

WATER QUALITY CRITERIA FOR DIAZINON AND CHLORPYRIFOS

by

DL

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SUMMARY

Recent toxicity information was reviewed and used to update freshwater and saltwater aquatic life criteria for diazinon and chlorpyrifos. These water quality criteria were compared to criteria developed by the U.S. Environmental Protection Agency (USEPA 1986;1998). The joint toxicity of diazinon and chlorpyrifos was also evaluated.

Thirteen new tests on the acute toxicity of diazinon to aquatic organisms were evaluated and 12 were accepted. These new values were pooled with values previously evaluated (Menconi and Cox 1994). The freshwater Final Acute Value (FAV) for diazinon was 0.16 µg/L. The freshwater Criterion Maximum Concentration (CMC) for diazinon was 0.08 µg/L. The draft CMC proposed by USEPA (1998) was 0.09 µg/L. No saltwater acute or chronic criteria were developed due to inadequate data. Six tests on the chronic toxicity of diazinon to aquatic organisms were evaluated and five were accepted. The freshwater Final Chronic Value (FCV) for diazinon was 0.05 µg/L. The freshwater Criterion Continuous Concentration (CCC) for diazinon was 0.05 µg/L. The USEPA (1998) did not propose a FCV or CCC for diazinon.

Twenty-five new tests on the acute toxicity of chlorpyrifos to aquatic organisms were evaluated and 13 were accepted. These new values were pooled with values previously evaluated (Menconi and Paul 1994). The freshwater FAV for chlorpyrifos was 0.05 µg/L. The freshwater CMC for chlorpyrifos was 0.02 µg/L. The freshwater CMC calculated by USEPA (1986) was 0.083 µg/L. The saltwater FAV for chlorpyrifos was 0.03 µg/L. The saltwater CMC was 0.02 µg/L. The saltwater CMC calculated by USEPA (1986) was 0.011 µg/L. One chronic toxicity test for chlorpyrifos was reviewed and accepted. The freshwater and saltwater FCVs for chlorpyrifos were 0.014 and 0.009 µg/L, respectively. The freshwater and saltwater CCCs for chlorpyrifos were 0.014 and 0.009 µg/L, respectively. Freshwater and saltwater CCCs calculated by USEPA (1986) were 0.041 and 0.0056 µg/L, respectively.

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Diazinon

Chlorpyrifos

From: Linda Pardy
To: James Smith
Date: 8/21/01 9:55AM
Subject: Fwd: Diazinon in Agua Hedionda Creek (AHC)

James, Here are my thoughts...

1. Please rename the sheet something else (besides Linda Pardy sheet 1). I don't wish to be forever made into a sheet and I only transcribed the data, I didn't invent it. Thanks :)
 2. Thanks for reminding me about the data, actually I already had the Agua Hedionda storm water mass loading site data and had forgotten it was there already.
 3. Although the measured values in AHC exceed the DFG water quality criteria for diazinon, we didn't impair Chollas Ck based solely on the exceedance of a DFG water quality criteria for diazinon. It was based also on the TIE showing diazinon was the causative agent, storm water toxicity data and diazinon data. What is the rationale for the diazinon listing for AHC? Considering the phase out of diazinon, are you certain this is necessary? Maybe we could take some other regulatory tact which would be more effective/time efficient?
 4. If you want to list AHC for diazinon, then we need to explain why we didn't list Chollas for chlorpyrifos exceeding the DFG criteria. We have toxicity data for the Chollas site, but because the TIE did not verify chlorpyrifos was the causative agent we didn't do a TMDL. Why should we list diazinon solely on DFG criteria, when we don't even have the toxicity data for AHC?
 5. I thought Greig Peters had a discussion with us about potential problems with listing the TDS. Have you considered his advice? Have you given regional consideration to this issue? If you want to list TDS, I would advise a well thought out regional perspective to be written up. TDS GIS mapping for the region would help.
 6. I would not call the TSM site location as "not given", that is incorrect. The TSM sites data are available from Del Rasmussen of State Board and also in the TSM reports.
 7. I noticed the TMDL priority is not explained. Perhaps these factsheets should have justification for the priority as stakeholders will want to know why.
 8. You might want to cite the Source References (as you would in a scientific paper). Once you compile the references, you could then quote the reference by (Author, date).
 9. Evidence of impairment - if we are not listing these other constituents, then why are we calling them evidence of impairment?
 10. Sources - I'm thinking a picklist would be easier to work with especially where source work has not been done.
 11. Watershed characteristics - how much detail are you looking for here? Perhaps watershed staff or the files have something which would help to provide a more detailed description of the watershed.
 12. Water quality objectives not attained: WQ Stds = objectives + BUs. If you say the stds are not attained, then you have to explain which beneficial uses are impaired for which constituents and the reason you consider this so. This is incomplete as it stands and needs to be redone before distribution to the public.
- Linda

>>> James Smith 08/21/01 08:25AM >>>

Hi Linda,

I would appreciate your review of this document and accompanying spreadsheet. Brennan Ott did the work if you have any questions.

Thanks,

-jimmy

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8/13/01

Agua Hedionda Creek 904.310

It is recommended that Agua Hedionda Creek be listed as impaired for diazinon and TDS.

Watershed Characteristics

Agua Hedionda Creek is a coastal stream located in the Agua Hedionda watershed, in northern San Diego County. It is 10.40 miles long. Uses for the creek include municipal, domestic, industrial, and agricultural water supply, contact and non-contact recreation, wildlife habitat, and a warm freshwater habitat as well.

Water Quality Objectives not Obtained

Agua Hedionda Creek was found to be in violation of inland surface water quality standards for diazinon, turbidity, cadmium, chromium, total dissolved solids (TDS), Sulfate, total phosphorus and Chloride.

Evidence of Impairment

All dates and locations that the above said violations took place and the concentration of the pollutants are summarized in the attached table. The standard set by the Basin Plan for inland surface waters for turbidity is 20 NTU, TDS is 500 mg/l and 250 mg/l for both chloride and sulfate. Diazinon is 0.05 ug/l. Cadmium is 5 ug/l and chromium is .05 mg/l.

There is whole fish tissue data available for mosquito fish for Agua Hedionda Creek occurring on 8/24/99, but ~~the location~~ where the fish were taken is not given. The organic concentrations in the tissue are ~~within~~ ^{near} allowable limits. However, ~~there are no~~ ^{no} standards ~~for concentrations in fish tissue other than zinc and mercury.~~

#)

There is qualitative data available for biological assessment of Agua Hedionda Creek. The sample sites are 5 riffles downstream of Sycamore Ave. (station AHC-SA) and 5 riffles downstream of El Camino Real (station AHC-ECR).

Bio-assessments were conducted in May, September, and November 1998 and May 1999 for station AHC-SA and November 1998 and May 1999 for station AHC-ECR. Results from these bio-assessments indicate that the distribution (richness) of taxa between September and November is relatively the same, while May showed a decrease. However, in May, the site displayed a greater abundance than the September and November samples. November and September have similar levels of functional feeding groups whereas May exhibited a decrease in functional feeders from these two months. At all sampling times, the site was dominated by a few disturbance tolerant insect and worm taxa and the functional feeding groups were composed mainly of collectors, filterers and grazers. Shredders were rare. The physical habitat quality at all sampling periods was fair to good.

Extent of Impairment

There are nine water quality data points in this Creek, with four sampling sites. Three samples occurred in the same month and year at different sites, with the remaining six data points taken at the same site over a period of three years.

Diazinon was in exceedance four of the six times it was measured. All violations took place in the winter months (rainy season) of '98 - '00.

Sulfate and Chloride standards were each exceeded one out of the 3 samples. All samples were taken on the same day. There is not enough data to draw conclusions for either constituent.

The Total phosphorus standard was exceeded three of the six times it was sampled for.

Cadmium and chromium standards were each only exceeded one out of the 7 samples.

The TDS standard was exceeded seven of the nine samples.

Turbidity was high on four of the nine sampling days. Three of the four violations all took place in '00, suggesting a potential increasing trend.

Potential Sources

Possible high turbidity, TDS, chloride and sulfate concentrations may be due to urban runoff from roads, industry, residential or commercial areas, as two of the four sampling sites are known to be located near roadsides. Diazinon may be from runoff from lawns or farmland.

TMDL Priority

It is recommended that Agua Hedionda Creek have low priority on the TMDL list.

Re 90!

Source References

Water quality standards were taken from the Water Quality Control Plan for the San Diego Basin. Fish data from the toxic monitoring program. Water quality data from Linda Pardy Sheet 1 and 1998-1999, 1999-2000 City of San Diego and Co-Permittee NPDES Stormwater Monitoring Program Report. Biological assessment data taken from San Diego Regional Water Quality Control Board: 1999 Biological Assessment Annual Report.

FINAL REPORT

**1999 – 2000 CITY OF SAN DIEGO
AND CO-PERMITTEE NPDES
STORMWATER MONITORING
PROGRAM REPORT**

Prepared for
The City of San Diego
Engineering & Development Department
1010 Second Avenue, Suite 500
San Diego, CA 92101

August 10, 2000

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MGD Technologies, Inc.
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University of Washington
Weatherwatch Services

Hedionda stations to identify water-borne pathogens. In addition, sediment samples were collected within a public access point in the lagoon to assess the bacteria trapped in the sediment and possibly available for resuspension. A new quality assurance/quality control procedure (QA/QC) was established and implemented for bacteria samples to assess possible contamination.

