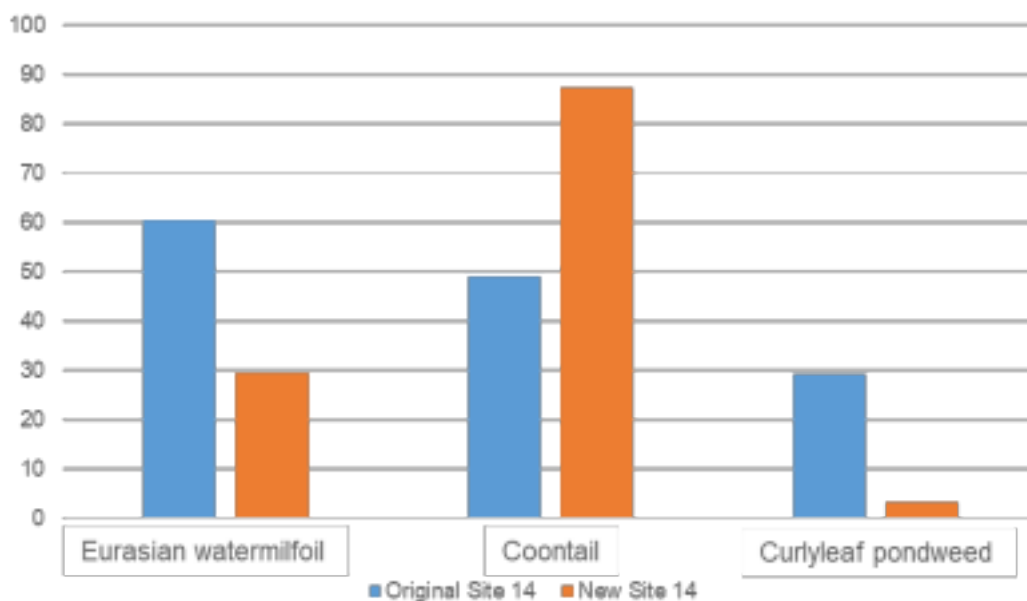
Figure 4. 2022 Comparison of Average Percent Species Composition Per Site (Original Site

14)



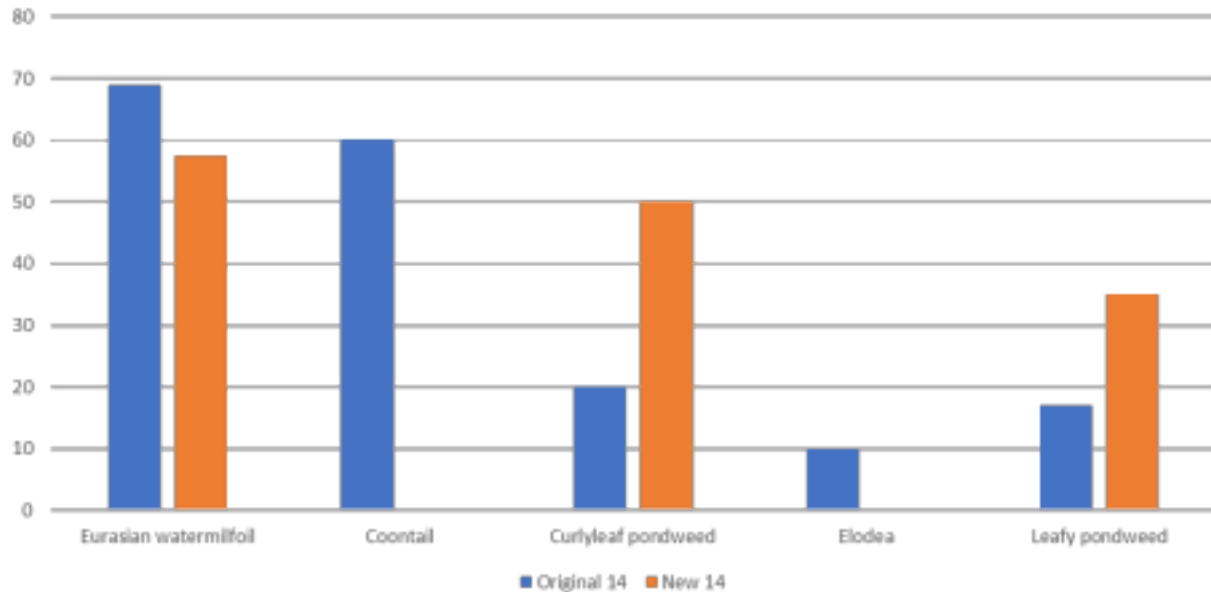
Tahoe Keys Property Owners Association April 22, 2022 Aquatic Pesticide Application Plan (2022 Amendment 2)
Page 5

Figure 5. 2022 Comparison of Average Percent Target Species Composition Per Site (Original and New Site 14)



Regarding distribution of curlyleaf pondweed, while Figures 3, 4 and 5 show a smaller occurrence of curlyleaf pondweed in the new Site 14 in comparison with the original Site 14, data from the 2021 annual macrophyte survey shows a higher prevalence in the new Site 14, as shown in Figure 6 below.

