Staff Report of the
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

SURFACE WATER AMBIENT MONITORING PROGRAM TULARE LAKE BASIN ANNUAL REPORT FISCAL YEAR 2001-2002

JANUARY 2003

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the United States Army Corps of Engineers;
and the Friends of the South Fork Kings River.

SURFACE WATER AMBIENT MONITORING PROGRAM
TULARE LAKE BASIN
ANNUAL REPORT FISCAL YEAR 2001-2002

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SURFACE WATER AMBIENT MONITORING PROGRAM
TULARE LAKE BASIN
ANNUAL REPORT FISCAL YEAR 2001-2002

EXECUTIVE SUMMARY

The Tulare Lake Basin comprises the drainage area of the San Joaquin Valley south of the San Joaquin River and encompasses approximately 10.5 million acres and includes the historical lakebed. The Tulare Lake Basin is essentially a closed basin since surface water drains north into the San Joaquin River only in years with well above average rainfall. The Tulare Lake Basin is divided into six watershed management areas: Kern County, Tulare Lake, Tule, Kaweah, Kings, and Westside basins. Each area is defined as the designated groundwater basin. Thus, the Kern County Basin Management Area includes the Kern River and the Poso Creek drainage areas, as well as the drainage areas of westside streams in Kern County. The Tulare Lake Basin Management Area consists of the historical lakebed. The Tule Basin Management Area includes the Tule River, Deer Creek, and White River drainage areas. The Kaweah Basin Management Area includes the Kaweah River and Yokohl Creek drainage areas. The Kings Basin Management Area includes the Kings River drainage area as well as the drainage area for the tributaries and distribution systems of the Kings River. The Westside Basin includes the drainage areas of westside streams in Kings and Fresno counties (Watershed Management Initiative Chapter, 2001).

The State Water Resources Control Board (State Board) has developed a comprehensive monitoring program known as the Surface Water Ambient Monitoring Program (SWAMP). The SWAMP has provided funding to develop a surface water monitoring program to evaluate water quality within the six watershed management areas of the Tulare Lake Basin. Water quality results have been assessed using the water quality objectives contained in the Water Quality Control Plan for the Tulare Lake Basin, Second Edition - 1995 (Basin Plan). During Fiscal Year (FY) 2001-2002, the intent of the study was to begin baseline sampling and gather preliminary data from the Kern, Tule, Kaweah, South Fork Kings, and Lower Kings Rivers, and associated reservoirs and tributaries draining the west face of the Sierra Nevada.

Two sampling events were conducted in each of the watersheds between March and June 2002. The results indicate the following:

1. Of 6 samples from Hume Lake 3 did not meet the Basin Plan dissolved oxygen water quality objective;

2. Of 5 samples from the lower Kings River 1 did not meet the Basin Plan minimum dissolved oxygen and maximum electrical conductivity water quality objectives;

3. Of 32 samples from Lake Isabella and the Kern River, 26 did not meet the Basin Plan pH water quality objective;

4. Of 16 samples from Lake Success and the Tule River, one sample did not meet the Basin Plan water quality objective for dissolved oxygen and fourteen samples did not meet the Basin Plan water quality objective for pH; and

5. Of 16 samples from Lake Kaweah and the Kaweah River, one sample did not meet the Basin Plan water quality objective for dissolved oxygen and two of sixteen samples did not meet the Basin Plan water quality objective for pH.

Due to the limited data obtained, additional monitoring is recommended to detect possible temporal, spatial, geographical, or other differences both within and between the water bodies sampled in FY 01-02.

SURFACE WATER AMBIENT MONITORING PROGRAM
TULARE LAKE BASIN
ANNUAL REPORT FISCAL YEAR 2001-2002

INTRODUCTION

The Tulare Lake Basin comprises the drainage area of the San Joaquin Valley south of the San Joaquin River. Surface water from the Tulare Lake Basin only drains north into the San Joaquin River in years of extreme rainfall. This essentially closed basin is situated in the topographic horseshoe formed by the Diablo and Temblor Ranges on the west, the San Emigdio and Tehachapi Mountains on the south and the Sierra Nevada Mountains on the east and southeast. Section 13192 of the Porter-Cologne Water Quality Control Act directs the State Water Resources Control Board (State Board) and Regional Water Quality Control Boards (Regional Boards) to develop a comprehensive surface water ambient monitoring program for the state. In order to meet this mandate, the State Board submitted a comprehensive monitoring program proposal entitled *Proposal for a Comprehensive Ambient Surface Water Quality Monitoring Program* to the California State Legislature on 30 November 2000. The proposal was expected to serve as a blueprint for implementing efforts both at the State and Regional Boards and was intended to protect and restore the State's water resources through the following:

1. Create an ambient monitoring program that addresses all hydrologic units of the State using consistent and objective monitoring, sampling, and analytical methods; consistent data quality assurance protocols; and centralized data management;

2. Document ambient water quality conditions in potentially clean as well as polluted areas;

3. Identify specific water quality problems preventing the State Board, Regional Boards, and the public from realizing beneficial uses of water in targeted watersheds; and

4. Provide data to evaluate the overall effectiveness of water quality regulatory programs in protecting beneficial uses of waters of the State.

In order to accomplish the above goals, the Central Valley Regional Water Quality Control Board developed a *Surface Water Ambient Monitoring Program Work Plan* for Fiscal Year (FY) 2001-2002. The work plan takes into account that watersheds within the Central Valley vary extensively with respect to such features as ecology, topography, geology, and overall land use. Since each watershed has both a unique set of stakeholders and unique water quality concerns that should be addressed, the management process and the accompanying monitoring programs are somewhat watershed specific. The purpose of this Report is to document the data collection activities conducted in accordance with the Fiscal Year (FY) 01-02 Work Plan for the Tulare Lake Basin.

BENEFICIAL USES

Surface water quality in the Tulare Lake Basin has been described as generally good, with excellent quality exhibited by most eastside streams. Protection and enhancement of beneficial uses of water against water quality degradation is a basic requirement of water quality planning under the Porter Cologne Water Quality Control Act.

The potential sources of contaminants and associated pollutants for the watershed management areas have not yet been identified. The monitoring program for FY 01-02 was primarily designed to address potential nonpoint source impacts, since most significant water quality problems in the region result from nonpoint sources (see 1998 Clean Water Act Section 303(d) List and 1996 Water Quality Assessment). Potential sources include, but are not limited to, publicly and privately owned treatment works, individual septic tanks, confined animal facilities, livestock grazing, agriculture, development, and recreation. The monitoring indicators assessed in FY 01-02 included water temperature, water quality constituents, and microorganisms. The analytical results have been evaluated against narrative and numeric water quality objectives in the Basin Plan.

MONITORING LOCATIONS

During FY 01-02, monitoring locations were identified in five of the watershed management areas in the Tulare Lake Basin with similar land uses such as foothill development, recreational uses, industrial processes, agriculture, and livestock grazing. Additional consideration in choosing sample sites included public access and safety issues. Sampling efforts on the mainstem rivers and reservoirs draining the western face of the Sierra Nevada occurred on a quarterly timetable to begin to establish baseline water quality conditions and to detect potential variations on a temporal and spatial scale.

The following water bodies were sampled in FY 01-02:

1. South Fork of the Kings River and tributaries;
2. Tenmile Creek, including Hume Lake;
3. Lower Kings River;
4. Kern River and tributaries, including Lake Isabella;
5. Upper Tule River and tributaries, including Lake Success; and
6. Upper Kaweah River and tributaries, including Lake Kaweah.

Because funding for the FY 01-02 was limited, the overall sampling strategy for the water bodies was based on a directed sampling approach. As there is limited quantitative data available for any of these water bodies, physical, chemical, and microbiological parameters were assessed to provide baseline information.

SAMPLE DESIGN AND COLLECTION

Sample collection, preservation, and transport were conducted in accordance with the Tulare Lake Basin Surface Water Sampling Plan (February 2002). Sample collection was conducted by Regional Board staff with the exception of Hume Lake, South Fork Kings River, and Tenmile Creek where volunteer monitors from the Friends of the South Fork Kings River provided sample collection assistance. Sample collection included surface water grab samples and field measurements. Grab samples were collected into laboratory supplied containers and immediately cooled to 4 degrees celsius for transfer to the laboratory. The water samples were transported to Twining Laboraties, Inc. where they were analyzed for nutrients, anions, cations, and specific metals; and cultured for bacterial population identification and distribution. Physical and chemical analyses were conducted in the field using hand held meters. The electrical conductivity of samples was measured using a hand held YSI 30 meter, dissolved oxygen and temperature a YSI 55 meter, and pH was measured using an Oakton pH tester 2. Reservoir water clarity was visually measured using a Secchi disk. In addition, deionized blanks and duplicate samples were analyzed as directed by the Quality Assurance Project Plan (February 2002).

Specific monitoring sites for each of the water bodies are listed in Attachment A. Sample sites were designated using a Global Positioning System and photographic documentation. At each monitoring site, samples were collected and analyzed for:

- Water Temperature
- pH
- Electrical Conductivity
- Dissolved Oxygen
- Water Clarity (reservoirs)
- Total Coliform
- Fecal coliform
- E. coli
- Fecal Streptococcus

Sample collection dates for FY 01-02 are summarized in Table 1.

TABLE 1
TULARE LAKE BASIN
QUARTERLY SAMPLING DATES
FISCAL YEAR 2001-2002

Sample Location	***First Sampling Event***	***Second Sampling Event***
South Fork of the Kings River	26 April 2002	13 June 2002
Tenmile Creek	26 April 2002	13 June 2002
Hume Lake	26 April 2002	13 June 2002
Lower Kings River	11 June and 12 June 2002	
Kern River	27 March 2002	19 June and 20 June 2002
Lake Isabella	28 March 2002	19 June and 20 June 2002
Tule River	26 February 2002	26 June 2002
Lake Success	26 February 2002	26 June 2002
Kaweah River	16 April 2002	11 June 2002
Lake Kaweah	16 April 2002	11 June 2002

RESULTS AND DISCUSSION

The Tulare Lake Basin water quality objectives for inland surface waters for the chemical parameters examined during FY 01-02 are summarized in Table 2.

TABLE 2
TULARE LAKE BASIN PLAN
SURFACE WATER QUALITY OBJECTIVES

Stream	*Reach*	*Location*	*pH*	*Minimum Dissolved Oxygen (mg/L)*	*Maximum Electrical Conductivity (uS/cm)*
Kings River	Reach I	Above Kirch Flat	6.5 to 8.3	9	100
	Reach IV	Friant Kern to Peoples Weir	6.5 to 8.3	7	100
	Reach V	Peoples Weir to Island Weir	6.5 to 8.3	7	200[A]
	Reach VI	Island Weir to Stinson Weir on North Fork and Empire Weir No. 2 on South Fork	6.5 to 8.3	7	300[A]
Kern River	Reach I	Above Lake Isabella	6.5 to 8.3	8	200
	Reach II	Lake Isabella	6.5 to 8.3	8	300
Kern River	Reach III	Lake Isabella to Southern California Edison Powerhouse (KR-1)	6.5 to 8.3	8	300
	Reach IV	KR-1 to Bakersfield	6.5 to 8.3		300
Tule River	Reach I	Above Lake Success	6.5 to 8.3		450
	Reach II	Lake Success	6.5 to 8.3	7	450
Kaweah River	Reach I	Above Lake Kaweah	6.5 to 8.3		175
	Reach II	Lake Kaweah	6.5 to 8.3	7	175

[A] During the period of irrigation deliveries. Providing, further, that for 10 percent of the time (period of low flow) the following shall apply to the following reaches of the Kings River: Reach V - 400 uS/cm and Reach VI - 600 uS/cm

mg/L = milligrams per liter
uS/cm = microSiemens per centimeter

The microorganism data is currently being evaluated to determine if a baseline for microbiological load can be established. The Tulare Lake Basin Plan states:

> *"In waters designated REC-1 (water contact recreation) the fecal coliform concentration based on a minimum of not less than five samples for any 30-day period shall not exceed*

a geometric mean of 200/100 ml, nor shall more than ten percent of the total number of samples taken during any 30-day period exceed 400/100 ml."

