

## Introduction

This water quality monitoring fact sheet was prepared by the Irrigated Agriculture Program of the Central Coast Regional Water Quality Control Board (Water Board) and made available on November 30, 2008. The data were delivered by Central Coast Water Quality Preservation, Inc. (CCWQP) to the Water Board as part of the monitoring and reporting requirements for all dischargers enrolled under *Conditional Waiver of Waste Discharge Requirements for Discharge from Irrigated Lands, Order No. R3-2004-0117*. Monitoring stations were selected to represent water quality in predominantly agricultural areas, but in some cases reflect mixed land uses upstream of the sites.

## 309CRR Chualar River Road

The Cooperative Monitoring Program sampled Chualar Creek at Chualar River Road 15 times (approximately one sample per month) between February 2005 and November 2007, with no samples in January, August through October, and December of any year.

## Summary of Water Quality Data

### Notable Measured Analytes for Water Quality Monitoring

Analyte/Parameter	Average	Range	Water Quality Criteria (WQC) or Guideline <sup>1</sup>	Percent Outside WQC or Guideline
Ammonia as N, Unionized	0.211 mg/L	0.001–1.4 mg/L	<0.025 mg/L <sup>+</sup>	67%
Nitrate/Nitrite as N	31.7 mg/L	5.9–50 mg/L	<10.0 mg/L*	92%
Orthophosphate as P	1.32 mg/L	0.01–2.40 mg/L	<0.12 mg/L*	92%
Turbidity (NTU)	1724 NTU	248–3000 NTU	<25 NTU*	100%
Conductivity	1.57 mmho/cm	0.25–2.70 mmho/cm	Ranges: <0.75 No Problem 0.75–3.0 Increasing >3.0 Severe	7% 93% 0%
pH	8.1	7.6–8.5	7.0–8.5 <sup>+</sup>	7%
Annual Median Dissolved Oxygen (% Saturation)	2005: 90% 2006: 78% 2007: 86%	40–104%	>85% annual median <sup>+</sup>	Std met Std not met Std met
Dissolved Oxygen	7.7 mg/L	4.0–10.7 mg/L	>5.0 mg/L ( <b>GEN/WARM</b> ) <sup>+</sup> >7.0 mg/L ( <b>COLD/SPWN</b> )*	7% 29%
Chlorophyll a	2.4 µg/L	0.2–6.6 µg/L	<40 µg/L*	0%
Water Temperature	18.3°C	12.0–27.3°C	Water Basin Specific	--

+ Indicates standard defined in the Water Quality Control Plan, Central Coast Basin (Basin Plan)

\* Indicates guideline not described in the Basin Plan or not specifically stated as applicable to the beneficial uses of the site. Origin of the guideline is described in the individual discussion of the analyte/parameter.

The present and potential beneficial uses for **Chualar Creek** are not specified in the Basin Plan. General Basin Plan water quality objectives will apply. Any analytes not specified under the general objectives in the Basin Plan are compared to a different water quality guideline to create a better understanding of the site's condition.

<sup>1</sup> Water Quality Criteria (WQC) are defined in the Water Quality Control Plan, Central Coast Basin (also referred to as the "Basin Plan") to protect beneficial uses such as drinking water, fish habitat, irrigation water, etc. WQC include general water quality standards for some analytes as well as specific criteria based on the defined beneficial uses. Other water quality guidelines were compiled to provide a standard in order to compare sites. Bold indicates beneficial uses that apply to this watershed.

## Unionized Ammonia (as N)

Unionized ammonia (as N) is a calculated value based on water temperature, pH, and total ammonium concentration. Ammonia can be toxic in water. With high water temperature and/or high pH, ammonia becomes unionized and is toxic at much lower levels. The Basin Plan general water quality objectives state that unionized ammonia shall not exceed 0.025 mg/L. Over time, ammonia should reduce to nitrate, so long-lasting levels of ammonia may indicate continuous discharges of waste. **Eight of 12 samples (67%) exceeded the standard. The high range of temperatures may have influenced the unionized ammonia concentrations. The average unionized ammonia concentration was 0.211 mg/L. However, the standard deviation was 0.390, indicating extreme (high and low) samples.**

