DRAFT FY 2013-14 Budget: Lake Elsinore & Canyon Lake TMDL Task Force

Summary Task Force Expenditures

		Budget 2013-14
	Part A: Task Force Regulatory/Administrative Budget	
1.	**Task Force Administration**	**$ 50,000**
	Task Force Administrator (LESJWA)	
	Annual Water Quality Reporting and Database Management	
	Amend Task Force Agreement	
	Grant Preparation	
2.	**TMDL Compliance Expert**	**$ 50,000**
	Risk Sciences	
3.	**Pollutant Trading Program Development**	
	TBD	
4.	**Contingency** **(approximately 10% of direct stakeholder expenses)**	**$ 10,000**
	TMDL Task Force Regulatory/Administrative Budget	**$ 110,000**
	Part B: TMDL Implementation Project Budget	
1.	**TMDL Compliance Monitoring**	
	Watershed-wide Nutrient Monitoring Program	**$ 85,000**
	Watershed-wide Nutrient Monitoring & Report Preparation (Weston Solutions)	$ 70,000
	Wet Year Watershed-wide Monitoring (weather dependant) (RCFC&WCD)	$ -
	Lab Analysis, Watershed-wide Monitoring (RCFC&WCD)	$ 15,000
	Stream gauge O&M (RCFC&WCD)	$ -
	Lake Elsinore Nutrient Monitoring Program	**$ -**
	Lake Elsinore Nutrient Monitoring & Lab Analysis (EVMWD)	$ -
	Canyon Lake Nutrient Monitoring Program	**$ -**
	Canyon Lake Nutrient Monitoring & Lab Analysis (EVMWD)	$ -
2.	**Lake Elsinore Project Alternatives**	
	Aeration & Destratification System O&M (to be handled by separate agreement)	
	O&M	$ -
	Pollutant Trading Administration (3% of O&M Costs)	$ -
	Fishery Management O&M	**$ -**
	Carp Removal Program	$ -
	Pollutant Trading Administration (3% of O&M Costs)	$ -
3.	**Canyon Lake Project Alternatives**	**$ 407,000**
	Chemical Additions - Alum Dosing (2 applications annually)	$ 270,000
	Consulting Support	$ 100,000
	Permitting / CEQA	
	Monitoring	
	O&M Agreement	
	Detailed Design	$ -
	Construction	$ -
	O&M	$ -
	Project Administration (10% of budgeted expenses)	$ 37,000
	Pollutant Trading Administration (3% of O&M Costs)	$ -
	TMDL Task Force Implementation Budget	**$ 492,000**
	TMDL Task Force Budget :	**$ 602,000**

Task Force Agency Contributions Summary

Budget 2013-14

1. **Task Force Agency Allocation**

	Administrative (Part A)	Project Implementation (Part B)	Total
MS4 Co-Permittees (Total)	**$ 66,000**	**$ 419,132**	**$ 485,132**
Riverside County	$ 11,863	$ 77,008	$ 88,871
City of Beaumont	$ 1,406	$ 9,125	$ 10,531
City of Canyon Lake	$ 1,224	$ 7,945	$ 9,169
City of Hemet	$ 8,179	$ 53,093	$ 61,272
City of Lake Elsinore	$ 4,347	$ 28,218	$ 32,566
City of Moreno Valley	$ 18,927	$ 122,862	$ 141,789
City of Murrieta	$ 234	$ 181	$ 416
City of Perris	$ 5,975	$ 38,786	$ 44,761
City of Riverside	$ 1,068	$ 6,936	$ 8,004
City of San Jacinto	$ 4,012	$ 26,044	$ 30,057
City of Menifee	$ 7,373	$ 47,858	$ 55,230
City of Wildomar	$ 1,391	$ 1,075	$ 2,465
Elsinore Valley Municipal Water District (EVMWD)	**$ 5,500**	**$ 4,250**	**$ 9,750**
San Jacinto Agricultural Operators	**$ 5,500**	**$ 32,422**	**$ 37,922**
San Jacinto Dairy & CAFO Operators	**$ 5,500**	**$ 14,951**	**$ 20,451**
CALTRANS - freeway	**$ 5,500**	**$ 4,250**	**$ 9,750**
CA DF&G - San Jacinto Wetlands	**$ 5,500**	**$ 4,250**	**$ 9,750**
Eastern Municipal Water District	**$ 5,500**	**$ 4,250**	**$ 9,750**
March Air Reserve Base Joint Powers Authority	**$ 5,500**	**$ 4,250**	**$ 9,750**
US Air Force (March Air Reserve Base)	**$ 5,500**	**$ 4,250**	**$ 9,750**
Total Funding Required	**$ 110,000**	**$ 492,004**	**$ 602,004**

Notes:

Task Force Administration

a. Organize and facilitate TMDL TASK FORCE and TAC meetings,
b. Perform secretarial, clerical and administrative services, including providing meeting summaries to TMDL TASK FORCE members,
c. Manage TMDL TASK FORCE funds and prepare annual reports of TMDL TASK FORCE assets and expenditures,
d. Serve as the contracting party, for the benefit of the TMDL TASK FORCE, for contracts with all consultants, contractors, vendors and other entities,
e. Seek funding grants to assist with achieving goals and objectives of the TMDL TASK FORCE.
f. Coordinate with other agencies and organizations as necessary to facilitate TMDL TASK FORCE work.
g. Administer the preparation of quarterly and annual reports, as required by the TMDL Implementation Plan, and submit them as required by the TMDL Implementation Plan on behalf of the TMDL TASK FORCE.
h. Possible administrator of future pollutant trading (water quality trading) agreements.

TMDL Compliance Expert

a. Support Task Force Agency as a Regulatory Strategist and Compliance Expert .
b. Develop implementation strategy to address TMDL compliance with nutrient targets
c. Plan and prepare Basin Plan Amendment for TMDL
d. Sub-contract out pollutant trading agreement preparation by consultant

Task Force Agency Contributions Detailed Tables

Part A: Task Force Regulatory/Administrative Budget

Task Force Regulatory/Administrative Expenses

	Allocation
MS4 Co-Permittees	**$ 66,000**
Riverside County	$ 11,863
City of Beaumont	$ 1,406
City of Canyon Lake	$ 1,224
City of Hemet	$ 8,179
City of Lake Elsinore	$ 4,347
City of Moreno Valley	$ 18,927
City of Murrieta	$ 234
City of Perris	$ 5,975
City of Riverside	$ 1,068
City of San Jacinto	$ 4,012
City of Menifee	$ 7,373
City of Wildomar	$ 1,391
Elsinore Valley Municipal Water District (EVMWD)	**$ 5,500**
San Jacinto Agricultural Operators	**$ 5,500**
San Jacinto Dairy & CAFO Operators	**$ 5,500**
CALTRANS - freeway	**$ 5,500**
CA DF&G - San Jacinto Wetlands	**$ 5,500**
Eastern Municipal Water District	**$ 5,500**
March Air Reserve Base Joint Powers Authority	**$ 5,500**
US Air Force (March Air Reserve Base)	**$ 5,500**
Funding Required	**$ 110,000**

Part B: TMDL Implementation Project Budget

TMDL Compliance Monitoring Expenses

Watershed-wide Nutrient Monitoring Program

	Allocation
MS4 Co-Permittees	**$ 51,000**
Riverside County	$ 9,167
City of Beaumont	$ 1,086
City of Canyon Lake	$ 946
City of Hemet	$ 6,320
City of Lake Elsinore	$ 3,359
City of Moreno Valley	$ 14,626
City of Murrieta	$ 181
City of Perris	$ 4,617
City of Riverside	$ 826
City of San Jacinto	$ 3,100
City of Menifee	$ 5,697
City of Wildomar	$ 1,075
Elsinore Valley Municipal Water District (EVMWD)	**$ 4,250**
San Jacinto Agricultural Operators	**$ 4,250**
San Jacinto Dairy & CAFO Operators	**$ 4,250**
CALTRANS - freeway	**$ 4,250**
CA DF&G - San Jacinto Wetlands	**$ 4,250**
Eastern Municipal Water District	**$ 4,250**
March Air Reserve Base Joint Powers Authority	**$ 4,250**
US Air Force (March Air Reserve Base)	**$ 4,250**
Funding Required	**$ 85,000**

Lake Elsinore Nutrient Monitoring Program

	Allocation
MS4 Co-Permittees	**$ -**
Riverside County	$ -
City of Beaumont	$ -
City of Canyon Lake	$ -
City of Hemet	$ -
City of Lake Elsinore	$ -
City of Moreno Valley	$ -
City of Murrieta	$ -
City of Perris	$ -
City of Riverside	$ -
City of San Jacinto	$ -
City of Menifee	$ -
City of Wildomar	$ -
Elsinore Valley Municipal Water District (EVMWD)	**$ -**
San Jacinto Agricultural Operators	**$ -**
San Jacinto Dairy & CAFO Operators	**$ -**
CALTRANS - freeway	**$ -**
CA DF&G - San Jacinto Wetlands	**$ -**
Eastern Municipal Water District	**$ -**
March Air Reserve Base Joint Powers Authority	**$ -**
US Air Force (March Air Reserve Base)	**$ -**
Funding Required	**$ -**

Canyon Lake Nutrient Monitoring Program

	Allocation
MS4 Co-Permittees	**$ -**
Riverside County	$ -
City of Beaumont	$ -
City of Canyon Lake	$ -
City of Hemet	$ -
City of Lake Elsinore	$ -
City of Moreno Valley	$ -
City of Murrieta	$ -
City of Perris	$ -
City of Riverside	$ -
City of San Jacinto	$ -
City of Menifee	$ -
City of Wildomar	$ -
Elsinore Valley Municipal Water District (EVMWD)	**$ -**
San Jacinto Agricultural Operators	**$ -**
San Jacinto Dairy & CAFO Operators	**$ -**
CALTRANS - freeway	**$ -**
CA DF&G - San Jacinto Wetlands	**$ -**
Eastern Municipal Water District	**$ -**
March Air Reserve Base Joint Powers Authority	**$ -**
US Air Force (March Air Reserve Base)	**$ -**
Funding Required	**$ -**