Finally, in response to TMDL issues concerning diazinon and chlorpyrifos in urban runoff, an Insecticide Use Survey was created and distributed to 5,000 households and posted on the County of San Diego web site to assess trends of purchase, use, and disposal.

1.3 OVERVIEW OF SCOPE OF WORK

URSGWC provided storm water monitoring services for the co-permittees during the seventh year of the wet-weather monitoring program (1999/2000). The 1999/2000 monitoring program consisted of the following sampling services:

- Pre- and post season sediment sampling at Chollas Creek and San Diego Bay locations. These locations have been monitored since wet-weather monitoring season 1994/95.
- Chemical water quality monitoring during three storm events at five mass loading stations throughout San Diego County, AH1-Aqua Hedionda, SV1-Sorrento Valley, SD13-California, SD5-Tecolote, SD8-Chollas. The mass loading stations represent large areas of the County that drain into important receiving waters. Stations SD5-Tecolote and SD8-Chollas have been monitored since the start of the wet-weather monitoring program in 1993/94. Stations SD13-California and SV1-Sorrento Valley were added to the program in 1996/97. Station AH1-Aqua Hedionda was added to the program in 1998/99, concurrently with the bacteria monitoring program.
- Bacteria monitoring during three storm events at two creek monitoring stations, AH-Co and AH-Re, and two stations representing direct inputs to the creeks, AH-Coc and AH-Rec, for a total of four stations in the Agua Hedionda watershed. Stations AH-Co and AH-Re were monitored for bacteria in 1998/99. Stations AH-Coc and AH-Rec were added to the program in 1999/2000.
- Pathogen monitoring during three storm events at four creek monitoring stations, AH-Os, AH-Co, AH-Re, and AH1, and two stations representing direct inputs to the creeks, AH-Coc and AH-Rec, for a total of six stations in the Agua Hedionda watershed. Two of the creek stations monitored for pathogens, AH-Co and AH-Re, and the two stations representing direct inputs to the creeks, AH-Coc and AH-Rec, were also monitored for bacteria. One of the creek stations, AH1, monitored for pathogens was also monitored as a mass loading station.
- Post storm event bacteria and pathogen monitoring at three sampling transect locations, AH-L, AH-Lc, and AH-Lm, in Agua Hedionda Lagoon. This monitoring was performed one day and seven days after the first and third storm events that bacteria monitoring in creek and creek input stations was performed. This monitoring was not conducted following the second bacteria monitoring event because rain occurred one day and seven days following the event. Station AH-L was monitored for bacteria in 1998/99. Stations AH-Lc and AH-Lm were added to the program in 1999/2000.

Aqua Hedronda Creek

STATION	METHOD	PARAMETER	UNITS	SAMPLE DATE						
				11/8/98	1/25/99	1/31/99	3/15/99			
GRAB SAMPLES										
GENERAL/PHYSICAL/ORGANIC										
AH1		TEMPERATURE	F	NM	54					
AH1		pH	UNITS	7.02	8.10	8.01	7.59			
AH1	EPA 413.2	OIL AND GREASE	MG/L	0.67	< 0.5	< 0.5	0.6			
AH1	EPA 9050/SM 2510-B	ELECTRICAL CONDUCTIVITY	UMHOS/CM	652	2748	1560	2270			
BACTERIOLOGICAL										
AH1	SM 9223	TOTAL COLIFORM	MPN/100ML	> 241900	2000	8130	197000			
AH1	9221E/MMO-MUG	FECAL COLIFORM	MPN/100ML	> 1600	500	240	> 1600			
AH1	9230	FECAL STREPTOCOCCI	MPN/100ML	50	23	8	130			
COMPOSITE SAMPLES										
INORGANIC - WET CHEM										
AH1	SM 5210-B	BOD	MG/L	20.0	< 3.0	5.25				
AH1	SM 5220-C	CHEMICAL OXYGEN DEMAND	MG/L	34.0	< 5.0	21.0				
AH1	SM 2340-B	TOTAL HARDNESS	MG/L	137	365	568				
AH1	SM 5540-C	SURFACTANTS (MBAS)	MG/L	0.25	0.07	< 0.05				
AH1	SM 4500 NH ₃ -C	AMMONIA AS NITROGEN	MG/L	0.3	0.15	0.21				
AH1	SM 4500 NO ₃ -E	NITRATE-N	MG/L	2.10	0.86	1.10				
AH1	SM 4500 NO ₂ -B	NITRITE-N	MG/L	< 0.05	< 0.05	< 0.05				
AH1	SM 4500 P-E	DISSOLVED PHOSPHOROUS	MG/L	0.57	0.12	0.10				
AH1	SM 4500 P-E	TOTAL PHOSPHORUS	MG/L	0.72	0.13	0.12				
AH1	SM 4500 H-B	pH	UNITS	7.58	7.95	8.47				
AH1	SM 2540-C	TOTAL DISSOLVED SOLIDS	MG/L	853	892	1611				
AH1	SM 4500 NH ₃ -C	TOTAL KJELDAHL NITROGEN	MG/L	< 0.01	0.44	2.80				
AH1	SM 2540-D	TOTAL SUSPENDED SOLIDS	MG/L	979	35.0	5.0				
AH1	SM 2130-B	TURBIDITY	NTU	72.0	8.0	14.0				
INORGANIC - METALS										
AH1	EPA 200.7	ARSENIC	MG/L	0.008	< 0.001	< 0.001				
AH1	EPA 200.7	CADMIUM	MG/L	0.007	< 0.00025	< 0.00025				
AH1	EPA 200.7	CHROMIUM	MG/L	< 0.005	< 0.005	0.12				
AH1	EPA 200.7	COPPER	MG/L	< 0.005	< 0.005	< 0.005				
AH1	EPA 200.7	NICKEL	MG/L	0.03	< 0.005	0.01				
AH1	EPA 200.7	LEAD	MG/L	< 0.001	< 0.001	0.0017				
AH1	EPA 200.7	ANTIMONY	MG/L	< 0.0015	< 0.0015	< 0.0015				
AH1	EPA 200.7	SELENIUM	MG/L	< 0.001	< 0.001	< 0.001				
AH1	EPA 200.7	ZINC	MG/L	0.030	0.194	0.035				
ORGANOCHLORINE PESTICIDES & PCB'S										
AH1		DIAZINON	UG/L	0.16	< 0.50	0.38				
AH1		CHLORPYRIFOS	UG/L	< 0.05	--	< 0.50				

CH₃ + S = DCGD *to formulate NPDB's*
DATA

SECTION FIVE

Chemical Analyses

Table 5-1
CONVENTIONAL, BIOLOGICAL AND ORGANIC COMPOUNDS
AT MASS LOADING STATIONS (AH1, SD5, SD8, SD13, SV1), 1999/2000

Parameter	Units	AH1			SV1			SD5			SD8			SD13		
		1/25/00	2/20/00	3/5/00	1/25/00	3/5/00	4/17/00	2/12/00	2/20/00	3/5/00	2/12/00	2/20/00	3/5/00	2/12/00	2/20/00	3/5/00
Grab Samples																
General/Physical/Organic																
Field pH	units	8.3	7.7	8.0	8.3	8.6	--	7.6	7.7	8.1	7.9	8.6	8.3	8.3	8.4	9.0
Oil and Grease	mg/l	3.24	3.54	2.28	2.98	2.54	2.10	4.16	1.56	2.96	1.92	2.04	1.48	1.76	1.76	5.60
Electrical Conductivity	umhos/cm	2160	1172	1194	463	312	120	746	823	792	186	187	185	118	107	98.0
Bacteriological																
Total Coliform	mpn/100ml	>1600	>1600	300	--	>1600	300	240	>1600	900	500	>1600	>1600	>1600	>1600	>1600
Fecal Coliform	mpn/100ml	>1600	>1600	<2.0	--	>1600	240	<2.0	>1600	<2.0	<2.0	>1600	>1600	>1600	>1600	>1600
Fecal Streptococci	mpn/100ml	>1600	>1600	<2.0	--	>1600	23.0	<2.0	>1600	<2.0	<2.0	>1600	>1600	<2.0	>1600	>1600
Composite Samples																
Inorganic - Wet Chemistry																
Laboratory pH	units	7.50	7.30	7.51	6.73	6.75	7.06	7.50	7.10	7.50	7.52	6.90	7.20	7.50	7.02	7.03
Biochemical Oxygen Demand	mg/l	6.00	2.98	6.60	17.7	3.30	3.00	11.7	2.38	5.70	7.80	2.54	6.10	7.60	5.25	5.00
Chemical Oxygen Demand	mg/l	70	66	41	141	28	42	74	60	36	41	104	57	50	48	35
Nitrate - nitrogen	mg/l	1.60	1.42	1.58	3.50	2.33	2.33	3.30	0.60	2.30	3.22	1.04	3.10	2.67	1.24	2.32
Nitrite - nitrogen	mg/l	0.057	<0.050	<0.050	0.280	<0.050	0.070	0.065	<0.050	<0.050	0.086	<0.050	<0.050	0.064	<0.050	<0.050
Ammonia as Nitrogen	mg/l	0.40	<0.10	0.11	3.6	0.29	1.21	1.57	<0.10	<0.10	1.65	<0.10	0.21	1.28	0.11	<0.10
Total Kjeldahl Nitrogen	mg/l	0.85	4.02	2.11	0.28	0.52	0.80	2.10	0.77	1.83	2.98	3.10	2.36	3.70	2.26	2.61
Dissolved Phosphorous	mg/l	0.12	0.22	<0.01	0.23	<0.01	<0.01	<0.01	0.13	<0.01	0.33	0.26	0.22	0.45	0.32	0.18
Total Phosphorous	mg/l	0.16	1.04	0.74	0.21	0.31	0.06	0.21	0.34	0.40	0.46	0.33	0.60	0.51	0.39	0.20
Total Hardness	mg/l CaCO ₃	52.2	155	35.3	44.6	21.0	26.0	216	126	105	40.9	35.1	45.5	44.3	35.3	25.0
Total Dissolved Solids	mg/l	1356	335	362	372	69	133	279	304	302	120	111	140	132	116	117
Total Suspended Solids	mg/l	65	134	286	53	174	34	478	80	87	457	62	200	45	39	42
Turbidity	nlu	22	52	58	30	25	13	17	63	60	50	27	38	18	32	35
Surfactants (MBAS)	mg/l	0.33	0.21	0.08	1.49	0.13	0.60	0.48	0.24	0.20	0.35	0.22	0.13	0.47	0.44	0.14
Organophosphate Pesticides																
Diazinon	µg/l	<0.50	0.47**	0.29	<0.50	<0.05	<0.50	0.30*	0.39**	0.18	0.27*	0.35**	0.20**	0.43*	0.48**	.08
Chlorpyrifos	µg/l	<0.50	<0.50	<0.05	<0.50	<0.05	<0.50	<0.50	<0.50	<0.05	<0.50	<0.50	0.04*	<0.50	<0.50	<0.05

