Stream Team Quarterly Newsletter

Volume 1 **Goleta Edition** **October 2003**

Welcome to the first edition of the Stream Team Quarterly Newsletter!
To keep our volunteers better informed, we are starting a quarterly newsletter to be handed out at monthly sampling events. This newsletter will include 3 regular sections each month (data summary, featured parameter, and featured site) as well as any special news or events. The newsletters will also be posted on our website, so you can view any issues that you may have missed. We hope this newsletter will help you to better understand the "how, why, what, and where" of Stream Team. We welcome your comments and suggestions!

This quarter's Featured Site: AT1 Atascadero at Ward Drive

Where is it?
Atascadero Creek, combining four major tributaries (Atascadero, Cieneguitas, Maria Ygnacio and San Jose creeks), runs from east to west through Goleta into the Goleta Slough. If you bicycle along the Coast Route, you will recognize Atascadero Creek, which runs adjacent to the bike path for several miles. We sample several sites on this creek; AT1 is the lowermost, the closest to the Slough and ocean. To get there from Hollister Rd., turn towards the ocean on Ward Drive. Go all the way to the end of Ward Drive and park on the side of the road. Walk past the road barrier and across the bike path, and Atascadero Creek will be straight in front of you. Our sampling site is a short distance to your left (upstream), above the small concrete dam.

What is unique about this site?
Atascadero is the largest creek in the Santa Barbara area and the greatest exporter of nutrients and sediment into the ocean. At AT1, we sample above a small concrete dam, separating fresh creek water from the tidal influenced and brackish Goleta Slough (the term "brackish" refers to a mixture of salt and fresh water). This is the end point of Atascadero's route to the ocean and sampling here allows us to evaluate its total contribution. With additional sampling sites upstream, we can also monitor how water quality is affected throughout the creek's passage through urban development in Goleta and Santa Barbara. There is appreciable agricultural use along the creek between AT1 and the next upstream sampling location at Patterson. Comparing these two sites helps evaluate any agricultural inputs and the affect of the small concrete dam (which turns this section of the creek into a long skinny lake).

Site AT1 flowing heavily after a storm

Results at this site:
Ponded water behind the concrete dam at AT1 usually encourages the growth of algae and plants. This tends to increase turbidity and cause noticeable daily fluctuations in dissolved oxygen. Ducks and other wildlife using the "pond" cause high bacteriological counts, but this is the only site in the Goleta survey that meets California swimming standards for enterococcus. Nutrients tend to be very low during summers (lots of uptake by plants and algae), but very high in winter (urban and agricultural storm runoff). Conductivity and dissolved solids are far above drinking water standards due to chemical interactions within the thick sediments that lay at the bottom of the ponded area.

Featured Parameter: Turbidity

What is Turbidity?

Turbidity is a measure of the amount of suspended particles in the water. Algae, suspended sediment, and organic matter particles can cloud the water, making it more turbid. The easiest way to think about turbidity is to ask: how clear is the water? If water is very clear, that means the turbidity is very low. The more cloudy or dirty, the higher the turbidity.

Why is it Important?

High turbidity levels can have many negative impacts on a creek or river. Here are some examples:

- Suspended particles can block sunlight from reaching algae in the water, decreasing photosynthesis.
- Suspended particles can also absorb heat, raising the temperature of the water.
- Suspended sediments can clog the gills of fish, making it difficult for them to breathe.
- When suspended sediments settle to the bottom, they can smother fish eggs and insects that live in the bottom of the creek.
- Suspended sediments can also carry pathogens, pollutants, and nutrients.

How do we measure Turbidity?

There are several methods for measuring turbidity. The method we use at Stream Team is a Turbidity Meter (also called a nephelometer). We fill up a clear tube with a water sample, and place it inside the meter. The meter shoots a beam of light through the sample, and measures how much the light is scattered. As the amount of suspended particles increases, more light is scattered and the turbidity readings increase. The units for turbidity are nephelometric turbidity units, or NTUs.

What factors affect Turbidity?

Natural Factors:

- High concentrations of microscopic algae caused by elevated nutrient levels
- Suspended sediment from erosion and sediment transport
- Seasonal weather, especially large storm events

Human Factors:

- Erosion due to removal of vegetation, land grading, stream alterations, etc.

