

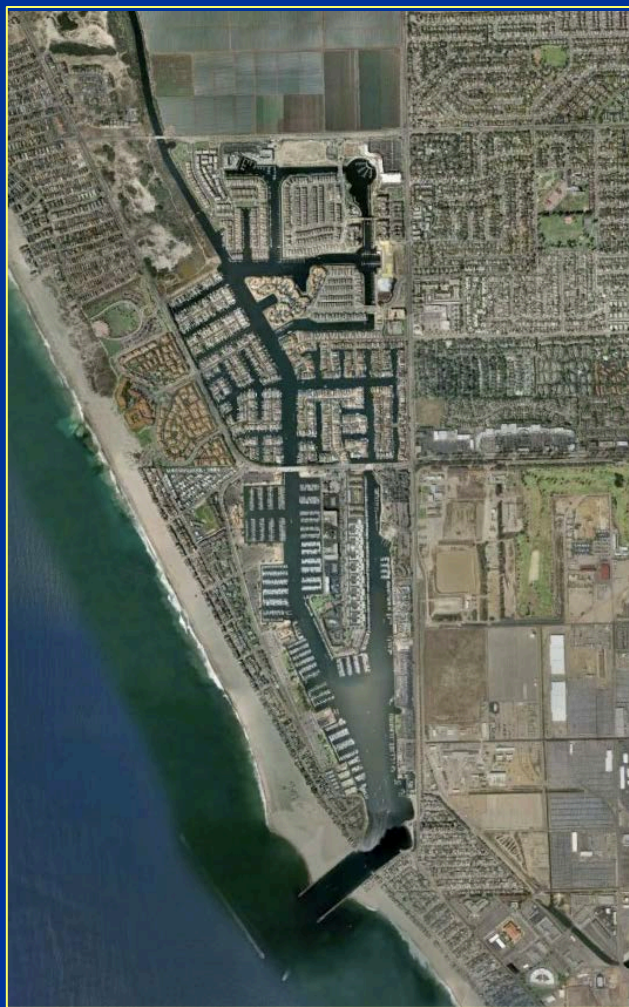
QMRA Case Study: Kiddie Beach

**State-of-the-Science: Fecal Source
Identification and Associated Risk
Assessment Tools**

John Griffith

WHY THIS SITE?

- **Persistent low level of water quality exceedances**
 - Historically about 15% of samples
- **High level of effort to eliminate possible human sources**
 - Storm drains diverted to sanitary sewer during dry weather
 - Restroom lateral replaced
 - Gravity sanitary collection system routinely inspected (annually)
- **Willing partners**
 - Ventura County
 - LA Regional Board





GOALS OF THE STUDY

- **Calculate the risk of swimming-related illness at Kiddie and Hobie Beach using QMRA**
- **Use this application as a case study for application at other beaches**
- **Use QMRA results to start a policy discussion**
 - Site specific objectives or TMDL numeric targets pinned to health-based standards

QMRA WORKPLAN

- **Characterize sources of FIB to the beach**
- **Indicator and pathogen loading from each source**
- **Quantify swimmer exposure**
- **Risk modeling**
 - Convert level of public health protection to equivalent FIB density for source(s) of concern

