Cooperative Monitoring Program

nutrient monitoring results

Nutrient Water Quality Symposium, Santa Maria

Central Coast Water Quality Preservation, Inc.
Executive Director: Kirk Schmidt (831-750-5449, kschmidt@ccwqp.org)
Program Manager: Sarah Greene (831-331-9051, sgreene@ccwqp.org)

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Water Quality Constituents

- Water temperature
- pH
- Dissolved Oxygen
- Conductivity
- Salinity
- Turbidity
- Chlorophyll
- Dissolved Solids

Hydrolab instrument
(image from www.hydrolab.com)

- Nitrogen
  - Nitrate
  - Ammonia
  - Ammonium

- Phosphorus
  - Orthophosphate

- Toxicity
  - Water (4x/yr)
  - Sediment (1x/yr)

- Organophosphate pesticides
  - Lower Salinas & Santa Maria only
  - 4x only

Water samples to lab
(image from www.co.water.usgs.gov)
Components of Ag Runoff

- Fertilizer (*nitrate, ammonium, phosphate*)
- Pesticides (*toxicity*)
- Sediment (*turbidity*)

Effects of Ag Runoff

- Algae growth (*Chlorophyll, % algal cover*)
- Low oxygen (*dissolved oxygen*)
Santa Maria Watershed Sites

- **Core CMP, monthly since 2005**: Red circle
- **2008 Follow-up, monthly in ’08**: Blue circle

Key Sites:
- **3120FN - Little Oso Flaco Creek**
- **3120FC - Oso Flaco Creek**
- **2008 - Oso Flaco Lk Rd & Hwy 1**
- **2008 - Division & Bonita School**
- **2008 - Cso Flaco Creek @ Hwy 1**
- **2008 - Santa Maria R @ Hwy 1**
- **312RC - Orcutt-Solomon Creek near mouth**
- **312ORI - Orcutt-Solomon @ Hwy 1**
- **312GVS - Green Valley @ Simas**
- **D12DCJ - Diolley Canal**
- **3128CC - Bradley Canyon Creek**
- **2008 - Orcutt-Solomon @ Black Rd**
- **2008 - "Mahoney Dip"**
- **2008 - Orcutt-Solomon @ Solomon Rd**

*Continuous Flow Summer, 2008*
Santa Barbara Creeks

= core CMP, monthly since 2006  
= 2008 Follow-up, monthly in '08
Cooperative Monitoring results are compared with existing regulatory criteria, set by the Regional Water Quality Control Board (RWQCB).

Different criteria apply, depending on the Beneficial Uses of the water body. The Beneficial Uses are also set by the RWQCB.

For example, most water bodies have the beneficial use “Municipal and Domestic Supply,” which says the water quality must be suitable for a potential drinking water source.

Basin Plan criteria for Municipal/Domestic Water Supply: <10 ppm
Nitrate Results for Southern Sites
(averages of all monthly samples, Jan ’05 or ’06 – Dec ’07)

- Sta Maria/Oso Flaco
- Sta Ynez & SB Creeks
- SLO Creeks

Nitrate Concentration (ppm as N)

Basin Plan criteria for Municipal/Domestic Water Supply: <10 ppm
Monthly nitrate results from three SLO/SB sites in 2006

Nitrate Concentration (ppm as N)

- Arroyo Grande
- Orcutt-Solomon
- Santa Ynez @ Floradale

Jan-06 | Feb-06 | Mar-06 | Apr-06 | May-06 | Jun-06 | Jul-06 | Aug-06 | Sep-06 | Oct-06 | Nov-06 | Dec-06
End Part I:
Intro to CMP and Nitrate Monitoring

... Questions?
Begin Part II: Ammonia, Phosphate, and Indirect Effects
Un-Ionized Ammonia Results, SLO & SB Sites
(averages of all monthly samples, Jan ’05 or ’06 – Dec ’07)

Sta Maria/Oso Flaco
Sta Ynez & SB Creeks
SLO Creeks

Numeric objective for protection of aquatic life < 0.025 ppm
“Un-ionized” Ammonia

Ammonia is found in water in several forms. The water’s pH and temperature affect the balance between ionized (NH4+) and un-ionized ammonia (NH3), which are both dissolved, inorganic forms of ammonia.

Higher pH = More un-ionized ammonia (NH3), which is toxic to fish. Water quality objective is < 0.025 ppm NH3-N.
Monthly un-ionized ammonia results from two SLO/SB sites in 2007

- Main St. Ditch: 0.30, 0.31
- Sta Ynez: 0.94

 Numeric objective for protection of aquatic life < 0.025 ppm
Monthly un-ionized ammonia results from Green Valley (Green Canyon) at Simas, 2005-2007

Numeric objective for protection of aquatic life < 0.025 ppm
Phosphate Results, SLO & SB Sites
(averages of all monthly samples, Jan ’05 or ’06 – Dec ’07)

- Sta Maria/Oso Flaco
- Sta Ynez & SB Creeks
- SLO Creeks

Phosphate Concentration (ppm)

Main St. Ditch
Sta Ynez Floradale
Bradley Cyn Crk
Sta Ynez Vandenburg
Bradley Channel
Los Berros Creek
Chorro Creek
Orcutt Hwy1
Orucc @ Dunes Pk
Sta Maria Estuary
Oso Flaco
Arroyo Grande
Green Valley
Warden Creek
L. Oso Flaco
Franklin Creek
Prefumo Creek
Sta Maria Hwy1
Sta Ynez River Pk
Glen Annie
Bell Creek
Arroyo Parodon
Indirect Effects of Nutrients in Runoff: Low (and high) Dissolved Oxygen

Numeric objective for protection of aquatic life >85%
Take Home Points

• Fertilizers in farm runoff can lead to high nitrate, phosphate, and/or ammonia levels in streams.

• Some Cooperative Monitoring sites have consistently high levels of nutrient-related constituents
  – Others do not.

• Direct effects of nutrients in streams:
  – Toxicity to fish from high un-ionized ammonia
  – Water not suitable as drinking water source, due to potential illness from night nitrates

• Indirect effects of nutrients in streams:
  – Stimulation of aquatic algae, which affects dissolved oxygen levels, which affects habitat for fish and other aquatic organisms

• All of these constituents can come from non-ag sources too.
  – The only way to know if your operation is contributing is to test the runoff.
END