Excessive nutrient loading

What are expected turbidity levels?

Expected turbidity levels vary according to the type of water body being monitored. This table shows what can be expected in 4 different situations:

Water Type	Expected Turbidity Levels
Groundwater	< 1 NTU
Water bodies with moderate plant and animal life	1-10 NTU
Water bodies enriched with nutrients, supporting much planktonic life	10-50 NTU
Winter storm flows in creeks and rivers	20-1000 NTU

We would generally place our Stream Team sites in the second category down, meaning that we should expect turbidity levels to be between 1-10 NTU.

Stream Team turbidity results

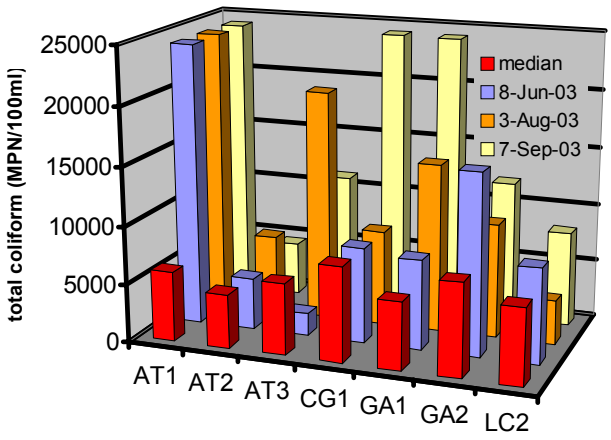
Good news! In both Ventura and Goleta Stream Teams, we typically find very low turbidity levels, between 0 and 5. Many sites, particularly in Ventura, consistently read a perfect 0.0 NTU! During major storm events, however, these levels can climb drastically. For example, in May 2003, we sampled during a storm and found turbidity levels so high that they were out of the range of our meters! The highest level that our meters were able to read on this day was 756 NTU. WOW! That's high!

Last Quarter's Data

July, August, and September 2003

Every month, Stream Team volunteers collect data on the Ventura River and Goleta Creeks. But what does this data mean? In this section, we will share with you our results, as well as an explanation of what we think these results mean. Because there is too much data to fit into this newsletter, we have decided to include only the information that we felt would be most interesting and meaningful to our volunteers. However, if your thirst for Stream Team data is not quenched in this section, please visit our new Stream Team website where you can view ALL the data that we have collected since the program began! (Note that the Stream Team website is being created as we speak, so please be patient– we hope to have it up and running in the next couple of months!)

Bacteria: Total Coliform

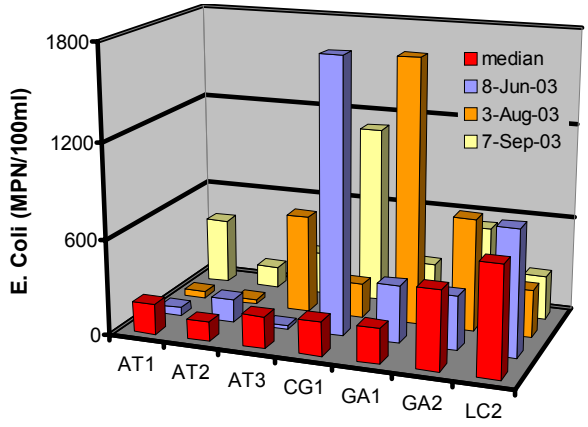


Each month, Stream Team collects samples at each site which we take back to our laboratory and analyze for bacterial content. One of the types of bacteria we test for is total coliform, which is one of the oldest standard tests for bacteriological contamination.