SOURCE CHARACTERIZATION STRATEGY

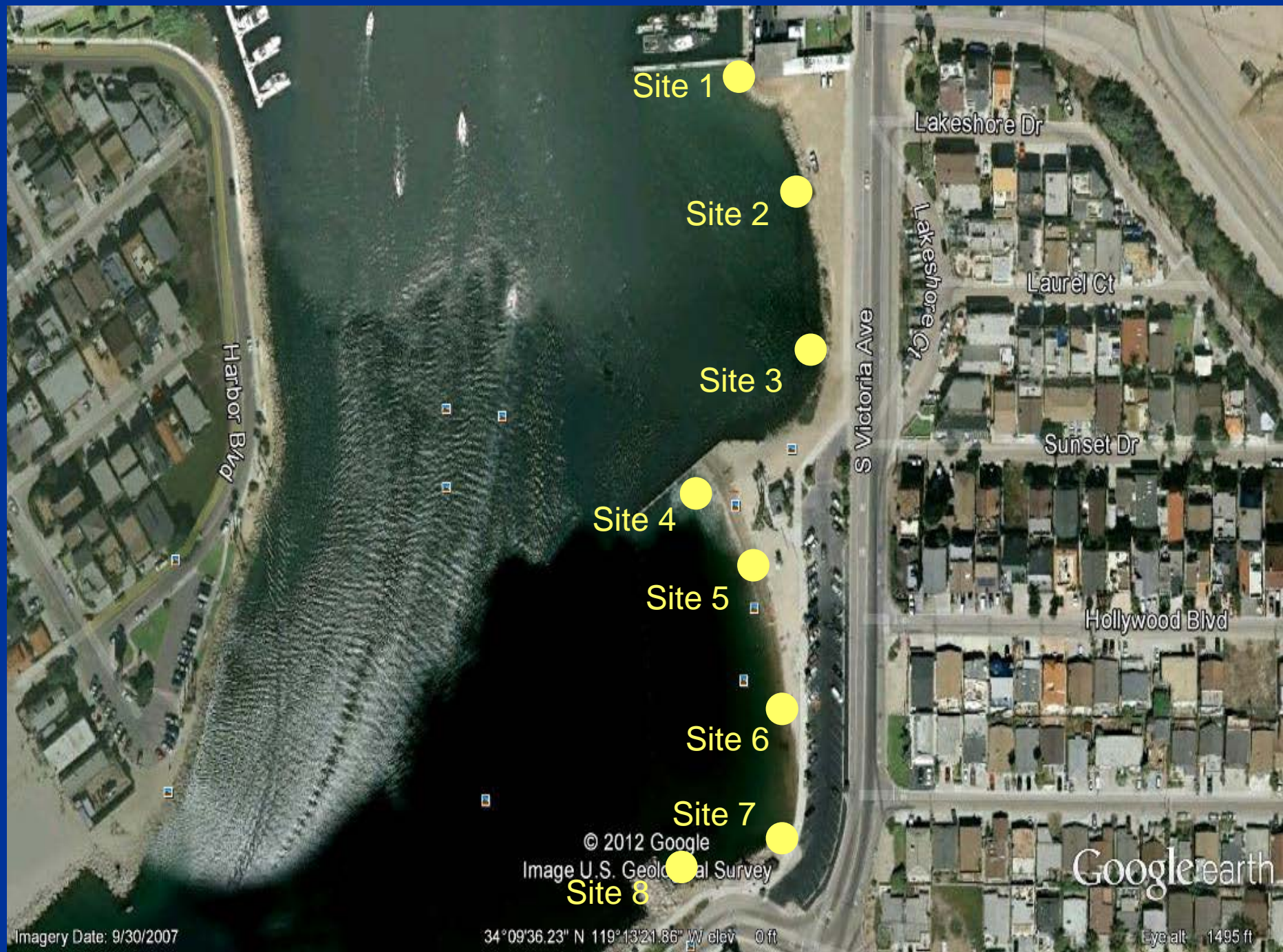
- **Make sure no (or very little) human sources of fecal pollution are present**
- **Determine primary non-human sources of fecal pollution**

TIERED SOURCE CHARACTERIZATION APPROACH

- **Observational data, historical information**
 - Sanitary survey
 - Produce list of all possible sources
- **Broad sampling to identify times and locations of greatest concern**
 - Start with less costly methods to prioritize
- **Utilize advanced methods at targeted locations/times**
 - Employ validated markers from SIPP Method Evaluation Study

DESIGN FOR SOURCE CHARACTERIZATION

- **8 weeks of daily sampling**
 - covers at least four tidal regimes
- **Target 8 sites to observe gradients**
- **Measure fecal indicator bacteria**
 - *Enterococcus*, *E. coli* and total coliforms
 - Keep sample archives for future genetic analysis
- **Record potential co-founders**
 - Bird counts, kelp/sea grasses, cats, boats, others?
 - Collect fecal material from potential sources



