Lake Elsinore/Canyon Lake TDML Task Force Monitoring Priorities

I. Near-Term Regulatory Requirements

A) Demonstrate compliance with 10-year TMDL and WLA (2011-2020)
B) Demonstrate attainment of interim Chlorophyll-a & DO targets by Dec., 2015
C) In-lake causal target monitoring not required until 2020

II. BMP Implementation and Effectiveness

A) Canyon Lake
   1. Alum project
   2. Watershed source controls (Ag & MS4)
B) Lake Elsinore
   1. Aeration project
   2. Fishery management

III. Compliance Strategy for Canyon Lake

A) Achieve response targets for Chlorophyll-a via alum application
B) Focus is on overall TP reduction in Lake, not meeting specific WLA/LA
C) Single nutrient control strategy (TP); nitrogen controls not primary focus
D) Expecting lower ammonia concentrations by reducing biomass (algae) decay
E) Impractical to partition responsibility for loads, by specific source, in runoff
   1. Man-made vs. Natural
   2. Urban vs. Ag
   3. Individual MS4 permittees
   4. WRCAC vs. Non-WRCAC Ag
   5. Exempt Ag (<20 acre parcels)

IV. Compliance Strategy for Lake Elsinore

A) Meet the TMDLs for New External Loads (Ag & Urban)
   1. TP: 10 yr. running annual average ≈3,200 kg
   2. TN: 10 yr. running annual average ≈22,500 kg
B) Minimize load transfer from Canyon Lake to Lake Elsinore
   1. Watershed BMPs
   2. Alum applications
C) Recycled water
   1. Meet numeric effluent limits for TP
   2. Rely on aeration offsets to meet numeric effluent limits for TN
D) Does not necessarily equate to attainment of in-lake nutrient concentrations
E) Does not necessarily equate to attainment of in-lake response targets

V. Recommendations for General Watershed Monitoring Above Canyon Lake

A) Monthly dry weather sample for TN & TP at SJR & Salt Creek and RR Cyn. Dam
B) Representative storm water sampling for TN & TP at same locations
C) Estimate flow-weighted average annual net external nutrient loading

VI. Recommendations for General Water Quality Monitoring In Canyon Lake

A) Chlorophyll-a: monthly, depth-integrated, separate main-body & E. bay
B) DO: monthly, depth-integrated, volume-weighted, main-body only
C) TP: monthly, depth-integrated, photic zone only, total and dissolved, 1 location (calculate separate averages for main-body & East bay)
D) No near term (2014-2019) ammonia monitoring
E) No near term (2014-2019) TN monitoring

VII. Consider Special Water Quality Studies in Canyon Lake

A) Monthly satellite monitoring for Chlorophyll-a (trend data)
B) Characterize TP flux from lake bottom sediments (alum effectiveness)

VIII. Recommendations for General Watershed Monitoring Above Lake Elsinore

A) Flow-weighted TP load transfers from Canyon Lake (non-base flows only)
B) Flow-weighted TN & TP from recycled water discharges

IX. Recommendations for General Water Quality Monitoring In Lake Elsinore

A) Chlorophyll-a: monthly, 2 mid-lake locations, depth-integrated, June-Sept. only
B) TP & TN: monthly, 2 mid-lake locations, depth-integrated, average all (N=24)
C) DO: daily average, mid-depth, 2 mid-lake locations using automated buoys
D) Conductivity (TDS): weekly avg., mid-depth, 1 mid-lake location (automated)
E) No near-term (2014-2019) ammonia monitoring

X. Consider Special Water Quality Studies in Lake Elsinore

A) Annual (mid-summer) zooplankton survey
B) Zooplankton salinity tolerance study (c. dubia and mock ionic matrix)
C) Characterize TP flux from lake bottom sediments (aeration effectiveness)
D) Seasonal (summer only) satellite monitoring for Chlorophyll-a (trend data)

XI. Recommendations for Performance-based BMP Monitoring/Reporting

A) Applied alum (total dry kilograms/year)
B) Aerator operation (total hours/year)
C) Axial mixers (total hours/year)
D) Carp removed (total pounds/year)
E) Storm flow diverted (total acre-feet/year)
F) On-site retention (total acre-feet/year)
G) (Ag metric #1)
H) (Ag metric #2)

A. Lake Elsinore and Canyon Lake Nutrient TMDL Numeric Targets

Numeric targets for Lake Elsinore and Canyon Lake are based on reference conditions when beneficial uses in the lakes were not significantly impacted by nutrients. Table 5-9n shows both "causal" and "response" interim and final numeric targets for both lakes. Causal targets are those for phosphorus and nitrogen. Phosphorus and nitrogen are the primary limiting nutrients in Lake Elsinore and Canyon Lake, respectively. However, under certain conditions, nitrogen may be limiting in Lake Elsinore and phosphorus may be limiting in Canyon Lake. Targets for both nutrients are therefore necessary . Reduction in nitrogen inputs will be necessary over the long-term and only final targets are specified. Response targets include chlorophyll *a* and dissolved oxygen. These targets are specified to assess water quality improvements in the lakes. Finally, ammonia targets are specified to prevent un-ionized ammonia toxicity to aquatic life.