Lake Elsinore Project Alternatives

Aeration & Destratification System O&M

	Allocation
MS4 Co-Permittees	**$ -**
Riverside County	$ -
City of Beaumont	$ -
City of Canyon Lake	$ -
City of Hemet	$ -
City of Lake Elsinore	$ -
City of Moreno Valley	$ -
City of Murrieta	$ -
City of Perris	$ -
City of Riverside	$ -
City of San Jacinto	$ -
City of Menifee	$ -
City of Wildomar	$ -
Elsinore Valley Municipal Water District (EVMWD)	**$ -**
San Jacinto Agricultural Operators	**$ -**
San Jacinto Dairy & CAFO Operators	**$ -**
CALTRANS - freeway	**$ -**
CA DF&G - San Jacinto Wetlands	**$ -**
Eastern Municipal Water District	**$ -**
March Air Reserve Base Joint Powers Authority	**$ -**
US Air Force (March Air Reserve Base)	**$ -**
Funding Required	**$ -**

Lake Elsinore Project Alternatives

Fishery Management O&M

	Allocation
MS4 Co-Permittees	**$ -**
Riverside County	$ -
City of Beaumont	$ -
City of Canyon Lake	$ -
City of Hemet	$ -
City of Lake Elsinore	$ -
City of Moreno Valley	$ -
City of Murrieta	$ -
City of Perris	$ -
City of Riverside	$ -
City of San Jacinto	$ -
City of Menifee	$ -
City of Wildomar	$ -
Elsinore Valley Municipal Water District (EVMWD)	**$ -**
San Jacinto Agricultural Operators	**$ -**
San Jacinto Dairy & CAFO Operators	**$ -**
CALTRANS - freeway	**$ -**
CA DF&G - San Jacinto Wetlands	**$ -**
Eastern Municipal Water District	**$ -**
March Air Reserve Base Joint Powers Authority	**$ -**
US Air Force (March Air Reserve Base)	**$ -**
Funding Required	**$ -**

Canyon Lake Project Alternatives

	Allocation
MS4 Co-Permittees	**$ 368,132**
Riverside County	$ 67,841
City of Beaumont	$ 8,039
City of Canyon Lake	$ 7,000
City of Hemet	$ 46,773
City of Lake Elsinore	$ 24,859
City of Moreno Valley	$ 108,236
City of Murrieta	$ -
City of Perris	$ 34,169
City of Riverside	$ 6,110
City of San Jacinto	$ 22,944
City of Menifee	$ 42,161
City of Wildomar	$ -
Elsinore Valley Municipal Water District (EVMWD)	**$ -**
San Jacinto Agricultural Operators	**$ 28,172**
San Jacinto Dairy & CAFO Operators	**$ 10,701**
CALTRANS - freeway	
CA DF&G - San Jacinto Wetlands	
Eastern Municipal Water District	**$ -**
March Air Reserve Base Joint Powers Authority	
US Air Force (March Air Reserve Base)	
	$ 407,004

Cost formula **: based upon the 1:1 ratio of TP to TN contributions from urban and agricultural runoff as projected in the respective**

Task Force Agency Contributions Detailed Tables

		Allocation
MS4 Co-Permittees (Total)	**$**	**485,132**
Task Force Regulatory/Administrative Expenses	$	66,000
TMDL Compliance Monitoring Expenses		
Watershed-wide Nutrient Monitoring Program	$	51,000
Lake Elsinore Nutrient Monitoring Program	$	-
Canyon Lake Nutrient Monitoring Program	$	-
Lake Elsinore Project Alternatives		
Aeration & Destratification System O&M	$	-
Fishery Management O&M	$	-
Canyon Lake Project Alternatives	$	368,132
Riverside County	**$**	**88,871**
Task Force Regulatory/Administrative Expenses	$	11,863
TMDL Compliance Monitoring Expenses		
Watershed-wide Nutrient Monitoring Program	$	9,167
Lake Elsinore Nutrient Monitoring Program	$	-
Canyon Lake Nutrient Monitoring Program	$	-
Lake Elsinore Project Alternatives		
Aeration & Destratification System O&M	$	-
Fishery Management O&M	$	-
Canyon Lake Project Alternatives	$	67,841
City of Beaumont	**$**	**10,531**
Task Force Regulatory/Administrative Expenses	$	1,406
TMDL Compliance Monitoring Expenses		
Watershed-wide Nutrient Monitoring Program	$	1,086
Lake Elsinore Nutrient Monitoring Program	$	-
Canyon Lake Nutrient Monitoring Program	$	-
Lake Elsinore Project Alternatives		
Aeration & Destratification System O&M	$	-
Fishery Management O&M	$	-
Canyon Lake Project Alternatives	$	8,039
City of Canyon Lake	**$**	**9,169**
Task Force Regulatory/Administrative Expenses	$	1,224
TMDL Compliance Monitoring Expenses		
Watershed-wide Nutrient Monitoring Program	$	946
Lake Elsinore Nutrient Monitoring Program	$	-
Canyon Lake Nutrient Monitoring Program	$	-
Lake Elsinore Project Alternatives		
Aeration & Destratification System O&M	$	-
Fishery Management O&M	$	-
Canyon Lake Project Alternatives	$	7,000
City of Hemet	**$**	**61,272**
Task Force Regulatory/Administrative Expenses	$	8,179
TMDL Compliance Monitoring Expenses		
Watershed-wide Nutrient Monitoring Program	$	6,320
Lake Elsinore Nutrient Monitoring Program	$	-
Canyon Lake Nutrient Monitoring Program	$	-
Lake Elsinore Project Alternatives		
Aeration & Destratification System O&M	$	-
Fishery Management O&M	$	-
Canyon Lake Project Alternatives	$	46,773

City of Lake Elsinore	**$**	**32,566**
Task Force Regulatory/Administrative Expenses	$	4,347
TMDL Compliance Monitoring Expenses		
Watershed-wide Nutrient Monitoring Program	$	3,359
Lake Elsinore Nutrient Monitoring Program	$	-
Canyon Lake Nutrient Monitoring Program	$	-
Lake Elsinore Project Alternatives		
Aeration & Destratification System O&M	$	-
Fishery Management O&M	$	-
Canyon Lake Project Alternatives	$	24,859
City of Moreno Valley	**$**	**141,789**
Task Force Regulatory/Administrative Expenses	$	18,927
TMDL Compliance Monitoring Expenses		
Watershed-wide Nutrient Monitoring Program	$	14,626
Lake Elsinore Nutrient Monitoring Program	$	-
Canyon Lake Nutrient Monitoring Program	$	-
Lake Elsinore Project Alternatives		
Aeration & Destratification System O&M	$	-
Fishery Management O&M	$	-
Canyon Lake Project Alternatives	$	108,236
City of Murrieta	**$**	**416**
Task Force Regulatory/Administrative Expenses	$	234
TMDL Compliance Monitoring Expenses		
Watershed-wide Nutrient Monitoring Program	$	181
Lake Elsinore Nutrient Monitoring Program	$	-
Canyon Lake Nutrient Monitoring Program	$	-
Lake Elsinore Project Alternatives		
Aeration & Destratification System O&M	$	-
Fishery Management O&M	$	-
Canyon Lake Project Alternatives	$	-
City of Perris	**$**	**44,761**
Task Force Regulatory/Administrative Expenses	$	5,975
TMDL Compliance Monitoring Expenses		
Watershed-wide Nutrient Monitoring Program	$	4,617
Lake Elsinore Nutrient Monitoring Program	$	-
Canyon Lake Nutrient Monitoring Program	$	-
Lake Elsinore Project Alternatives		
Aeration & Destratification System O&M	$	-
Fishery Management O&M	$	-
Canyon Lake Project Alternatives	$	34,169
City of Riverside	**$**	**8,004**
Task Force Regulatory/Administrative Expenses	$	1,068
TMDL Compliance Monitoring Expenses		
Watershed-wide Nutrient Monitoring Program	$	826
Lake Elsinore Nutrient Monitoring Program	$	-
Canyon Lake Nutrient Monitoring Program	$	-
Lake Elsinore Project Alternatives		
Aeration & Destratification System O&M	$	-
Fishery Management O&M	$	-
Canyon Lake Project Alternatives	$	6,110

City of San Jacinto	**$**	**30,057**
Task Force Regulatory/Administrative Expenses	$	4,012
TMDL Compliance Monitoring Expenses		
Watershed-wide Nutrient Monitoring Program	$	3,100
Lake Elsinore Nutrient Monitoring Program	$	-
Canyon Lake Nutrient Monitoring Program	$	-
Lake Elsinore Project Alternatives		
Aeration & Destratification System O&M	$	-
Fishery Management O&M	$	-
Canyon Lake Project Alternatives	$	22,944

City of Menifee	**$**	**55,230**
Task Force Regulatory/Administrative Expenses	$	7,373
TMDL Compliance Monitoring Expenses		
Watershed-wide Nutrient Monitoring Program	$	5,697
Lake Elsinore Nutrient Monitoring Program	$	-
Canyon Lake Nutrient Monitoring Program	$	-
Lake Elsinore Project Alternatives		
Aeration & Destratification System O&M	$	-
Fishery Management O&M	$	-
Canyon Lake Project Alternatives	$	42,161

City of Wildomar	**$**	**2,465**
Task Force Regulatory/Administrative Expenses	$	1,391
TMDL Compliance Monitoring Expenses		
Watershed-wide Nutrient Monitoring Program	$	1,075
Lake Elsinore Nutrient Monitoring Program	$	-
Canyon Lake Nutrient Monitoring Program	$	-
Lake Elsinore Project Alternatives		
Aeration & Destratification System O&M	$	-
Fishery Management O&M	$	-
Canyon Lake Project Alternatives	$	-

Elsinore Valley Municipal Water District (EVMWD)	**$**	**9,750**
Task Force Regulatory/Administrative Expenses	$	5,500
TMDL Compliance Monitoring Expenses		
Watershed-wide Nutrient Monitoring Program	$	4,250
Lake Elsinore Nutrient Monitoring Program	$	-
Canyon Lake Nutrient Monitoring Program	$	-
Lake Elsinore Project Alternatives		
Aeration & Destratification System O&M	$	-
Fishery Management O&M	$	-
Canyon Lake Project Alternatives	$	-

