

## 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.

## 309JON Salinas Reclamation Canal at San Jon Road

The Cooperative Monitoring Program sampled the Salinas Reclamation Canal at San Jon Road 37 times (One sample per month) between January 2005 and December 2007, with an additional sample in February 2005.

## 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	0.019 mg/L	0.001–0.227 mg/L	<0.025 mg/L <sup>+</sup>	19%
Nitrate/Nitrite as N	15.1 mg/L	1.9–69.1 mg/L	<10.0 mg/L*	48%
Orthophosphate as P	0.47 mg/L	0.00–1.06 mg/L	<0.12 mg/L*	97%
Turbidity (NTU)	164 NTU	3–807 NTU	<25 NTU*	86%
Conductivity	1.03 mmho/cm	0.02–1.83 mmho/cm	Ranges: * <0.75 No Problem 0.75–3.0 Increasing >3.0 Severe	% in Range: 30% 70% 0%
pH	8.3	7.4–9.1	7.0–8.3 <sup>+</sup>	46%
Annual Median Dissolved Oxygen (% Saturation)	2005: 93% 2006: 64% 2007: 100%	27–228%	>85% annual median <sup>+</sup>	Std met Std not met Std met
Dissolved Oxygen	8.3 mg/L	2.7–18.4 mg/L	>5.0 mg/L (GEN/WARM) <sup>+</sup> >7.0 mg/L (SPWN/COLD)*	14% 32%
Chlorophyll a	11.1 µg/L	0.5–120 µg/L	<40 µg/L*	6%
Water Temperature	17.1°C	8.9–26.2°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 **Salinas Reclamation Canal** as defined in the Basin Plan include Water Contact Recreation (REC-1), Non-Contact Water Recreation (REC-2), Wildlife Habitat (WILD), Warm Fresh Water Habitat (WARM), and Commercial and Sport Fishing (COMM).

## 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

<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.

mg/L. Over time, ammonia should reduce to nitrate, so long-lasting levels of ammonia may indicate continuous discharges of waste. **Seven of 36 samples (19%) exceeded the standard. The five highest exceedances occurred between the months of June and August. The average unionized ammonia concentration was 0.019 mg/L.**

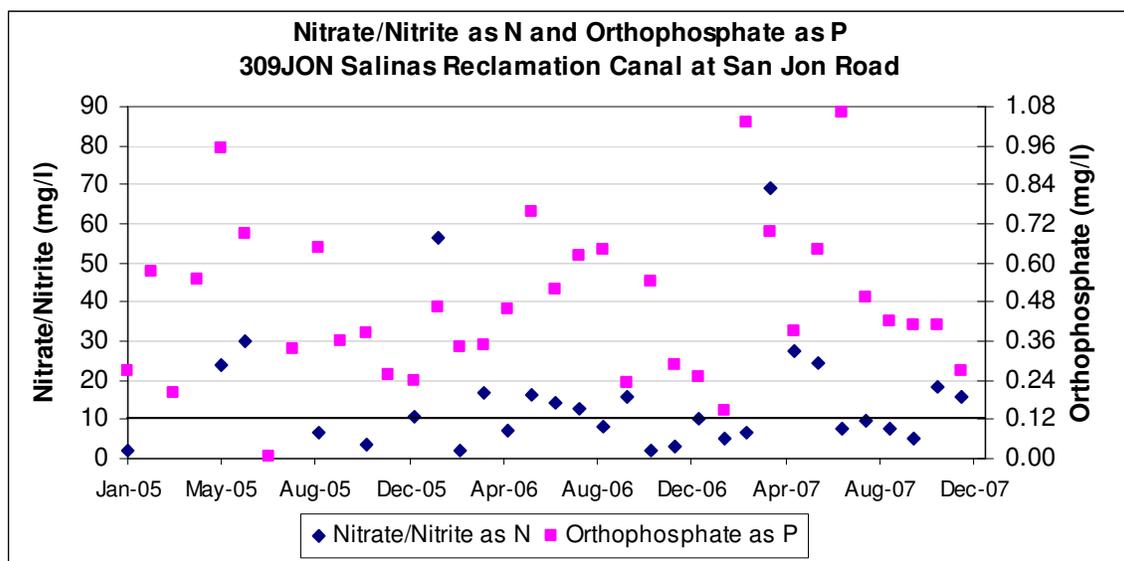
### Nitrate/Nitrite as N

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. **Fourteen of 29 nitrate/nitrite samples (48%) exceeded the guideline. Five of the six samples that exceeded 20 mg/L occurred between the months of April and June.**

