Wet Weather Epidemiology
and
Quantitative Microbial Risk Assessment
NEW APPLICATIONS FOR SOURCE TRACKING

- Once we can confidently identify and remove human sources, new challenges arise
  - Should we remediate wildlife sources?

- Non-human sources are expected to carry less risk

- New EPA Beach Criteria open the door to site-specific objectives
  - Quantitative Microbial Risk Assessment
PROBABILITY OF ILLNESS BY SOURCE

(When Enterococcus Geomean = 35 cfu/100 ML)

Soller et. al. 2010
WHAT IS A QUANTITATIVE MICROBIAL RISK ASSESSMENT (QMRA)?

• Estimates the risk of swimmer illness using quantitative models
  – Similar to health risk models used for other contaminants

• Function of pathogen exposure and illness response

• Not been attempted at a marine beach in the US
  – SCCWRP is currently initiating a dry-weather QMRA
WET WEATHER IS A PROBLEM

• Sources are almost completely unknown
  – FIB levels seem to be high everywhere

• Beach use is much less in winter than summer
  – Mostly surfers

• We’re uncertain wet weather results in illness
  – Surfers have repeated exposures

• Managers struggle with how to fix wet weather exceedences
  – Expected costs are orders of magnitude greater than dry weather
WET WEATHER STUDY QUESTIONS

• Is water contact associated with an increased risk of illness?

• Is risk of illness greater following wet weather compared to dry weather exposures?

• What is the association between levels of Enterococcus and illness following wet weather events?

• What level of Enterococcus corresponds to the same risk of illness as current water quality standards?
THREE KEY STUDY DESIGN CHALLENGES

• Using surfers as our study population
  – Focused recruitment during wet weather
  – Use phone/web app to track health weekly

• Multiple exposures
  – Longitudinal study design compares one person’s variable exposures

• Multiple beaches
  – Sentinel beach(es)
  – Include other beaches via routine monitoring
WHERE WE’RE AT

• **Cultivated our Study Team**
  – UC Berkeley, US EPA, Surfrider

• **Creating our draft workplan**

• **First Advisory Committee meeting is next month**

• **Pilot Study this winter**
  – Enhance effectiveness and efficiency for 2014-15 wet season