Because five samples for any 30-day period were not collected during the Surface Water Ambient Monitoring Program (SWAMP) sampling events, the resultant information should not be evaluated against the Basin Plan bacteria water quality objective. However, the information is useful in determining which sampling sites, if any, may necessitate more intensive sampling in the future. All of the water bodies sampled during FY 01-02 are designated REC-1 (water contact recreation) as a beneficial use.

A comprehensive summary of the sample analytical results for each of the water bodies is in Attachment B. General trends in the data are discussed below and, where applicable, the results evaluated against narrative and numeric water quality objectives summarized in the Basin Plan. Overall, based on two quarterly sampling events for FY 01-02, there is not enough data to submit to parametric testing and derive any meaningful statistical analysis with respect to temporal, spatial, geographical, or other differences both within and between the water bodies sampled in FY 01-02. Therefore, additional samples are necessary to characterize reference and baseline water body conditions in the Tulare Lake Basin.

South Fork of the Kings River
Tenmile Creek
Hume Lake

The results indicate water samples collected and analyzed during the two sampling events for FY 01-02 met the water quality objectives of the Basin Plan for pH and electrical conductivity. One of the eight samples collected on 26 April 2002 (HUM030) and all of the samples collected on 13 June 2002 did not meet the minimum dissolved oxygen water quality objective. Attachment C provides a comparative analysis of the sample results obtained during the two sampling events.

Lower Kings River

The results indicate water samples collected and analyzed during the single sampling event for FY 01-02 met the water quality objectives of the Basin Plan for pH. One of the five samples collected on 11 June 2002 (LKI050) did not meet the minimum dissolved oxygen and maximum electrical conductivity water quality objectives. Future sampling events should include random laboratory analysis of electrical conductivity to determine the precision and accuracy of the field meter. Attachment D provides an analysis of the sample results obtained during the sampling event.

Kern River
Lake Isabella

The results indicate water samples collected and analyzed during the two sampling events for FY 01-02 met the water quality objectives of the Basin Plan for electrical conductivity.

Two of the eight samples collected on 19 and 20 June 2002 (ISA080 and ISA090) on Lake Isabella did not meet the minimum dissolved oxygen water quality objective.

Thirteen of the sixteen samples collected on 28 March 2002 and fourteen of seventeen samples collected on 20 June 2002 did not meet the pH water quality objective. The pH at each of the sampling locations was obtained using a hand held pH meter with an accuracy rate of $^{+}/\text{-}$ 0.1 pH unit. The meter was calibrated to two known standards (pH 4.0 and pH 7.0) the day prior to each sampling event. Future sampling events in FY 02-03 should include random laboratory analysis of pH to determine the precision and accuracy of the field pH meters used during FY 01-02.

Attachment E provides a comparative analysis of the sample results obtained during the two sampling events.

Tule River
Lake Success

The results indicate water samples collected and analyzed during the two sampling events for FY 01-02 met the water quality objectives of the Basin Plan for electrical conductivity and dissolved oxygen.

Seven of the eight samples collected on 26 February 2002 and seven of eight samples collected on 26 June 2002 did not meet the pH water quality objective. The pH at each of the sampling locations was obtained using a hand held pH meter with an accuracy rate of $^{+}/\text{-}$ 0.1 pH unit. The meter was calibrated to two known standards (pH 4.0 and pH 7.0) the day prior to each sampling event. Future sampling events in FY 02-03 should include random laboratory analysis of pH to determine the precision and accuracy of the field pH meters used during FY 01-02.

Attachment F provides a comparative analysis of the sample results obtained during the two sampling events.

Kaweah River
Lake Kaweah

The results indicate water samples collected and analyzed during the two sampling events for FY 01-02 met the water quality objectives of the Basin Plan for electrical conductivity.

One of the eight samples collected on 16 April 2002 did not meet the minimum water quality objective for dissolved oxygen (KAL020).

Two samples of eight samples collected on 16 April 2002 (KAR040 and KAL040) did not meet the pH water quality objective. The pH at each of the sampling locations was obtained using a hand held pH meter with an accuracy rate of $^{+}/\text{-}$ 0.1 pH unit. The meter was calibrated to two known standards (pH 4.0 and pH 7.0) the day prior to each sampling event. Future sampling events in FY 02-03 will include random laboratory analysis of pH to determine the precision and accuracy of the field pH meters used during FY 01-02.

Attachment G provides a comparative analysis of the sample results obtained during the two sampling events.

REFERENCES

California Regional Water Quality Control Board, Central Valley Region. 19 January 2001. *Watershed Management Initiative*.

California Regional Water Quality Control Board, Central Valley Region. February 2002. *Draft Tulare Lake Basin Surface Water Sampling Plan*.

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ATTACHMENT A
Sample Station Locations

Station ID	*Sample Station South Fork Kings River Hume Lake - Tenmile Creek Lower Kings River*	*Sample Location Descriptions* *Latitude*	*Longitude*	*Approx. Location*
KIN050	Kings River - Roads End	36.47370 N	118.34470 W	50 feet above inlet of Copper Creek into Kings River
KIN010	Kings River	36.78980 N	118.66600 W	Downstream of inflow of Hotel Creek into Kings River
KIN020	Kings River - Lewis Creek	36.48000 N	118.41390 W	Downstream of inflow of Lewis Creek into Kings River
LEW010	Lewis Creek	36.80328 N	118.69310 W	Upstream of California Conservation Corps. Primitive camp
KIN040	Kings River - Grizzly Creek	36.48250 N	118.44550 W	Downstream of inflow of Grizzly Creek into Kings River
TEN010	Kings River - Tenmile Creek	36.81673 N	118.88834 W	Downstream of inflow of Tenmile Creek into Kings River
HUM030	Hume Lake - Long Meadow Creek	36.78709 N	118.91350 W	Inlet of Long Meadow Creek into Hume Lake
HUM020	Hume Lake - Tenmile Creek	36.78650 N	118.90110 W	Inlet of Tenmile Creek into Hume Lake
HUM010	Hume Lake - Dam Site	36.79425 N	118.90010 W	At dam site
LKI010	Kings River – Fresno Weir	36.8191 N	119.3805 W	Winton Co. Park – NE of Centerville on Trimmer Springs Road
LKI020	Kings River – Peoples Weir	364849 N	119.5388 W	Peoples Weir just west of Hwy 99
LKI030	Kings River – Island Weir	36.38752 N	119.78965 W	Island Weir just east of Hwy 41
LKI040	Kings River – S. Fork	36.2558 N	119.8551 W	At Jackson Avenue bridge SW of Lemoore
LKI050	Kings River – S. Fork	36.1789 N	119.8348 W	Hwy 41 near Stratford

ATTACHMENT A CONTINUED

Station ID	*Sample Station Kern River*	*Sample Location Descriptions* *Latitude*	*Longitude*	*Approx. Location*
KER010	Springhill	35.86356 N	118.44830 W	Hwy 178 - Springhill primitive campground
KER020	River Kern Beach	35.78370 N	118.44513 W	Hwy 178 - River Kern Beach day use area
KER030	Riverside Park	35.05330 N	118.42470 W	Hwy 178 - Riverside Park - Kernville adjacent to playground equipment
KER040	Keyesville Rec Area	35.63900 N	118.48460 W	Hwy 178 - downstream from Slippery Rock raft launch site
KER050	Democrat	35.53120 N	118.66310 W	US Forest Service Rd. 28S67 - Democrat primitive recreation area
KER060	Lower Richbar	35.47620 N	118.7263 W	Hwy 178 - Lower Richbar picnic area
KER070	Ker MM14/MM15	35.45010 N	118.78260 W	Hwy 178 - site on road between Kern County mile marker 14 and mile marker 15
KER080	Rancheria Rd.	35.12652 N	118.33065 W	Rancheria Road day use area
KER090	Hart Park	35.44992 N	118.91624 W	Alfred Harrell Hwy - South end of Hart Park
KER110	Calloway Weir	35.39945 N	119.02661 W	Willow Dr. - Oildale - access to weir via Riverview Playground

ATTACHMENT A CONTINUED

Station ID	*Sample Station* *Lake Isabella*	*Sample Location Descriptions* *Latitude*	*Longitude*	*Approx. Location*
ISA010	Tillie Creek	35.696000 N	118.450100 W	At entrance of Tille Creek into Lake Isabella
ISA020	Boulder Gulch	35.667790 N	118.464503 W	Adjacent to Boulder Gulch camping area
ISA040	Main Dam	35.646630 N	118.468021 W	Near outflow of Lake Isabella - Main Dam
ISA050	So. Fork Rec.	35.662100 N	118.437070 W	Adjacent to the South Fork Picnic area
ISA060	French Gulch	35.655560 N	118.482570 W	Near the inflow of French Gulch drainage into Lake Isabella
ISA070	Camp 9	35.693000 N	118.443500 W	Adjacent to Camp 9 camping area
ISA080	Hanning Flat	35.666560 N	118.395710 W	Adjacent to Hanning Flat recreation area
ISA090	Wofford Heights	35.708180 N	118.435842 W	Adjacent to community of Wofford Heights

Station ID	*Sample Station* *Kaweah River – Lake Kaweah*	*Sample Location Descriptions* *Latitude*	*Longitude*	*Approx. Location*
KAR010	Kaweah River - Ash Mountain	36.48413 N	118.83594 W	Ash Mountain Park headquarters - Hwy 198
KAR020	Kaweah River - Dinely Rd.	36.46058 N	118.87920 W	Approx. 4 miles from Sequoia Nat'l Park Entrance
KAR030	Kaweah River - North Fork	36.43957 N	118.90598 W	North of Three Rivers - Hwy 198 and N. Fork Dr.
KAR040	Kaweah River - Slick Rock Rec. Area	36.41237 N	118.93784 W	North of Lake Kaweah - Hwy 198
KAL010	Lake Kaweah - Greasy Creek	36.42588 N	118.99283 W	Inflow of Greasy Creek into Lake Kaweah
KAL020	Lake Kaweah - Horse Creek	36.39356 N	118.95432 W	Inflow of Horse Creek into Lake Kaweah
KAL030	Lake Kaweah - Inflow	36.41107 N	118.94529 W	Inflow of Kaweah River
KAL040	Lake Kaweah - Outflow	36.41391 N	119.00225 W	Outflow of Kaweah Lake