Asterisk (*) indicates an estimated value that is below quantification limit. Double asterisk (**) indicates the percent difference between primary and confirmation columns is greater than 40%.

SECTION FIVE

Chemical Analyses

Table 5-2
DISSOLVED METAL, TOTAL METAL, AND HARDNESS DATA SUMMARY —
MASS LOADING STATIONS (AH1, SD5, SD8, SD13, SV1), 1999/2000

PARAMETER	AH1			SV1			SD5			SD8			SD13		
	1/25/00	2/20/00	3/5/00	1/25/00	3/5/00	4/17/00	2/12/00	2/20/00	3/5/00	2/12/00	2/20/00	3/5/00	2/12/00	2/20/00	3/5/00
TOTAL HARDNESS (mg/l CaCO ₃)	52.2	155	35.3	44.6	21.0	26.0	216	126	105	40.9	35.1	45.5	44.3	35.3	25.0
TOTAL METALS ($\mu\text{g/l}$)															
ANTIMONY	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5
ARSENIC	<1.0	18.0	7.0	<1.0	<1.0	<1.0	<1.0	6.0	9.0	<1.0	7.0	5.0	<1.0	5.0	3.0
CADMIUM	<0.25	1.0	0.25	<0.25	<0.25	<0.25	<0.25	1.0	<0.25	<0.25	2.0	<0.25	2.0	1.0	<0.25
CHROMIUM	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
COPPER	<5.0	54.0	20.0	40.0	10.0	<5.0	36.0	17.0	<5.0	29.0	16.0	14.0	33.0	17.0	<5.0
LEAD	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	27.0	<1.0	<1.0	15.0	<1.0	<1.0	15.0	<1.0	<1.0
NICKEL	<5.0	50.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
SELENIUM	<1.0	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
ZINC	10.0	110.0	50.0	110.0	80.0	110.0	160.0	12.0	50.0	96.0	50.0	80.0	110.0	94.0	60.0
DISSOLVED METALS ($\mu\text{g/l}$)															
ANTIMONY	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5
ARSENIC	<1.0	11.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	5.0	<1.0	1.0	4.0	<1.0
CADMIUM	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
CHROMIUM	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
COPPER	<5.0	<5.0	<5.0	38.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
LEAD	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
NICKEL	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
SELENIUM	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
ZINC	10.0	<1.0	5.0	70.0	9.0	40.0	16.0	12.0	<1.0	19.0	28.0	8.0	19.0	53.0	9.0

SECTION FIVE**Chemical Analyses**

Table 5-2
TOTAL METAL AND HARDNESS DATA SUMMARY —
MASS LOADING STATIONS (AH1, SD5, SD8, SD13, SV1), 1998/99

Metals Results 1997/98		AH1			SD5			SD8			SD13			SV1		
		11/8/98	1/31/99	3/15/99	11/8/98	1/25/99	3/15/99	11/8/98	1/25/99	3/15/99	11/8/98	1/25/99	3/15/99	11/8/98	1/25/99	3/15/99
Arsenic	mg/l	0.008	<0.001	<0.001	0.004	0.0015	0.002	0.006	0.0018	0.003	<0.001	<0.001	0.006	0.006	0.0012	0.002
Cadmium	mg/l	0.007	<0.00025	<0.00025	0.004	<0.00025	<0.00025	0.002	<0.00025	<0.00025	0.0069	<0.00025	<0.00025	0.016	<0.00025	<0.00025
Chromium	mg/l	<0.005	<0.005	0.12	<0.005	0.009	0.056	<0.005	0.015	0.035	<0.005	0.019	0.07	<0.005	0.023	0.02
Copper	mg/l	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	<0.005	0.015	<0.005	<0.005	0.10	<0.005	<0.005	0.022
Nickel	mg/l	0.03	<0.005	0.01	0.02	<0.005	0.009	0.04	0.028	0.016	0.03	0.048	0.029	0.006	0.088	0.018
Lead	mg/l	<0.001	<0.001	0.0017	0.04	0.003	0.023	<0.001	0.007	0.082	0.009	0.006	0.145	0.01	0.009	0.039
Antimony	mg/l	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	0.003	0.0019	<0.0015	<0.0015	<0.0015	<0.0015
Selenium	mg/l	<0.001	<0.001	<0.001	0.004	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	0.005	<0.001	<0.001
Zinc	mg/l	0.03	0.194	0.035	<0.025	<0.025	0.071	0.03	0.048	0.21	0.06	0.036	0.51	<0.025	<0.025	0.15
Total hardness	mg/l	137	365	568	148	218	277	77	42.5	90.8	32.9	24.5	130	151	41.0	102

SECTION FIVE

Chemical Analyses

Table 5-1
CONVENTIONAL, BIOLOGICAL AND ORGANIC COMPOUNDS
AT MASS LOADING STATIONS (AH1, SD5, SD8, SD13, SV1), 1998/99

Mass Loading Stations		AH1			SD5			SD8			SD13			SV1		
Conventional/Biological/ Organic Constituents	Units	11/8/98	1/31/99	3/15/99	11/8/98	1/25/99	3/15/99	11/8/98	1/25/99	3/15/99	11/28/98	1/25/99	3/15/99	11/8/98	1/25/99	3/15/99
Laboratory pH	pH units	7.58	7.95	8.47	7.55	7.39	7.99	7.19	6.98	7.00	6.88	6.66	6.46	7.63	7.36	7.11
Electrical conductivity	µmhos/cm	652	1560	2270	6070	629	542	286	270	215	451	221	136	2.03	-	141
Total hardness	mg/l	137	365	568	148	218	277	77	42.5	90.8	32.9	24.5	130	151	41.0	102
Total suspended solids	mg/l	979	35.0	5.0	913	540	55.0	7.58	280	159	<1.0	164	372	349	276	116
Total dissolved solids	mg/l	853	892	1611	1492	563	660	249	125	222	111	97.0	407	1624	125	249
Turbidity	NTU	72.0	8.0	14.0	84.0	450	17.0	69	38.0	21.0	10.0	22.0	68.0	22.0	40.0	26.0
Biochemical oxygen demand	mg/l	20	<3.0	5.25	30.0	5.0	9.0	19.0	6.0	11.0	<3.0	<3.0	24.0	37.0	4.0	11.0
Chemical oxygen demand	mg/l	34.0	<5.0	21.0	61.0	33.0	33.0	59.0	41.0	85.0	38	32	160	39.0	19.0	59.0
Total coliform	MPN/100ml	>241900	8130	197000	>241900	125900	613000	>241900	298700	>2419000	344800	307600	>2419000	141360	-	98000
Fecal coliform	MPN/100ml	>1600	240	>1600	>1600	>1600	>1600	>1600	>1600	>1600	>1600	>1600	>1600	>1600	-	>1600
Fecal streptococci	MPN/100ml	50	8	130	<1	>1600	240	30	>1600	240	240	>1600	240	30	-	130
Oil and grease	mg/l	0.67	<0.5	0.6	0.7	<0.5	<0.5	1.29	1.56	0.95	4.6	0.9	<0.5	1.11	-	<0.5
Surfactants (MBAS)	mg/l	0.25	0.07	<0.05	0.51	0.08	<0.05	0.48	0.19	0.07	0.15	0.12	0.17	0.21	0.19	0.16
Total Kjeldahl nitrogen	mg/l	<0.01	0.44	2.8	0.12	2.93	1.85	0.44	1.25	3.61	2.10	0.94	5.62	<0.01	0.16	1.70
Nitrate-nitrogen	mg/l	2.1	0.86	1.10	0.52	0.70	0.53	1.1	0.98	0.44	1.70	1.10	0.45	1.96	0.93	0.98
Nitrite – nitrogen	mg/l	<0.05	<0.05	<0.05	0.10	<0.05	0.05	0.06	0.12	0.14	0.19	0.07	<0.05	0.12	0.07	<0.05
Ammonia as nitrogen	mg/l	0.3	0.15	0.21	0.6	0.57	0.51	1.00	0.78	1.06	0.94	0.79	2.28	0.3	0.71	0.79
Total phosphorus	mg/l	0.72	0.13	0.12	0.61	0.16	0.16	1.28	0.3	0.17	0.46	0.33	0.32	1.61	0.09	0.08
Dissolved phosphorus	mg/l	0.57	0.12	0.10	0.52	0.15	0.10	1.07	0.27	0.22	0.41	0.34	0.18	1.39	0.09	0.08
Diazinon	µg/l	0.16	<0.50	0.38	0.40	0.28	0.41	0.46	0.46	0.53	0.72	0.47	0.79	0.23	<0.50	<0.50
Chlorpyrifos	µg/l	<0.05	-	<0.50	<0.05	-	<0.50	0.10	-	<0.50	-	-	<0.50	<0.05	-	<0.50