Figure 6. 2021 Comparison of Average Percent Species Composition Per Site (Original and New Site 14)



Tahoe Keys Property Owners Association April 22, 2022 Aquatic Pesticide Application Plan (2022 Amendment 2)
Page 6

Hydroacoustic scan data was collected in mid-April 2022. Results of the scans are shown in Figure 7 below.

Figure 7. Spring 2022 Hydroacoustic Scan Data

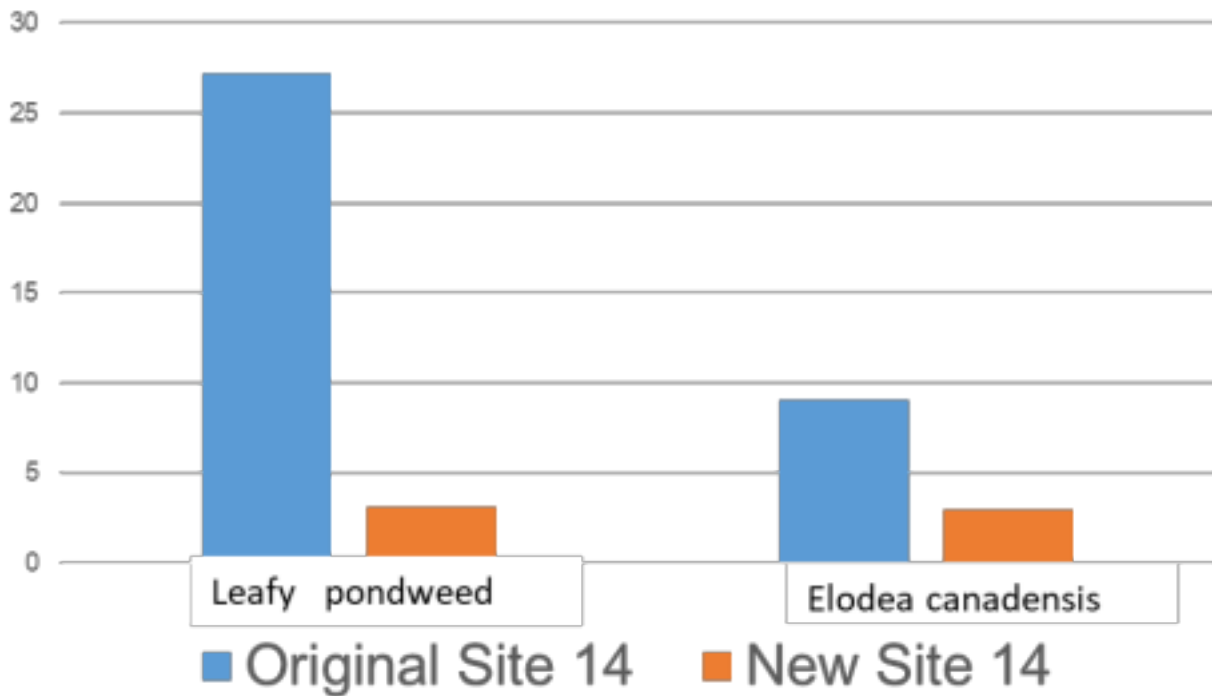


1.2.3 Criteria #3: Separation

New Site 14 is separated from Site 13 (slightly reduced in size) by a turbidity curtain maintaining the required isolation of treatments. Additionally, the original sites in Lake Tallac, while separated, were still close to each other and would have required applications of the same herbicide. By reducing the total acreage treated (expanding Site 19 from 1 acre to 2 acres) and moving Sites 20 and 21, now both control sites, the replicate is sufficiently isolated.

1.2.4 Criteria #4: Native Plants

As previously mentioned, TKPOA completed the pre-project macrophyte point intercept sampling on April 18, 2022. From this survey, the originally proposed Site 14 had a higher incidence of desirable native plants than the newly proposed Site 14, shown in Figure 8 below.