ATTACHMENT A CONTINUED

	Sample Location Descriptions			
Station ID	***Sample Station Tule River – Lake Success***	***Latitude***	***Longitude***	***Approx. Location***
TUR010	Tule River - Powerhouse	36.16143 N	118.70950 W	At the head of the Flume - Hwy 190
TUR020	Tule River - Lower Coffee Camp	36.14885 N	118.75241 W	Coffee Camp rec area - Hwy 190
TUR030	Tule River - Rio Vista Day Use Park	36.13247 N	118.77486 W	Day use area - Hwy 190
TUR040	Tule River - Sequoia N'tl Forest Fire Station	36.13459 N	118.81049 W	East of Springville - Hwy 190
TUR050	Tule River - Globe Rd. East	36.10913 N	118.81978 W	Globe Rd. - just south of Hwy 190 - west of Springville
SUC010	Lake Success	36.08452 N	118.90792 W	Inflow of Tule River into lake
SUC020	Lake Success	36.07178 N	118.90465 W	Middle of lake
SUC030	Lake Success - Outflow	36.06332 N	118.92060 W	Outflow of dam

ATTACHMENT B

SUMMARY OF ANALYTICAL RESULTS

South Fork Kings River
Ten Mile Creek
Hume Lake

Sample Location	Sample Date	Water Temp. Celsius	DO mg/L	pH	Conductivity uS/cm	Total Coliform MPN/100 ml	E. Coli MPN/100 ml	Fecal Coliform MPN/100 ml	Fecal Strep MPN/100 ml
HUM010	4/26/02	11.6	9.04	7.1	38.8	<2	<2	<2	<2
HUM020	4/26/02	7.30	9.97	8.3	36.0	32	2	2	13
HUM030	4/26/02	11.60	7.78	8.1	40.4	110	2	2	8
TEN010	4/26/02	8.6	10.73	8.2	43.5	110	8	8	23
KIN010	4/26/02	6.3	10.5	7.1	23.6	8	2	2	30
KIN020	4/26/02	6.1	10.39	7.1	24.1	17	2	2	4
LEW010	4/26/02	7.1	10.75	7.25	23.2	17	<2	<2	11
KIN040	4/26/02	7.0	10.5	7.2	24.1	8	4	4	7
HUM010	6/13/02	20.5	6.72	8.3	38.5	50	2	2	70
HUM020	6/13/02	18.8	6.83	8.1	37.2	500	23	23	80
HUM030	6/13/02	20.0	6.51	7.9	39.3	500	80	80	23
TEN010	6/13/02	17.0	7.55	7.9	55.5	50	17	17	1600
KIN010	6/13/02	11.2	8.34	6.98	17.6	2	<2	<2	8
KIN020	6/13/02	12.2	7.85	7.03	18.1	8	2	2	6
LEW010	6/13/02	12.2	7.77	7.19	19.82	22	17	17	22
KIN040	6/13/02	12.5	8.34	7.06	18.3	<2	<2	<2	4
KIN050	6/13/02	9.9	7.66	6.84	20.3	2	2	2	50

DO = Dissolved Oxygen
MPN/100 ml = Most Probable Number per 100 milliliters
mg/L = milligrams per liter
uS/cm = microSiemens/centimeter
< = less than

ATTACHMENT B CONTINUED

Lower Kings River

Sample Location	Sample Date	Water Temp. Celsius	DO mg/L	pH	Conductivity uS/cm	TDS mg/L	EC uS/cm	Cl mg/L	SO_4 mg/L	NO_3 mg/L
LKI010	6/12/02	11.9	9.72	7.9	23.4	33	30	<1	2.2	<0.5
LKI020	6/12/02	14.6	9.52	7.9	27.1	26	32	<1	2.4	<0.5
LKI030	6/12/02	18.4	7.82	8.0	29.6	29	32	<1	2.3	<0.5
LKI040	6/11/02	22.5	7.2	8.3	129.5	97	150	5.7	30	<0.5
LKI050	6/11/02	22.9	5.3	8.1	1260	870	1300	77	410	<0.5

Sample Location	Sample Date	Bicarbonate mg/L	Carbonate mg/L	Ca mg/L	Mg mg/L	K mg/L	Na mg/L	pH	Ammonia mg/L	P mg/L
LKI010	6/12/02	12	<1	3.1	0.53	<1	1.8	6.8	<1	<0.1
LKI020	6/12/02	13	<1	3.3	0.68	<1	1.9	6.6	1.3	<0.1
LKI030	6/12/02	13	<1	3.2	0.69	<1	1.9	6.7	<1	<0.1
LKI040	6/11/02	29	<1	7.0	3.7	1.5	15	7.5	<1	<0.1
LKI050	6/11/02	160	<1	49	31	5.5	210	7.9	<1	0.20

Sample Location	Sample Date	Se ug/L	Mo ug/L	Total Coliform MPN/100 ml	E. Coli MPN/100 ml	Fecal Coliform MPN/100 ml	Fecal Strep MPN/100 ml
LKI010	6/12/02	<2.0	<5.0	22	8	8	17
LKI020	6/12/02	<2.0	<5.0	900	80	80	80
LKI030	6/12/02	<2.0	<5.0	500	23	23	8
LKI040	6/11/02	<2	<5	1600	30	30	240
LKI050	6/11/02	<2	<5	1600	130	130	240

DO = Dissolved Oxygen   < = less than   uS/cm = microSiemens/centimeter   mg/L = milligrams per liter   Cl = chlorine
MPN/100 ml = Most Probable Number per 100 milliliters   ug/L = micrograms/liter   EC = electrical conductivity SO_4 = sulfate
NO_3 = Nitrate   Ca = calcium   Mg = magnesium   K = potassium   Na = sodium   P = phosphorus   Se = selenium   Mo = molybdenum

ATTACHMENT B CONTINUED

Kern River

Sample Location	Sample Date	Water Temp. Celsius	DO mg/L	pH	Conductivity uS/cm	Total Coliform MPN/100 ml	E. Coli MPN/100 ml	Fecal Coliform MPN/100 ml	Fecal Strep MPN/100 ml
KER010	3/27/02	8.9	10.34	8.5	< 0.10 ppt	4	<2	<2	11
KER020	3/27/02	9.7	10.28	8.3	< 0.10 ppt	2	<2	<2	30
KER030	3/27/02	9.0	10.46	8.4	< 0.10 ppt	8	<2	<2	33
KER040	3/27/02	9.4	10.57	8.5	162.1	13	2	2	4
KER050	3/27/02	13.1	9.68	8.4	169.6	23	2	2	13
KER060	3/27/02	14.6	10.34	8.4	204.1	13	<2	<2	17
KER070	3/27/02	14.6	10.09	8.5	171.5	50	<2	<2	14
KER080	3/27/02	13.1	11.16	8.3	< 0.10 ppt	8	2	2	8
KER090	3/27/02	14.0	11.84	8.5	< 0.10 ppt	30	23	23	50
KER110	3/27/02	15.1	10.6	8.8	< 0.10 ppt	30	30	30	17
KER010	6/20/02	17.2	8.51	8.4	46.5	4	4	4	13
KER020	6/19/02	20.6	7.56	8.4	58.2	2	2	2	110
KER030	6/19/02	18.0	8.27	8.3	44.3	2	2	2	110
KER040	6/19/02	18.5	8.87	8.5	84.7	4	4	4	50
KER050	6/20/02	20.3	9.33	8.5	91.4	170	170	170	30
KER060	6/20/02	22.5	9.17	8.4	96.3	500	500	500	26
KER070	6/20/02	21.8	9.42	8.5	92.6	130	130	130	80
KER080	6/20/02	22.5	9.69	8.5	103.5	240	240	240	170
KER090	6/20/02	24.3	10.34	8.5	112.8	170	170	170	300

DO = Dissolved Oxygen
MPN/100 ml = Most Probable Number per 100 milliliters
mg/L = milligrams per liter
uS/cm = microSiemens/centimeter
ppt = parts per thousand
< = less than

ATTACHMENT B CONTINUED

Sample Location	Sample Date	Water Temp. Celsius	DO mg/L	pH	Conductivity uS/cm	Secci Disk Meters	Total Coliform MPN/100 ml	E. Coli MPN/100 ml	Fecal Coliform MPN/100 ml	Fecal Strep MPN/100 ml
ISA010	3/28/02	14.1	9.83	8.4	150.5	0.7	4	<2	<2	7
ISA020	3/28/02	13.4	10.17	8.2	156.5	1.0	2	2	2	<2
ISA040	3/28/02	12.8	9.59	8.4	163.1	0.9	2	2	2	<2
ISA050	3/28/02	14.7	10.27	8.4	176.6	0.6	4	4	4	8
ISA060	3/28/02	14.3	10.05	8.4	160.6	1.2	2	<2	<2	<2
ISA070	3/28/02	12.9	10.11	8.9	165.5	0.7	<2	<2	<2	<2
ISA010	6/20/02	21.7	8.28	8.5	63.0	1.9	7	7	7	8
ISA020	6/19/02	20.6	8.41	8.5	92.6	1.2	<2	<2	<2	<2
ISA040	6/19/02	19.8	8.55	8.5	89.4	1.2	2	2	2	<2
ISA050	6/19/02	20.6	8.50	8.5	100.6	1.1	<2	<2	<2	<2
ISA060	6/19/02	20.5	8.66	NA	91.3	1.5	13	13	13	<2
ISA070	6/20/02	21.3	8.54	8.1	74.0	1.4	7	7	7	4
ISA080	6/19/02	20.6	6.91	8.4	105.8	0.6	8	8	8	<2
ISA090	6/20/02	22.1	7.05	8.3	73.2	1.52	130	130	130	22

Lake Isabella

DO = Dissolved Oxygen
MPN/100 ml = Most Probable Number per 100 milliliters
uS/cm = microSiemens/centimeter
< = less than
NA = Data not available
mg/L = milligrams per liter

ATTACHMENT B CONTINUED

Tule River
Lake Success

Sample Location	Sample Date	Water Temp. Celsius	DO mg/L	pH	Conductivity uS/cm	Secci Disk Meters	Total Coliform MPN/100 ml	E. Coli MPN/100 ml	Fecal Coliform MPN/100 ml	Fecal Strep MPN/100 ml
SUC010	2/26/02	13.3	10.52	8.3	0.20 ppt	1.8396	110	22	27	
SUC020	2/26/02	14.2	10.35	8.5	0.20 ppt	2.3368	2	2	2	
SUC030	2/26/02	15.1	10.16	8.5	0.20 ppt	3.81	50	13	23	
TUR010	2/26/02	7.9	11.03	8.5	0.10 ppt		22	2	2	
TUR020	2/26/02	9.8	10.73	8.6	0.20 ppt		8	8	8	
TUR030	2/26/02	10.0	10.79	8.4	0.20 ppt		30	23	23	
TUR040	2/26/02	11.3	10.54	8.5	0.10 ppt		13	13	13	
TUR050	2/26/02	12.1	11	8.7	0.10 ppt		23	4	4	
SUC010	6/26/02	27.7	8.40	8.7	212.5	2.44	<2	<2	<2	<2
SUC020	6/26/02	27.30	8.35	8.7	209.7	2.51	<2	<2	<2	<2
SUC030	6/26/02	27.20	7.91	8.5	209.9	2.59	2	<2	<2	<2
TUR010	6/26/02	15.70	9.82	8.4	236.3		23	23	23	220
TUR020	6/26/02	22.00	5.83	8.6	294.9		50	50	50	50
TUR030	6/26/02	23.30	8.84	NA	294.6		170	130	130	900
TUR040	6/26/02	21.50	8.87	8.5	287.7		50	50	50	1600
TUR050	6/26/02	21.50	9.08	8.3	289.3		130	50	50	240