San Jacinto Agricultural Operators	**$**	**37,922**
Task Force Regulatory/Administrative Expenses	$	5,500
TMDL Compliance Monitoring Expenses		
Watershed-wide Nutrient Monitoring Program	$	4,250
Lake Elsinore Nutrient Monitoring Program	$	-
Canyon Lake Nutrient Monitoring Program	$	-
Lake Elsinore Project Alternatives		
Aeration & Destratification System O&M	$	-
Fishery Management O&M	$	-
Canyon Lake Project Alternatives	$	28,172

San Jacinto Dairy & CAFO Operators	**$**	**20,451**
Task Force Regulatory/Administrative Expenses	$	5,500
TMDL Compliance Monitoring Expenses		
Watershed-wide Nutrient Monitoring Program	$	4,250
Lake Elsinore Nutrient Monitoring Program	$	-
Canyon Lake Nutrient Monitoring Program	$	-
Lake Elsinore Project Alternatives		
Aeration & Destratification System O&M	$	-
Fishery Management O&M	$	-
Canyon Lake Project Alternatives	$	10,701

CALTRANS - freeway	**$**	**9,750**
Task Force Regulatory/Administrative Expenses	$	5,500
TMDL Compliance Monitoring Expenses		
Watershed-wide Nutrient Monitoring Program	$	4,250
Lake Elsinore Nutrient Monitoring Program	$	-
Canyon Lake Nutrient Monitoring Program	$	-
Lake Elsinore Project Alternatives		
Aeration & Destratification System O&M	$	-
Fishery Management O&M	$	-
Canyon Lake Project Alternatives	$	-

CA DF&G - San Jacinto Wetlands	**$**	**9,750**
Task Force Regulatory/Administrative Expenses	$	5,500
TMDL Compliance Monitoring Expenses		
Watershed-wide Nutrient Monitoring Program	$	4,250
Lake Elsinore Nutrient Monitoring Program	$	-
Canyon Lake Nutrient Monitoring Program	$	-
Lake Elsinore Project Alternatives		
Aeration & Destratification System O&M	$	-
Fishery Management O&M	$	-
Canyon Lake Project Alternatives	$	-

Eastern Municipal Water District	**$**	**9,750**
Task Force Regulatory/Administrative Expenses	$	5,500
TMDL Compliance Monitoring Expenses		
Watershed-wide Nutrient Monitoring Program	$	4,250
Lake Elsinore Nutrient Monitoring Program	$	-
Canyon Lake Nutrient Monitoring Program	$	-
Lake Elsinore Project Alternatives		
Aeration & Destratification System O&M	$	-
Fishery Management O&M	$	-
Canyon Lake Project Alternatives	$	-

March Air Reserve Base Joint Powers Authority	**$**	**9,750**
Task Force Regulatory/Administrative Expenses	$	5,500
TMDL Compliance Monitoring Expenses		
Watershed-wide Nutrient Monitoring Program	$	4,250
Lake Elsinore Nutrient Monitoring Program	$	-
Canyon Lake Nutrient Monitoring Program	$	-
Lake Elsinore Project Alternatives		
Aeration & Destratification System O&M	$	-
Fishery Management O&M	$	-
Canyon Lake Project Alternatives	$	-

US Air Force (March Air Reserve Base)	**$**	**9,750**
Task Force Regulatory/Administrative Expenses	$	5,500
TMDL Compliance Monitoring Expenses		
Watershed-wide Nutrient Monitoring Program	$	4,250
Lake Elsinore Nutrient Monitoring Program	$	-
Canyon Lake Nutrient Monitoring Program	$	-
Lake Elsinore Project Alternatives		
Aeration & Destratification System O&M	$	-
Fishery Management O&M	$	-
Canyon Lake Project Alternatives	$	-
Total:	**$**	**602,004**

CANYON LAKE HYPOLIMNETIC OXYGENATION SYSTEM
PROJECT DESCRIPTION

1. Introduction

Canyon Lake was formed in 1928 when the Canyon Lake / Railroad Canyon Dam was constructed. Canyon Lake is located in Riverside County, and is within the City of Canyon Lake (reference Figure 1, *Vicinity Map*). The reservoir, covers approximately 525 acres (212 ha), has 14.9 miles (24.0 km) of shoreline and has a storage capacity of 11,586 acre·ft (14,291,000 m^3). It is owned and operated by the Elsinore Valley Municipal Water District. Elsinore Valley Municipal Water District (EVMWD) has used the reservoir as a potable water source since 1957 when the Canyon Lake water treatment plant began operation. The reservoir is supplied by storm water runoff from the San Jacinto River and Salt Creek. Water from the reservoir feeds the Canyon Lake Water Treatment Plant, which provides approximately 10% of the domestic water supply in the Lake Elsinore/Canyon Lake area.

The lake has three main sections, as depicted on Figure 1, *Vicinity Map* – the relatively shallow East Bay (depths generally less than 10 ft), the deeper Central Body of the lake (depths in excess of 40 ft), and the area north of the causeway that connects with the San Jacinto River.

Allowable recreational activities on Canyon Lake are defined in the lease agreement between EVMWD and the Canyon Lake Property Owners Association (POA). All of the homeowners within the Canyon Lake POA have rights and access to the Lake for recreational uses. Personal watercraft (Jet Skis, etc.) are banned for use on the reservoir. However, ski-boats (with a maximum length of 21 feet), fishing boats, row boats, paddle boats, sailboats and kayaks are allowed, as are wake-boarding and water-skiing. There is a 35 mph (56 km/h) speed limit on the main lake, which is patrolled by Canyon Lake's Lake and Marine Patrol, as well the California Department of Fish and Game. The East Bay is limited to a "No Wake" speed. Each year the Association stocks the lake with a generous supply of catfish and bass, which join the crappie and bluegill there, for the enjoyment of fisherman. There are swimming areas, fishing "holes", beaches, a slalom course and a jump lagoon, gas docks, and rental slips which make the lake a busy place thanks to the Canyon Lakers and the more than 2,000 boats they have registered with the POA.

The Central Body of Canyon Lake is a monomictic lake (~~*the density difference between the warm surface waters and the colder bottom waters prevents these lakes from mixing in summer and during winter the surface waters cool to a temperature equal to the bottom waters*), eutrophic (*has high biological productivity due to excessive nutrients*~~*temperature and climate differences limit the lake to turning over once in the fall*) that typically stratifies (*water masses with different properties form layers that act as barriers to water mixing*) from about late-February/early-March through late-November/early-December each year.

Comment [JU1]: Was Steve Wolosoff/Tim Moore implying that there was weak stratification and turn over in February as well. May not be true monomictic lake.

Maximum depth of the main body of the lake is about 50 feet, with a mean depth of approximately 20 feet. In the Central Body of the lake the water column is divided into three depth zones, with the deep-water layer starting at about the 20 to 25 foot depths by mid-summer, with oxygen depletion at or near zero at 16 to 18 feet. Reference Figure 2, *Bathymetry Map of Central Body of Canyon Lake*, which depicts the Lake depths, ranging from the shoreline to 45-50 feet in depth. The deep water becomes anaerobic and devoid of dissolved oxygen by early summer each year. This low oxygen condition causes the release of dissolved iron, manganese, ammonia, hydrogen sulfide, phosphorus and other substances, some of which may

~~that~~ degrade potable water quality. Internal ~~P~~phosphorus loading from phosphorus release from sediments under anaerobic conditions may increase eutrophication (*the ecosystem response to the addition of artificial or natural substances, to an aquatic system*)~~, through internal phosphorus loading~~. ~~Reference Figure 2, *Bathymetry Map of Central Body of Canyon Lake*, which depicts the Lake depths, ranging from the shoreline to 45-50 feet in depth.~~

For purposes of discussion, the top layer of lake water is referred to as the epilimnion, which is typically the warm, low-density water~~ present at the top of a lake~~. The bottom layer of lake water is the hypoliminion, which consists of cool, high-density water. The layer in-between the epilimnion and hypolimnion is the thermocline, which is the layer of water with transitioning temperature (reference Figure 3 *Lake Layer Terminology*)

EVMWD has been collecting weekly temperature, pH, and dissolved oxygen measurements from Canyon Lake near the Canyon Lake Water Treatment Plant for the past seven years. Data indicates that from~~Starting in~~ early April through November, Canyon Lake has~~ zero~~ low oxygen in the hypolimnion. This is typical of deep reservoirs such as Canyon Lake without mechanical mixing or oxygen injection systems. The disadvantage of having low oxygen in bottom waters is that anaerobic conditions contribute to biogeochemical processes that release~~it causes~~ reduced constituents such as iron, manganese, phosphorus, ammonia, and sulfide ~~to dissolve~~ into the water column. The dissolution of these constituents then causes immediate bacterial respiration of oxygen, but also high quantities of algal growth, and the decaying algae is ultimately consumed by bacteria and respired. The high rates of respiration cause additional oxygen depletion and additional nutrient dissolution. The reversal of this process is similar in that in theory it is exponentially beneficial: increases in bottom water oxygen will reduce nutrient dissolution, which decreases algal growth, which decreases bacterial respiration.

Comment [JU2]: Is this accurate? Might recommend focusing on nutrient release as I am not sure that ammonia and other constituents impact algal growth and respiration. Also focus on bacterial respiration seems to be an effort to set up discussion of 303(d) listing for bacterial indicators below. Not sure that this is an accurate assessment of the basis of that listing. Also we need to incorporate language indicating that the listing is not supported and that it is the intent of the RWQCB to delist bacteria. See my edits below. May need study references to support.

As a result of the above circumstances, Canyon Lake is listed on the Clean Water Act Section 303(d) list as impaired for excessive nutrients.~~ and high bacteria~~. The Regional Water Quality Control Board, Santa Ana Region (RWQCB), adopted a resolution in 2004 to amend the Basin Plan to incorporate total maximum daily loads (TMDLs) for Canyon Lake to control nutrients, specifically identifying numeric water quality targets for total phosphorus, total nitrogen, ammonia, chlorophyll a, and dissolved oxygen. This TMDL was subsequently approved by the State Water Resources Control Board and by the U.S. Environmental Protection Agency.