SECTION FIVE

Results

Table 5-5

CONVENTIONAL, BIOLOGICAL AND ORGANIC COMPOUNDS AT MASS LOADING STATIONS (SD5, SD8, SD13, SV1), 1997/98

Mass Loading Stations		SD5			SD8			SD13			SV1		
Conventional/Biological/Organic Constituents	Units	11/10/97	12/6/97	3/25/98	11/10/97	12/6/97	3/14/98	11/10/97	11/26/97	2/3/98	11/10/97	11/26/97	2/3/98
Laboratory pH	pH units	7.35	7.82	7.27	6.97	7.56 ^e	6.70 ^e	6.35 ^e	7.10	6.70	7.41	8.90	7.19
Electrical conductivity	µmhos/cm	1130	1690	726	310	155	1146	732	337	61	—	259	62
Total hardness	mg/l	694	186	124	116	39	96.4	44.2	16.5	14.4	46.3	52.0	54.7
Total suspended solids	mg/l	410	503	2024	182	315	805	350	140	198	164	258	348
Total dissolved solids	mg/l	1730	447	318	374	250	344	167	92	98	154	180	214
Turbidity	NTU	160	27	96	90	29	24	62	71	43	63	68	392
Biochemical oxygen demand	mg/l	33	43	22	49	24	40 ^e	39	62	4	15	52	15
Chemical oxygen demand	mg/l	89	20	22	146	44	135	85	100	17	124	87	22
Total coliform	MPN/100ml	>160,000	>20,000	>20,000	>160,000	>20,000	—	>160,000	>20,000	>20,000	—	>20,000	16,500
Fecal coliform	MPN/100ml	160,000	3,640	8,850	>160,000	9,450	—	90,000	10,900	9,450	—	3,640	420
Fecal streptococci	MPN/100ml	160,000	16,000 ^e	50	>160,000	16,000 ^e	—	160,000 ^e	230	170	—	2,400	1,600
Oil and grease	mg/l	3.6	1.6	0.6	6.9	<0.5	4.56	2.9	1.3	<0.5	—	<0.5	<0.5
Total petroleum hydrocarbons (TPH)	mg/l	—	—	—	—	—	—	—	—	—	—	—	—
Surfactants (MBAS)	mg/l	<0.10	0.05	0.20	<0.10	0.07	0.66 ^e	0.14	0.062	<0.05	0.10	0.112	0.08
Total Kjeldahl nitrogen	mg/l	1.6	<1.0	1.1	1.6	<1.0	15.0	1.5	1.41	1.6	0.95	1.32	<1.0
Nitrate-nitrite as nitrogen	mg/l	1.7	—	—	3.5	—	—	2.8	—	—	2.3	—	—
Nitrate-nitrogen	mg/l	—	0.54	0.5	—	0.52	0.4	—	1.0	0.5	—	1.5	0.3
Nitrite - nitrogen	mg/l	—	0.06	0.05	—	0.08	<0.05	—	<0.05	<0.05	—	0.05	<0.05
Ammonia as nitrogen	mg/l	0.56	0.57	0.60	1.3	0.4	10.0	0.55	1.09	<0.5	1.3	0.80	<0.5
Total phosphorus	mg/l	0.70	0.12	0.23	0.7	<0.10	2.2	0.90	0.70	0.36	0.30	0.273	0.25
Dissolved phosphorus	mg/l	<0.10	0.10	0.12	0.40	<0.10	1.41	0.50	0.54	0.21	0.10	0.15	0.12
Total cyanide	mg/l	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	<0.01	<0.02	<0.02	—	<0.02	<0.02
Bis (2-ethylhexyl) phthalate ^a	µg/l	15 ^e	24.7	13.3	24 ^e	8.72	37.5	—	94.5	10.9	—	14.7	9.98
Butyl benzyl phthalate	µg/l	<10 ^e	<2.5	2.51	<10 ^e	<2.5	13.3	—	29.3	<2.5	—	12.8	<2.5
Di-n-butyl phthalate	µg/l	<10 ^e	37.5	42.7	<10 ^e	34.6	15.9	—	49.8	55.7	—	69.5	43.8

^a Bis (2-ethylhexyl) phthalate was detected in a field equipment blank taken prior to the start of the wet-weather monitoring season. Since this compound was detected in the blank, levels present in the stormwater should be considered as non-detect at an elevated level.

^e Estimated result due to sample holding time exceedence.

Table 5-8
TOTAL METAL AND HARDNESS DATA SUMMARY —
INDUSTRIAL SITES (SC2, NC3, SD11), 1997/98

Metals Results 1997/98		NC3			SC2			SD11		
		11/26/97	12/6/97	3/14/98	11/10/97	12/6/97	2/3/98	11/10/97	11/26/97	2/3/98
Silver	µg/l	<7	<7	<7	<5	<7	<7	<5	<7	<7
Arsenic	µg/l	<53	<53	<53	<1	<53	<53	5	<53	<53
Beryllium	µg/l	<0.3	<0.3	<0.3	<2	<0.3	<0.3	<2	<0.3	<0.3
Cadmium	µg/l	<4	<4	<4	0.60	<4	<4	0.70	<4	<4
Chromium	µg/l	<7	<7	18	<5	<7	22	<5	12	<7
Copper	µg/l	42	38	60	28	36	43	96	128	37
Liquid Mercury	µg/l	<2	<2	<2	<0.5	<2	<2	<0.5	<2	<2
Nickel	µg/l	31	43	<15	11	39	<15	16	24	<15
Pb	µg/l	<42	<42	151	2	<42	<42	5	<42	<42
Antimony	µg/l	<32	<32	<32	2.7	<32	<32	<1.5	<32	<32
Selenium	µg/l	<75	<75	<75	1	<75	<75	<1	<75	<75
Hallium	µg/l	<40	<40	<40	<2	<40	<40	<2	<40	<40
Uranium	µg/l	204	214	81	543	482	149	606	876	190
Hardness	µg/l	67.0	148.0	221.0	50.0	18.0	35.9	66.7	39.0	16.1

Table 5-9
TOTAL METAL AND HARDNESS DATA SUMMARY —
MASS LOADING STATIONS (SD5, SD8, SD13, SV1), 1997/98

Metals Results 1997/98		SD5			SD8			SD13			SV1		
		11/10/97	12/6/97	3/25/98	11/10/97	12/6/97	3/14/98	11/10/97	11/26/97	2/3/98	11/10/97	11/26/97	2/3/98
Silver	µg/l	<5	<7	<7	<5	<7	<7	<5	<7	<7	<5	<7	<7
Arsenic	µg/l	1	<53	<53	2	<53	<53	<1	<53	<53	2	<53	<53
Beryllium	µg/l	<2	<0.3	<0.3	<2	<0.3	<0.3	<2	<0.3	<0.3	<2	<0.3	<0.3
Cadmium	µg/l	<0.25	<4	<4	0.30	<4	<4	<0.25	<4	<4	<0.25	<4	<4
Chromium	µg/l	<5	<7	19	<5	<7	11	<5	16	24	<5	11	23
Copper	µg/l	9	56	146	17	28	28	35	61	37	14	50	30
Liquid Mercury	µg/l	<0.5	<2	<2	<0.5	<2	<2	<0.5	<2	<2	<0.5	<2	<2
Nickel	µg/l	<5	<15	<15	9	<15	<15	6	38	<15	5	27	<15
Pb	µg/l	<1	<42	<42	3	<42	95	5	<42	<42	1	<42	<42
Antimony	µg/l	<1.5	<32	<32	1.6	<32	<32	<1.5	<32	<32	<1.5	<32	<32
Selenium	µg/l	<1	<75	<75	1	<75	<75	<1	<75	<75	1	<75	<75
Hallium	µg/l	<2	<40	<40	<2	<40	<40	<2	<40	<40	<2	<40	<40
Uranium	µg/l	69	68	130	176	11	92	176	329	70	129	189	67
Hardness	µg/l	694.0	186.0	124.0	116.0	39.0	96.4	44.2	16.5	14.4	463	52.0	54.7