Table 5-9n
Lake Elsinore and Canyon Lake Nutrient TMDL Numeric Targets*

Indicator	Lake Elsinore	Canyon Lake
Total P concentration (Final)	Annual average no greater than 0.1 mg/L; to be attained no later than 2020	Annual average no greater than 0.1 mg/L; to be attained no later than 2020
Total N concentration (Final)	Annual average no greater than 0.75 mg/L; to be attained no later than 2020	Annual average no greater than 0.75 mg/L; to be attained no later than 2020
Ammonia nitrogen concentration (Final) [Ref. #4]	Calculated concentrations to be attained no later than 2020 Acute: 1-hour average concentration of total ammonia nitrogen (mg/L) not to exceed, more than once every three years on the average, the CMC (acute criteria), where $CMC = 0.411/(1+10^{7.204-pH}) + 58.4/(1+10^{pH-7.204})$ Chronic: thirty-day average concentration of total ammonia nitrogen (mg/L) not to exceed, more than once every three years on the average, the CCC (chronic criteria) $CCC = (0.0577/(1+10^{7.688-pH}) + 2.487/(1+10^{pH-7.688})) * \min(2.85, 1.45*10^{0.028(25-T)})$	Calculated concentrations to be attained no later than 2020 Acute: 1-hour average concentration of total ammonia nitrogen (mg/L) not to exceed, more than once every three years on the average, the CMC (acute criteria), where $CMC = 0.411/(1+10^{7.204-pH}) + 58.4/(1+10^{pH-7.204})$ Chronic: thirty-day average concentration of total ammonia nitrogen (mg/L) not to exceed, more than once every three years on the average, the CCC (chronic criteria) $CCC = (0.0577/(1+10^{7.688-pH}) + 2.487/(1+10^{pH-7.688})) * \min(2.85, 1.45*10^{0.028(25-T)})$
Chlorophyll *a* concentration (Interim)	Summer average no greater than 40 ug/L; to be attained no later than 2015	Annual average no greater than 40 ug/L; to be attained no later than 2015
Chlorophyll *a* concentration (Final)	Summer average no greater than 25 ug/L; to be attained no later than 2020	Annual average no greater than 25 ug/L; to be attained no later than 2020
Dissolved oxygen concentration (Interim)	Depth average no less than 5 mg/L; to be attained no later than 2015	Minimum of 5 mg/L above thermocline; to be attained no later than 2015
Dissolved oxygen concentration (Final)	No less than 5 mg/L 1 meter above lake bottom; to be attained no later than 2020	Daily average in hypolimnion no less than 5 mg/L; to be attained no later than 2020.

* compliance with targets to be achieved as soon as possible, but no later than the date specified

Table 5-9r

Lake Elsinore
Nitrogen and Phosphorus Wasteload and Load Allocations[a]

Lake Elsinore Nutrient TMDL	Final Total Phosphorus Load Allocation (kg/yr)[b,c]	Final Total Nitrogen Load Allocation (kg/yr)[c,d]
TMDL	28,584	239,025
WLA	3,845	7,791
Supplemental water[d]	3,721	7,442
Urban	124	349
CAFO	0	0
LA	21,969	210,461
Internal Sediment	21,554	197,370
Atmospheric Deposition	108	11,702
Agriculture	60	213
Open/Forest	178	567
Septic systems	69	608
CL Watershed[e]	2,770	20,774

[a] The Lake Elsinore TMDL allocations for urban, agriculture open/forest, septic systems and CAFOs only apply to those land uses located downstream of Canyon Lake.
[b] Final allocation compliance to be achieved as soon as possible, but no later than December 31, 2020.
[c] TMDL and allocations specified as 10-year running average.
[d] WLA for supplemental water should met as soon as possible as a 5 year running average.
[e] Allocation for Canyon Lake overflows

The TMDL distributes the portions of the waterbody's assimilative capacity to various pollution sources so that the waterbody achieves its water quality standards. The Regional Board supports the trading of pollutant allocations among sources, where appropriate. Trading can take place between point/point, point/nonpoint, and nonpoint/nonpoint pollutant sources. Optimizing alternative point and nonpoint control strategies through allocation tradeoffs may be a cost-effective way to achieve pollution reduction benefits. (See Section E. TMDL Implementation, Task 11, below).