Canyon Lake is also 303(d) listed for bacterial indicators currently identified in the Santa Ana Region Regional Water Quality Control Board Water Quality Control Plan (Basin Plan). However, these indicators are no longer deemed accurate by US EPA or the RWQCB. The RWQCB is in the process of adopting new bacterial indicator water quality objectives. Data collected to date indicates that Canyon Lake is in compliance with the new bacterial indicator water quality objectives and it is expected that the RWQCB will subsequently de-list Canyon Lake for bacterial indicators.

The Canyon Lake TMDL focused on requiring watershed based source control of nutrients to Canyon Lake. However, ~~As part of the TMDL,~~ an In-lake Sediment Nutrient Treatment Plan was also required to evaluate opportunities for regulating cycling of sediments from the nutrients as a partial alternative and complimentary action to watershed based source control. In-lake management was deemed an appropriate alternative as the bulk of nutrient loading to Canyon Lake arrives during extreme wet years when source control activities are likely to be ineffective. A study was prepared and strategies were evaluated ~~initiated~~ to prevent the release of excess nutrients from lake sediments. The plan was completed and submitted to the Regional Board in July 2007. This study was followed-up with additional analysis; the "Predicted Effects of External Load Reductions and In-Lake Treatment on Water Quality in Canyon Lake – a Supplemental

Simulation Study"; was completed in December 2008. This report, prepared by Dr. Michael Anderson, demonstrates that in-lake oxygenation treatment could enhance oxygen levels in the hypolimnion and may assist with sediment phosphorus load reductions, but both in-lake oxygenation treatment and a large reduction in external nutrient sources from the watershed are required to approach meeting RWQCB TMDL targets summarized in Table 1. Additional studies conducted from 2010 through 2012 by Dr. Michael Anderson of UCR also determined that aluminum sulfate (alum) treatment was an effective control measure for phosphorus and that, applied appropriately, it could quickly achieve both interim and final response targets for chlorophyll a and interim response targets for dissolved oxygen. Its ability to achieve final dissolved oxygen target remains in question and will be the target of further study.

Table 1: Basin Plan Resolution No. R8-2004-0037 TMDL Targets for Canyon Lake

Indicator	TMDL Targets
Total Phosphorus Concentration	≤ 0.1 mg/L in 2020
Total Nitrogen Concentration	≤ 0.75 mg/L in 2020
NH3-Nitrogen Concentration	CMC and CCC limits per formula
Chlorophyll a Concentration	≤ 40 ug/L in 2015
Chlorophyll a Concentration	≤ 40 ug/L in 2015
Epilimnion DO* Concentration	≥ 5 ug/L in 2015
Hypolimnion DO* Concentration	≥ 40 ug/L in 2015

* - dissolved oxygen abbreviated by DO

2. Project Components

The Lake Elsinore and Canyon Lake TMDL Task Force (Task Force), inclusive of the Lake Elsinore and San Jacinto Watersheds Authority (LESJWA), whom serves as the Task Force administrator; 20 plus local, state and federal agencies including Elsinore Valley Municipal Water District (EVMWD), the Regional Board, Riverside County and the City of Canyon Lake; and private interests including dairy and agricultural operators; have considered a wide range of management options, ranging from ~~extensive~~ oxygenation, aeration, mixing, dredging to ~~of the lake to~~ application of alum, phoslock and other nutrient binders. These alternatives are ~~addressed~~ in various studies and reports that serve to inform compliance plans required under the federal National Pollutant Discharge Elimination System program such as the Santa Ana Region Municipal Separate Storm Sewer System (MS4) permittees' (cities and County of Riverside) Lake Elsinore and ~~the~~ Canyon Lake Comprehensive Nutrient Reduction Plan (CNRP). A similar plan is being prepared by agricultural and dairy operators. Other dischargers will be required to develop plans as their NPDES permits come up for renewal. The entities that are required or will be required to submit these compliance plans are coordinating their proposed in-lake management activities through the Task Force. LESJWA, the Task Force Administrator, has agreed to manage these projects on behalf of the underlying project partners. The partners are funding the activities through contribution to project funds that have been established as part of the TMDL Task Force budget. ~~After extensive internal review these agencies the proposed initial treatment system consists of the application of alum to remove TMDL contaminants from within the Canyon Lake water column.~~Based on the underlying science developed by the Task Force and the recommendations of Task Force experts, the NPDES MS4 Permittees are proposing a three part program to protect the lake. Step one consists of implementing watershed based source controls where feasible to eliminate sources of nutrients to the lake. Step two consists of supplementing source control with alum treatments to reduce the the impacts of remaining nutrients on the lake. Step three consists of an evaluation of success at the end of 2015, followed by recommendations for supplemental projects necessary to attain the final TMDL response targets by 2020. As previously noted, it is expected that other entities will contribute towards the proposed in-lake management projects.

2.1 In-Lake Remediation Activities: Canyon Lake

The MS4 permit requires that the CNRP identify the specific regional treatment facilities and the locations where such facilities will be built to reduce the concentration of nutrient discharged from urban sources and the expected water quality improvements to result when the facilities are complete (MS4 Permit Section VI.D.2.d.i.(d)). The CNRP includes implementation of in-lake remediation activities that serve as regional treatment facilities for Canyon Lake and Lake Elsinore. The following sections describe the specific in-lake remediation activities planned specifically for Canyon Lake;by the participating Task Force agencies. iInformation regarding the expected water quality improvements to result from implementation of these activities is provided below.

Numerous studies have been conducted by the Task Force to evaluate potential in-lake nutrient management BMPs for Canyon Lake, including addition of chemicals such as ; alum, Phoslock, and zeolite; mixing systems; dredging, and construction of aeration or hypolimnetic oxygenation systems. The most recent set of studies are summarized in Attachment C, and provide the basis for the selected in-lake BMPs. Table 2 provides a matrix showing how the two selected most viable in-lake BMPs for inclusion in the CNRP perform in meeting either causal WLAs (Waste Load Allocation) and LAs (Load Allocation) for urban and septic sources orand TMDL numeric targets for causal and response targetsvariables. The basis for these determinations is provided by modeling studies conducted in 2012, which are summarized in Attachment C.

Comment [JU3]: The report focuses extensively on CNRP; but as noted above this is a plan of task force entities that potentially go beyond the MS4's CNRP program. I would focus less on CNRP and more on proposed actions of TMDL Task Force members.

Table 2: Matrix Comparing Effectiveness of HOS and Alum in Lake Nutrient Management

Criteria	Constituent	HOS	Alum
~~WLA/LA~~	~~TP~~	■	■
	~~TN~~	■	□
TMDL Numeric Targets	TP (causal)	□	■
	TN (causal)	□	□
	Final Chlorophyll-a (response)	□	■
	Final Dissolved Oxygen (response)	■	◩

Key: Filled in square denotes an expectation that the target will be achieved, partially filled square denotes an expectation of significant improvement, but not enough to achieve tartget, and blank boxes indicate targets that are not effectively managed.

To comply with the TMDL, the named dischargers ~~MS4 Permittees~~ must either demonstrate that 1) implement projects that meet their assigned WLAs and/or LAs ~~for urban and septic sources can be achieved with implementation of a project~~ or 2) implement ~~that the~~ projects that will improve lake water quality to protect water quality standards, as measured by TMDL response targets for chlorophyll-a and DO. For example, ~~I~~incubation studies and subsequent models specific to Canyon Lake suggest that watershed BMPs combined with a~~the~~ Hypolimnetic Oxygenation System (HOS) would suppress sediment nutrient flux to offset enough urban and septic watershed loads to bring the MS4 Permittees into compliance with the WLA for urban and LA for septic sources. However, Anderson 2012b determined that exceedences of the chlorophyll-a response target would continue to occur if only HOS were to be implemented in the lake. In its March 31, 2012 comment letter, the Regional Board states that if allocations are met by all dischargers, but in lake water quality response targets are not achieved, then the TMDL will be reconsidered and allocated loads may be further reduced. Thus, the dischargers ~~Permittees~~have ~~-~~opted to prioritize in-lake BMPs based on their effectiveness in meeting the TMDL response targets for chlorophyll-a, and DO.

~~Adding alum to Canyon Lake was estimated to be highly effective in achieving the interim and final chlorophyll-a response target.~~ Therefore to control algae in the lake, the Task Force's~~Permittees~~ initial effort proposes ~~under the CNRP is~~ to first conduct 5 alum applications over a 3~~2~~-year period (see Section 3.4.2 of the CNRP). By binding phosphorus and reducing algae growth, the continued use of alum will reduce the cycling of nutrients and associated sediment oxygen demand in the lake bottom. The expected result is compliance with the interim and final chlorophyll-a response targets by the end of the test period.~~Accordingly, the c~~Changes in biogeochemical processes should also~~will~~ indirectly increase DO in the hypolimnion as well as reduce the frequency of ammonia toxicity, which should be sufficient to achieve the interim DO response targets and may be sufficient to achieve the final DO ~~and ammonia toxicity~~ response targets.

The effectiveness of in-lake remediation using alum addition will be evaluated as part of the adaptive management process incorporated into the Task Force efforts ~~this CNRP ((~~see Section 2.4 of the CNRP). If it is found that a combination of watershed BMPs and alum additions are not sufficient to meet the final response targets, then the participating TMDL Task Force

Comment [JU4]: This focuses solely on urban WLA/LA. Recommending deleting. The next set of rows focus on the ability of the projects to meet the "total" WLA/LA for all dischargers and are more appropriate global comparisons of success.

members Permittees will evaluate the need for, and if necessary, plan to construct a supplemental in-lake management systems such as aeration or oxygenation system and/or consider supplemental watershed based source controls. If necessary, It is possible, as previously noted, that a this system will be constructed to system may be needed to provide the additional oxygen needed to meet the DO final response target. As the alum is expected to have a positive effect on hypolimnetic oxygenation levels, any such system would likely be This is expected to be implemented at a much smaller scale than if it had been the HOS was used for suppression of sediment nutrient flux alone. Any remaining ammonia toxicity in hypolimnetic waters would also be addressed by the supplemental project proposal. The Permittees also expect the system to reduce the frequency of ammonia toxicity by increasing DO concentrations in the hypolimnion.