DO = Dissolved Oxygen
MPN/100 ml = Most Probable Number per 100 milliliters
NA = Data not available
uS/cm = microSiemens/centimeter
ppt = parts per thousand
< = less than
mg/L = milligrams per liter

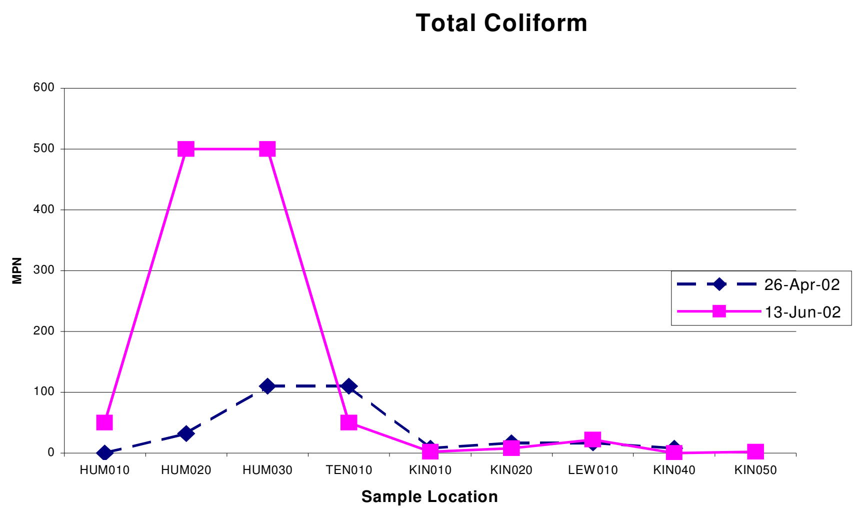
ATTACHMENT B CONTINUED

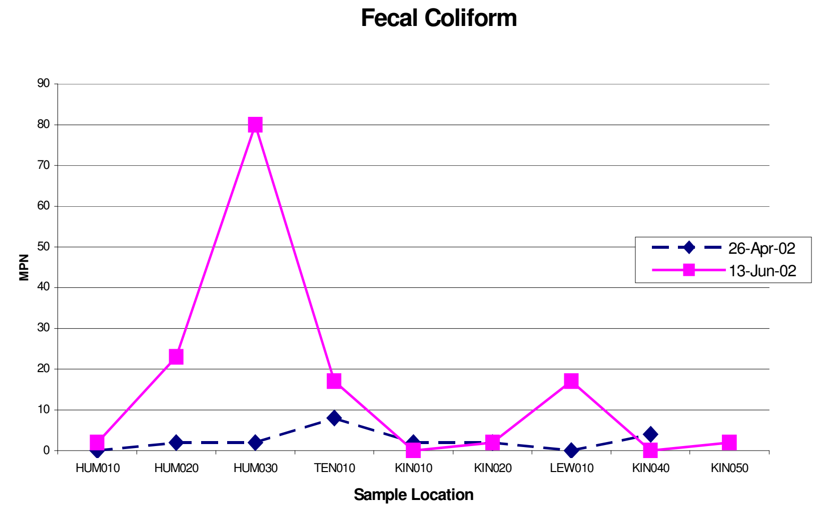
Kaweah River
Lake Kaweah

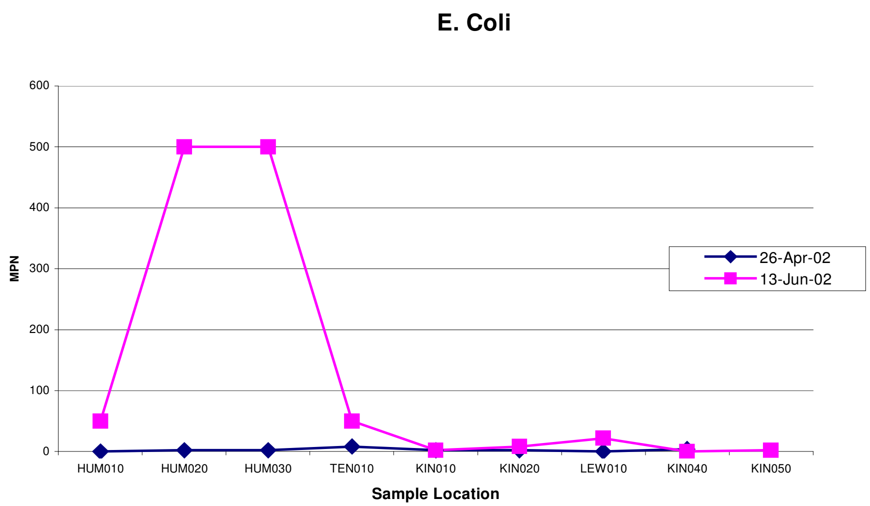
Sample Location	Sample Date	Water Temp. Celsius	DO mg/L	pH	Conductivity uS/cm	Secci Disk Meters	Total Coliform MPN/100 ml	E. Coli MPN/100 ml	Fecal Coliform MPN/100 ml	Fecal Strep MPN/100 ml
KAR010	4/16/02	7.8	11.75	8.0	25.2		110	2	2	2
KAR020	4/16/02	8.3	11.40	7.8	35.9		30	2	2	4
KAR030	4/16/02	9.1	11.54	8.0	38.0		70	23	23	23
KAR040	4/16/02	8.9	11.02	8.4	39.1		50	13	13	80
KAL010	4/16/02	17.9	8.39	7.8	76.6	4.52	50	4	4	2
KAL020	4/16/02	18.6	6.47	7.6	74.4	3.48	220	7	7	11
KAL030	4/16/02	17.6	8.36	8.2	64.7	NA	170	9	9	13
KAL040	4/16/02	17.5	8.27	8.6	71.6	4.42	17	8	8	8
KAR010	6/11/02	13.4	10.65	8.3	21.5		50	8	8	22
KAR020	6/11/02	15.2	10.6	8.3	31.5		50	4	4	7
KAR030	6/11/02	16.2	10.52	8.1	34.7		13	4	4	34
KAR040	6/11/02	24.5	7.50	8.1	52.0		170	50	6	13
KAL010	6/11/02	25.4	7.80	7.9	57.0	2.90	13	<2	<2	<2
KAL020	6/11/02	26.0	8.3	8.0	54.9	3.10	13	4	4	<2
KAL030	6/11/02	24.7	8.61	8.0	53.0	2.67	4	<2	<2	<2
KAL040	6/11/02	24.0	8.07	8.1	54.0	5.03	2	<2	<2	<2

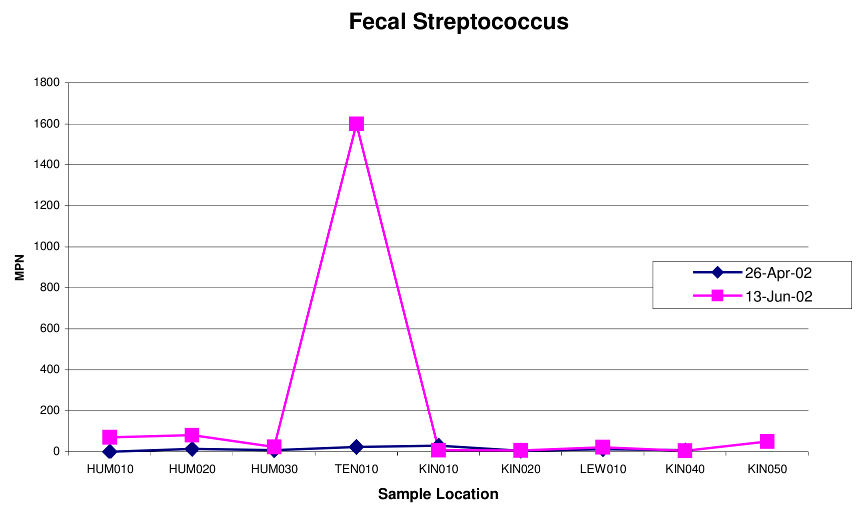
DO = Dissolved Oxygen
MPN/100 ml = Most Probable Number per 100 milliliters
NA = Data not available
uS/cm = microSiemens/centimeter
ppt = parts per thousand
< = less than
mg/L = milligrams per liter

