

Water Quality and Mission Bay

Ken Schiff

www.sccwrp.org

Tonight's Topics

- Lists of pathogens and diseases from swimming in contaminated water
- The big picture of monitoring to protect your health
- Some details about how monitoring is done and used
- Some interesting twists

Risks From Swimming Related Exposures

(Bertram and Rees 2000)

PATHOGENIC AGENT	DISEASE
Bacteria	
<i>Escherichia coli</i> (<i>E. coli</i>)	Gastroenteritis
<i>Salmonella</i> (not typhi)	Gastroenteritis, usually with fever; less commonly septicemia (generalized infection - organisms multiply in the bloodstream)
Some strains of Shigella	Gastroenteritis, usually with fever
Protozoa (Intestinal Parasites)	
Cryptosporidium	Diarrhea - Cryptosporidiosis
<i>Giardia lamblia</i>	Diarrhea - Giardiasis
Viruses	
Rotavirus	Gastroenteritis
Enteroviruses	Respiratory infection, rash, fever, meningitis
Norwalk and Norwalk-like viruses	Gastroenteritis
Adenovirus	Respiratory infection and gastroenteritis
Hepatitis A (outbreaks associated with eating shellfish from sewage-contaminated water)	Infectious hepatitis (liver malfunction)

Some Perspectives

- 175 million beachgoers per year in So Cal
 - More than FL, HI, and NJ...combined
- Over \$3M spent on monitoring our beaches
 - 80,000 samples per year
- One of the best notification systems in the nation
 - On beach signage, county notifications, web report cards



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other links

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San Diego Beach Status

(Redirected from [Beach Monitoring](#))

Current Beach Status (May 10, 2011)

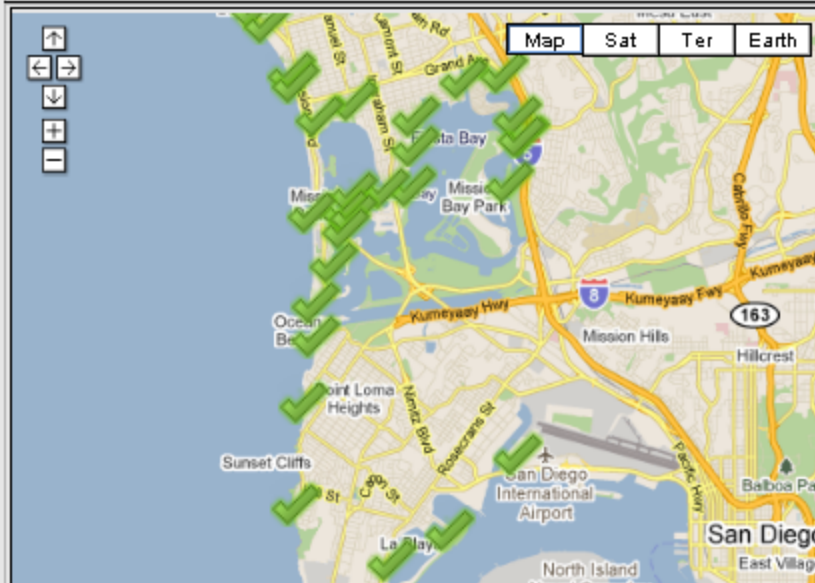
Contents [\[hide\]](#)

- 1 [Current Beach Status \(May 10, 2011\)](#)
- 2 [Beach Status](#)

Beach and Bay Status Report - Water quality closures and advisories for San Diego County Beaches [Department of Environmental Health](#)

Signs warning of contaminated water are posted at the locations listed below the interactive map.