During the April 2022 survey, Site 19 did not have any occurrence of native plant species. 1.2.5 Criteria #5: West Channel Distance

The newly proposed Site 14 is twice the distance from the West Channel in comparison with the original Site 14.

1.2.6 Criteria #6: Behind Turbidity Curtains

The new Site 14 is within the double turbidity curtain zone, established adjacent to Site 2, as well as within its own turbidity curtain between Site 13 and the new 14. Site 19 remains behind the double turbidity curtain located within Lake Tallac.

1.2 Total Volume of Herbicides Applied

An additional consideration for the alteration of treatment sites as shown in Figure 1 and Table 1 is the amount of herbicides applied. As proposed, the size of Sites 13 and 14 would be reduced (from approximately 2 acres each to about 1 acre each) and two (2) herbicide treatment sites would be removed from Lake Tallac (20 and 21). Additionally, the size of Site 19 would increase (from 1 acre to 2 acres); however, compared to the original three sites in Lake Tallac, this change results in a net reduction of 1 acre in total acreage to be treated with herbicides. Therefore, the total amount of herbicide to be applied during the CMT Project would be reduced.

Table 3. Comparison of Original CMT Sites 13, 14, and Lake Tallac vs Proposed Site Changes

Site	Original L. Tallac	New L. Tallac	Original #14 Combo*	New #14 Combo	Original #13 Combo	New #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

1.3 Conclusion

In summary, changes proposed in Figure 1:

- New Site 14 is more comparable to other combinations sites with regards to size and shape;
- New Site 14 poses less potential impact to non-target native plant populations than the original Site 14;
- The New Site 14 is more isolated and greater distance from the West Channel than the original Site 14; and
- Therefore, changes meet all criteria for CMT Site Selection as described in Section 1.1 above.

Additionally, the changes illustrated in Figure 1, Figure 2, and Table 1 would result in a reduction in the total amount of herbicides applied in Year 1 of the CMT Project.

2.0 CURRENT AND PROJECTED HYDROLOGIC CONDITIONS FOR CMT PROJECT APPLICATION OF HERBICIDES IN MAY/JUNE 2022

2.1 National Pollutant Discharge Elimination System (NPDES) Permit Requirements (Order No. CA6202201, WDID 6A91701001)

Aquatic herbicide applications are proposed during the spring snow-melt period when Lake Tahoe is filling faster than the Tahoe Keys Lagoons and water flow is from Lake Tahoe into the Tahoe Keys Lagoons. The NPDES for the Control Methods Test (CMT) Project includes several sections that describe the requirements for hydrologic conditions prior to and during the application of herbicides. The most specific requirements are presented in NPDES Attachment E, Section IV. Other Monitoring Requirements, Subsection D. Hydrologic Conditions:

Page E-15: The Discharger must monitor the hydraulic gradient or flow of water between the Tahoe Keys and Lake Tahoe prior to herbicide application and at a weekly frequency during the treatment event.

NPDES Section VI, Aquatic Pesticide Use Requirements, C. Aquatic Pesticide Application Plan (APAP), Subsection 5., NPDES Attachment F – Fact Sheet, Section II. Project Description, Subsection C. Discharge Points and Receiving Waters, and NPDES Attachment F – Fact Sheet, Section II. Project Description, B. Discharge Description, 1. Aquatic Herbicides.

2.2 Hydrologic Conditions: Projections for Lake Tahoe Water Levels and Filling of the West Lagoon

2022 Water Year conditions for the Lake Tahoe Basin, and for the Sierra Nevada as a whole, show considerable deviation from average. Significantly above average precipitation and snowfall in December 2021 was followed by significantly below average precipitation for January through March 2022. For April 2022, the Lake Tahoe Basin is now receiving above average precipitation, rebuilding much of the snowpack that was melting in late March/early April.

Figure 9 shows the Lake Tahoe level changes from April 1 to date. Figure 10 shows the CA-NV River Forecasting Center's (CNRFC) seasonal tracking of actual inflow to Lake Tahoe to date and forecast of net inflow for the balance of the 2022 snowmelt runoff season. The net inflow forecast is updated daily using a probabilistic model based on the past 40 years of record, which is developed and updated periodically by the federal watermaster (Chad Blanchard) for the Truckee River watershed.