Site 1

Site 2

Site 3

Site 4

Site 5

Site 6

Site 7

Site 8

Lakeshore Dr

Lakeshore Ct

Laurel Ct

Sunset Dr

Hollywood Blvd

S Victoria Ave

Harbor Blvd

© 2012 Google
Image U.S. Geological Survey

Google earth

Imagery Date: 9/30/2007

34°09'36.23" N 119°13'21.86" W elev 0 ft

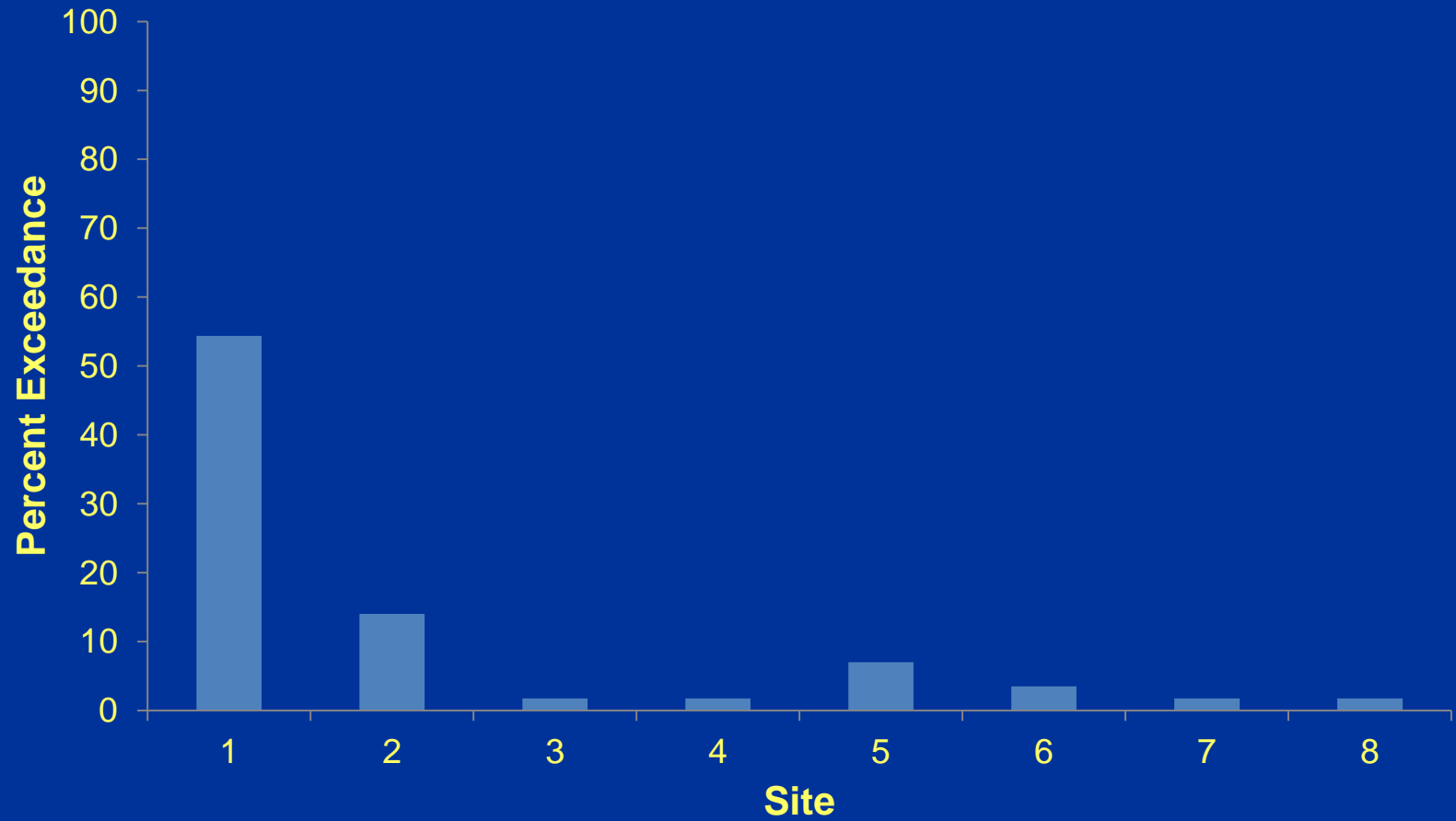
Eye alt 1495 ft

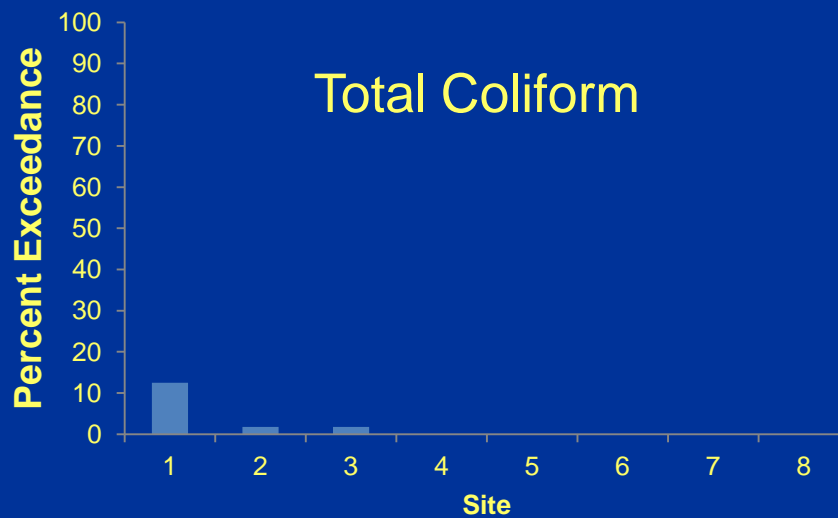
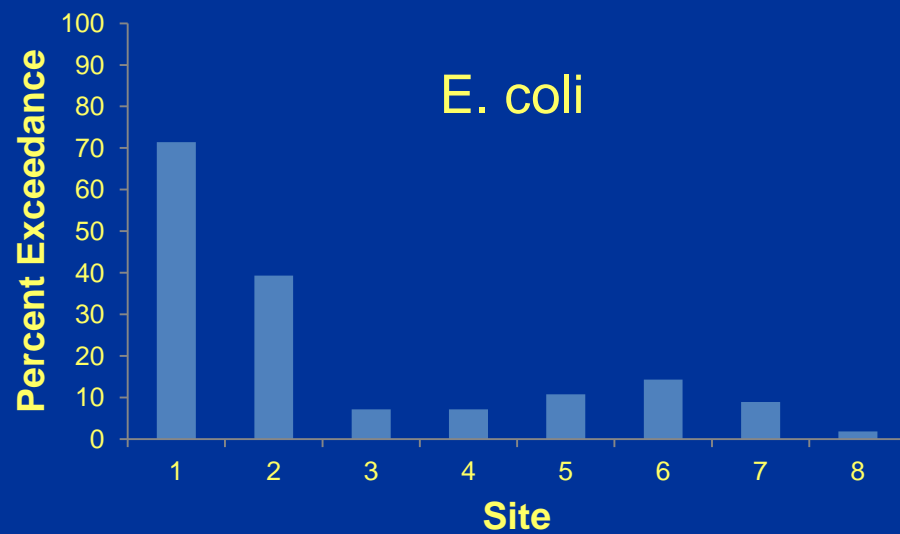
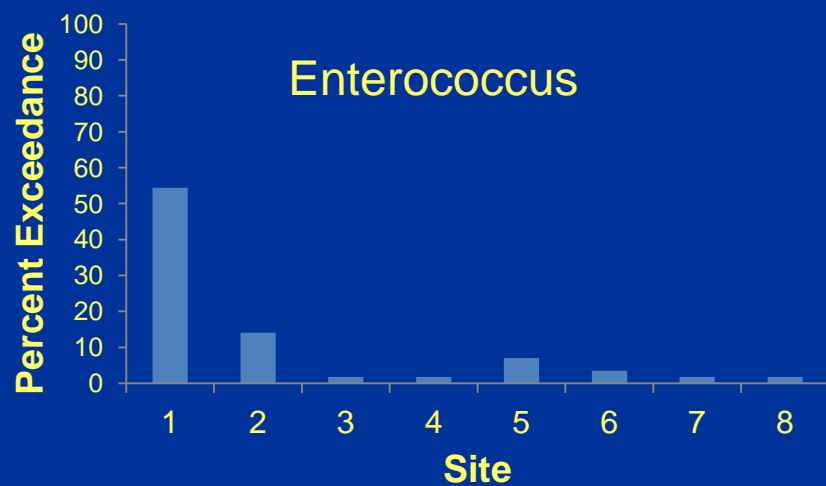
DATA ANALYSIS ROAD MAP

- **Frequency of FIB exceedance**
- **Magnitude of FIB exceedance**
- **Presence/Absence of Human markers**