2.2 Canyon Lake In-Lake Best Management Plan Implementation

Table 3 shows the plan for alum additions to Canyon Lake for both the wet and dry season applications. These applications are based on the evaluation of an effective dose for the Main Body and East Bay as well as an assessment of seasonality in algal growth to determine the appropriate times of year to conduct the alum additions. The estimate of treated Total Phosphorus (TP) with the proposed alum applications is roughly twice the combined TP load from urban (1709 kg/yr) and septic (56 kg/yr) sources to Canyon Lake based on the 2010 update to the watershed model used for the TMDL linkage analysis (Tetra Tech, 2010). Thus, the proposed alum addition plan would provide more than enough TP removal to offset the load reduction needed to meet the WLA for urban and LA for septic sources, as well as providing excess credits for other potential project proponents.

Table 3: Lake Elsinore In-Lake BMP Load Reduction Requirements for MS4 Permittees

Application Date	Description	Alum Dosage (mg/L)	Alum Application (kg dry alum)	Treated TP (kg)
February	Water column stripping following wet season storms prior to spring algal bloom	10	70,000	685
September	Water column stripping prior to turnover/fall algal bloom and suppression of internal sediment nutrient flux	20	140,000	1,309
February	Water column stripping following wet season storms prior to date of historic algal bloom occurrence	30	50,000	808
September	Water column stripping prior to turnover in deeper sections and fall algal bloom	30	50,000	808
		Annual Total	310,000	3,609

With the addition of alum, tThere is a potential for acute or chronic aluminum toxicity to aquatic life in surface waters (e.g. zooplankton) that receives the initial dose of alumtreated with alum. Studies of aluminum toxicity from similar source waters show that this is not a likely condition, especially considering the low dose and the high ambient pH (greater than 7.0) in Canyon Lakeproposed for Canyon Lake in ambient waters with a pH greater than 7.0 ((EPA Region 9, 2006). Jar tests performed at each of the Canyon Lake compliance monitoring stations provided an approximation of the dissolved aluminum that may be present in the water column immediately following the alum application. With dissolved aluminum concentrations ranging from 200-600 ug/L, acute or chronic toxicity is not expected (Colorado Department of Public

Comment [JU5]: Do we need to talk about efforts to evaluate the appropriateness of the final response target?

Comment [JU6]: Reframe consistent with the total required TP load reduction for the TMDL; not just the urban component. I believe the answer is that the TP application is still more than enough to meet the combined WLA/LA.

Comment [JU7]: Confirm against most recent CNRP estmates

Health, 2012; AWWQRP, 2006). However, to ensure that the alum additions in Canyon Lake are safe for aquatic life, the Task Force Permittees first step to implement the CNRP will involve conducting additional toxicity tests using ambient water from different parts of Canyon Lake prior to alum addition. If these tests find there is no impact to aquatic life from the proposed alum additions, such data will be used to develop a case for a negative declaration in the CEQA analysis required for project implementation.

Beginning in September 2013, assuming CEQA compliance is complete and negative responses to aluminum toxicity tests, alum application will be performed according to the schedule shown in Table 3. After the fifth alum application in September of 2015, the MS4 Permitteesparticipating Task Force agencies will evaluate water quality data in the lake, and determine whether response targets are achieved. -or if mModification to the alum application plan or potential supplemental BMPs may be needed to achieve response targets in Canyon Lake for chlorophyll-a and DO (see Table E-1 in Attachment E for detailed implementation schedule).

The Task Force will also be conducting studies to support revision of the TMDL final DO Targets by 2016In 2016, the TMDL will be reopened to revise the final numeric target for DO to incorporate consideration of controllability by means of an allowable exceedence frequency representative of a pre-development condition in the watershed. The 2012 DYRESM-CAEDYM simulations of a lake water quality for a pre-development level of watershed nutrient loads will be used to representthe impacts of natural nutrient loads on an uncontrollable frequency of exceeding exceedances of the final DO target of at least 5 mg/L in the hypoliminion. A cumulative frequency plot of average daily DO data from the two year period of alum applications (Sep 2013 through Sep 2015) will be compared to the pre-development cumulative frequency to determine whether sufficient improvement to DO was achieved with the alum applications. This evaluation is consistent with the TMDL Basin Plan Amendment, which noted that the Regional Board needed additional data to properly set Dissolved Oxygen targets.

2.3 Compliance Analysis for Canyon Lake

The following compliance analysis for Canyon Lake uses TMDL response targets of nutrient related impairments, chlorophyll-a and DO, to demonstrate compliance with the TMDL targets using a lake water quality model, in lieu of achieving documenting load reductions needed to meet WLAs and LAs for nutrients TP and TN. The Riverside County NPDES MS4 Permit allows the Permittees to use the response targets exclusively to demonstrate compliance with the TMDL (Order R8-2010-0033, Section VI.D.2.k.ii). Other dischargers are expected to receive the same flexibility. The following sections describe how the use of alum additions may achieve compliance with the response targets for chlorophyll-a and DO.

A one dimensional lake water quality model, DYRESM-CAEDYM, was developed by the Task Force for use in evaluating nutrient management strategies for Canyon Lake and Lake Elsinore. The analysis of in-lake nutrient management alternatives for Canyon Lake to achieve response targets does account for estimated load reductions from watershed BMPs included in thethis draft CNRP and Western Riverside County Agricultural Coalition's (WRCAC) Agricultural Nutrient Management Plan (AgNMP) by reducing daily inflow loads to DYRESM-CAEDYM. Since watershed load reductions are estimated on an annual basis, an assumption was made that percent load reductions are roughly equivalent for different seasons and storm event sizes, allowing for daily inflow load reductions at the same percentage as annual reductions (Table 4). Table 4 includes additional watershed load reductions projected from implementation of Western Riverside County Agricultural Coalition's (WRCAC) agriculture nutrient management plan (AgNMP) for the CL/LE nutrient TMDL and from expectation of continued improvement to vehicle emissions as a result of more stringent federal and state air quality standards (State Implementation Plan, South Coast Air Quality Management District).

The Task Force has completed detailed evaluations of aeration, oxygenation, and chemical addition (Anderson, 2008; CDM, 2011; Anderson, 2012b; Anderson, 2012c). Based on these evaluations, the Task Force has determined that chemical addition, using aluminum sulfate (alum), will be the most effective in-lake nutrient control strategy to achieve interim numeric targets for the response variablestargets, chlorophyll-a and DO. Appendix C provides the basis for this determination.

Table 4: Projected External Nutrient Load Reduction to Canyon Lake from all Jurisdictions with Allocated Loads

Nutrient Reduction Source	TN Load Reduction (kg/yr)	TP Load Reduction (kg /yr)
Land use change (2003 to 2010)	2828	818
Stormwater program implementation	955	182
Future urbanization w/ LID (2010 to 2020)	-217	649
Atmospheric Deposition [1]	384	0
AgNMP Projects	835	208
Estimated Load Reduction	4,785	1,857
External Load to Lake from 2010 Model Update	32,209	8,932
% of TMDL External Load	15%	21%

1) Reduced emissions of NOx from new air quality standards are expected to reduce atmospheric NOx concentrations in southern California by 60 percent (State Implementation Plan, South Coast Air Quality Management District). Based on recent TMDL implementation planning in the Chesapeake Bay, it was assumed this reduced NOx concentration could translate into 20 percent less TN load from direct atmospheric deposition over Canyon Lake. This reduction does not account for reduced deposition and subsequent washoff from watersheds.

2.4 Lake Water Quality Response Targets for Canyon Lake

The DYRESM-CAEDYM simulation projected that with implementation of the CNRP and AgNMP, annual average chlorophyll-a for the entire lake would be 5 ug/L with wetter years reaching 10 ug/L. Therefore, the model projects that the CNRP will achieve compliance with the final chlorophyll-a response target of an annual average of 25 ug/L, irrespective of hydrologic fluctuation. This model estimates a lake-wide average chlorophyll-a, which is the same metric used to determine compliance with the response target per the TMDL. Even if the lake-wide average chlorophyll-a meets the response target, specific areas of Canyon Lake during critical seasons may still experience more algal growth than others, such as East Bay. For this reason, a heavier dose of alum is planned for shallower areas to drop TP below 0.1 mg/L, furthering limiting the available phosphorus needed for algae to grow, based on East Bay specific simulations using SLAM.

These models rely on a relationship between the dose of alum addition and resultant phosphorus reduction, which was based on one set of jar tests from each of the four compliance monitoring station, collected in dry season of 2012 (see Attachment C). These jar tests may not be representative of potential ambient water quality when alum additions are implemented in 2013-2015, and thus the expected benefits may not be realized exactly as predicted. For example, if pH is higher than it was in the jar test samples, then a portion of the applied alum would be spent acidifying the water before forming an effective aluminum hydroxide floc that is able to bind with phosphorus. The Task ForcePermittees will continually evaluate water quality data to assess whether the alum applications are performing as expected or if the plan should be modified.

Uncertainty is greatest when it comes to the ability for alum to achieve the final DO response target for the hypolimnion, even after accounting for controllability. The DYRESM-CAEDYM results showed a reduction in exceedence frequency from 80 to 65 percent of the time, attributable to the indirect benefits of reduced nutrient cycling and associated sediment oxygen demands. Anderson 2012a suggests that such benefits may continue to accrue over several decades, but there is much uncertainty as to the ultimate potential for DO conditions in the hypolimnion. Consequently, the participating Task Force agenciesPermittees have developed adaptive management into theiris CNRPcompliance plans. In 2016, the participating Task Force agenciesPermittees will evaluate the effectiveness of alum applications for DO in the hypolimnion and determine whether a supplemental in-lake project for DO, such as aeration or oxygenation, would be needed.

Because this outcome remains speculative, the Permittees Task Force agencies have made a decision to conduct any analysis of a follow-on treatment system at the end of the alum application program. At that time the specific system required to achieve DO objectives will be re-evaluated and a specific treatment system will be designed and evaluated under the California Environmental Quality Act (CEQA) as a second-tier environmental document. Such a second-tier environmental document would be prepared at the end of the alum application program, sometime in 2015. However, if aluminum toxicity occurs within the lake, this issue may be revisited before 2015.