### 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 35 of 36 samples (97%), ranging from one sample with an undetectable level to 1.06 mg/L (almost nine times the guideline). The four highest exceedances occurred between the months of March and June. The average concentration was 0.47 mg/L.**

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. **Thirty-two of 37 turbidity readings (86%) exceeded the guideline. Turbidity levels in the Salinas Reclamation Canal at San Jon Road averaged 164 NTU (over 6.5 times the guideline). The number of extreme exceedances (over 250 NTU) decreases from 2005 to 2007, with no readings in 2007 exceeding 250 NTU compared to four readings exceeding 250 NTU in 2005 and again in 2006.**

### Conductivity

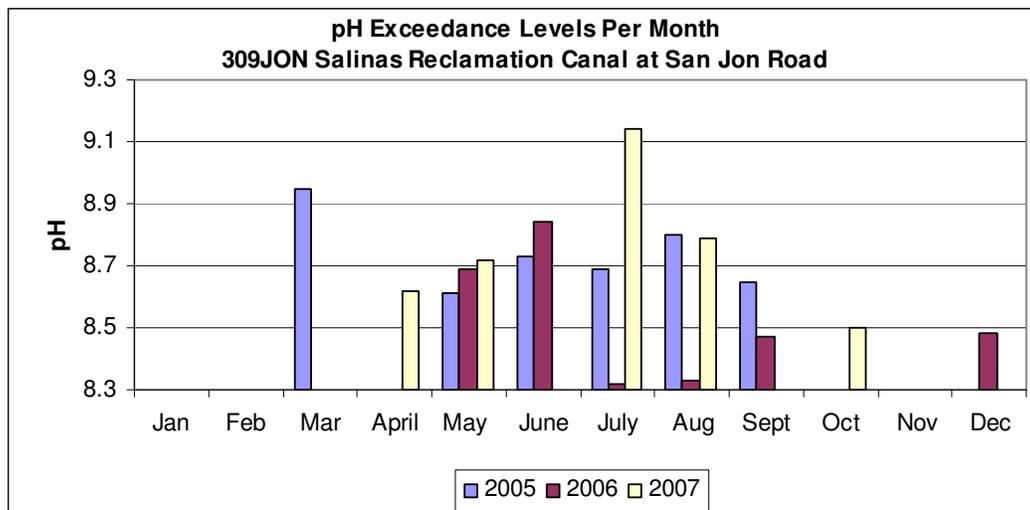
Conductivity is measured from a water sample. Based on Table 3-3 of the Basin Plan showing Guidelines for Interpretation of Quality of Water for Irrigation, conductivity below 0.75 mmho/cm causes no problems to irrigation,

<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.

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. **Eleven of 37 conductivity samples (30%) indicated no problems to irrigation water; 26 samples (70%) indicated increasing problems; no samples indicated severe problems.**

## 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. **Seventeen of 37 pH samples (46%) exceeded the standard, reaching as high as 9.1. Eight of the nine highest exceedances occurred between May and August, with 13 of the 17 exceedances occurring between May and September.**



The chart above displays pH levels above 8.3 by month, showing that pH exceeded the standard more often between April and September than during the remaining months.

## 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. **Five of 37 samples (14%) did not meet the general and WARM concentration standard. Dissolved oxygen did not meet the saturation standard during 2006, with a median annual value of 64% saturation. The median annual values for 2005 (93%) and 2007 (100%) met the standard for dissolved oxygen saturation.**

**Though no standards have been set in the Basin Plan regarding dissolved oxygen supersaturation (>100%), studies have shown that supersaturation of gases may cause gas bubble trauma in fish<sup>3</sup>. Dissolved gas saturation levels were not collected at this site; however, oxygen levels reached 228% saturation, which may indicate dissolved gas supersaturation.**

## 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. Chlorophyll a levels over 40µg/L are considered problematic by North Carolina Administrative Code (NCAC). **Two of 36 Chlorophyll a readings (6%) exceeded the guideline. The two samples that were in exceedance were measured in July and August 2005, the same months as the highest and fifth highest ammonia exceedances. Chlorophyll a may be a concern in this water body if the right conditions, such as high ammonia and other factors, occur at the same time.**

<sup>3</sup> Mesa, M.G., L.K. Weiland, & A.G. Maule. (2000). *Progression and severity of gas bubble trauma in juvenile salmonids*. Transactions of the American Fisheries Society. 129:174-185.