				Detection Limit	Station Location										Ammonia-N	0.14	Nitrate as N	0.20	Nitrite-N	0.01	Total Kieldahl Nitrogen	0.1	Orthophosphate P	0.02	Total Phosphate as PO ₄	0.01	Total Dissolved Solids	1100	Turbidity NTU	10.0	Chloride	10	Sulfate	40.0	Total Hardness	10	Edta	0.005	Antimony	0.0	Arsenic	0.0
Sampling Date	Station Name	Station ID	Hydrologic Subarea																																							
5/20/98	LAC-CB-T1	DFG-978-300	—	Loma Alta Creek at College Blvd	0.23	0.61	0.04	0.70	0.12	0.40					2800	0.98																										
5/20/98	BVC-SVW-T3	DFG-978-301	—	Buena Vista Creek at South Vista Way	<.14	2.50	0.02	0.42	0.22	0.22					1378	0.79																										
5/20/98	SLRR-FR-T1	DFG-978-302	✓	San Luis Rey River at Foussat Road	<.14	2.40	0.01	0.39	0.58	0.24					850	5.10																										
5/20/98	LAC-ECR-A	DFG-978-303	✓	Loma Alta Creek at El Camino Real	<.14	0.27	0.00	0.36	0.44	0.14					2459	0.58																										
6/2/98	SR-79	DFG-978-304	✓	Sweetwater River at Hwy 79 near Interstate 8	<.14	0.33	0.00	0.29	0.13	0.13					224	1.90																										
6/2/98	SR-94	DFG-978-305	✓	Sweetwater River upstream of Hwy 94 (Campo Road)	<.14	0.36	0.01	0.16	0.07	0.06					397	2.80																										
6/2/98	SR-WS	DFG-978-306	✓	Sweetwater River downstream of Willow Street	<.14	0.35	0.01	0.40	0.05	0.20					825	0.76																										
6/2/98	SDR-MD	DFG-978-307	7.11✓	San Diego River up stream of Mission Dam	0.19	0.35	0.02	0.38	0.22	0.09					1038	3.70																										
6/2/98	SDR-MT	DFG-978-308	7.11✓	San Diego River at Mission Trails Regional Park	<.14	0.28	0.01	0.49	0.14	0.05					1046	0.77																										
6/2/98	SDR-FVR	DFG-978-309	7.11✓	San Diego River at Fashion Valley Road	<.14	0.23	0.00	0.42	0.23	0.06					1217	5.00																										
6/3/98	LPC-BMR	DFG-978-310	—	Los Penasquitos Creek upstream of Black Mountain Road	<.14	0.34	0.01	0.76	0.30	0.55					1678	0.67																										
6/3/98	LPC-CCR	DFG-978-311	✓	Los Penasquitos Creek at Cobblestone Creek Road.	<.14	1.10	0.03	1.90	0.17	0.55					1633	3.80																										
6/3/98	RC-HP	DFG-978-312	—	Rattlesnake Creek at Hilleary Park, off Community Road	6.20										1412	0.54																										
6/3/98	EC-HRB	DFG-978-313	4.60✓	Escondido Creek below Harmony Grove Bridge.	<.14	7.20	0.07	0.46	0.46	0.37					1196	0.99																										
6/3/98	EC-EF	DFG-978-314	4.60✓	Escondido Creek at intersection Elfin Forest and Harmony Grove (end of Elfin Forest Resort).	<.14	6.90	0.02	0.55	0.77	0.29					1145	0.38																	ND	3.8								
6/3/98	EC-LCA	DFG-978-315	—	Encinitas Creek at Green Valley Road	<.14	0.34	<.01	0.54	0.34	0.32					2082	3.70																										
6/3/98	SMC-RSFR	DFG-978-316	4.51✓	San Marcos Creek at Rancho Santa Fe Road	<.14	0.00	0.01	0.60	0.42	0.52					780	0.99																										
6/3/98	SMC-M	DFG-978-317	4.51✓	San Marcos Creek at McMahr	<.14	6.20	0.04	0.62	0.49	0.56					1346	13.80																										
6/9/98	MC-WB	DFG-978-318	✓	Murrieta Creek at Calle Del Oso Rd	<.14	1.29	<.01	0.31	0.21	0.28					709	0.38																ND	3.0									
6/9/98	MC-GS	DFG-978-319	✓	Murrieta Ck behind cement factory	<.14	0.32	0.01	0.44	0.09	0.06					753	2.31															Linda	ND	3.1									
6/9/98	TC-I15	DFG-978-320	✓	Temecula Ck east of confluence, west of I-15	<.14	1.40	0.01	0.44	0.30	0.17					840	0.67															Sheet1											

			Detection Limit													Ceriodaphnia-survival	Ceriodaphnia-reproduction	Pimephales-survival	Pimephales-growth			
Sampling Date	Station Name	Station ID	Hydrologic Subarea	Station Location				Beryllium	Cadmium	Chromium Total	Chromium Dissolved	Copper	Lead, Total	Lead, Dissolved	Mercury	Nickel	Selenium	Silver	Thallium	Zinc, Total	Zinc, Dissolved	
5/20/98	LAC-CB-T1	DFG-978-300		Loma Alta Creek at College Blvd				0.0005	0.0005	0.4	0.01	0.01	0.001	0.001	0.01	0.002	0.01	0.01	0.01	0.01	0.01	
5/20/98	BVC-SVW-T3	DFG-978-301		Buena Vista Creek at South Vista Way																		
5/20/98	SLRR-FR-T1	DFG-978-302		San Luis Rey River at Foussat Road																		
5/20/98	LAC-ECR-A	DFG-978-303		Loma Alta Creek at El Camino Real																		
6/2/98	SR-79	DFG-978-304		Sweetwater River at Hwy 79 near Interstate 8																		
6/2/98	SR-94	DFG-978-305		Sweetwater River upstream of Hwy 94 (Campo Road)																		
6/2/98	SR-WS	DFG-978-306		Sweetwater River downstream of Willow Street																		
6/2/98	SDR-MD	DFG-978-307	7.11	San Diego River up stream of Mission Dam																		
6/2/98	SDR-MT	DFG-978-308	7.11	San Diego River at Mission Trails Regional Park																		
6/2/98	SDR-FVR	DFG-978-309	7.11	San Diego River at Fashion Valley Road																		
6/3/98	LPC-BMR	DFG-978-310		Los Penasquitos Creek upstream of Black Mountain Road																		
6/3/98	LPC-CCR	DFG-978-311		Los Penasquitos Creek at Cobblestone Creek Road.																		
6/3/98	RC-HP	DFG-978-312	6.20	Rattlesnake Creek at Hilleary Park, off Community Road																		
6/3/98	EC-HRB	DFG-978-313	4.60	Escondido Creek below Harmony Grove Bridge.																		
6/3/98	EC-EF	DFG-978-314	4.60	Escondido Creek at intersection Elfin Forest and Harmony Grove (end of Elfin Forest Resort).				ND	ND	11.0		13.7	150		ND	2.4	ND	ND	ND	72.8		
6/3/98	EC-LCA	DFG-978-315		Encinitas Creek at Green Valley Road																		
6/3/98	SMC-RSFR	DFG-978-316	4.51	San Marcos Creek at Rancho Santa Fe Road																		
6/3/98	SMC-M	DFG-978-317	4.51	San Marcos Creek at McMahr																		
6/9/98	MC-WB	DFG-978-318		Murrieta Creek at Calle Del Oso Rd				ND	1.1	16.2		26.3	36.7		0.068	9.4	ND	ND	ND	182		
6/9/98	MC-GS	DFG-978-319		Murrieta Ck behind cement factory				ND	ND	2.8		6.1	9.2		ND	1.9	ND	ND	3.0	53.8		
6/9/98	TC-I15	DFG-978-320		Temecula Ck east of confluence, west of I-15																		

These are in units of mg/kg wet weight.