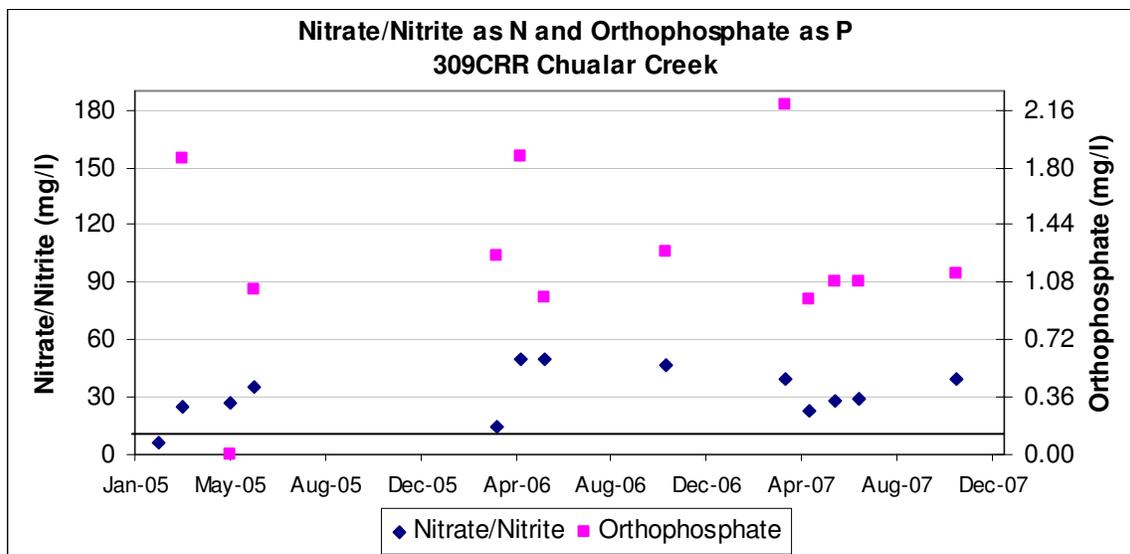
## Nitrate/Nitrite as N

The Municipal and Domestic Supply (MUN) objective states in Table 3-2 of the Basin Plan that nitrate as NO<sub>3</sub> shall not exceed 45 mg/L. This value is equivalent to 10 mg/L of nitrate as N. Nitrite accounts for a small percent of total nitrate/nitrite, and therefore, nitrate as N criterion was used as a guideline for nitrate/nitrite. **Twelve of 13 nitrate/nitrite samples (92%) exceeded the guideline. Nitrate/Nitrite levels are more than double the Basin Plan criteria in 11 out of the 12 exceeding samples. The average concentration over the two years was 31.7 mg/L (three times the guideline).**

## Orthophosphate as P

The Basin Plan does not contain orthophosphate standards. The Central Coast Ambient Monitoring Program (CCAMP) non-regulatory guideline for general water quality objectives states that orthophosphate concentrations shall not exceed 0.12 mg/L. **Orthophosphate concentrations exceeded the guideline in 12 of 13 samples (92%), by over 15 times in four cases. This means that if this water body were diluted by 15 times, these four samples would still not meet the guideline. The average concentration was 1.32 mg/L (over 10 times the guideline).**

The chart below shows the nitrate/nitrite and orthophosphate concentration levels throughout the sampling period. The guidelines for nitrate/nitrite as N and orthophosphate as P state that their concentrations shall not exceed 10 mg/L and 0.12 mg/L, respectively, shown by the black horizontal line on the graph.



## Turbidity

The Basin Plan states: “Water shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses.” Sigler et al.<sup>2</sup> shows that turbidity levels of 25 NTU or greater caused reduction in juvenile salmonid growth due to interference with their ability to find food. Turbidity is often affected by suspended material in runoff. **All 14 turbidity readings exceeded the guideline. Nine of the 14 samples were over 1000 NTU. Turbidity levels in Chualar Creek**

<sup>2</sup> Sigler, J.W., T.C. Bjornn, & F.H. Everst. (1984). *Effects of chronic turbidity on density and growth of steelhead and coho salmon*. Transactions of the American Fisheries Society. 113:142-150.

averaged 1724 NTU, ranging from 248 to greater than 3000 NTU. All readings exceeded the guideline by at least 10 times; some samples exceeded the guideline by over 120 times. This means water from Chualar Creek would need to be diluted with water from a clear water body over 120 times its size in order to reach a turbidity level that did not impair fish.