Supported by



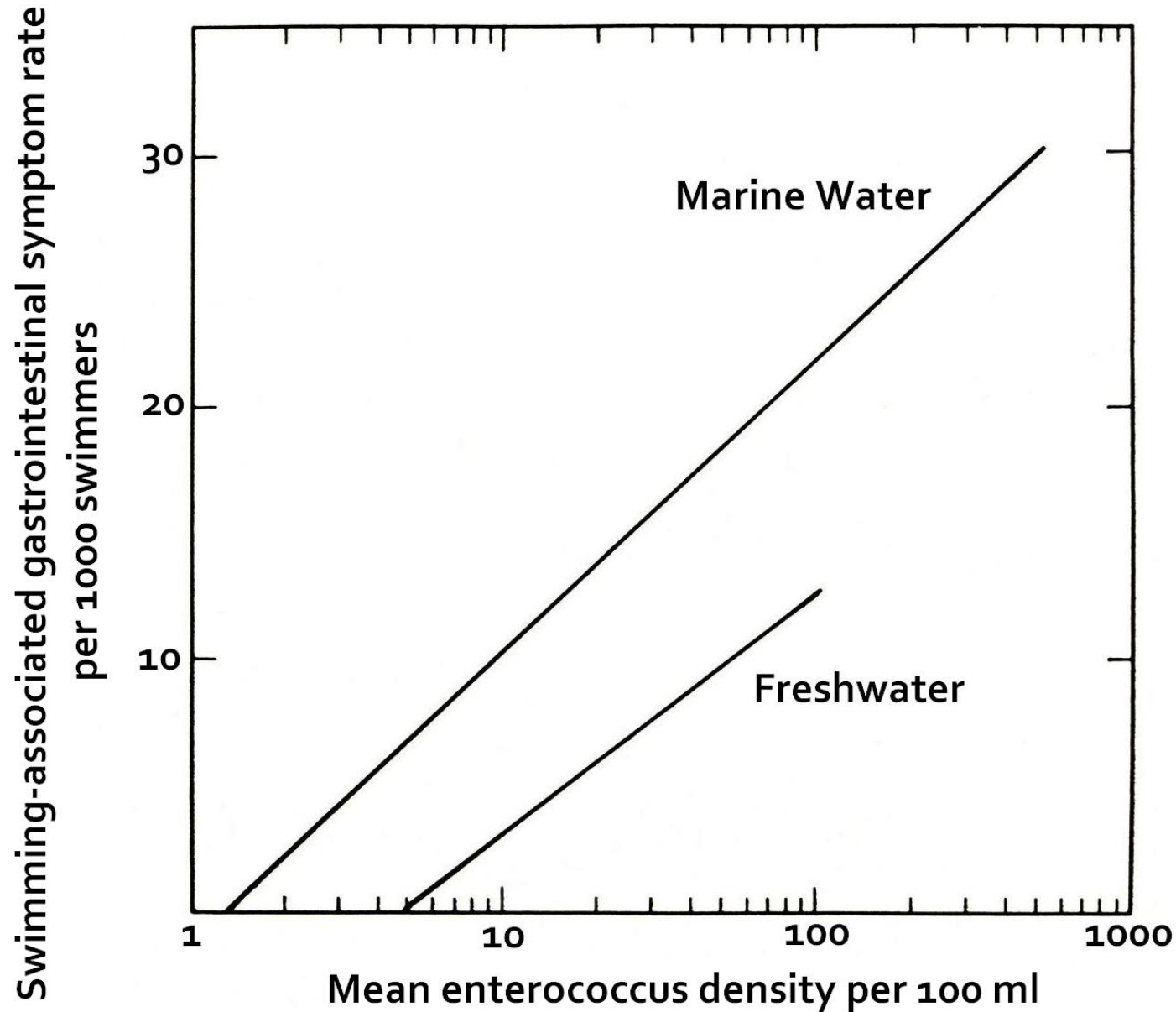
How Do We Monitor?

- Fill up a sterilized water bottle
- Filter and place in a petri dish with growth media
- Incubate at same temperature as your gut for a day
- Count the colonies that grow on the petri dish

What Exactly Is Measured?