Sampling Date	Station Name	Station ID	Hydrologic Subarea	Detection Limit	Station Location								Ammonia-N	Nitrate as N	Nitrite-N	Total Kjeldahl Nitrogen	Inorganic Phosphate-P	Total Phosphate as P (revised)	Total Dissolved Solids	Turbidity, NTU	Calcium	Sodium	Magnesium	Potassium	Chloride	Sulfate	Total Hardness	Ec. Nutrients	Antimony	Arsenic
6/9/98	RC-WGR	DFG-978-321	/	Rainbow Creek at Willow Glen Rd	<.14	11.47	0.02	0.44	0.95	0.77			810	0.30																
6/9/98	SMR-WGR	DFG-978-322	-	Santa Margarita at Willow Glen Rd (Stage Coach Ln).	<.14	3.76	0.02	0.47	0.11	0.62			913	0.46																
6/9/98	SMR-SCD	DFG-978-323	/	SMR at DeLuz/ Pico Rd near Sandia Ck	<.14	4.69	0.01	0.34	0.18	0.35			923	0.50																
6/9/98	SC-SCR	DFG-978-324	-	Sandia Ck at Sandia Ck Rd, 0.5 to 1 mile above confluence	<.14	5.83	0.01	0.17	0.24	0.30			817	1.80													ND 7.8			
6/9/98	SMR-CP	DFG-978-325	/	Santa Margarita River below diversion weir on Camp Pendleton	<.14	2.71	0.01	0.34	0.23	0.41			667	3.77												ND 5.9				
6/9/98	SMR-SMB	DFG-978-326	/	SMR at Stuart Mesa Rd bridge on Camp Pendleton	<.14	1.63	0.01	0.28	0.23	0.35			713	3.60												ND 2.3				
6/10/98	BVR-ED	DFG-978-327	/	San Marcos Creek at Rancheros Drive	<.14	14.70	0.05	0.53	0.14	0.95			1372	0.49																
6/10/98	AHC-SA	DFG-978-328	-	Agua Hedionda Ck at Sycamore Ave	0.17	15.30	0.08	0.58	1.00	0.90			1144	1.10																
6/10/98	SMC-SP	DFG-978-329	/	Buena Vista Ck at Wildwood Park	0.23	3.40	0.09	0.62	0.12	0.75			1360	1.70																
6/10/98	AC-CCR	DFG-978-330	-	Aliso Ck along Country Club Rd	3.30	3.10	1.00	0.81	1.10	0.93			1712	4.10												ND 1.2				
6/10/98	AC-PPD	DFG-978-331	/	Aliso Ck at Pacific Park Dr/ Oso Pkwy	0.18	1.00	0.03	0.56	0.15	0.81			1961	1.10																
6/10/98	AHC-ECR	DFG-978-332	/	Agua Hedionda Ck at El Camino Real	<.14	5.80	0.02	0.53	0.44	0.61			1716	0.55																
6/11/98	SLRR-395	DFG-978-333	/	San Luis Rey River at old Hwy 395 (Couster Canyon Rd)	<.14	4.20	0.03	0.42	0.75	0.99			970	3.73												These are				
6/29/98	LLP-978-405-BUV		/	Buena Vista Creek	<.14	1.20	0.02	0.64	0.83		7.1	1133	1.3	120	254	80.7	3.6	454	281	570	1965	ND	ND							
6/29/98	LLP-978-405-AGH		/	Agua Hedionda Creek	<.14	4.50	0.03	0.76	0.25		4.2	1624	0.6	168	255	97.9	3.3	465	363	745	2300	ND	ND							
6/29/98	LLP-978-405-ESC		/	Escondido Creek	<.14	3.60	0.01	0.76	0.25		4.6	1382	4.4	109	251	87.5	3.4	322	342	570	1969	ND	ND							

Linda_Pardy
Sheet1

				Detection Limit																		
Sampling Date	Station Name	Station ID	Hydrologic Subarea	Station Location	Beryllium	Cadmium	Chromium Total	Chromium Dissolved	Copper	Lead Total	Lead Dissolved	Mercury	Nickel	Selenium	Silver	Thallium	Zinc Total	Zinc Dissolved	Ceriodaphnia-survival	Ceriodaphnia-reproduction	Pimephales-survival	Pimephales-growth
6/9/98	RC-WGR	DFG-978-321		Rainbow Creek at Willow Glen Rd																		
6/9/98	SMR-WGR	DFG-978-322		Santa Margarita at Willow Glen Rd (Stage Coach Ln).																		
6/9/98	SMR-SCD	DFG-978-323		SMR at DeLuz/ Pico Rd near Sandia Ck																		
6/9/98	SC-SCR	DFG-978-324		Sandia Ck at Sandia Ck Rd, 0.5 to 1 mile above confluence	ND	ND	17.0	20.0	1.7	ND	7.7	ND	ND	ND	26.2							
6/9/98	SMR-CP	DFG-978-325		Santa Margarita River below diversion weir on Camp Pendleton	ND	ND	5.7		4.0	6.7	ND	2.8	ND	ND	1.5	24.3						
6/9/98	SMR-SMB	DFG-978-326		SMR at Stuart Mesa Rd bridge on Camp Pendleton	ND	0.44	14.7		9.1	12.3	ND	5.5	ND	ND	ND	81.1						
6/10/98	BVR-ED	DFG-978-327		San Marcos Creek at Rancheros Drive																		
6/10/98	AHC-SA	DFG-978-328		Agua Hedionda Ck at Sycamore Ave																		
6/10/98	SMC-SP	DFG-978-329		Buena Vista Ck at Wildwood Park																		
6/10/98	AC-CCR	DFG-978-330		Aliso Ck along Country Club Rd	ND	ND	7.6		2.2	ND	ND	3.4	ND	ND	1.2	16.0						
6/10/98	AC-PPD	DFG-978-331		Aliso Ck at Pacific Park Dr/ Oso Pkwy																		
6/10/98	AHC-ECR	DFG-978-332		Agua Hedionda Ck at El Camino Real																		
6/11/98	SLRR-395	DFG-978-333		San Luis Rey River at old Hwy 395 (Couser Canyon Rd)																		
6/29/98		LLP-978-405-BUV		Buena Vista Creek	ND	ND	0.0	0.01	ND	ND	ND	ND	ND	ND	ND	0.04	0.02	No Difference				
6/29/98		LLP-978-405-AGH		Agua Hedionda Creek	ND	ND	0.0	0.01	ND	ND	ND	ND	ND	ND	ND	0.03	0.02	No Difference				
6/29/98		LLP-978-405-ESC		Escondido Creek	ND	ND	0.0	0.01	ND	ND	0.002	ND	ND	ND	ND	0.06	0.04	No Difference				

are in units of milligrams per liter.

Linda_Pardy
Sheet1

From: Linda Pardy
To: Tracy_Weddle@nps.gov
Date: 3/01 2:45PM
Subject: Re: Cabrillo National Monument Water Quality Data

Tracy, FYI. In reply to your email:

The source of 1998 water quality data was the San Diego Regional Water Quality Control Board (Regional Board). The Regional Board collected water samples at selected sites throughout the Region to scan sites for elevated levels of the sampled parameters. The June 1998 sampling was limited to those samples/constituents shown. The samples were delivered to the lab by the Regional Board. The contract lab which did the analyses was Truesdail Laboratories, Inc located at 14201 Franklin Ave, Tustin, CA 92780-7008. The project manager at that time for the testing was Divina B. Pascual. Their phone number was 714 730-6239. -Linda

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Linda Pardy, Environmental Specialist
California Regional Water Quality Control Board
San Diego Region
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The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways to reduce demand and cut your energy costs, see the tips at: <http://www.swrcb.ca.gov/news/echallenge.html>

>>> <Tracy_Weddle@nps.gov> 03/05/01 10:18AM >>>
Ms. Pardy,

I am currently establishing a baseline water quality report for Cabrillo National Monument for the National Park Service. I am taking over the work of Brett Atkinson, whom you spoke to previously. Brett prepared the data which you sent him for these reports, but there is one bit of information missing before these reports can be completed and the data uploaded to the EPA database STORET. A paragraph description is needed, describing the source of data and purpose for data collection and monitoring. I have looked on your agency's website to try and determine this, but there are so many projects that I could not determine where the data you sent came from. Could you please describe to me what the monitoring was for, the extent of monitoring, and any other information you feel is significant? I am attaching a copy of the data you sent in case you are unsure about what data I'm referring to. Thank you for your help!

Sincerely,

Tracy Weddle
Water Quality Data Analyst
National Park Service
Water Resources Division
1201 Oakridge Drive, Suite 250
Fort Collins, CO 80525



A WATER QUALITY INVENTORY SERIES
BIOLOGICAL AND PHYSICAL/HABITAT ASSESSMENT OF
CALIFORNIA WATER BODIES

San Diego Regional Water Quality Control Board:
1999 Biological Assessment Annual Report

Fish in SD River Folder
— Agua Hedionda Creek

California Department of Fish and Game
Office of Spill Prevention and Response
Water Pollution Control Laboratory
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PROGRAM MANAGER
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PROJECT LEADERS
Peter Ode, Angie Montalvo

LABORATORY AND FIELD TECHNICIANS
Doug Post, Christopher Sheehy, Mike Dawson

Table 1
Toxic Substances Monitoring Program
Preliminary Summary of 1999 Data: Trace Elements in Fish and Clams (ppm, wet weight)

