

# WATER QUALITY ISSUES

## Number Two in a Series of Five Tracking the Source: Where is all this pollution coming from?

By Mara Dias

As surfers and beach goers who care about the environment, we are becoming increasingly aware of water quality issues that affect our favorite beaches. Our coastal towns are growing and development brings not only more homes and businesses to our neighborhoods, but also more pollution. Coastal watersheds are affected by failing septic systems, sewage leaks, pet waste, agriculture, large populations of birds and other wildlife.

The B.E.A.C.H. Act of 2000 has prompted most states to develop beach water quality monitoring programs to protect human health. Decisions, based on a measurement of bacteria that indicate the presence of illness-causing pathogens, are made by local health departments to issue swimming advisories or close beaches. Once a beach closure sign is posted, however, the responsibility of most health agencies ends, leaving local citizens to ask: "Where is all this pollution coming from?"

The difficulty with determining the sources of beach water pollution is that the indicator bacteria that are measured, typically *Enterococcus* or *e.coli*, are present in the gut of all warm-blooded animals. The methods approved by the EPA for beach monitoring do not differentiate between bacteria from animal sources, such as cow manure or pet waste, from human-based sources such as leaking sewer systems. Fortunately, there are technologies developing that can distinguish the sources of fecal pollution in a watershed. Source tracking methods can be separated into groups of related technologies.

Genetic methods are based on identifying a genetic 'fingerprint', or distinct DNA pattern, of the fecal bacteria from a known source in the watershed and comparing it to the bacteria in polluted water. To perform a source tracking study, samples of fecal matter from human and animal sources throughout the watershed are taken, and distinct genetic fingerprints are isolated from the bacteria from each source. The bacteria present in the receiving coastal waters are then compared to the known sources.

Genetic fingerprinting identifies the sources of fecal pollution and can determine their relative contribution to the pollution problem. For instance,

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The Charleston Chapter making Dog Rockets. Design by Bubba Hutto.

a study of the Tualatin River Basin in Oregon revealed that birds were responsible for approximately 50% of the pollution. Other sources were identified as rodent (16%), dog (13%), human (4%), wildlife (6%), cat (1%), and 9% unknown. As a result of this study, the local government began an aggressive public education program to make people aware of the consequences of feeding ducks and other birds (Clean Water Services, 2005).

Other source tracking methods compare the physiological differences that bacteria have acquired from different animal hosts. For instance, the bacteria present in humans have a greater resistance to antibiotics than those from animals. While not as specific as genetic methods, antibiotic resistance analysis can be used to distinguish pollution from human, livestock, and wildlife sources.

Other types of methodologies identify human viruses or chemicals such as caffeine or laundry detergent to indicate human sources of pollution. These methods are most useful in urban areas to identify sewer spills.

So, if the technology is available, why aren't more coastal cities doing source-tracking studies? The answer is pretty simple. Microbial source tracking is expensive. Most methods require expensive equipment and a high level of technical expertise.

This shouldn't discourage chapters who want to help solve water quality problems at their local beaches. After a source tracking study of the Atlantic Intracoastal Waterway near Charleston, S.C. identified domestic pet waste as the major source of fecal pollution, the Charleston Chapter designed and installed plastic bag dispensers, *Dog Rockets*, at each public access on Folly Beach.



Public access at Folly Beach, N.C.

MARTY MORGANELLO

Read more at <http://surfrider.org/charleston/projects.php#water>



Pismo Beach.

JENNIFER JOZWIAK



Storm water outfall discharging into Nye Creek, Oregon.

CHARLIE PLYBON

In response to high bacteria counts and beach closures at Stinson Beach, Calif., the Marin County Chapter partnered with the County to commission a source tracking study. The study showed that the National Park Service Golden Gate Recreation Area was discharging wastewater into the ocean. The chapter notified the local press and has continued to work with the County to convince the National Park Service to upgrade their on-site septic systems.

Further down the coast, the San Luis Bay Chapter noticed an interesting trend when they evaluated three years of water quality data from Pismo Beach. Higher levels of bacteria were detected during the dry summer months



CHARLIE PLYBON

Newport volunteer collects a water sample for the Chapter's Blue Water Task Force water quality monitoring program.

than during the wet winter season. The Chapter brought this to the attention of the City, who responded by forming a Pismo Beach Water Quality Group. This Group has already improved the public notification system of beach closures at Pismo Beach and has applied for a state grant to fund a source tracking study.

Similarly, the Newport Chapter in Oregon approached the City of Newport with their Blue Water Task Force data demonstrating a problem with bacterial pollution in Nye Creek and Nye Beach. The City formed an ad-hoc committee and improved their public notification protocol. Nye Beach was also included in the State's Beach Monitoring Program for the first time. The Chapter has now formed its own research committee to seek match funding to pay for a source tracking study in the Nye Creek Watershed.

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**To view this full-length article please visit [www.surfrider.org/makingwaves](http://www.surfrider.org/makingwaves).**

#### References

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Clean Water Services. 2005. DNA Fingerprinting of Bacteria Sources in the Tualatin Sub-basin.

## Electricity from the Oceans

There is research occurring throughout the world that is focusing on renewable sources of energy from the oceans. Projects are being developed to tap into the incredible amounts of energy carried by the ocean's tides, waves and winds. They are spurred on by the threat of global climate change and the need to reduce our input of greenhouse gases to the atmosphere from the burning of fossil fuels. While potential growth in this area is exciting, there are still many environmental risks, which need to be addressed as these new technologies grow. To learn more about this check out our article on "Alternative Energy" in our **Coastal A-Z** section of the Surfrider Foundation web site.

**Coastal A-Z** provides a valuable collection of educational articles on a wide variety of topics about our coasts and oceans. You can find it under the "What We Do" heading on the web site, or directly at [www.surfrider.org/whatwedo4b.asp](http://www.surfrider.org/whatwedo4b.asp)