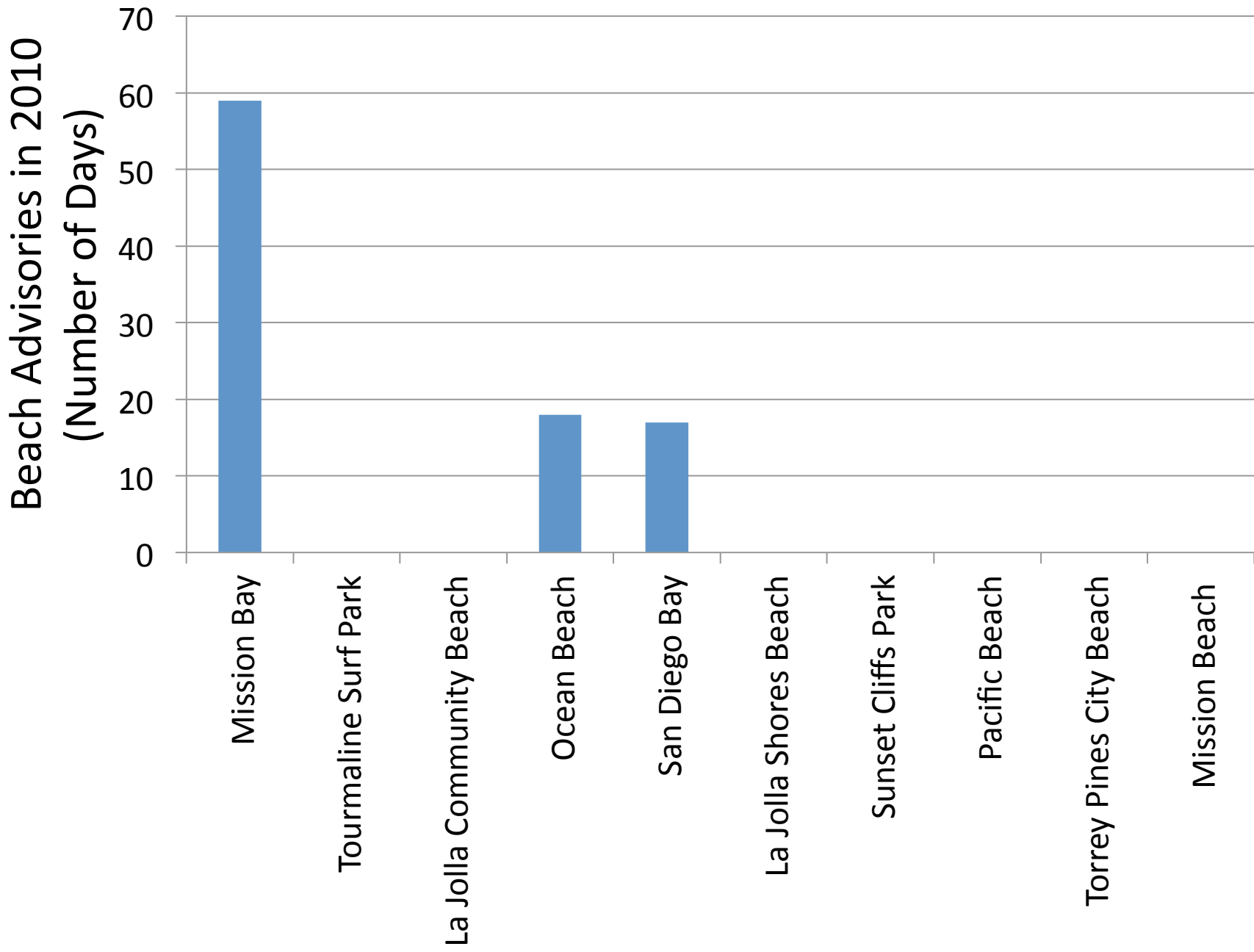
- Fecal indicator bacteria
 - Total coliform, fecal coliform, *Enterococcus*
- FIB don't make you sick
 - Supposed to covary with human pathogens
- Epidemiology studies make the link between FIB and illness