Station Number	Station Name	Species Code	Tissue Date	Sample	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Zinc
801.11.89	Lower Newport Bay/Rhine Ch	YFC	L 08/10/99	NA	NA	0.089	5.3300	0.1290	NA	NA	NA	NA	0.0060	23.90
801.11.96	Peters Canyon Channel	PRS	W 08/05/99	0.179	0.0350	0.121	1.2300	0.0300	0.048	0.1370	4.110	<0.0020	45.80	
801.11.96	Peters Canyon Channel	PRS	W 08/05/99	0.190	0.0360	0.171	1.2900	0.0380	0.040	0.1390	4.240	0.0030	44.70	
801.11.99	Upper Newport Bay/Newport Dunes	ORC	F 08/04/99	1.300	<0.0020	NA	NA	NA	0.050	0.0170	0.760	NA	NA	
801.11.99	Upper Newport Bay/Newport Dunes	ORC	L 08/04/99	NA	NA	0.088	6.2600	0.0080	NA	NA	NA	<0.0020	18.40	
901.12.##	Aliso Cr/Pacific Park Dr	PRS	W 08/27/99	0.245	0.2240	0.110	1.3000	0.0710	<0.015	0.1950	1.610	<0.0020	32.50	
902.11.01	Santa Margarita R/Stuart Mesa Rd	CKF	W 08/25/99	0.221	0.0050	0.050	1.1200	0.0320	<0.015	0.1900	0.248	0.0270	28.30	
902.22.03	Rainbow Creek ✓	GSF	F 08/26/99	0.031	<0.0020	NA	NA	NA	0.051	0.0080	0.388	NA	NA	
902.22.03	Rainbow Creek ✓	GSF	L 08/26/99	NA	NA	0.067	2.4500	0.0100	NA	NA	NA	<0.0020	16.70	
902.32.##	Murrietta Cr/u/s Temecula Cr✓	BLB	F 08/26/99	0.036	<0.0020	NA	NA	NA	0.059	0.0370	0.287	NA	NA	
902.32.##	Murrietta Cr/u/s Temecula Cr✓	BLB	L 08/26/99	NA	NA	0.100	9.2500	0.0070	NA	NA	NA	0.0290	19.20	
904.10.##	Loma Alta Cr/College Blvd ✓	GAM	W 08/26/99	0.217	0.0220	0.236	3.6900	0.0770	0.061	0.1990	0.371	0.0340	37.70	
904.21.02	Buena Vista Lagoon ✓	LMB	F 08/25/99	0.072	<0.0020	NA	NA	NA	0.054	0.0100	0.392	NA	NA	
904.21.02	Buena Vista Lagoon ✓	LMB	L 08/25/99	NA	NA	0.122	3.8300	0.0210	NA	NA	NA	0.0060	21.90	
904.31.##	Agua Hedionda Cr/El Camino Real✓	GAM	W 08/24/99	0.386	0.0250	0.220	1.3400	0.0380	<0.015	0.1520	0.461	0.0050	25.90	
904.51.03	San Marcos Cr ✓	LMB	F 08/24/99	0.045	<0.0020	NA	NA	NA	0.046	0.0230	0.335	NA	NA	
904.51.03	San Marcos Cr ✓	LMB	L 08/24/99	NA	NA	0.193	3.0800	<0.0020	NA	NA	NA	<0.0020	16.00	
904.61.07	Escondido Cr/Elfin Forest Park✓	GSF	F 08/24/99	0.064	0.0010	NA	NA	NA	0.050	0.3410	0.496	NA	NA	
904.61.07	Escondido Cr/Elfin Forest Park✓	GSF	L 08/24/99	NA	NA	0.070	2.4400	0.0100	NA	NA	NA	0.0050	17.30	
907.11.03	San Diego R/u/s Taylor St ✓	LMB	F 08/23/99	0.096	<0.0020	NA	NA	NA	0.035	0.0150	0.854	NA	NA	
907.11.03	San Diego R/u/s Taylor St ✓	LMB	L 08/23/99	NA	NA	0.112	5.9400	0.0130	NA	NA	NA	0.0130	23.10	

L = Liver. F = Filet. W = Whole Body. < = Below Indicated Detection Limit. NA = Not Analyzed.

Species codes are listed in Table 3.

TABLE 2
Toxic Substances Monitoring Program
Preliminary Summary of 1999 Data: Organic Chemicals in Fish and Clams (ppb, wet weight)

Station Number	Station Name	Species Code	Tissue Type	Sample Date	Aldrin	alpha-Chlor-dene	cis-Chlor-dene	gamma-Chlor-dene	trans-Chlor-dene	cis-Nona-chlor	trans-Nona-chlor	Oxy-chlor-dene	Total Chlor-dane	Chlor-pyrifos	Dacthal				
801.11.09	San Diego Cr/Barranca Pkwy	PRS	W	08/05/99	<1.0	<1.0	4.2	<1.0	2.3	2.3	5.7	2.1	16.6	<2.0	<2.0				
801.11.89	Lower Newport Bay/Rhine Ch	YFC	F	08/10/99	<1.0	<1.0	<2.0	<1.0	<2.0	<2.0	<1.0	<1.0	ND	<2.0	<2.0				
801.11.96	Peters Canyon Channel	PRS	W	08/05/99	<1.0	<1.0	3.2	<1.0	2.6	2.9	9.1	1.4	19.3	4.2	<2.0				
801.11.96	Peters Canyon Channel	PRS	W	08/05/99	<1.0	<1.0	3.3	<1.0	2.8	3.2	9.8	1.5	20.7	5.2	<2.0				
801.11.99	Upper Newport Bay/Newport Dunes	ORC	F	08/04/99	<1.0	<1.0	<2.0	<1.0	<2.0	<2.0	1.9	<1.0	1.9	<2.0	<2.0				
901.12.##	Aliso Cr/Pacific Park Dr ✓	PRS	W	08/27/99	<1.0	<1.0	5.4	1.2	2.0	<2.0	5.3	3.6	17.5	4.3	4.1				
902.11.01	Santa Margarita R/Stuart Mesa Rd✓	CKF	W	08/25/99	<1.0	<1.0	<2.0	<1.0	<2.0	<2.0	<1.0	<1.0	ND	<2.0	<2.0				
902.22.03	Rainbow Creek ✓	GSF	F	08/26/99	<1.0	<1.0	<2.0	<1.0	<2.0	<2.0	<1.0	<1.0	ND	<2.0	<2.0				
902.32.##	Murrietta Cr/u/s Temecula Cr ✓	BLB	F	08/26/99	<1.0	<1.0	<2.0	<1.0	<2.0	<2.0	2.0	<1.0	2.0	<2.0	<2.0				
904.10.##	Loma Alta Cr/College Blvd ✓	GAM	W	08/26/99	<1.0	<1.0	<2.0	<1.0	<2.0	<2.0	1.6	<1.0	1.6	<2.0	<2.0				
Station Number	Dieldrin DDD	o,p' DDD	p,p' DDD	o,p' DDE	p,p' DDE	o,p' DDT	p,p' DDT	p,p' DDMU	p,p' DDMS	Total DDT	Dicofol	Diazinon	Endo-sulfan I	Endo-sulfan II	Endo-sulfan Sulfate	Total Endo-sulfan	Endrin	Ethion	
801.11.09	4.1	3.2	27.0	<2.0	139.0	<3.0	<5.0	8.9	NA	178.1	NA	<20.0	<2.0	NA	NA	ND	<2.0	<6.0	
801.11.89	<2.0	<2.0	<2.0	<2.0	22.8	<3.0	<5.0	<3.0	NA	22.8	NA	<20.0	<2.0	NA	NA	ND	<2.0	<6.0	
801.11.96	3.3	5.8	24.4	2.7	503.0	<3.0	<5.0	10.9	NA	546.8	NA	<20.0	<2.0	NA	NA	ND	<2.0	<6.0	
801.11.96	3.4	5.8	25.8	2.8	516.0	3.1	<5.0	11.4	NA	564.9	NA	<20.0	<2.0	NA	NA	ND	<2.0	<6.0	
801.11.99	<2.0	<2.0	6.0	<2.0	54.5	<3.0	<5.0	3.3	NA	63.9	NA	<20.0	<2.0	NA	NA	ND	<2.0	<6.0	
901.12.##	8.8	<2.0	<2.0	<2.0	9.4	<3.0	<5.0	<3.0	NA	9.4	NA	<20.0	<2.0	NA	NA	ND	<2.0	<6.0	
902.11.01	<2.0	2.6	4.8	<2.0	15.2	<3.0	<5.0	<3.0	NA	22.5	NA	<20.0	<2.0	NA	NA	ND	<2.0	<6.0	
902.22.03	<2.0	<2.0	<2.0	<2.0	<2.0	<3.0	<5.0	<3.0	NA	ND	NA	<20.0	<2.0	NA	NA	ND	<2.0	<6.0	
902.32.##	<2.0	<2.0	<2.0	<2.0	2.9	<3.0	<5.0	<3.0	NA	2.9	NA	<20.0	<2.0	NA	NA	ND	<2.0	<6.0	
904.10.##	<2.0	<2.0	<2.0	<2.0	7.6	<3.0	<5.0	<3.0	NA	7.6	NA	<20.0	<2.0	NA	NA	ND	<2.0	<6.0	
Station Number	alpha-HCH	beta-HCH	delta-HCH	gamma-HCH (Lindane)	Total HCH	Hepta-chlor	Hepta-chlor-epoxide	Hexa-chloro-benzene	Methoxy-chlor	Oxa-diazon	Ethyl Para-thion	Methyl Para-thion	PCB 1248	PCB 1254	PCB 1260	Total PCB	Toxaphene	Chemical Group A	
801.11.09	<1.0	<2.0	<2.0	<1.0	ND	<2.0	<1.0	0.7	<5.0	329.0	<2.0	<4.0	<25.0	71.0	14.0	85.0	81.4	102.1	
801.11.89	<1.0	<2.0	<2.0	<1.0	ND	<2.0	<1.0	<0.3	<5.0	<3.0	<2.0	<4.0	<25.0	39.0	<10.0	39.0	<20.0	ND	
801.11.96	<1.0	<2.0	<2.0	<1.0	ND	<2.0	<1.0	0.6	<5.0	59.6	<2.0	<4.0	<25.0	26.0	15.0	41.0	72.0	94.6	
801.11.96	<1.0	<2.0	<2.0	<1.0	ND	<2.0	<1.0	0.6	<5.0	62.7	<2.0	<4.0	<25.0	29.0	15.0	44.0	80.5	104.6	
801.11.99	<1.0	<2.0	<2.0	<1.0	ND	<2.0	<1.0	<0.3	<5.0	<3.0	<2.0	<4.0	<25.0	21.0	<10.0	21.0	<20.0	1.9	
901.12.##	<1.0	<2.0	<2.0	<1.0	ND	<2.0	<2.0	2.9	0.4	<5.0	41.9	<2.0	<4.0	<25.0	22.0	<10.0	22.0	<20.0	29.2
902.11.01	<1.0	<2.0	<2.0	<1.0	ND	<2.0	<1.0	<0.3	<5.0	5.2	<2.0	<4.0	<25.0	<10.0	<10.0	ND	<20.0	ND	
902.22.03	<1.0	<2.0	<2.0	<1.0	ND	<2.0	<1.0	<0.3	<5.0	<3.0	<2.0	<4.0	<25.0	<10.0	<10.0	ND	<20.0	ND	
902.32.##	<1.0	<2.0	<2.0	<1.0	ND	<2.0	<1.0	<0.3	<5.0	<3.0	<2.0	<4.0	<25.0	<10.0	<10.0	ND	<20.0	2.0	
904.10.##	<1.0	<2.0	<2.0	<1.0	ND	<2.0	<1.0	<0.3	<5.0	4.9	<2.0	<4.0	<25.0	21.0	<10.0	21.0	<20.0	1.6	

NA Means that the sample was not analyzed for the chemical.