ATTACHMENT C – ANALYTICAL TRENDS, HUME LAKE AND SOUTH FORK KINGS RIVER



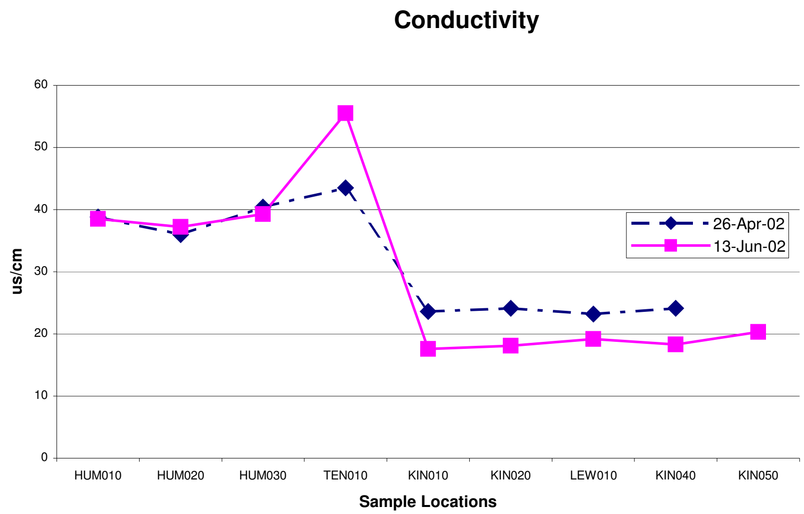


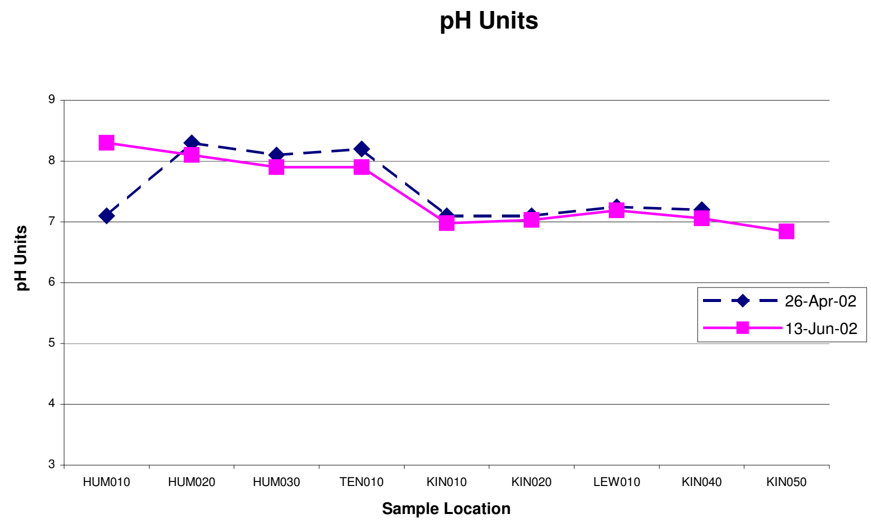


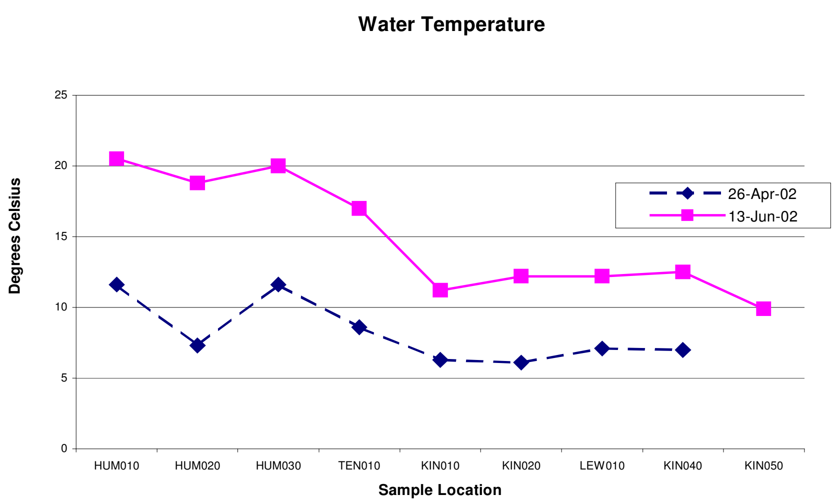


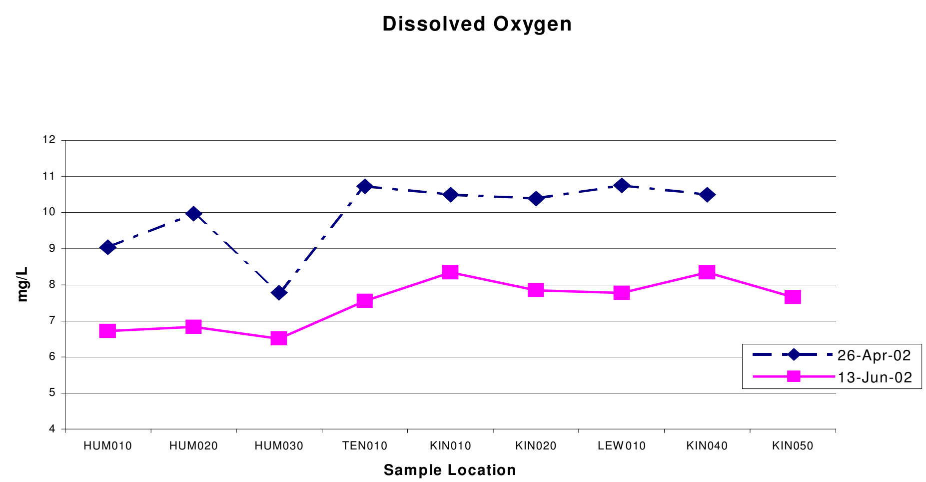
MPN = Most Probable Number per 100 milliliters