LAKE TAHOE A TAHOE CITY CA

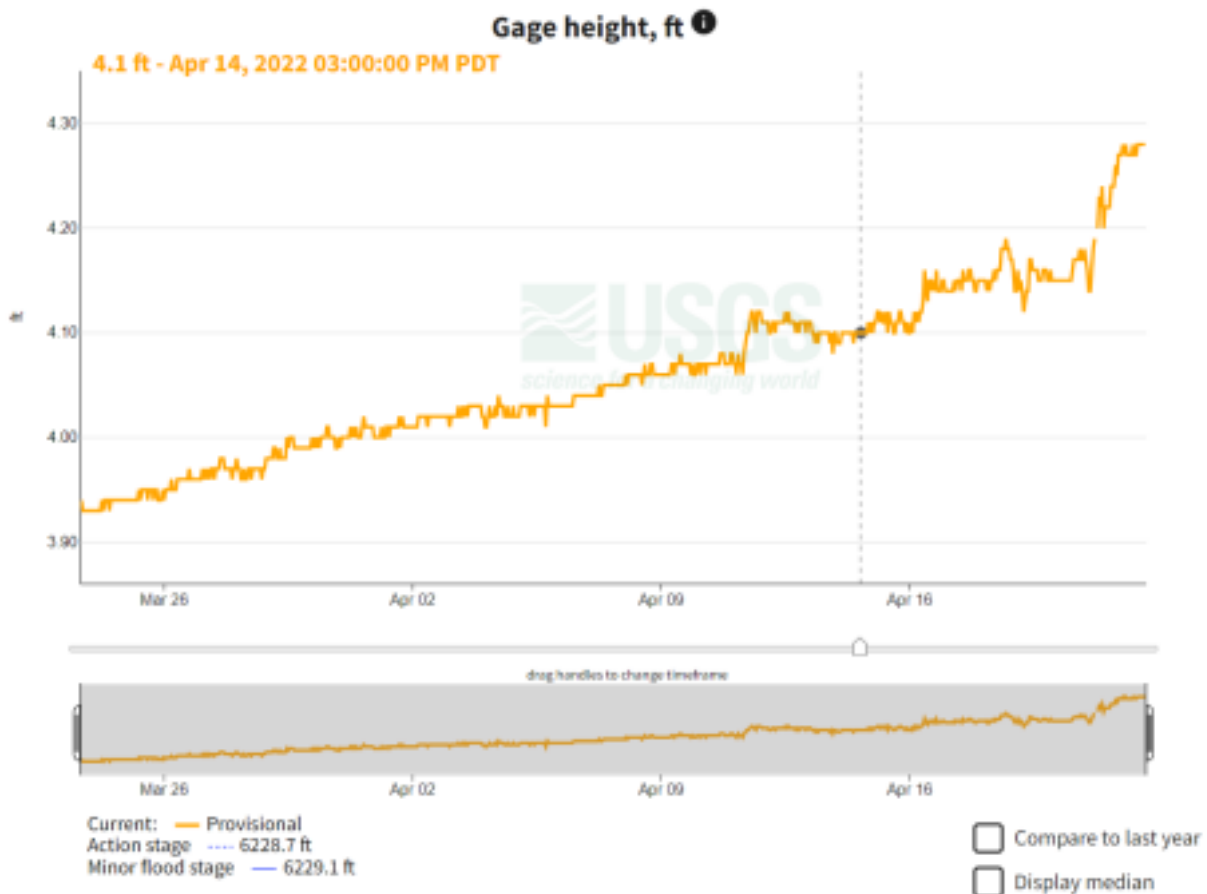


IMPORTANT [Legacy real-time page](#) ¹

Monitoring location 10337000 is associated with a LAKE, RESERVOIR, IMPOUNDMENT in PLACER COUNTY, CALIFORNIA. Current conditions of GAGE HEIGHT are available. Water data back to 1900 are available online.

☐ 7 days ☒ 30 days ☐ 1 year

Change time span | [Retrieve data](#)



<https://waterdata.usgs.gov/monitoring-location/10337000/#parameterCode=00065&period=P30D>