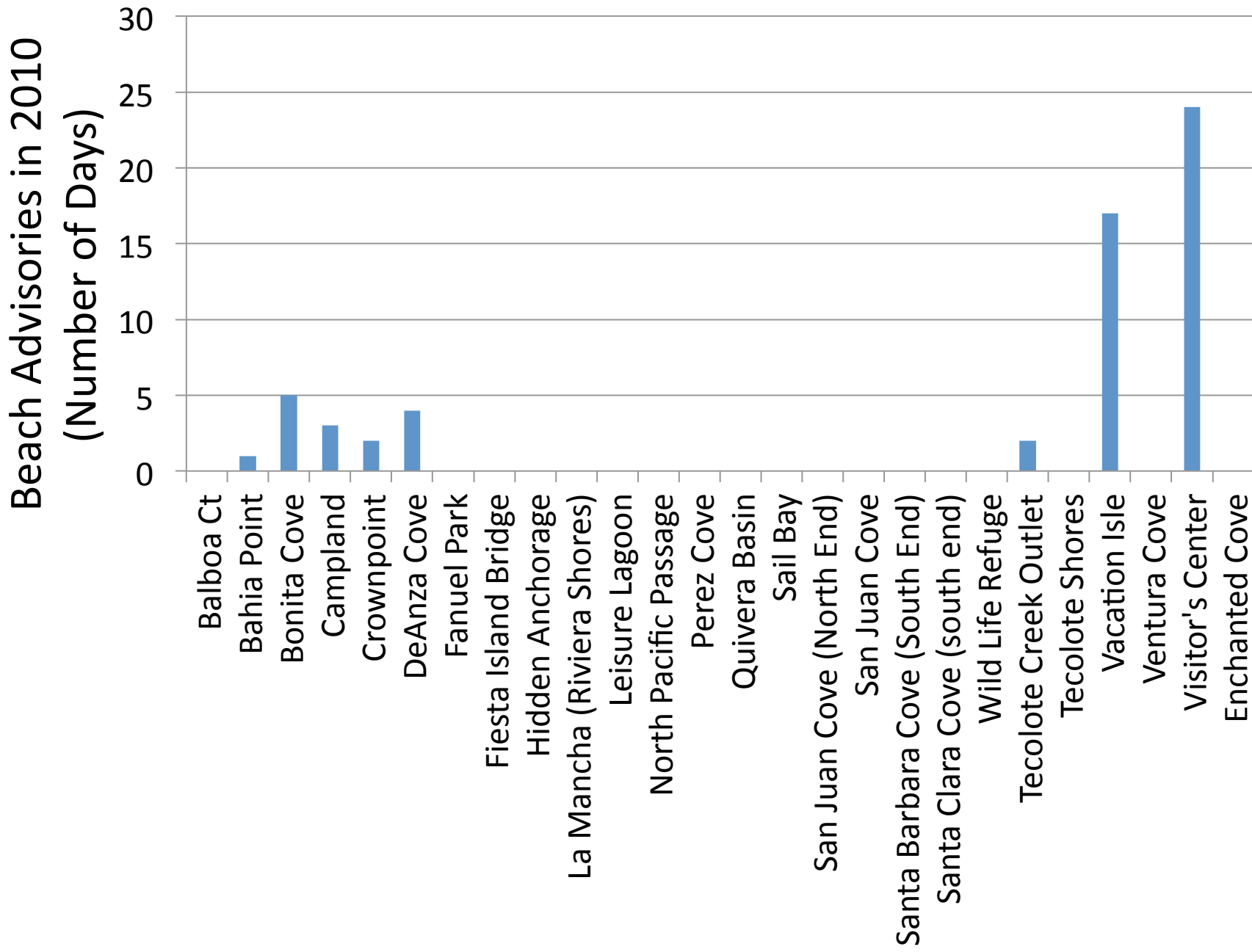
From EPA Criteria Development Document (1986)