ATTACHMENT C CONTINUED





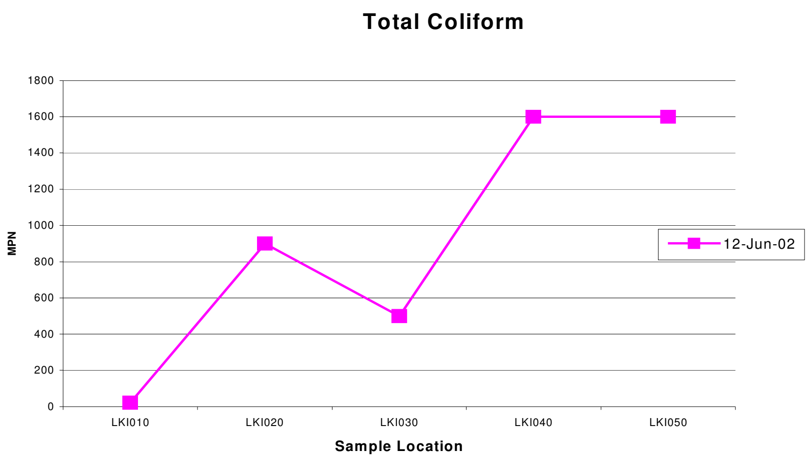


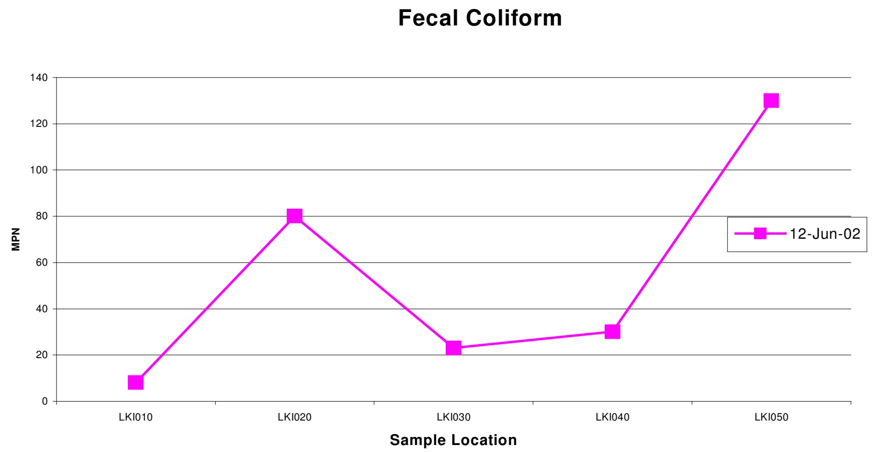


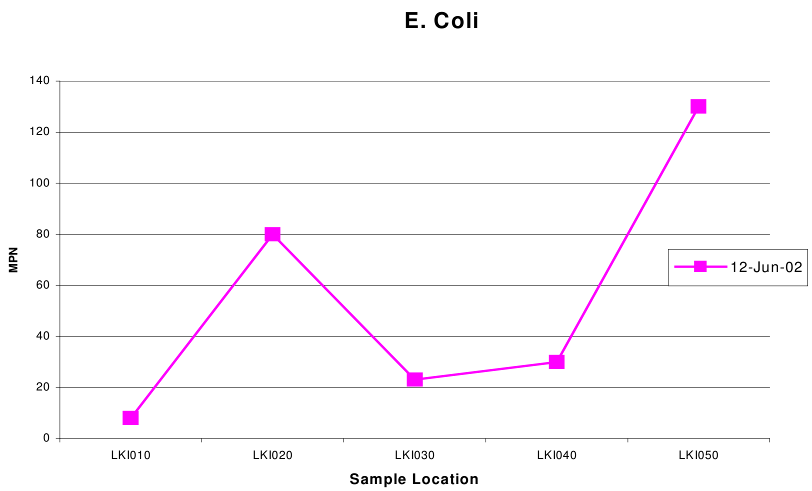
uS/cm = microSiemens per centimeter

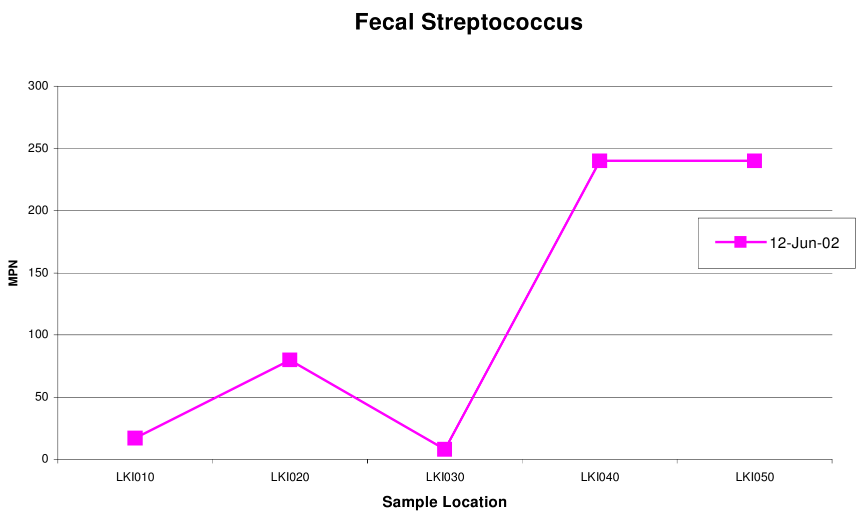
mg/L = milligrams per liter

ATTACHMENT D – ANALYTICAL TRENDS, LOWER KINGS RIVER



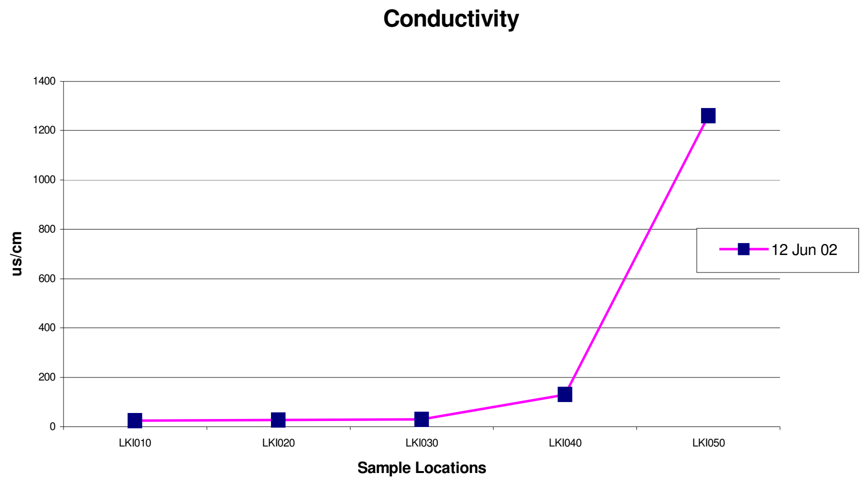


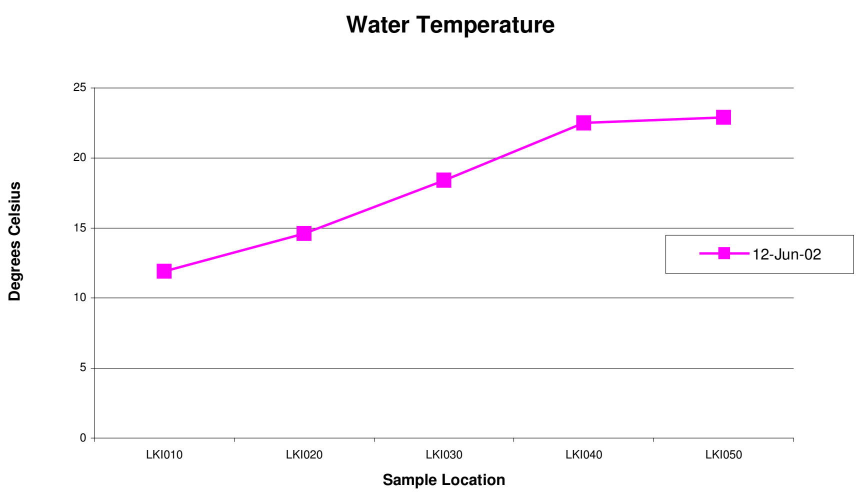


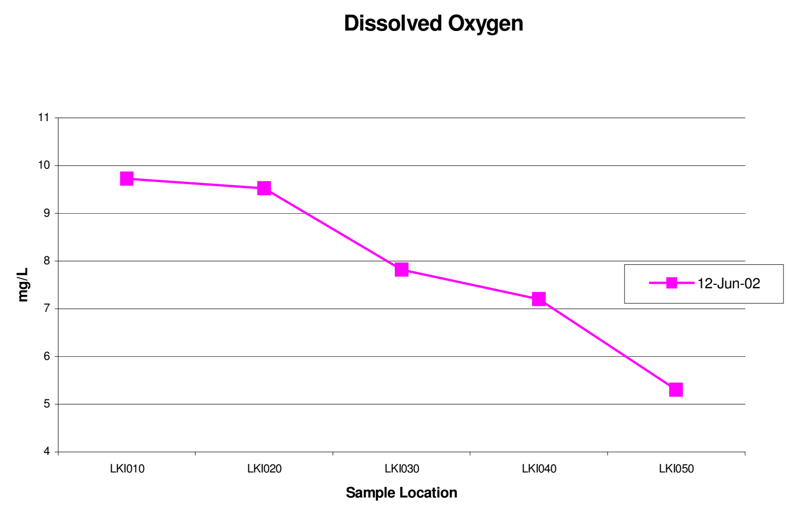


MPN = Most Probable Number per 100 milliliters

ATTACHMENT D CONTINUED



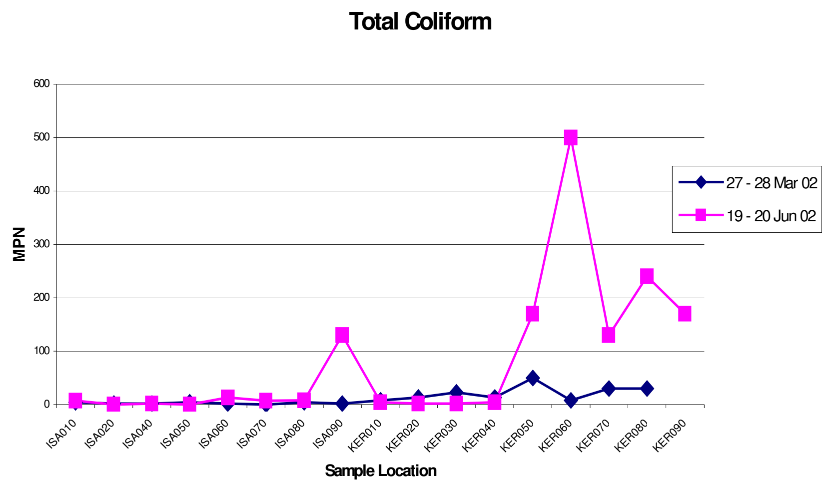


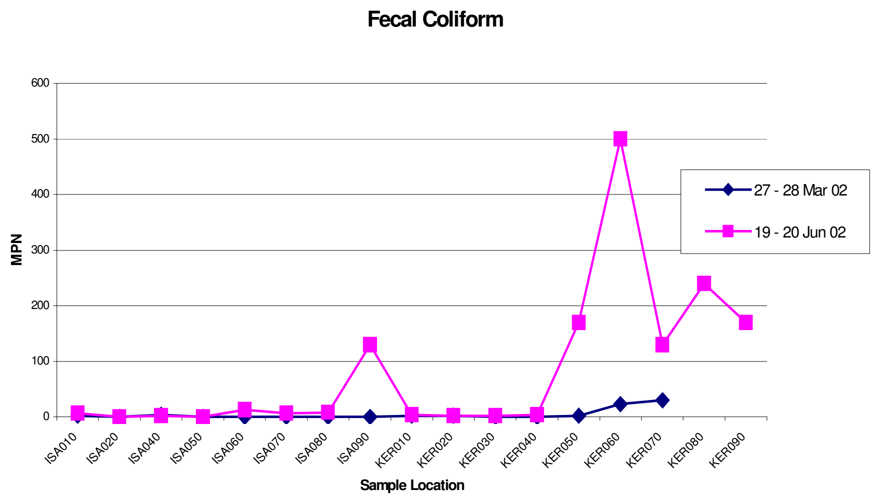


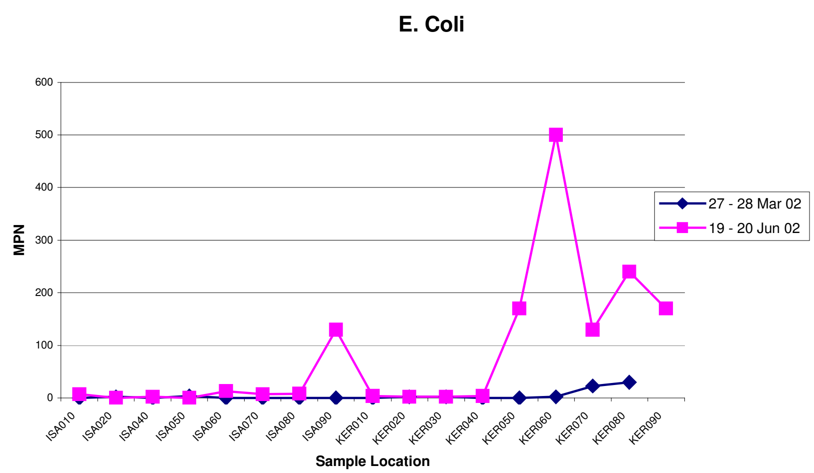
uS/cm = microSiemens per centimeter

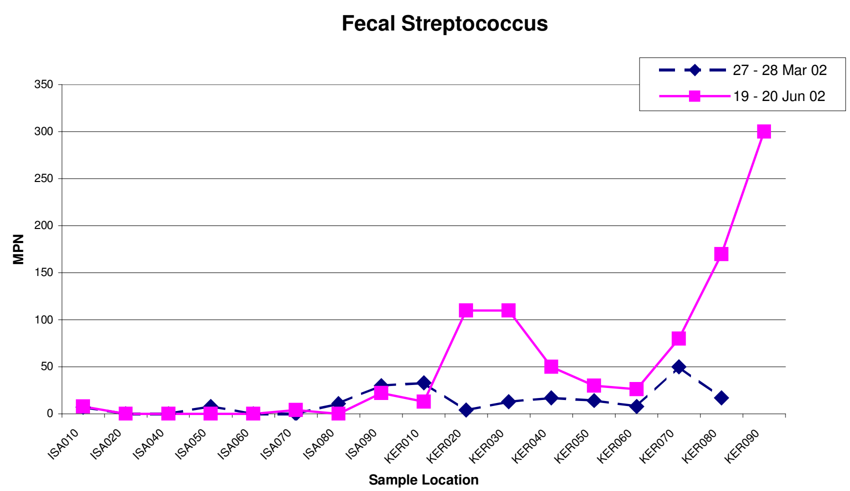
mg/L = milligrams per liter

ATTACHMENT E – ANALYTICAL TRENDS, LAKE ISABELLA AND KERN RIVER



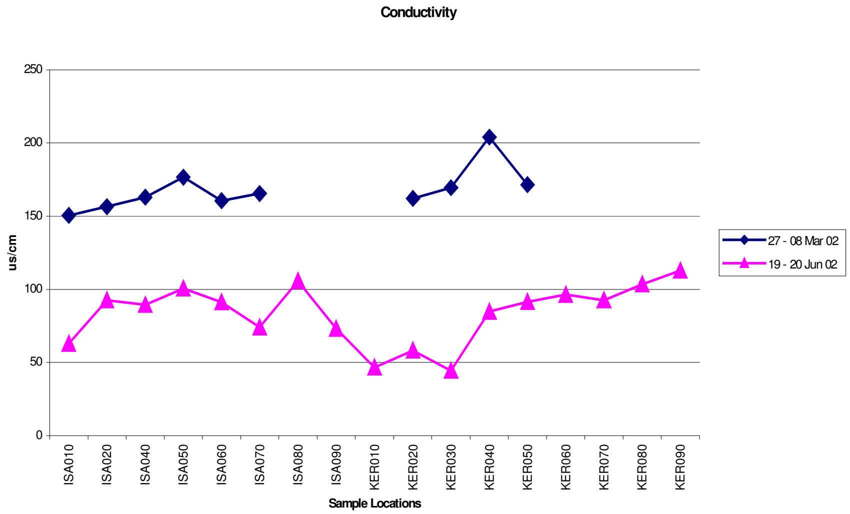


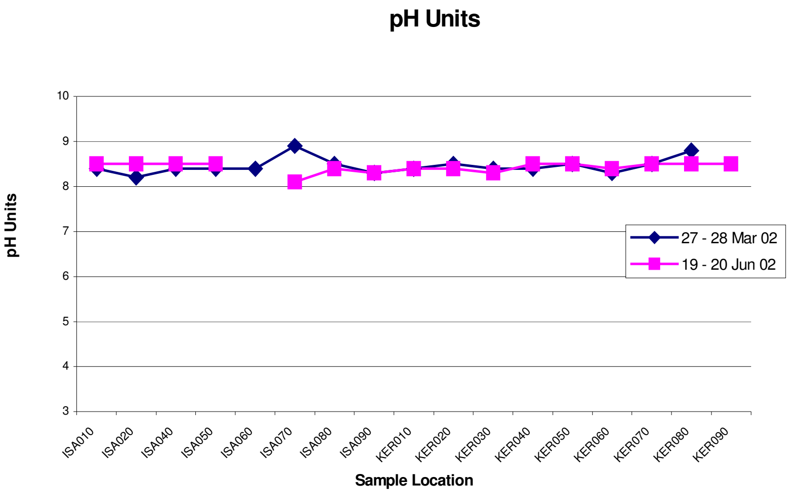


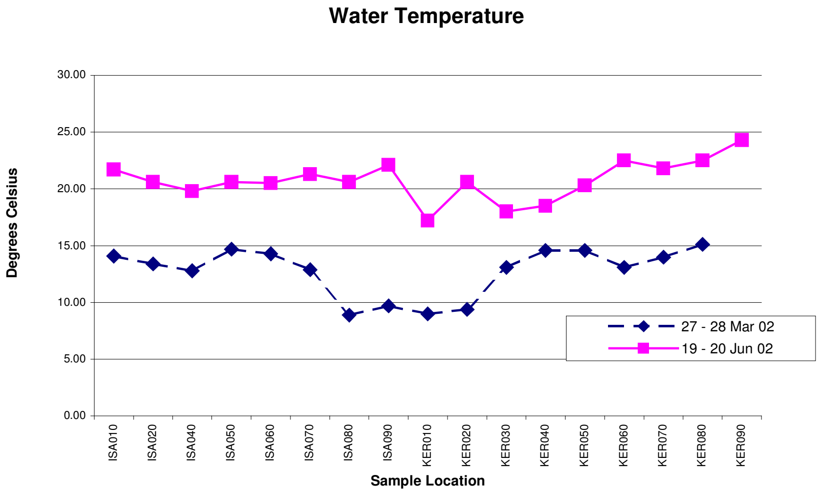


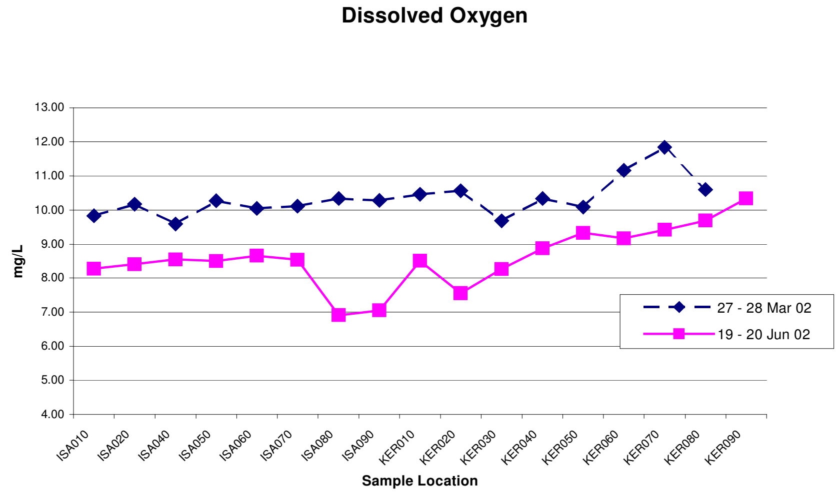
MPN = Most Probable Number per 100 milliliters