2.5 Implementation of the Alum Best Management Plan

Questions that need to be answered:

1. Given the volume of alum required, do the Permittees expect to have it delivered seasonally or is the intent to have it delivered and stored onsite? Will a storage structure need to be constructed?
2. Where can alum be purchased in the quantities envisioned (need a specific location)?
3. How much alum can be delivered in a single truck? What size of truck?
4. How will the alum be applied to the lake?
5. Will a new boat or barge need to be purchased to apply the alum?
6. Once applied and the floc sinks to the bottom of the lake, how much volume will initial and subsequent alum applications occupy.
7. Will the floc affect the existing aquatic ecosystem in the Lake other than reducing nutrients? Does the reduction in nutrients change the future ecosystem in the lake, and if so, how?
8. Does the floc at the bottom of the lake pose an aesthetic problem for swimmers, boaters, fishermen, or recreation in general?
9. Is it necessary or possible to remove the floc? If so, how is this accomplished? If so, where would the removed floc be dispose of? If so, is the floc disposed of as a wet mass or dried and then disposed of. If so, where would the floc be dried?
10. Will the floc remain forever in the lake or does it gradually dissipate and release the phosphorus, i.e., is it a short-term solution or permanent?
11. Will the floc have any effect on the EVMWD's water treatment system, either at the water intakes or in the existing treatment system? Will the EVMWD water treatment system need to be modified to accommodate the presence of floc in Canyon Lake?
12. What will future monitoring of the lake consist of? Will monitoring requirements result in more or less monitoring (additional sampling, additional samples, etc.) after the program is implemented?

13. We need a list of all the studies performed for Canyon Lake and I would like to obtain a CD with electronic copies of all these studies.

14. I would also like to obtain a hard copy of the CNRP, including the attachments.

~~14.~~15. What types of in-lake controls have been considered for Canyon Lake. Should alum prove to be insufficient; which of those controls may be considered as viable supplemental options: Initially: Aeration; seasonal mixing; dredging; alum, phoslock, zeolite, wetlands, other???. As supplement to alum: aeration, seasonal mixing, HOS, orther??

Canyon Lake Hybrid Treatment Project Proposed Schedule										
	December	**January**	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**
CEQA	Distribute Alum Application and Alternative Project Scope	Dodson drafts Preliminary Project Scope based on alum (project) and HOS and Alternatives (Programmatic)								
	Develop CEQA Document		Start upon approval of Project Scope	Complete CEQA Document						
	Public Review				Initiate Public 30 day Review	Conclude Public Review				
	CEQA Approval					City Council Approval				
Alum Water Effects Ratio Testing		Begin sample collection		Preliminary results				2nd sample collection (if needed)		
Canyon Lake Alum Application Project							Release Request for proposal	Review Proposals	Approve Contract	Alum application

2.2.2 In-Lake Remediation Activities

The MS4 permit requires that the CNRP identify the specific regional treatment facilities and the locations where such facilities will be built to reduce the concentration of nutrient discharged from urban sources and the expected water quality improvements to result when the facilities are complete (MS4 Permit Section VI.D.2.d.i.(d)). The CNRP includes implementation of in-lake remediation activities that serve as regional treatment facilities for Canyon Lake and Lake Elsinore. The following sections describe the remediation activities planned for each lake; information regarding the expected water quality improvements to result from implementation of these activities is provided in Section 3.

Canyon Lake

Numerous studies have been conducted by the Taskforce to evaluate potential in-lake nutrient management BMPs for Canyon Lake, including addition of chemicals; alum, Phoslock, and zeolite, and construction of aeration or hypolimnetic oxygenation. The most recent set of studies are summarized in Attachment C, and provide the basis for the selected in-lake BMPs. Table 2-1 provides a matrix showing how the two selected in-lake BMPs for inclusion in the CNRP perform in meeting either WLAs and LAs for urban and septic sources or TMDL numeric targets for causal and response variables. The basis for these determinations is provided by modeling studies conducted in 2012, which are summarized in Attachment C.

Table 2-1. Matrix Comparing Effectiveness of HOS and Alum In-Lake Nutrient Management BMPs for Compliance with the TMDL, per the MS4 Permit

Criteria	Constituent	HOS	Alum
WLA/LA	TP	■	■
	TN	■	□
TMDL Numeric Targets	TP (causal)	□	■
	TN (causal)	□	□
	Chlorophyll-a (response)	□	■
	Dissolved Oxygen (response)	■	◪

Key: Filled in square denotes an expectation that the target will be achieved, partially filled square denote an expectation of signifcnat improvement, but not enough to achieve target, and blank boxes indicate targets that are not effectively managed

To comply with the TMDL, the MS4 Permittees must either demonstrate that 1) WLAs and LAs for urban and septic sources can be achieved with implementation of a project or 2) that the project will improve lake water quality to protect water quality standards, as measured by TMDL response targets for chlorophyll-a and DO. Incubation studies and subsequent models specific to Canyon Lake suggest that the HOS would suppress sediment nutrient flux to offset enough watershed loads to bring the MS4 Permittees into compliance with the WLA for urban and LA for septic sources. However, Anderson 2012b determined that exceedences of the chlorophyll-a response target would continue to occur if only HOS were to be implemented in the lake. In its Mar 31, 2012 comment letter, the Regional Board states that if allocations are met by all dischargers, but in lake water quality response targets are not achieved, then the TMDL will be reconsidered and allocated loads may be further reduced. Thus, the Permittees opted to prioritize in-lake BMPs based on their effectiveness in meeting the TMDL response targets for chlorophyll-a, and DO.

Adding alum to Canyon Lake was estimated to be highly effective in achieving the interim and final chlorophyll-a response target, therefore to control algae in the lake, the Permittees plan is to first conduct 5 alum applications over a 2-year period (see Section 3.4.2). By binding phosphorus and reducing algae growth, the continued use of alum will reduce the cycling of nutrients and associated sediment oxygen demand in the lake bottom. Accordingly, the changes in biogeochemical processes will indirectly increase DO in the hypolimnion, and may be sufficient to achieve the final DO response target.

The effectiveness of in-lake remediation using alum addition will be evaluated as part of the adaptive management process incorporated into this CNRP (see Section 2.4). If it is found that a combination of watershed BMPs and alum additions are not sufficient to meet the final response target, then the Permittees plan to construct a HOS. If necessary, the HOS will most likely be constructed to provide the additional oxygen needed to meet the DO final response target. This is expected to be a much smaller scale than if the HOS was used for suppression of sediment nutrient flux.

3.4.2 Canyon Lake

This compliance analysis for Canyon Lake uses response targets of nutrient related impairments, chlorophyll-a and DO, to demonstrate compliance using a lake water quality model, in lieu of achieving load reductions needed to meet WLAs and LAs for nutrients TP and TN. The Riverside County MS4 Permit allows the Permittees to use the response targets exclusively to demonstrate compliance with the TMDL (Order R8-2010-0033, Section VI.D.2.k.ii). The following sections describe how the use of alum additions will achieve compliance with the response targets for chlorophyll-a and DO.

A one dimensional lake water quality model, DYRESM-CAEDYM, was developed by the Taskforce for use in evaluating nutrient management strategies for Canyon Lake and Lake Elsinore. The analysis of in-lake nutrient management alternatives to achieve response targets does account for estimated load reductions from watershed BMPs included in this CNRP by reducing daily inflow loads to DYRESM-CAEDYM. Since watershed load reductions are estimated on an annual basis, an assumption was made that percent load reductions are roughly equivalent for different seasons and storm event sizes, allowing for daily inflow loads reductions at the same percentage as annual reductions (Table 3-18). Table 3-18 includes additional watershed load reductions projected from implementation of Western Riverside County Agricultural Coalition's (WRCAC) agriculture nutrient management plan (AgNMP) for the CL/LE nutrient TMDL and from expectation of continued improvement to vehicle emissions as a result of more stringent federal and state air quality standards (State Implementation Plan, South Coast Air Quality Management District).

The Taskforce has completed detailed evaluations of aeration, oxygenation, and chemical addition (Anderson, 2008; CDM, 2011; Anderson, 2012b; Anderson, 2012c). Based on these evaluations, the Taskforce has determined that chemical addition, using aluminum sulfate (alum), is the most effective in-lake nutrient control strategy to achieve interim numeric targets for the response variables, chlorophyll-a and DO. Appendix C provides the basis for this determination.

Table 3-18. Projected External Nutrient Load Reduction to Canyon Lake from all Jurisdictions with Allocated Loads

Nutrient Reduction Source	TN Load Reduction (kg/yr)	TP Load Reduction (kg /yr)
Land use change (2003 to 2010)	2828	818
Stormwater program implementation	955	182
Future urbanization w/ LID (2010 to 2020)	-217	649
Atmospheric Deposition [1]	384	0
AgNMP Projects	835	208
Estimated Load Reduction	4,785	1,857
External Load to Lake from 2010 Model Update	32,209	8,932
% of TMDL External Load	15%	21%

1) Reduced emissions of NOx from new air quality standards are expected to reduce atmospheric NOx concentrations in southern California by 60 percent (State Implementation Plan, South Coast Air Quality Management District). Based on recent TMDL implementation planning in the Chesapeake Bay, it was assumed this reduced NOx concentration could translate into 20 percent less TN load from direct atmospheric deposition over Canyon Lake. This reduction does not account for reduced deposition and subsequent washoff from watersheds.

3.4.2.1 Chlorophyll-a Response Target

When alum is added to a waterbody, an aluminum hydroxide precipitate known as floc is formed. The floc binds with phosphorus in the water column to form an aluminum phosphate compound which will settle to the bottom of the lake or reservoir. Once precipitated to the bottom of the reservoir, the floc will also act as a phosphorus barrier.It binds any phosphorus released from the sediments during normal nutrient cycling processes that occur primarily under anoxic conditions such as those found in much of the hypolimnion at Canyon Lake. The aluminumphosphate compounds are insoluble in water under most conditions and will render all bound phosphorus unavailable for nutrient uptake by aquatic organisms. It is through the reduction of bioavailable phosphorus that alum additions reduce the growth of algae in Canyon Lake, as measured by chlorophyll-a concentration in water samples.