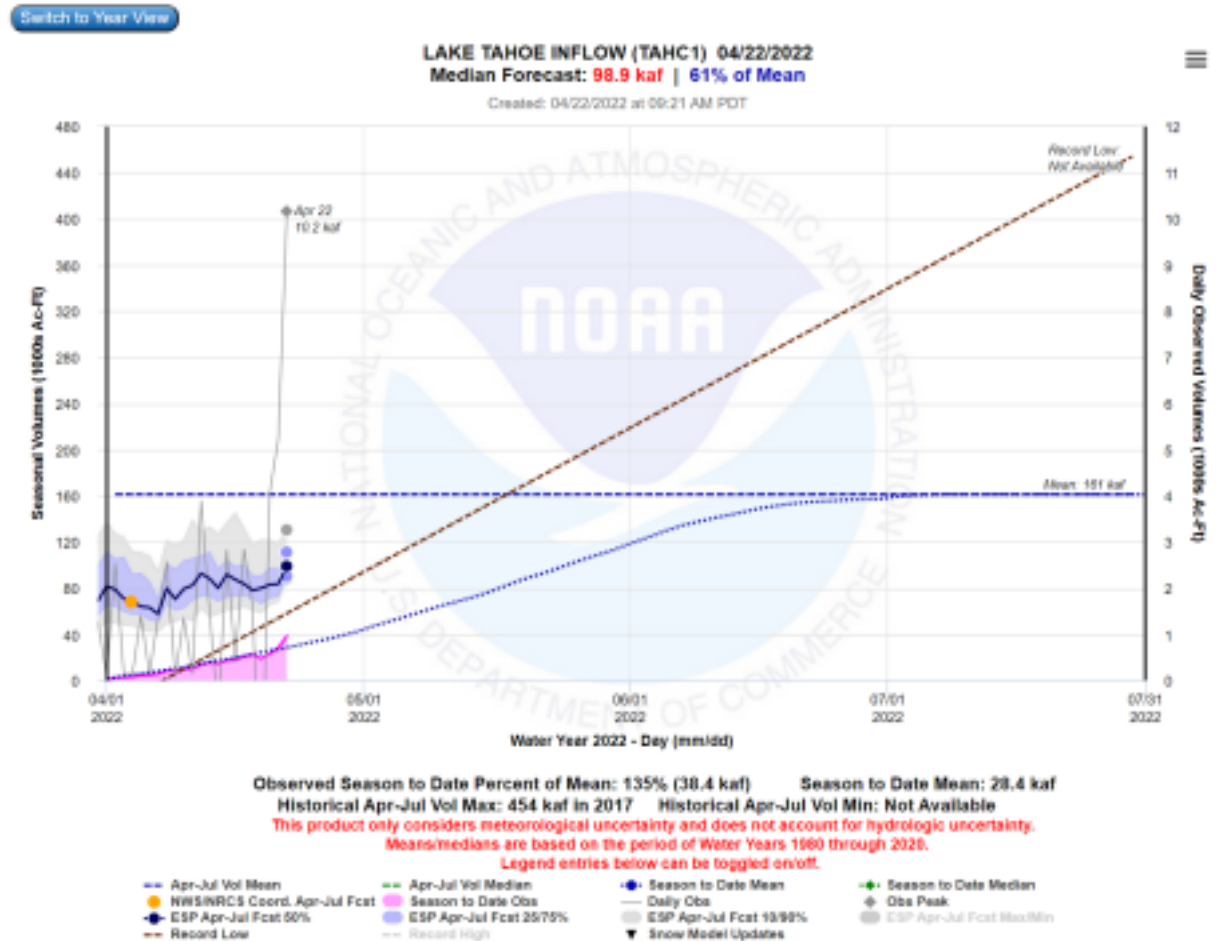
Issuance Time: Apr 22 2022 at 9:21 AM PDT

PRODUCT NOTE: Ensemble forecasts produced by CNRFC only consider meteorological uncertainty and do not account for hydrologic uncertainty.

SPECIAL NOTE: Forecasts are for the net inflow volume to Lake Tahoe from April 1st to peak volume. To convert the volume to a stage rise, divide by 123,000.

2022 Seasonal Trend Plot (Year View)

Tabular View | Select a Different Water Year: 2022



<https://www.cnrfc.noaa.gov/ensembleProduct.php?id=TAHC1&prodID=7>

The CNRFC forecast for snowmelt inflow to Lake Tahoe is also used with the 40-year historic record to develop a probabilistic forecast of monthly inflow volumes to Lake Tahoe. Figure 11 shows the probabilities of the different inflow volumes projected for the month of May when Tahoe Keys POA proposes to apply herbicides at the CMT Project treatment sites. Total volume of snowpack water equivalent based on 17 stations in the Truckee River Basin is shown in Figure 12, which compares current snowpack water conditions to the past 30-year average. As of April 22, 2022, there is a 100 percent chance for continued net inflow to Lake Tahoe from snowmelt for the month of May. May 23, 2022 is currently scheduled for the start of the herbicide applications.