ATTACHMENT E CONTINUED





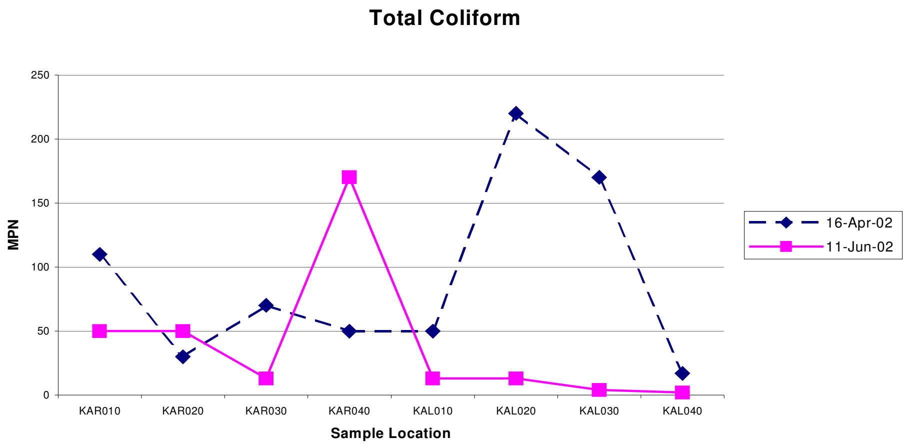


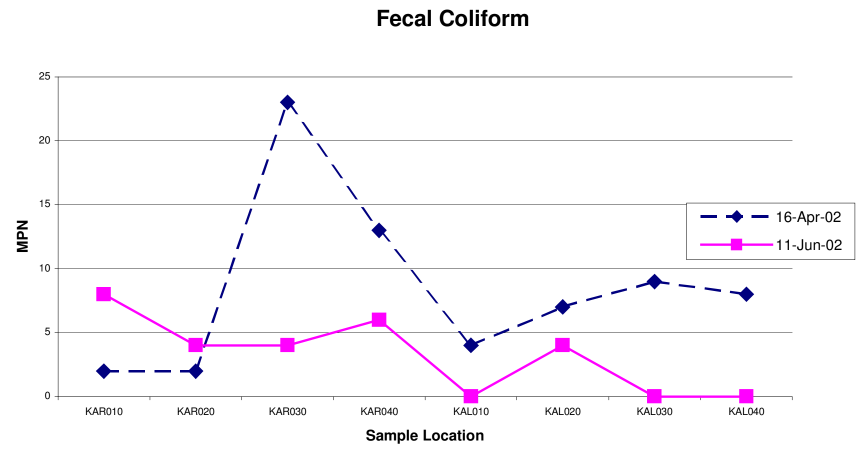


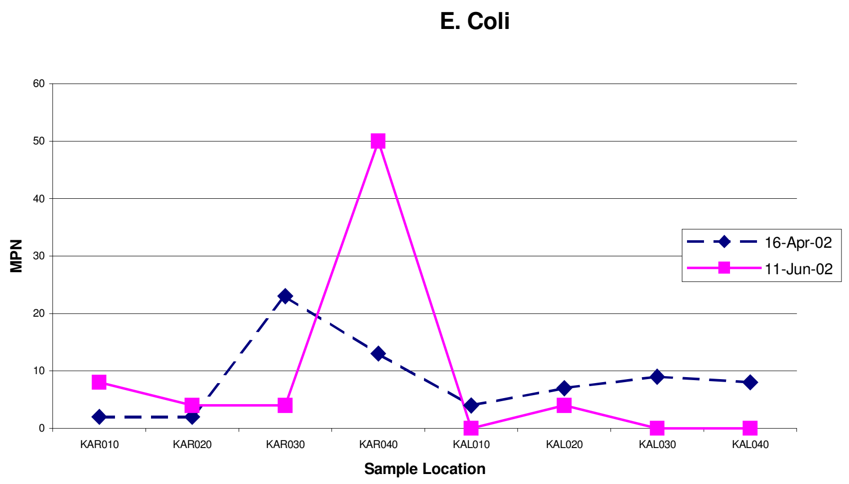
uS/cm = microSiemens per centimeter

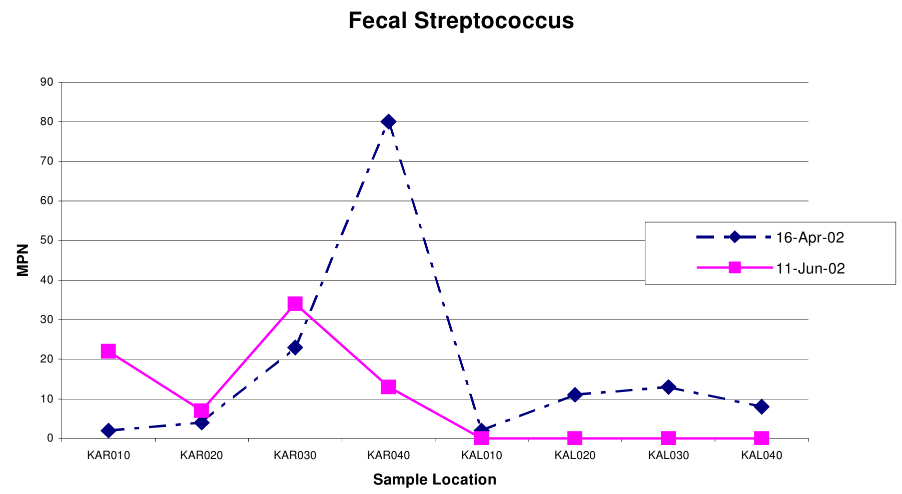
mg/L = milligrams per liter

ATTACHMENT F – ANALYTICAL TRENDS, LAKE KAWEAH AND KAWEAH RIVER



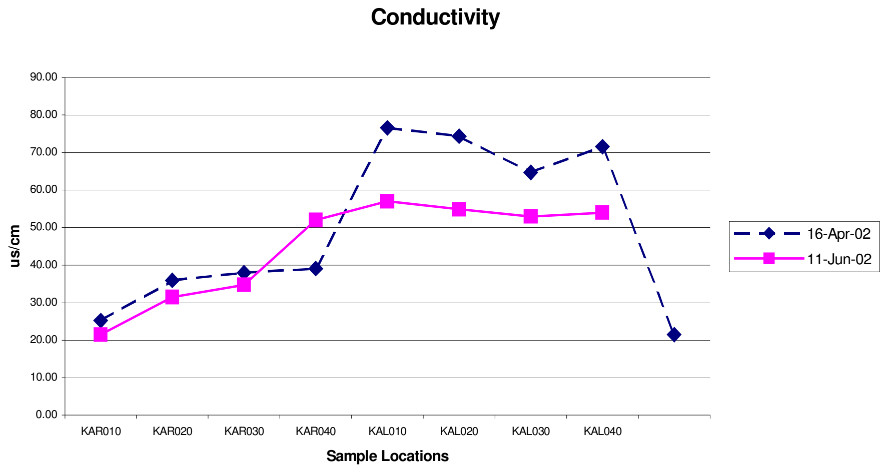


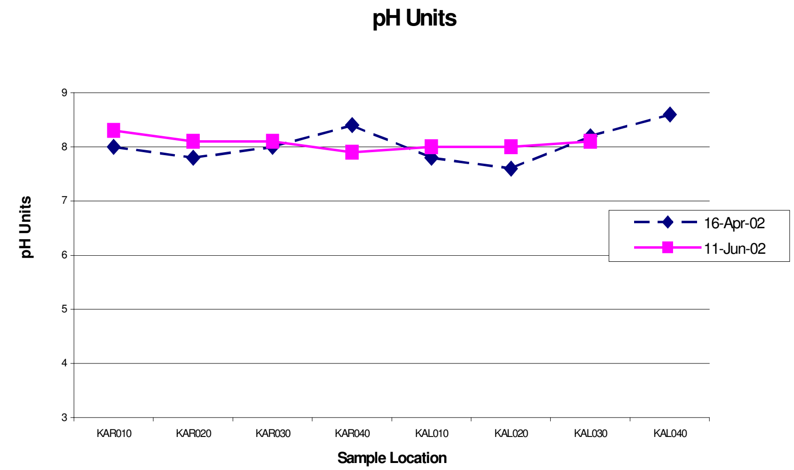


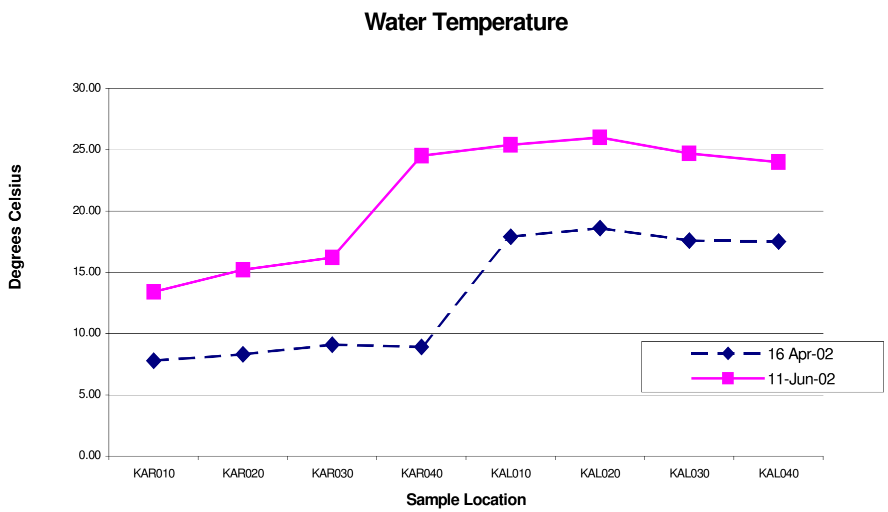


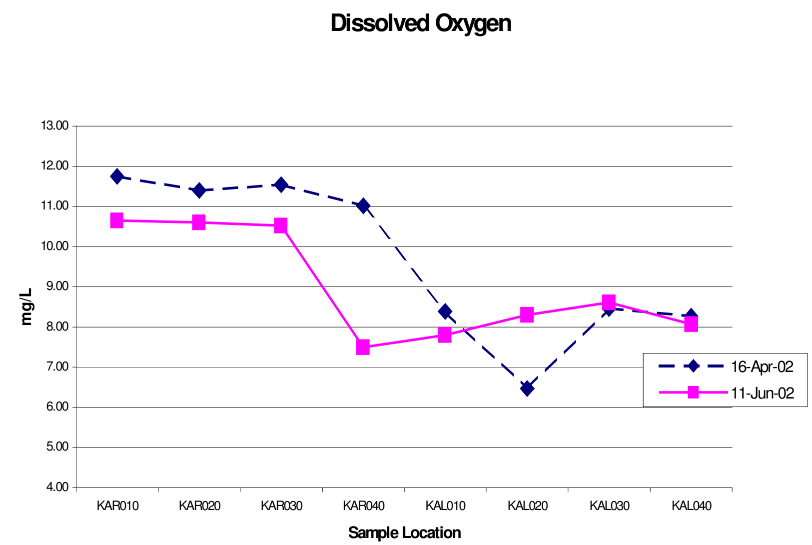
MPN = Most Probable Number per 100 milliliters