Algae need both nitrogen and phosphorus for growth. The limiting nutrient is the one that is completely used for algal growth while some of the other still remains in its bioavailable form. Thus, only reductions of the limiting nutrient would be expected to generate reductions in algal growth. A Redfield ratio of TN to TP of greater than 7 suggests the waterbody is phosphorus limited, while a ratio less than 7 suggests the waterbody is nitrogen limited. Historical water quality data for Canyon Lake shows that the system is weakly nitrogen limited (Figure B-18).However, alum additions are only effective for addressing phosphorus. Thus, Canyon Lake alum additions must reduce phosphorus sufficiently to create a condition of phosphorus limitation before generating any positive results toward compliance with the chlorophyll-a response target.

Seasonality

Generally, algal blooms in Canyon Lake occur at similar times of year (Figure 3-10)and are primarily a function of nutrient loading trends. For this reason, the CNRP was developed to reduce seasonal chlorophyll-a concentrations, despite the numeric target being an annual average basis. This approach provides an additional MOS for compliance. In addition, this approach is more likely to gain support from the public as it addresses the impairment as it occurs.

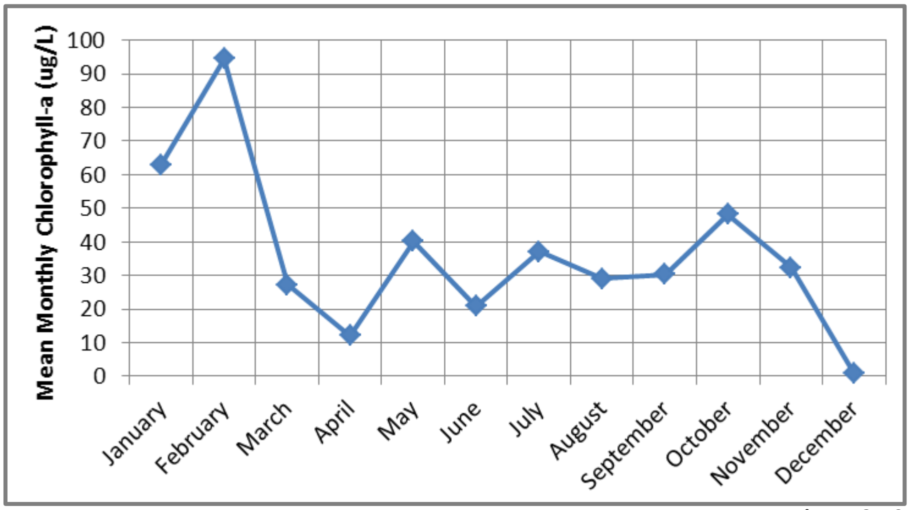

Figure 3-10
Mean Monthly Chlorophyll-a in Main Body of Canyon Lake

The first algal bloom occurs around February and is caused by the presence of nutrient rich external loads in dissolved or suspended particulate form that remain in Canyon Lake at the end of the wet season, coincident with increasing daylight hours and water temperatures. The second algal bloom occurs around October and is caused by turnover of the lake, which brings nutrient enriched water from the hypolimnion to the photic zone where it serves as a food source for algae. This source of nutrients comes from internal loads released from bottom sediments into the hypolimnion during the period of thermal stratification (roughly March through October). The presence of anoxic conditions in the hypolimnion increases the rate of nutrient flux from bottom sediments and subsequent loading of nutrients to photic zone at turnover. To address both periods of enhanced algal growth, alum applications to Canyon Lake are proposed twice per year, once around February 15th and again around September 15th.

Analysis for Main Body

The DYRESM-CAEDYM model was used to estimate the reduction of bioavailable phosphorus that would be needed to limit algae growth, and maintain average annual chlorophyll-a concentration at less than 25 ug/L in all hydrologic years. Adsorption isotherms were then used to estimate the required dose of alum needed to reduce phosphorus from current levels to the target concentration. Results showed that a dose of 10 mg/L of alum (~1 mg/L as Al) would effectively reduce 10-year averages of chlorophyll-a from ~35 ug/L to less than ~5 ug/L by reducing TP from ~0.31 mg/L to ~0.15 mg/L (Anderson, 2012e). The model predicted a significant reduction in chlorophyll-a despite average TP concentrations being above the TMDL numeric target of 0.1 mg/L. The reason for this is that the reduction accounts for most of the bioavailable pool of phosphorus (i.e. dissolved orthophosphate form). At a relatively low dose of 10 mg/L, alum forms a less than typical floc size or “microfloc”, which has a longer residence time as it settles through the water column. The longer residence time allows for chemical processes needed to bind dissolved forms of phosphorus relative to heavier doses (50-100 mg/L) that largely only provide physical entrainment of particulates as a larger floc settles through the water column (Moore et al., 2009).

Analysis for East Bay

The one dimensional DYRESM-CAEDYM model simulates a lake wide average vertical profile of water quality, therefore areas of relatively greater concern for chlorophyll-a are averaged with areas of typically better water quality. Of particular interest to the MS4 Permittees is the East Bay of Canyon Lake. The East Bay is shallower than the Main Body, receives runoff from a different watershed, has higher nutrient concentrations, more dense and persistent algal blooms, and experiences minimal lateral mixing with the Main Body of the lake. A separate analysis using CDM Smith's Small Lake Assessment Model (SLAM) was completed for this zone of Canyon Lake to assess whether alum can be effective for reducing chlorophyll-a (CDM Smith, 2012). Once calibrated using historical nutrient and chlorophyll-a data (2007 – 2010), SLAM was used to test the effect of reduced water column TP on chlorophyll-a. See Attachment C for details on the SLAM application to Canyon Lake. SLAM results suggest that TP would need to be reduced to ~0.05 mg/L to reduce seasonal chlorophyll-a concentrations to below the numeric target of 25 ug/L (Figure 3-11).

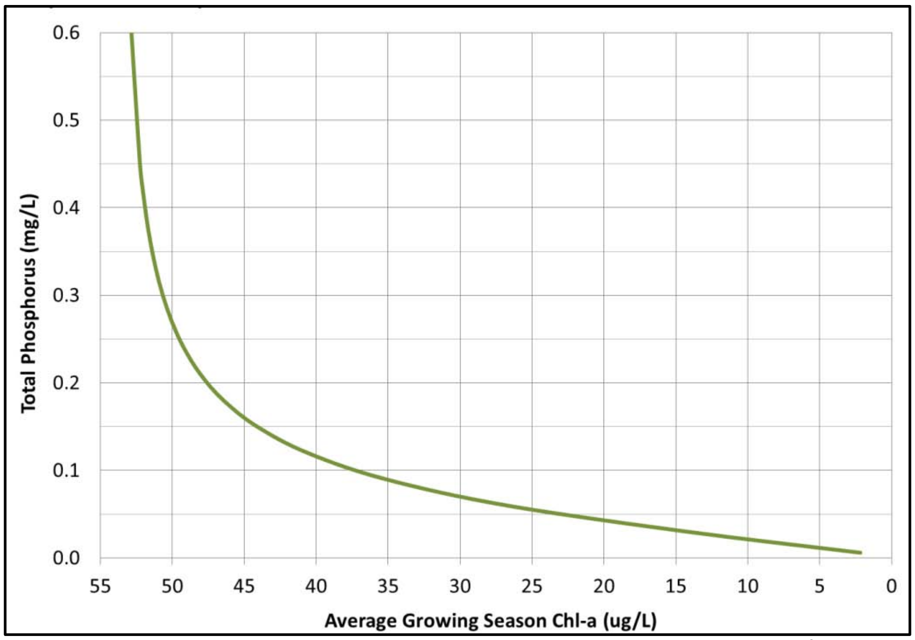

Figure 3-11
SLAM Results Showing Chlorophyll-a for Varying Reductions in Total Phosphorus during Growing Seasons

EVMWD conducted jar tests to determine the reduction of TP that could be achieved at varying doses of alum (see Attachment C). Jar test results from the two East Bay monitoring locations (CL09 and CL10) showed that a dose of 20-40 mg/L alum would result in a TP of ~0.05 mg/L, therefore a heavier dose of 30 mg/L alum (~3 mg/L as Al) was selected for East Bay alum applications.

3.4.2.2 Dissolved Oxygen Response Target

Per the TMDL, the numeric target for DO is not limited to conditions that exist "as a result of controllable water quality factors", a condition which is contained in the Basin Plan WQO for DO. The TMDL Staff Report recognizes uncertainty and comes to the resolution that "as the relationship between nutrient input and dissolved oxygen levels in the lakes is better understood, the TMDL targets for dissolved oxygen can be revised appropriately to ensure protection of aquatic life beneficial uses". Accordingly, the Taskforce developed a DYRESM-CAEDYM model scenario to assess DO conditions above and below the thermocline if the watershed were completely undeveloped (Anderson 2012d). The cumulative frequency plots in Figure 3-12 show the full range of daily results. For the hypolimnion, exceedences of the DO WQO of at least 5 mg/L occur roughly 50 percent of the time in the predevelopment scenario, which is intended to represent the uncontrollable portion of low DO conditions. For the epilimnion (model output average for top 3 meters of water column), there are no exceedences of the DO WQO in the predevelopment nor in the existing watershed condition. Thus, it can be concluded that Canyon Lake is currently meeting interim numeric targets for DO.