Coliforms are a family of bacteria, rarely harmful in themselves, found in the intestines (and fecal matter) of mammals. Unfortunately, they are also found in soil and plant material so high numbers may not actually indicate contamination. Direct tests for disease causing bacteria and viruses are difficult and expensive, and rarely done. Instead, easy and inexpensive to test for organisms are used to indicate "*possible pathways of contamination*." Numerous studies have shown that there is a relationship between the numbers of various indicator bacteria and human disease and infection. Based on these studies, the state and other regulatory bodies have established allowable limits of indicator bacteria, depending on the type of aquatic recreational activity. The unit of measure used in the figure is the "*most probable number*" (MPN) of bacteria in 100 ml (about 4 ounces) of water – we use a statistical test instead of directly counting bacteria so the actual number represents an estimate. The basic California limits for total coliform (these vary somewhat with location) are no more than 10,000 per 100 ml in a single sample test, no more than 1000/100 ml in an average of 5 or more weekly samples (this gets complicated so we wouldn't bother going into more details – just think "no more than 10,000 in a single sample, and an average of less than 1000"). As you can see from the figure, only AT2 and LC2 never exceeded the 10,000 limit this summer, and *all* of the samples have been much greater than 1000. The red boxes, identified as "median," represent long-term average values at each site over the 15 months of Stream Team testing. The "median" is the half-way value – half the samples were above this number, half below it; when you have occasional very high or very low values the median is a better estimate of what we might call "the average" than an actual average.

Al Leydecker takes a sample for bacterial analysis

Bacteria: E. Coli



The second indicator bacteria we test for is E. Coli. This is a type of coliform bacteria usually restricted to the guts of mammals (E.Coli is a more precise version of an older "fecal coliform" test) and as such is considered a better indicator of possible contamination. California's "average of 5 or more samples" limit is 126 and the single sample limit varies from 235 to 500 depending on intensity of use (235 for beach areas, 500 for occasional use). Again, this varies somewhat by location and the average referred to is not a simple arithmetic average but a geometric average – if you are truly interested, ask about it on the next sampling date. The red boxes are again the long-term "average value" for the site – only AT1 (barely) and AT2 have median values below the 200 limit. All sites, except AT2, have summer samples above the 500 single sample limit.

Volunteers from IV Surfrider test samples for bacteria

Goleta Stream Team Information

Goleta Stream Team is a program of Santa Barbara Channelkeeper . For more information, please contact us or visit our website:
www.sbck.org
(805) 563-3377 x3

Other Stream Team News

2004 Stream Team Dates Announced!

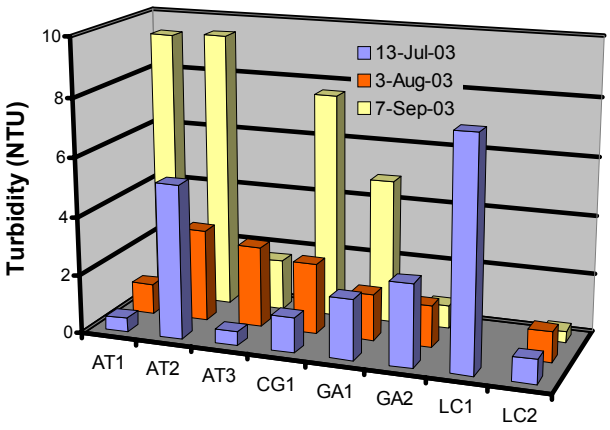
As usual, Goleta Stream Team will be held the first Sunday of every month, with the exception of holiday weekends and a few others! Please mark your calendar with the following dates:

January 11 February 8 March 7 April 4
May 2 June 6 July 11 August 8
September 12 October 3 November 7
December 5

New Stream Team Website on the way!

We are currently working on a new Stream Team website. This website will include maps, photos, site descriptions, answers to basic water quality questions, and an interactive database! It is still in the works, but we hope it will be up and running in the next month or so. So please be patient, and keep checking **www.sbck.org** for new and exciting updates! Special thanks to Mark Lim and Brice Loose for putting the website together.

Turbidity



Outside of the rainy season, turbidity levels are usually low. AT1 and CG1 show a pattern of increasing values with time – probably due to the formation of a biological "soup" (dense colonies of floating bacteria and microscopic algae) as the season progressed at these stagnant locations. Only GA2 exhibits the decreasing pattern we might expect as slower flows reduce the amount of sediment the creek can carry, and reduce the possibility of sediment being eroded or stirred up from river bottom or banks. Variation at the other sites probably indicates the difficulty of collecting a valid sample without stirring up the bottom at very low and shallow flows.