ATTACHMENT F CONTINUED





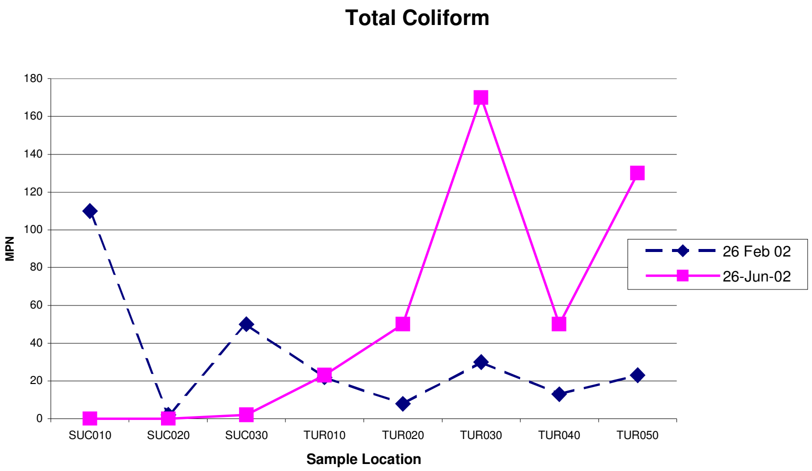


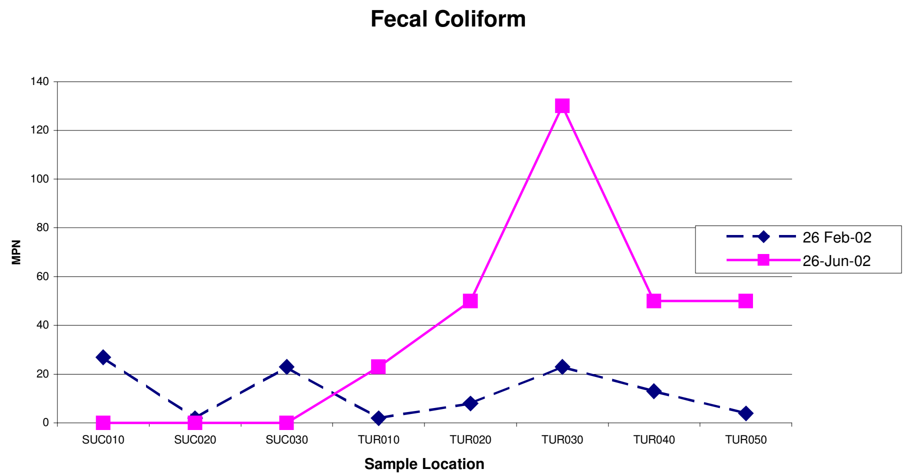


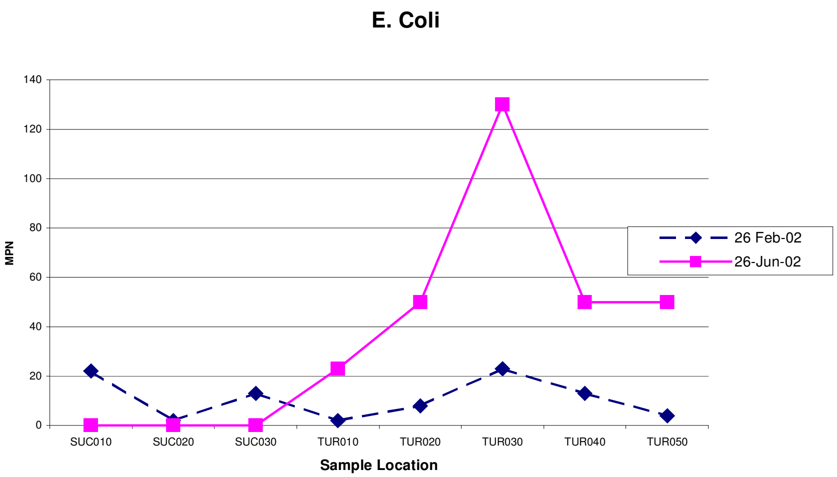
uS/cm = microSiemens per centimeter

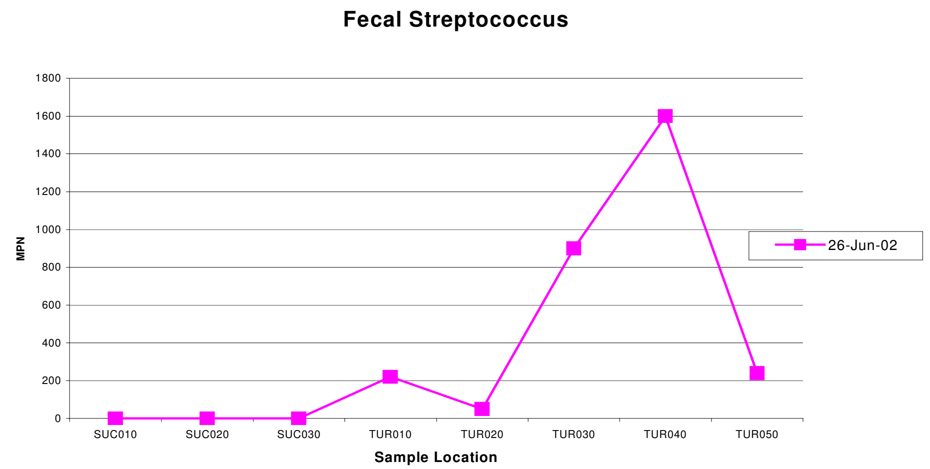
mg/L = milligrams per liter

ATTACHMENT G – ANALYTICAL TRENDS, LAKE SUCCESS AND TULE RIVER



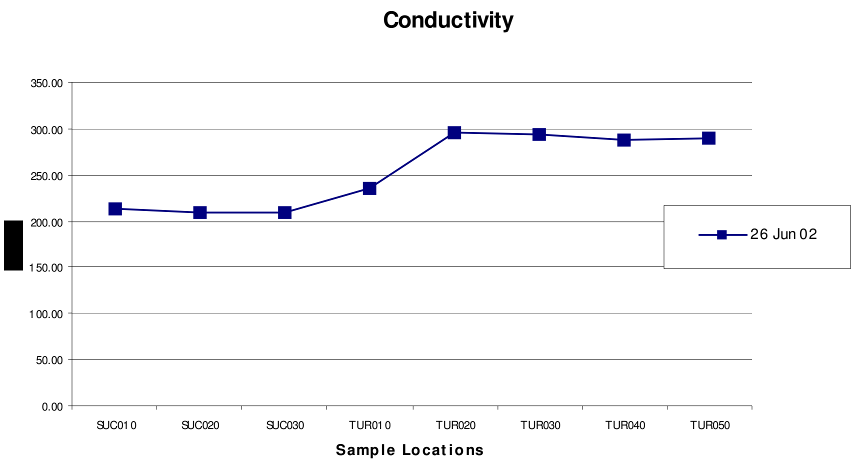


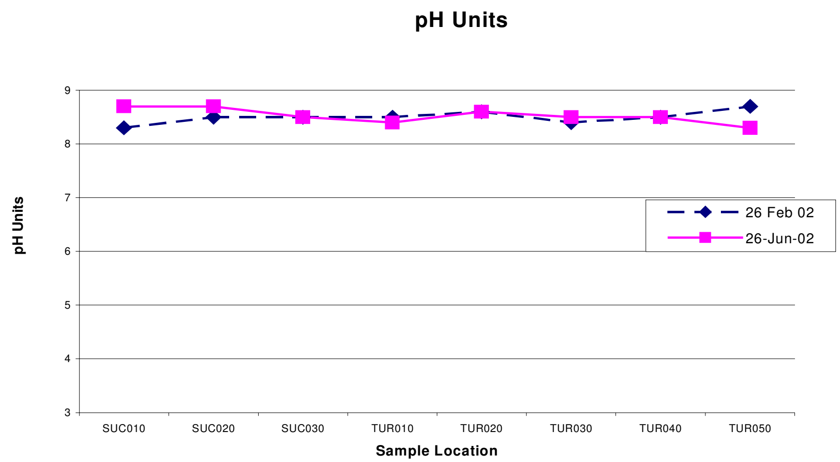


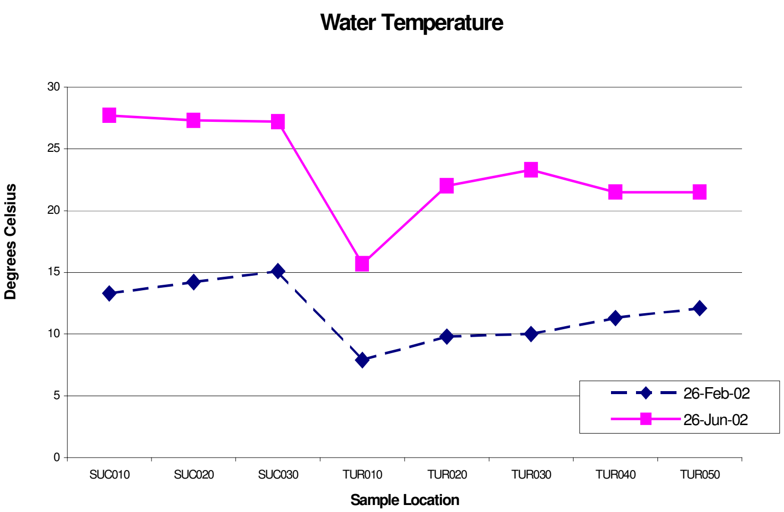


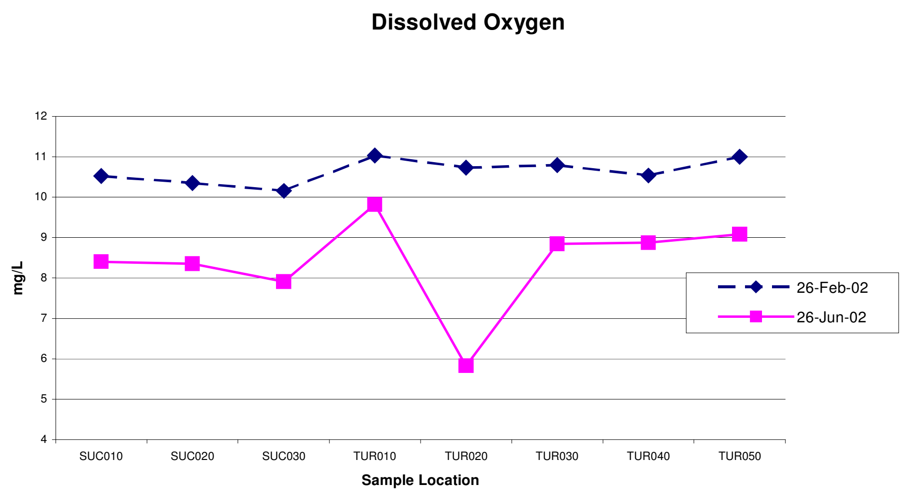
MPN = Most Probable Number per 100 milliliters

ATTACHMENT G CONTINUED









uS/cm = microSiemens per centimeter

mg/L = milligrams per liter