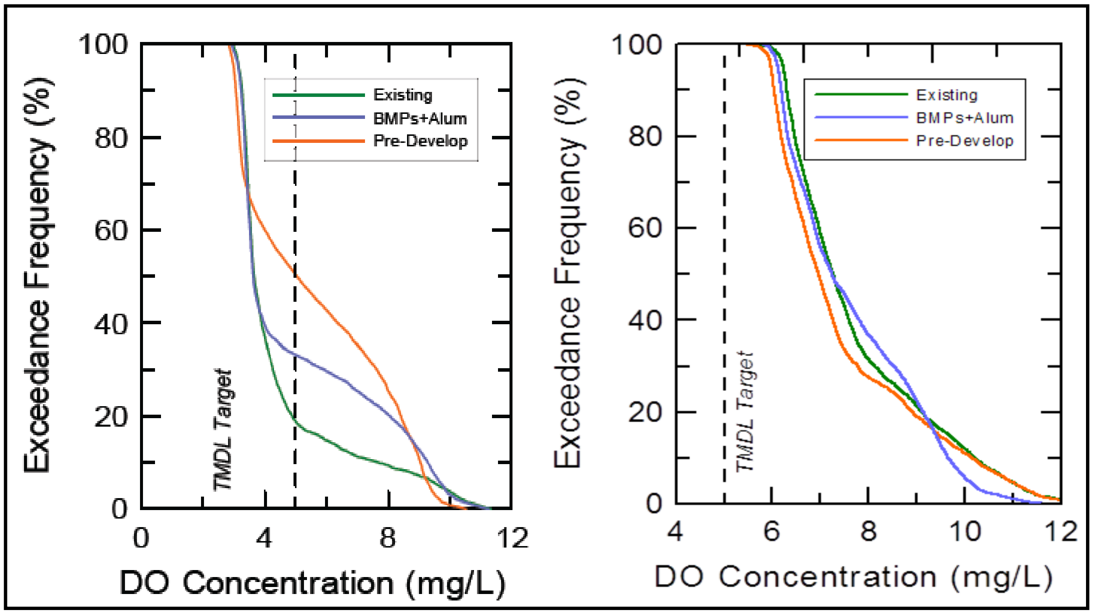

Figure 3-12

Cumulative Frequency of Daily Average DO in hypolimnion (left) and epilimnion (right) for DYRESM-CAEDYM Simulations of Existing, Pre-development, and with CNRP Implementation Scenarios

The combination of watershed BMPs and alum additions will not directly increase dissolved oxygen within Canyon Lake; however, over time, the indirect benefit of reduced algal growth and die-off/settling will reduce sediment oxygen demand, and therefore reduce anoxic conditions at sediment-water interface. In turn, more oxic conditions at the sediment-water interface will reduce the flux of nutrient from bottom sediments to the water column, which would provide additional reductions in algal growth and die-off/settling. Figure 3-12 shows that implementation of watershed BMPs and alum additions over a 10-year period would be expected to provide significant progress toward returning exceedence frequency of WQOs to pre-development levels. However, these indirect benefits will not be realized immediately, and could take multiple decades to accrue given that the half-life of settled nutrients in Canyon Lake is estimated to be approximately 10 years (Anderson, 2012a). Attachment C includes a slideshow presentation, given by Michael Anderson on February 14, 2012, describing kinetic modeling completed to assess the length of time settled nutrients are rendered no longer bioavailable, or inert, in Canyon Lake bottom sediments.

3.4.2.3 Ammonia Toxicity Response Target

Limited instances of acute and chronic ammonia toxicity occur in the Main Body and East Bay for samples taken from the hypolimnion or depth integrated over the entire water column. These ammonia levels of concern are the result of anoxic conditions at the sediment-water interface, which facilitates ammonification of organic nitrogen in lake-bottom sediments. Over time, reduced algal growth and die-off/settling due to alum additions will reduce sediment oxygen demand, and therefore reduce anoxic conditions at sediment-water interface. In turn, more oxic conditions at the sediment-water interface will reduce the frequency of ammonia toxicity in the water column. If ammonia toxicity continues to occur after the initial alum additions, then a supplemental BMP will be considered that would more directly address ammonia in the lake bottom or from external sources.

3.4.2.4 Canyon Lake In-Lake BMP Implementation

Table 3-19 shows the plan for alum additions to Canyon Lake for both the wet and dry season applications. These applications are based on the evaluation of an effective dose for the
Main Body and East Bay as well as an assessment of seasonality in algal growth to determine the appropriate times of year to conduct the alum additions. The estimate of treated TP with the proposed alum applications is roughly twice the combined TP load from urban (1709 kg/yr) and septic (56 kg/yr) sources to Canyon Lake based on the 2010 update to the watershed model used for the TMDL linkage analysis (Tetra Tech, 2010). Thus, the proposed alum addition plan would provide more than enough TP removal to offset the load reduction needed to meet the WLA for urban and LA for septic sources, as well as providing excess credits for other potential project proponents.

Table 3-19. Lake Elsinore In-Lake BMP Load Reduction Requirements for MS4 Permittees

Zone	Application Date	Description	Alum Dosage (mg/L)	Alum Application (kg dry alum)	Treated TP (kg)
Main Body	February	Water column stripping following wet season storms prior to spring algal bloom	10	70,000	685
	September	Water column stripping prior to turnover/fall algal bloom and suppression of internal sediment nutrient flux	20	140,000	1,309
East Bay	February	Water column stripping following wet season storms prior to date of historic algal bloom occurrence	30	50,000	808
	September	Water column stripping prior to turnover in deeper sections and fall algal bloom	30	50,000	808
			Annual Total	310,000	3,609

One concern with the use of alum in lakes is the possible effects on aquatic life. There is potential for acute or chronic aluminum toxicity to aquatic life in surface waters (e.g. zooplankton) that receives the initial dose of alum. Studies of aluminum toxicity from similar source waters show that this is not a likely condition, especially considering the low dose proposed for Canyon Lake (EPA Region 9, 2006). Jar tests performed at each of the Canyon Lake compliance monitoring stations provided an approximation of the dissolved aluminum that may be present in the water column immediately following the alum application. With dissolved aluminum ranging from 200-600 ug/L, acute or chronic toxicity is not expected. However, to ensure that the alum additions in Canyon Lake are safe for aquatic life, the Permittees first step to implement the CNRP will involve conducting toxicity tests using ambient water from different parts of Canyon Lake prior to alum addition. In addition, benthic aquatic invertebrates (benthos) that live in the lake bottom sediments may be affected by the added layer of floc. Thus, the Permittees will also conduct surveys of benthos before and after the first alum application. If these tests find there is not impact to aquatic life from the proposed alum additions, such data will be used to develop a case for a negative declaration in the CEQA analysis.

Beginning in September 2013, assuming CEQA compliance is complete, alum application will be performed according to the schedule shown in Table 3-19. After the fifth alum application in September of 2015, the MS4 Permittees will evaluate water quality data in the lake, and determine whether response targets are achieved or if modification to the alum application plan or potential supplemental BMPs may be needed to achieve response targets in Canyon Lake for chlorophyll-a and DO (see Table E-1 in Attachemnt E for detailed implementation schedule).

In 2016, the TMDL will be reopened to revise the final numeric target for DO to incorporate controllability by means of an allowable exceedence frequency representative of a pre-development condition in the watershed. The 2012 DYRESM-CAEDYM simulations of a lake water quality for a pre-development level of watershed nutrient loads will be used to represent an uncontrollable frequency of exceeding the final DO target of at least 5 mg/L in the hypoliminion. A cumulative frequency plot of average daily DO data from the two year period of alum applications (Sep 2013 through Sep 2015) will be compared to the pre-development cumulative frequency to determine whether sufficient improvement to DO was achieved with the alum applications.

3.5 Uncertainty

3.5.3.2Lake Water Quality Response Targets for Canyon Lake

The DYRESM-CAEDYM simulation projected that with implementation of the CNRP and AgNMP, annual average chlorophyll-a for the entire lake would be 5 ug/L with wetter years reaching 10 ug/L. Therefore, the model projects that the CNRP will achieve compliance with the final chlorophyll-a response target of an annual average of 25 ug/L, irrespective of hydrologic fluctuation. This model estimates a lake-wide average chlorophyll-a, which is the same metric used to determine compliance with the response target per the TMDL. Even if the lake-wide average chlorophyll-a meets the response target, specific areas of Canyon Lake during critical seasons may still experience more algal growth than others, such as East Bay. For this reason, a heavier dose of alum is planned for shallower areas to drop TP below 0.1 mg/L, furthering limiting the available phosphorus needed for algae to grow, based on East Bay specific simulations using SLAM.

These models rely on a relationship between the dose of alum addition and resultant phosphorus reduction, which was based on one set of jar tests from each of the four compliance monitoring station, collected in dry season of 2012 (see Attachment C). These jar tests may not be representative of potential ambient water quality when alum additions are implemented in 2013-2015, and thus the expected benefits may not be realized. For example, if pH is higher than it was in the jar test samples, then a portion of the applied alum would be spent acidifying the water before forming an effective aluminum hydroxide floc that is able to bind with phosphorus. The Permittees will continually evaluate water quality data to assess whether the alum applications are performing as expected or if the plan should be modified.

Uncertainty is greatest when it comes to the ability for alum to achieve the final DO response target for the hypolimnion, even after accounting for controllability. The DYRESM-CAEDYM results showed a reduction in exceedence frequency from 80 to 65 percent of the time, attributable to the indirect benefits of reduced nutrient cycling and associated sediment oxygen demands. Anderson 2012a suggests that such benefits may continue to accrue over several decades, but there is much uncertainty as to the ultimate potential for DO conditions in the hypolimnion. Consequently, the Permittees have developed adaptive management into this CNRP. In 2016, the Permittees will evaluate the effectiveness of alum applications for DO in the hypolimnion and determine whether a supplemental in-lake project for DO, such as aeration or oxygenation, would be needed.

Projected LE/CL TMDL Compliance Costs				
Cost	FY 12/13	FY 13/14	FY 14/15	FY 15/16
TF admin	$ 110,000.00	$ 110,000.00	$ 110,000.00	$ 110,000.00
Watershed Monitoring	$ 85,000.00	$ 85,000.00	$ 85,000.00	$ 85,000.00
Supplemental Lake Monitoring (Toxicity ratios)	$ 42,080.00	$ -	$ -	$ -
Alum Treatment(inclusive of Admin)	$ -	$ 307,000.00	$ 307,000.00	$ 307,000.00
CEQA	$ 25,000.00	$ -	$ -	$ -
Canyon Lake Alum Effectiveness Monitoring	$ -	$ -	$ 150,000.00	$ 150,000.00
Supplemental Model/Project Assessment (201	$ -	$ 100,000.00	$ 100,000.00	$ 100,000.00
Basin Plan DO target adjustement	$ -	$ -	$ 25,000.00	$ 50,000.00
Public Relations Suport	$ 25,000.00	$ 15,000.00	$ -	$ -
Aeration (LE)	?	?	?	?
Grant	$ -	$ -	$ (250,000.00)	$ (250,000.00)
Carry Over From FY12/13 Alum Treatment		$ (129,000.00)		
Total	$ 287,080.00	$ 488,000.00	$ 527,000.00	$ 552,000.00