## Conductivity

Conductivity is measured from a water sample. Based on Table 3-3 of the Basin Plan showing Guidelines for Interpretation of Quality of Water for Irrigation, conductivity below 0.75 mmho/cm causes no problems to irrigation, between 0.75 and 3 mmho/cm causes increasing problems, and conductivity above 3 mmho/cm causes severe problems. The conductivity level can be greatly affected by geologic and biological influences and is not necessarily related to agricultural activities. **One of 14 conductivity samples (7%) indicated no problems to irrigation water; 13 samples (93%) indicated increasing problems; no samples indicated severe problems. The average remained below the midpoint of increased problems, 1.57 mmho/cm.**

## pH

Multiple beneficial uses have objectives for pH. The Basin Plan general water quality objective for pH is between 7.0 and 8.5; MUN, AGR, REC-1, and REC-2 pH objectives are between 6.5 and 8.3. The standard, therefore, is 7.0-8.3 if one or more of MUN, AGR, REC-1, and REC-2 is defined as a beneficial use. pH above 9 can cause skin irritation to humans and makes water inhospitable to many species. **Four of 14 pH samples (29%) exceeded the MUN, AGR, REC-1, REC-2 standard for pH, and one pH sample (7%) exceeded the GEN standard for pH. The pH levels at this site ranged from 7.65 to 8.62.**

## Dissolved Oxygen Concentration and Dissolved Oxygen Saturation

The Basin Plan general water quality objectives state annual median dissolved oxygen shall remain above 85% saturation. General and WARM objectives state that the dissolved oxygen concentration must remain above 5.0 mg/L at all times, and SPWN and COLD objectives state that the dissolved oxygen concentration must remain above 7.0 mg/L at all times. **One of 14 samples (7%) did not meet the general and WARM concentration standard, and four samples (29%) did not meet the COLD and SPWN concentration standard. Dissolved oxygen did not meet the saturation standard during 2006, with a median annual value of 78% saturation. The median annual values for 2005 (90%) and 2007 (86%) met the standard for dissolved oxygen saturation. Samples indicate decreasing dissolved oxygen saturation levels from 2005 to the lowest level in 2007, excluding a spike during April of each year.**

## Chlorophyll a

Healthy and appropriate Chlorophyll a levels are not defined in the Basin Plan. Chlorophyll a indicates phytoplankton growth, a necessary component of healthy water bodies. Because turbidity causes interference for the Chlorophyll a probe, measurements of chlorophyll a may not be accurate when turbidity is above 1000 NTU. **At Chualar Creek, turbidity averaged 1724 NTU. Therefore, Chlorophyll a readings are almost entirely estimates, ranging from 0.2 to 6.6 µg/L.** Chlorophyll a levels over 40µg/L are considered problematic by North Carolina Administrative Code (NCAC).

## Temperature

Though the Basin Plan does not define whether Chualar Creek is a cold water or warm water habitat, the majority of Salinas' water bodies is considered cold water and is steelhead trout habitat. Sullivan et al.<sup>3</sup> state that the maximum weekly average temperatures for protection of steelhead or rainbow trout, and coho salmon are 19.6 and 19.7°C, respectively. **The temperature averaged 18.3°C and ranged from 12.0 to 27.3°C. Though weekly averages were not taken, the temperatures taken at this site indicate averages that may regularly exceed the maximum temperatures for fish protection.**

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<sup>3</sup> Sullivan, K., D.J. Martin, R.D. Cardwell, T.E. Toll, & S. Duke. (2000). *An analysis of the effects of temperature on salmonids of the Pacific Northwest with implications for selecting temperature criteria*. Portland, OR: Sustainable Ecosystems Institute

## Summary of Toxicity Data

### Species with Significant Mortality

	Feb-05	Mar-05	May-06	Apr-07
Invertebrate (Water Column)	Yes <sup>+</sup>	Yes <sup>+</sup>		
Invertebrate (Sediment)			Yes	Yes
Fish (Water Column)	No	No		
Algae (Water Column)		Yes		

<sup>+</sup>Indicates complete mortality within 24 hours of test initiation

Significant effect is determined by statistically significant rates of mortality, growth, or reproduction compared to a control sample and provides an indication that something is affecting plant or animal life in the stream. Invertebrates show significant sensitivity to organophosphates and pesticides. Significant effect to algae often indicates the presence of herbicides and metals such as copper. Fish are less sensitive to organophosphates but can be impacted by other pollutants such as ammonia and pyrethroid pesticides.