<https://www.cnrfc.noaa.gov/ensembleProduct.php?id=TAHC1&prodID=6>



https://www.nrcs.usda.gov/Internet/WCIS/AWS_PLOTS/basinCharts/POR/WTEQ/assocHUCnv_8/lake_tahoe.html

2.3 Measuring and Reporting the Filling of the West Lagoon Prior to and During the Herbicide Applications

Because the Tahoe Keys lagoons have no watershed or tributary area, except for the lagoons and adjacent land, the lagoons fill almost entirely from inflow from Lake Tahoe via the West Channel. And because weather (i.e., wind), differential water temperatures, lake hydrology, and even gravitational effects on Lake Tahoe all are continuously changing, water inflows through the West Channel vary within the water column between Lake Tahoe and the West Lagoon.

With the variable water exchange rates within the West Channel water column, specialized equipment is needed to record the total actual inflow of water through the West Channel. For the CMT Project, doppler equipment has been purchased that can measure water movement throughout the cross-section of the West Channel and calculate the total filling of the West Lagoon from the lake. The equipment purchased for the CMT Project is the SonTek-IQ Plus (Figure 13) that will be installed in the West Channel during the week of May 2.



The equipment will be installed, tested, and then used to report daily average filling of the West Lagoon prior to and during the herbicide applications. Those daily volumes of inflow will then be used to quantify, on a weekly basis, the total amount of inflow that is occurring during the week prior to, and then during, the estimated 5 to 7 days of the herbicide applications.

From the above data collection and synthesis, a weekly 7-day average using single day average values is proposed to measure, record, and report on mass filling from the lake to the West Lagoon during the week prior to and week (5-7 day period) of the herbicide application test portion of the CMT Project. The 7-day period will account for the variations in lake hydrology, daily heating and cooling of the water masses within the lagoons and

the lake, and the longer-term weather, wind, and temperature shifts characteristic of the spring season. Taken together with the CNRFC and NRCS snowpack melt, net lake

inflow, and water equivalent projected net inflow to Lake Tahoe, the data will fully represent West Lagoon inflow conditions during the test and inform the data collection objectives of the CMT Project, and therefore meet the monitoring requirements of the NPDES permit conditions for the Project.

Beginning the week of May 2, 2022, TKPOA will install, test and then begin collecting and compiling SonTek-IQ Plus data on filling conditions of the West Lagoon. Beginning one week (May 16) prior to the scheduled start date of May 23 for herbicide applications, TKPOA will submit its first 7-day report on the water inflow recorded over the first reporting period, and then submit its second report immediately prior to the May 23, 2022 start of herbicide applications. Assuming that the SonTek-IQ Plus measured inflow to the West Lagoon confirms CNRFC and NRCS projections for lake level rise in May, and that there continues to be filling of the West Lagoon, then TKPOA will proceed with the herbicide application portion of the CMT Project on or about May 23, 2022 as currently scheduled. TKPOA will then continue to monitor and collect data on water exchanges through the West Channel and submit a post-herbicide application report on or about June 1, 2022 that covers the full period of the anticipated May 23 through May 30 herbicide applications at the CMT Project herbicide application treatment sites. If the date of application is altered (i.e., delayed) due to environmental conditions or other unforeseen circumstances, then the proposed flow averaging and reporting schedule will be adjusted to accommodate the change and will sustain the same relative pre- and post- herbicide application data collection and reporting sequences. All other NPDES compliances will be met, including necessary notifications of application dates.

3.0 PROPOSED APPLICATION DATES

Given current 2022 snowpack and historic hydrologic flow, TKPOA anticipates the application of herbicides to take place between May 23, 2022 and May 29, 2022.

The tentative schedule for herbicide application is provided below in Table 4.

Table 4. Preliminary Herbicide Application Schedule

Site No.	Treatment	Proposed Herbicide	Proposed Application Date
1	Herbicide Only	Endothall	May 23, 2022
2	Herbicide Only	Endothall	May 23, 2022
3	Herbicide Only	Endothall	May 23, 2022
5	Herbicide Only	Triclopyr	May 25, 2022
8	Herbicide Only	Triclopyr	May 25, 2022
9	Herbicide Only	Triclopyr	May 25, 2022
10	Combination	Endothall	May 27, 2022
11	Combination	Endothall	May 27, 2022
12	Combination	Triclopyr	May 29, 2022
13	Combination	Triclopyr	May 29, 2022

14	Combination	Triclopyr	May 29, 2022
15	Combination	Endothall	May 27, 2022
19	Herbicide Only	Endothall	May 27, 2022