

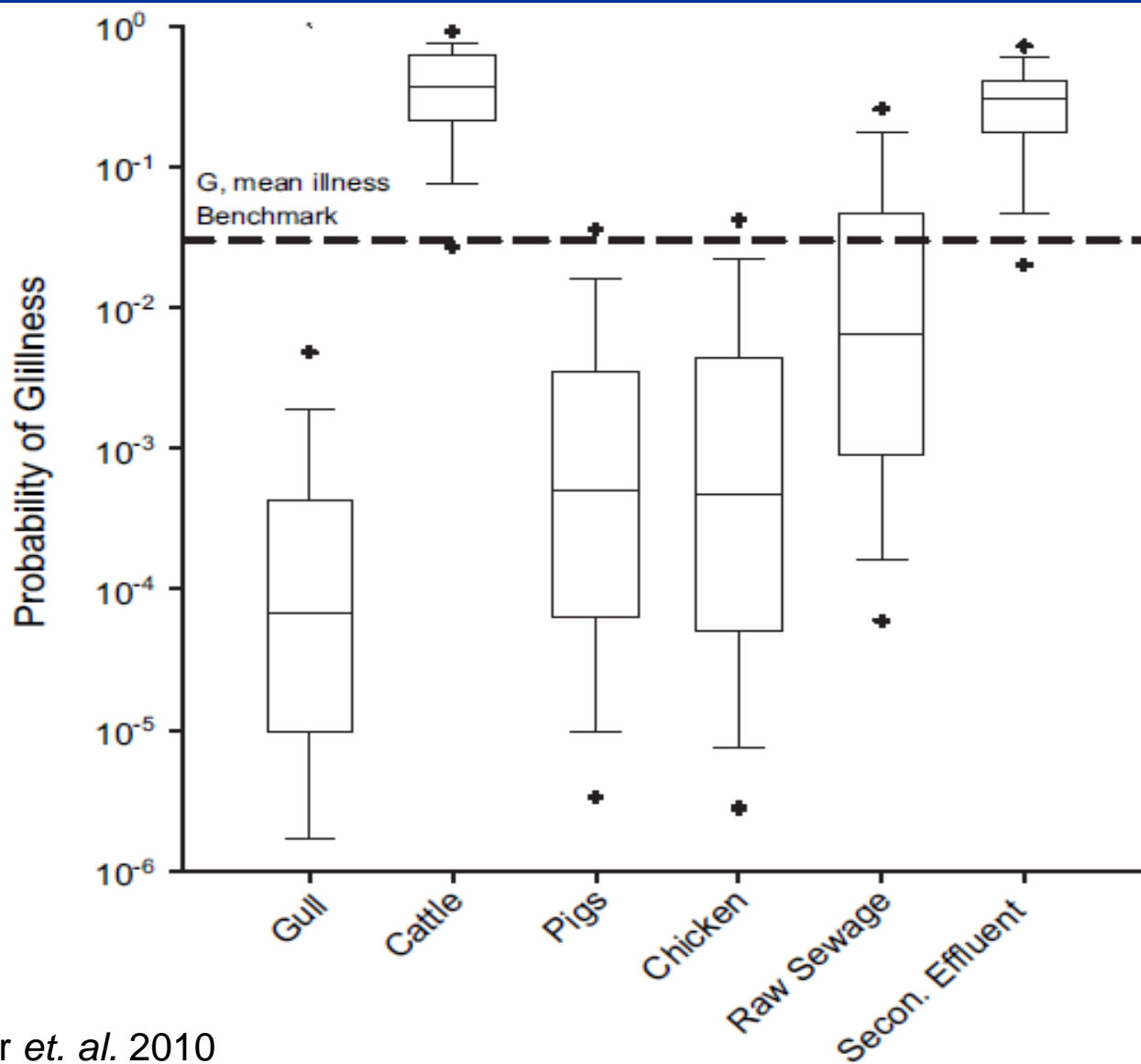
**Wet Weather Epidemiology
and
Quantitative Microbial Risk Assessment**

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 MI)



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 persons' 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