What to do with the Enterococci Standard?

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Other Sources of Enterococci

It's the wetlands, it's the birds, it's the sand, it's the groundwater

- It's not the Wetlands
  - Decades of research show wetlands remediate pollution (sink, not a source)
  - Municipalities use wetlands to treat domestic waste – daily functioning proof.
  - Only one study concludes wetlands generate enteric bacteria, and that was refuted by further study of the same system by the same researchers.
- It's not the Birds
  - Birds do add fecal matter, but the impact is in small restricted water bodies (ponds & bays).
  - Majority of beaches have birds and the majority are clean.
  - If the birds, then wetlands would have the worst water quality – but they don't.
- It's not the Sand
  - Majority of beaches are sand beaches and the majority are clean.
  - Can post excretion growth generate Ent. levels of 400 cfu for open ocean beaches?
  - **BUT IF TRUE:**
  - Must assume other bacteriological pathogens (*Strep*., *Staph*., *E.coli, pseudomonas, Salmonelia, eramones*, etc.) are also growing, and the risk is elevated
    - not a false positive
    - Sand can not be a selective growth media for only benign indicator bacteria.
- It's not the Ground Water
  - Purified freshwater pumped underground to combat saltwater intrusion can not be a source.
- It is the people

Applicability to California Beaches

1: EPA studies conducted in the presence of domestic waste
2: The Mission Bay Study says it doesn't work

- Santa Monica Bay study found Enterococci to be the best indicator
  - low flow urban runoff from relatively small watersheds.
- Four meta-analysis all agree on Enterococci for marine waters
  - *Saliba*, 1990; *Pruss*, 1998; *Zmirou*, 2003; *Wade*, 2003
- Some So. Cal. beaches can be affected by domestic sewage.
  - Urban runoff contains raw waste from degrading infrastructure
  - 75% LA rivers' dry weather flow is treated sewage. 30% for SG River.
- Mission Bay Study:
  - Their conclusion: "it is difficult to extrapolate this finding beyond Mission Bay"… "or beyond our study conditions"
  - They found risk increased between swimmers vs. non-swimmers, so there was pollution in the water and elevated risk – and the system did not detect it.

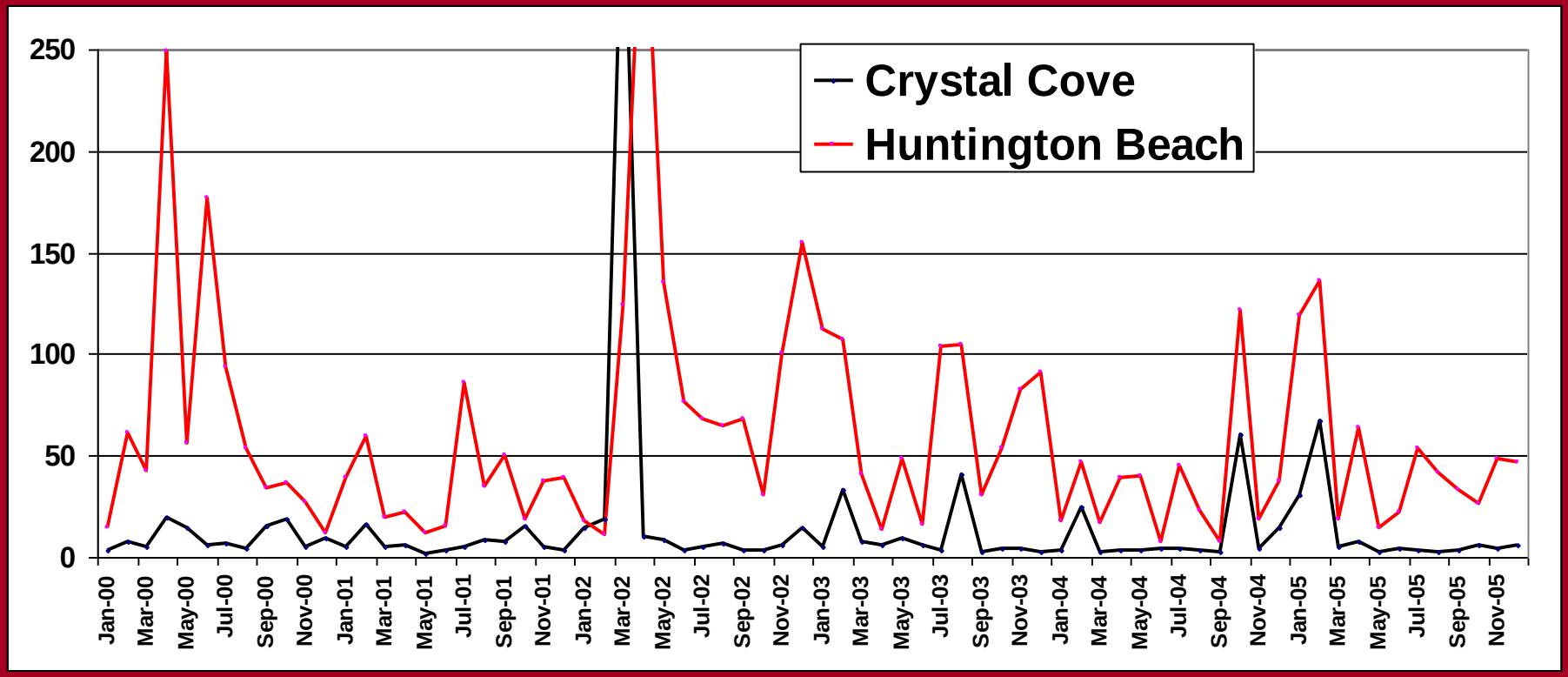
Variability of Bacteria Levels

1: Bacteria levels fluctuate with time and tides
2: Results take too long to be of any value

- Phenomena occurs at polluted beaches
  - Majority of beaches are clean with low variation
- Variation between beaches (and seasons) validates the monitoring system
- Tidal effect is a sampling artifact
  - tides do not affect growth of enteric bacteria
- Testing takes too long
  - Delay becoming moot with advancements in rapid testing

Mean Monthly Enterococci Levels

2000 - 2005



Both beaches have sand, birds, groundwater, tides, kelp

How to Improve the System

- Reevaluate the “acceptable illness rate”
  - 1.9% risk rate HCGI is too high
    - EPA’s Cabelli reported they “expected local officials would want small risks of illness and, hence, would promulgate more more restrictive standards”
    - The result: 1 million GI illnesses per year (LA & OC) resulting in $36 million in health costs. *(Given, 2006)*
      - Illnesses occurred when beaches were open
      - Is this acceptable? A question that needs further discussion
- Current monitoring system underestimates risk
    - Bacteria underestimate risk from viruses
    - Cabelli dose/response curve underestimates risk
      - Kay/Fleisher model more appropriate
    - Accumulative risk higher from respiratory, eye, ear and skin inf.
    - Children more susceptible than adults
      - Should be the target population (50% of user population)

Summary

- Humans are the source of coastal water pollution
- Enterococci standard is applicable to Cal. beaches
  - Current system underestimates risk
- The current standard (1.9% HCGI) is too high
  - Allows millions of illnesses per year
  - Costing tens of millions of dollars in health costs.
- The Solutions
  - Clean up water pollution
  - Need new technology to test water directly for pathogens
    - allow us to abandon indicators


Huntington Beach
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Thank you