### Photos of Site



February 2006

### QAQC

The data in this water quality monitoring fact sheets meet the quality assurance and quality control requirements of the Water Board's Surface Water Ambient Monitoring Program (SWAMP). Additional surface water monitoring data are available at the Water Board's Central Coast Ambient Monitoring Program website <http://www.ccamp.org>. Any questions regarding the data or analysis should be directed to either **Peter Meertens** at [pmeertens@waterboards.ca.gov](mailto:pmeertens@waterboards.ca.gov) (805) 549-3869 or **Amanda Bern** at [abern@waterboards.ca.gov](mailto:abern@waterboards.ca.gov) (805) 594-6197.

### Attachment: Monitoring Data

Site Tag	Chualar Creek													
309 CRR	Beneficial Uses: Not Specified													
	Ammonia as N, Unionized	Chlorophyll a	Conductivity	Instantaneous Flow	Nitrate/Nitrite as N	N/N / STD	Orthophosphate as P	OP / STD	Oxygen, Dissolved	Oxygen, Saturation	pH	Turbidity	T / STD	Water Temp
Units	mg/L	µg/L	mmho/cm	CFS	mg/L	none	mg/L	none	mg/L	%		NTU	none	°C
Feb-05			1.148						9.87	98	8.28	247.5	10	14.9
Feb-05		<b>1.69</b>	0.251	0	5.9	0.59	2.40	20.0	7.5	70	7.77	2881	115	12.0
Mar-05	0.0935	<b>1.34</b>	0.774	2.91	25	2.5	1.86	15.5	7.69	85	8.09	3000	120	20.1
May-05	0.0947	<b>0.47</b>	2.208	2.08	27	2.7	0.01	0.0	7.03	90	8.37	*3000	120	27.3
Jun-05	0.1550	<b>1.55</b>	2.027	0.08	35	3.5	1.03	8.6	8.47	97	8.30	2468	99	21.6
Apr-06	0.0249	<b>0.19</b>	1.043	0.20	14.4	1.44	1.25	10.4	10.73	104	8.32	3000	120	13.9
May-06	0.0125	3.51	2.150	2.95	50	5	1.87	15.6	5.99	70	8.14	1075	43	23.2
Jun-06	1.4001	<b>0.73</b>	1.526	0.34	49.7	4.97	0.99	8.2	7.02	85	8.07	3000	120	24.8
Nov-06	0.0292	<b>1.17</b>	1.175	0.05	46.3	4.63	1.26	10.5	6.29	67	7.84	3000	120	18.7
Apr-07	0.0074		2.704	3.11	39.3	3.93			9.34	94	8.52			15.0
Apr-07		3.25		0.00			2.19	18.2				335.6	13	
May-07	0.3433	2.63	1.092	0.03	22.8	2.28	0.97	8.0	3.99	40	7.64	340	14	15.9
Jun-07	0.2754	6.34	0.976	0.04	28.4	2.84	1.09	9.1	6.22	62	7.71	679	27	15.7
Jul-07	0.0966	6.63	2.233	0.17	29	2.9	1.08	9.0	7.79	87	8.33	409	16	20.5
Nov-07	0.0010	<b>1.92</b>	2.666	0.18	39.6	3.96	1.14	9.5	9.29	86	7.60	1983	79	12.0
Average	0.211	2.4	1.57	0.9	31.7		1.32		7.7	Below	8.1	1724		18.3
St. Dev.	0.390	<b>2.1</b>	0.76	1.3	13.3		0.63		1.8		0.3	<b>1216</b>		4.8
Maximum	1.400	6.6	2.70	3.1	50.0		2.40		10.7	104	8.5	3000		27.3
Minimum	0.001	0.19	0.25	0.0	5.9		0.01		4.0	40	7.6	248		12.0
Standard	<0.025	<40	<0.75		<10		<0.12		>7		7-8.5	<25		
%Outside	67%	0%	7%		92%		92%		29%		7%	100%		
Standard 2			>3.0	DO Annual Median					>5		7-8.3			
%Outside			0%	Year	Median	Meet Criteria			7%		29%			
				2005	90%	Yes								
				2006	78%	No								
				2007	86%	Yes								
indicates times exceeding standard														