## Temperature

Sullivan et al.<sup>4</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 17.1°C and ranged from 8.9 to 26.2°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.**

## Summary of Toxicity Data

### Species with Significant Mortality

	Feb-05	Mar-05	Apr-05	Jul-05	Sep-05	Feb-06	May-06	Aug-06	Sep-06	Feb-07	Mar-07	Apr-07	Oct-07
Invertebrate (Water Column)	Yes <sup>+</sup>	Yes <sup>+</sup>		Yes <sup>&amp;</sup>	Yes <sup>&amp;</sup>	Yes		Yes <sup>+</sup>	Yes	Yes	Yes		No
Invertebrate (Sediment)			Yes				Yes					Yes	
Fish (Water Column)	No	No*				No		No	No	No	No		No
Algae (Water Column)	Yes	No				No		No	No	No	Yes		No

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

<sup>&</sup>Indicates complete mortality within 96 hours of test initiation

\*Indicates significant effect on growth or reproduction (even though mortality did not have a significant effect)

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



July 2006



February 2006

<sup>4</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.

## **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

SiteTag	Salinas Reclamation Canal at San Jon Road													
309 JON	Beneficial Uses: REC1, REC2, WILD, WARM, COMM													
		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	Water Temp
Units		mg/L	µg/L	mmho/cm	CFS	mg/L	none	mg/L	none	mg/L	%		NTU	°C
1/26/2005	Jan-05	0.0125	3.45	0.211		2.1	0.2	0.270	2.3	7.90	78	8.01	419.5	14.4
2/16/2005	Feb-05	0.0125		0.294						7.17	71	7.7	807	15.4
2/22/2005	Feb-05		3.49	0.438	64.7			0.573	4.8	7.67	77	7.61	476.9	15.3
3/21/2005	Mar-05	0.0125	30.22	0.660	4.6			0.200	1.7	12.56	127	8.95	131	16.3
4/11/2005	Apr-05	0.0286	4.26	0.825	9.8			0.550	4.6	8.40	93	7.77	272	20.6
5/24/2005	May-05	0.0125	0.66	1.334	5.6	24.1	2.4	0.950	7.9	11.70	133	8.61	133	21.6
6/28/2005	Jun-05	0.0125	13.59	1.282	4.0	30.0	3.0	0.691	5.8	10.28	117	8.73	22.7	21.6
7/27/2005	Jul-05	0.2268	120	1.358	5.1			0.004	0.0	10.42	121	8.69	23	22.5
8/30/2005	Aug-05	0.0349	45.53	1.341	3.2			0.334	2.8	11.20	123	8.8	61.6	19.7
9/27/2005	Sep-05	0.0526	21.95	1.438	3.4	6.6	0.7	0.645	5.4	9.01	98	8.65	43.5	19.3
10/25/2005	Oct-05	0.0121	18.54	0.019	2.2			0.363	3.0	4.57	46	7.65	27.4	15.6
11/29/2005	Nov-05	0.0057	4.89	1.052	35.3	3.4	0.3	0.386	3.2	7.14	66	7.75	220.4	12.2
12/13/2005	Dec-05	0.0019	5.3	1.283	1.2			0.259	2.2	6.84	61	8.02	33.3	10.6
1/24/2006	Jan-06	0.0050	2.91	0.898	2.8	10.7	1.1	0.240	2.0	10.38	92	8.15	112.9	9.8
2/22/2006	Feb-06	0.0037	19.86	1.090	7.4	56.3	5.6	0.462	3.9	6.05	59	8	598	14.3
3/29/2006	Mar-06	0.0116	2.36	0.293	91.7	1.9	0.2	0.340	2.8	6.22	61	8.24	480	13.9