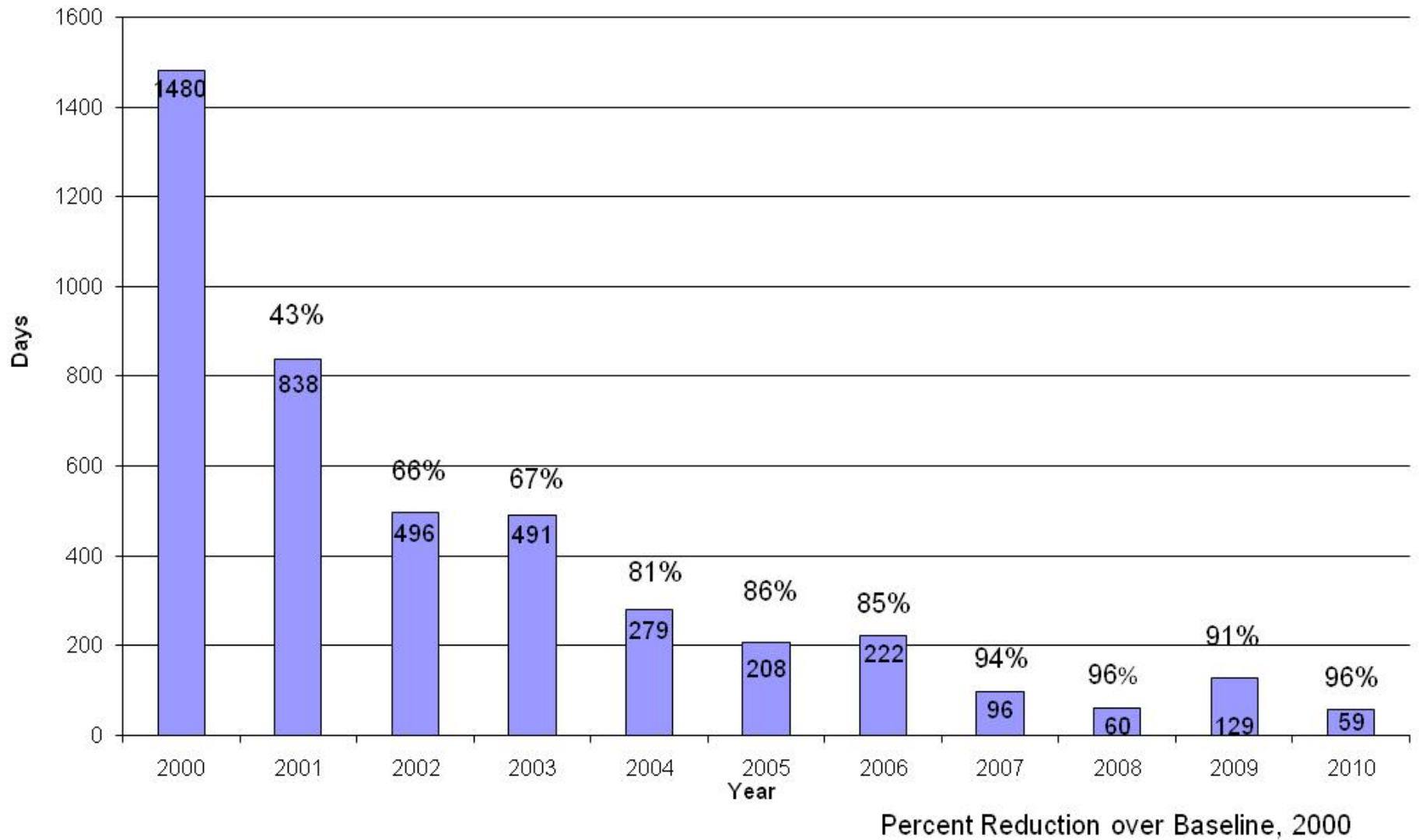
How Are Data Used?

- City SD monitors 151 coastal sites
 - 26 sites in Mission Bay
- Submit the data to Public Health Dept
 - Evaluate for health risk
- Submit to the State's Regional Water Quality Control Board
 - Compliance with California's water quality laws





Mission Bay Beach Postings and Closures



Summary Of Mission Bay Water Quality Monitoring

- Mission Bay had more swimmer advisories than any City SD beach in 2010
- Mission Bay advisories in 2010 were limited to a small number of Mission Bay beaches
- The number of Mission Bay advisories has been declining dramatically over the last decade

Some Interesting Twists

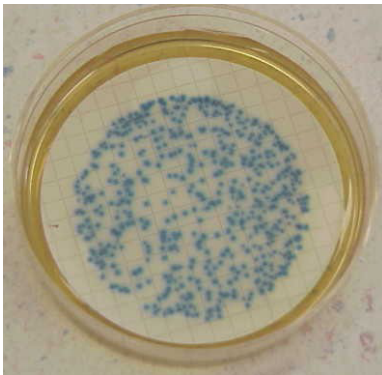
- Current methods used for measuring fecal indicator bacteria are too slow
- Current methods for measuring fecal indicator bacteria are non-specific
- There was an epidemiology study conducted in Mission Bay during 2003