ND Means that the chemical was not detected.

< Means that the chemical was not detected above the indicated limit of detection.

F = Filet.

W = Whole Body.

Species codes are listed in Table 3.

TABLE 2
Toxic Substances Monitoring Program
Preliminary Summary of 1999 Data: Organic Chemicals in Fish and Clams (ppb, wet weight)

Station Number	Station Name	Species Code	Tissue Type	Sample Date	Aldrin	alpha-Chloro-dene	cis-Chloro-dene	gamma-Chloro-dene	trans-Chloro-dene	cis-Nona-chlor	trans-Nona-chlor	Oxy-chloro-dene	Total Chloro-dane	Chlor-pyrifos	Dacthal			
904.21.02	Buena Vista Lagoon	LMB	F	08/25/99	<1.0	<1.0	<2.0	<1.0	<2.0	<2.0	<1.0	<1.0	ND	<2.0	<2.0			
904.31.##	Agua Hedionda Cr/El Camino Real	GAM	W	08/24/99	<1.0	<1.0	<2.0	<1.0	<2.0	<2.0	4.7	2.6	7.2	<2.0	<2.0			
904.51.03	San Marcos Cr	LMB	F	08/24/99	<1.0	<1.0	<2.0	<1.0	<2.0	<2.0	<1.0	<1.0	ND	<2.0	<2.0			
904.61.07	Escondido Cr/Elfin Forest Park	GSF	F	08/24/99	<1.0	<1.0	<2.0	<1.0	<2.0	<2.0	<1.0	<1.0	ND	<2.0	<2.0			
907.11.03	San Diego R/u/s Taylor St.	LMB	F	08/23/99	<1.0	<1.0	<2.0	<1.0	<2.0	<2.0	3.0	<1.0	3.0	<2.0	<2.0			
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Station Number	Dieldrin	o,p'	p,p'	o,p'	p,p'	o,p'	p,p'	p,p'	p,p'	Total Dicofol	Diazinon	Endo-sulfan I	Endo-sulfan II	Total Endo-sulfan	Endrin	Ethion		
	DDD	DDD	DDE	DDE	DDT	DDT	DDMU	DDMS	DDT	ND	NA	ND	ND	ND	<2.0	<6.0		
904.21.02	<2.0	<2.0	<2.0	<2.0	2.2	<3.0	<5.0	<3.0	NA	2.2	NA	<20.0	<2.0	NA	<2.0	<6.0		
904.31.##	<2.0	<2.0	3.3	<2.0	42.8	<3.0	<5.0	<3.0	NA	46.1	NA	<20.0	<2.0	NA	ND	<2.0	<6.0	
904.51.03	<2.0	<2.0	<2.0	<2.0	<2.0	<3.0	<5.0	<3.0	NA	ND	NA	<20.0	<2.0	NA	ND	<2.0	<6.0	
904.61.07	<2.0	<2.0	<2.0	<2.0	<2.0	<3.0	<5.0	<3.0	NA	ND	NA	<20.0	<2.0	NA	ND	<2.0	<6.0	
907.11.03	<2.0	<2.0	<2.0	<2.0	4.8	<3.0	<5.0	<3.0	NA	4.8	NA	<20.0	<2.0	NA	ND	<2.0	<6.0	
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Station Number	alpha-HCH	beta-HCH	delta-HCH	gamma-HCH	Total HCH	Hepta-chlor	Hepta-chlor	Hexa-chloro-	Methoxy-chlor	Oxa-diazon	Ethyl Para-thion	Methyl Para-thion	PCB 1248	PCB 1254	PCB 1260	Total PCB	Toxaphene Chemical Group A	
				(Lindane)		epoxide	benzene	chlorobenzene										
904.21.02	<1.0	<2.0	<2.0	<1.0	ND	<2.0	<1.0	<0.3	<5.0	<3.0	<2.0	<4.0	<25.0	<10.0	<10.0	ND	<20.0	ND
904.31.##	<1.0	<2.0	<2.0	<1.0	ND	<2.0	<1.0	<0.3	<5.0	<3.0	<2.0	<4.0	<25.0	<10.0	<10.0	ND	<20.0	7.2
904.51.03	<1.0	<2.0	<2.0	<1.0	ND	<2.0	<1.0	<0.3	<5.0	<3.0	<2.0	<4.0	<25.0	<10.0	<10.0	ND	<20.0	ND
904.61.07	<1.0	<2.0	<2.0	<1.0	ND	<2.0	<1.0	<0.3	<5.0	<3.0	<2.0	<4.0	<25.0	<10.0	<10.0	ND	<20.0	ND
907.11.03	<1.0	<2.0	<2.0	<1.0	ND	<2.0	<1.0	<0.3	<5.0	<3.0	<2.0	<4.0	<25.0	18.0	<10.0	18.0	<20.0	3.0

NA Means that the sample was not analyzed for the chemical.

F = Filet.

ND Means that the chemical was not detected.

W = Whole Body.

< Means that the chemical was not detected above the indicated limit of detection.

Species codes are listed in Table 3.

TABLE 3
 Toxic Substances Monitoring Program
 1999 Species Code List

Freshwater Fish *

Species Code	Common Name	Species Name	Family Name
AC	Arroyo Chub	<i>Gila orcutti</i>	Cyprinidae
BB	Brown Bullhead	<i>Ameiurus nebulosus</i>	Ictaluridae
BCR	Black Crappie	<i>Pomoxis nigromaculatus</i>	Centrarchidae
BG	Bluegill	<i>Lepomis macrochirus</i>	Centrarchidae
BK	Brook Trout	<i>Salvelinus fontinalis</i>	Salmonidae
BLB	Black Bullhead	<i>Ameiurus melas</i>	Ictaluridae
BN	Brown Trout	<i>Salmo trutta</i>	Salmonidae
CCF	Channel Catfish	<i>Ictalurus punctatus</i>	Ictaluridae
CP	Carp	<i>Cyprinus carpio</i>	Cyprinidae
GAM	Mosquitofish	<i>Gambusia affinis</i>	Poeciliidae
GSF	Green Sunfish	<i>Lepomis cyanellus</i>	Centrarchidae
LMB	Largemouth Bass	<i>Micropterus salmoides</i>	Centrarchidae
PCP	Prickly Sculpin	<i>Cottus asper</i>	Cottidae
PRS	Red Shiner	<i>Cyprinella lutrensis</i>	Cyprinidae
RBT	Rainbow Trout	<i>Oncorhynchus mykiss</i>	Salmonidae
RCH	California Roach	<i>Hesperoleucus symmetricus</i>	Cyprinidae
SKR	Sucker	<i>Catostomus sp.</i>	Catostomidae
SPM	Sacramento Pike Minnow	<i>Ptychocheilus grandis</i>	Cyprinidae
STB	Threespine Stickleback	<i>Gasterosteus aculeatus</i>	Gasterosteidae
TL	Tilapia	<i>Tilapia sp.</i>	Cichlidae

Marine Fish *

Species Code	Common Name	Species Name	Family Name
CKF	California Killifish	<i>Fundulus parvipinnis</i>	Cyprindontidae
ORC	Orangemouth Corvina	<i>Cynoscion xanthulus</i>	Sciaenidae
SSP	Shiner Perch	<i>Cymatogaster aggregata</i>	Embiotocidae
STF	Starry Flounder	<i>Platichthys stellatus</i>	Pleuronectidae
YFC	Yellowfin Croaker	<i>Umbrina roncador</i>	Sciaenidae

Non-Fish

Species Code	Common Name	Species Name	Family Name
TFC	Asiatic Clam (transplant)	<i>Corbicula manilensis</i>	Corbiculidae

* Common and scientific fish names were obtained from Robins, C.R., R.M. Bailey, C.E. Bond, J.R. Brooker, E.A. Lachner, R.N. Lea, and W.B. Scott. 1991. Common and Scientific Names of Fishes from the United States and Canada. American Fisheries Society Special Publication 20, Bethesda, Maryland.