4/25/2006	Apr-06	0.0086	8.65	1.199	5.2	17.0	1.7	0.348	2.9	5.06	50	7.81	51.8	15.0
5/24/2006	May-06	0.0125	21.33	0.888	10.2	7.2	0.7	0.458	3.8	8.07	97	8.69	86.3	25.3
6/27/2006	Jun-06	0.0523	1.24	1.162	12.0	16.5	1.7	0.756	6.3	7.51	85	8.84	58	20.9
7/25/2006	Jul-06	0.0045	4.99	1.231	56.9	14.3	1.4	0.518	4.3	5.64	68	8.32	29.9	24.3
8/23/2006	Aug-06	0.0125	4.81	1.227	33.5	12.9	1.3	0.620	5.2	7.15	82	8.33	20.5	22.1
9/27/2006	Sep-06	0.0071	4.15	1.467	15.2	7.9	0.8	0.640	5.3	4.53	48	8.47	21.9	18.1
10/24/2006	Oct-06	0.0043	1.36	1.757	3.7	15.7	1.6	0.231	1.9	2.67	27	7.97	3.3	16.4
11/14/2006	Nov-06	0.0048	1.47	0.185	101.3	2.1	0.2	0.544	4.5	5.28	53	7.85	265.7	15.5
12/12/2006	Dec-06	0.0172	5.14	0.371	50.6	2.9	0.3	0.288	2.4	7.46	67	8.48	256.6	11.1
1/30/2007	Jan-07	0.0048	0.51	0.637	3.7	10.0	1.0	0.251	2.1	4.53	42	7.38	115.2	11.9
2/14/2007	Feb-07	0.0026	1.47	0.649	3.4	5.1	0.5	0.147	1.2	6.71	68	8.15	202.4	16.5
3/21/2007	Mar-07	0.0278	1.2	0.607	1.4	6.9	0.7	1.030	8.6	4.93	49	7.71	235.2	15.2
4/5/2007	Apr-07	0.0139	4.77	1.666	0.9	69.1	6.9	0.697	5.8	9.33	95	8.62	51.7	16.0
5/29/2007	May-07	0.0124	4.18	1.166	2.2	27.7	2.8	0.391	3.3	10.03	108	8.72	73.3	18.7
6/26/2007	Jun-07	0.0042	1.73	1.354	4.2	24.6	2.5	0.642	5.4	7.42	78	8.15	41.9	17.6
7/23/2007	Jul-07	0.0064	14.46	1.335	1.7	7.8	0.8	1.060	8.8	18.36	228	9.14	101.6	26.2
8/28/2007	Aug-07	0.0404	12.16	1.476	1.8	9.8	1.0	0.495	4.1	12.07	139	8.79	163.5	22.1
9/25/2007	Sep-07	0.0012	1.83	1.010	1.8	7.5	0.8	0.423	3.5	10.92	120	8.17	85.6	20.5
10/23/2007	Oct-07	0.0058	2.7	1.378	0.4	5.0	0.5	0.408	3.4	10.39	105	8.5	111.1	16.2
11/27/2007	Nov-07	0.0054	1.25	1.826	0.8	18.3	1.8	0.409	3.4	11.93	109	8.29	96.5	11.3
12/16/2007	Dec-07	0.0036	1.42	1.704	1.3	15.9	1.6	0.268	2.2	9.52	82	8	144.2	8.9
Average		0.019	11.1	1.03	15.8	15.1		0.47		8.3	Below	8.3	164	17.1
Standard Deviation		0.038	21.1	0.48	26.1	15.4		0.24		3.0		0.4	181	4.4
Minimum		0.001	0.5	0.02	0.4	1.9		0.00		2.7	27	7.4	3.3	8.9
Maximum		0.227	120	1.83	101.3	69.1		1.06		18.4	228	9.1	807	26.2
Standard		<0.025	<40	<0.75		<10		<0.12		>7		7-8.3	<25	
%Outside		19%	6%	30%		48%		97%		32%		46%	86%	
Standard 2				3						>5	Median Annual DO %			
%Outside				0%						14%	Year	Median	Meet Criteria	
Temp increasing over time, with annual cycles also											2005	93%	Yes	
Ammonia spike and chlorophyll spike at same time											2006	64%	No	
OP speak in May-July except one in March (3/4 between May and July)											2007	100%	Yes	
Turbid higher in Febs, not with highest flows indicates times exceeding standard														