SPEED MAKES A DIFFERENCE



Beachgoers feel protected

The Problem



Results in 24-96 hours



Reality

The Solution

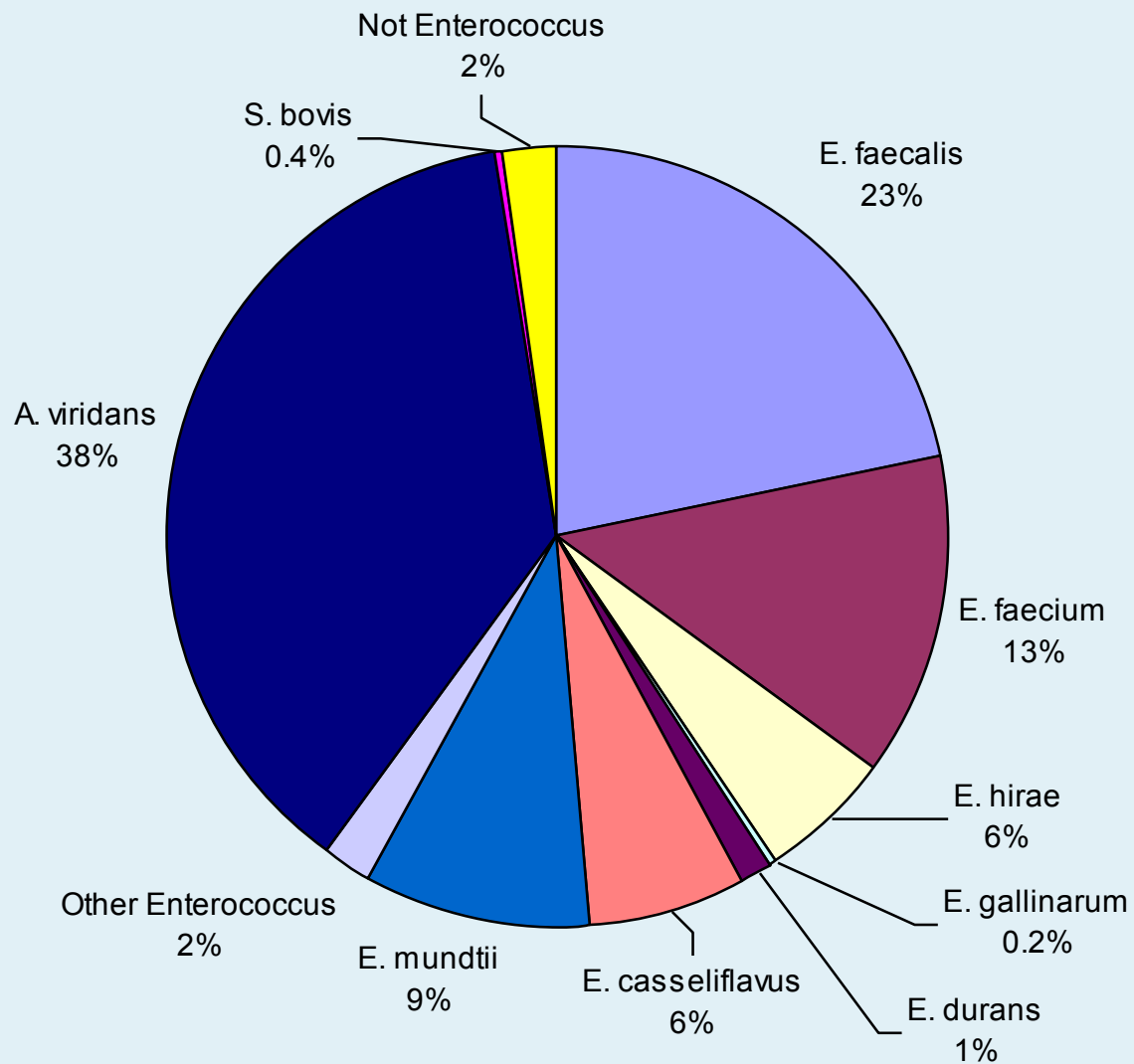


Results in 2 hours

Electronic Signage Improves Risk Communication



Avalon Epidemiological Study
***Enterococcus* Species Distribution Avalon Bay (n=539)**



Adjusted Odds Ratio

Any Water Contact

Gastrointestinal

1.29 Diarrhea

1.11 Cramps

0.96 Highly Credible GI (1)

0.90 Highly Credible GI (2)

0.85 Nausea

0.83 Vomiting

Respiratory

0.97 Signif Respiratory Dis

0.82 Sore throat

0.73 Cough

Miscellaneous

****1.97 Rash**

1.26 Eye irritation

1.08 Fever

1.00 Earache

0.42 Ear Discharge

**** Statistically
significant
at $p < 0.05$**

Monitoring Challenges For The Future

- Implement the new technology to speed monitoring results to the public
- Use new technology to help identify sources of greatest risk
- Develop new water quality criteria that predicts actual risk