ENTEROCOCCUS

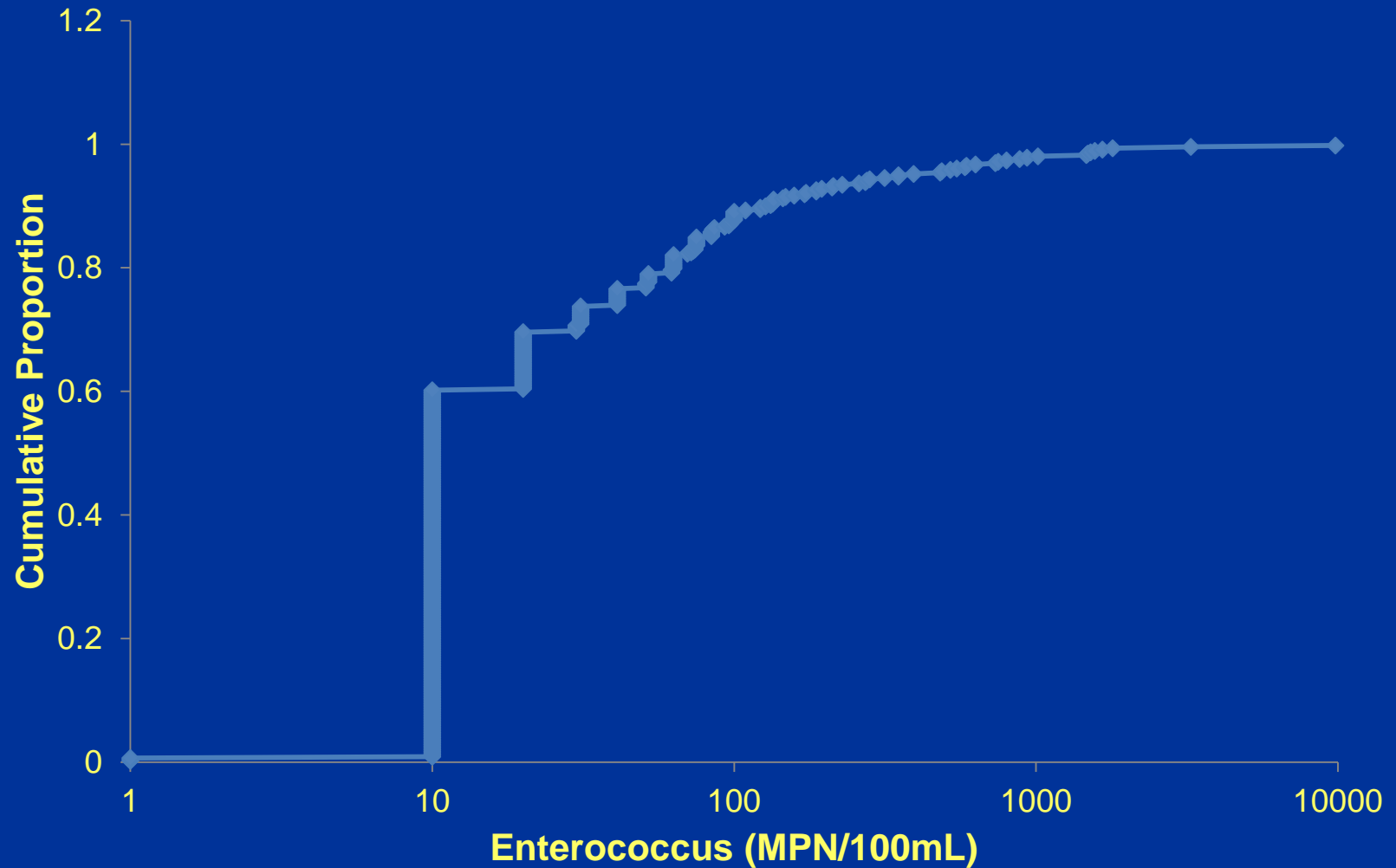
FREQUENCY OF EXCEEDANCE

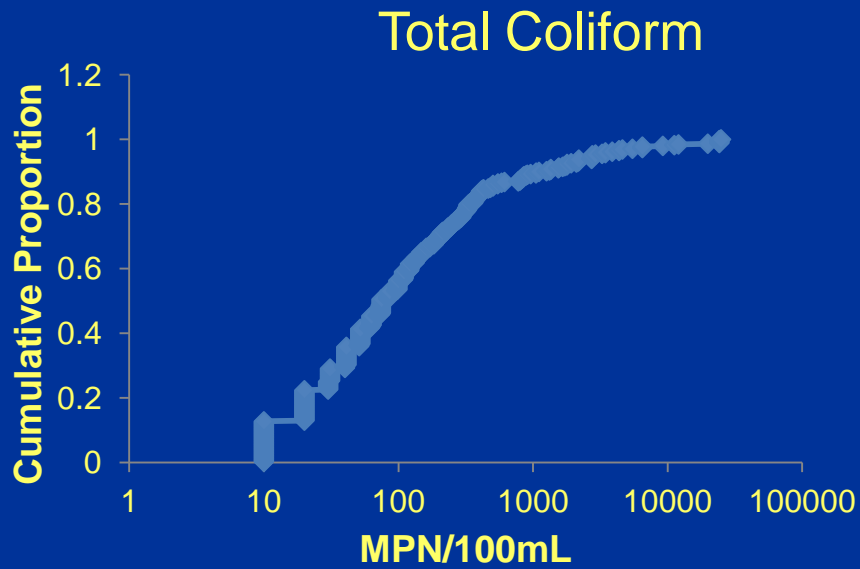
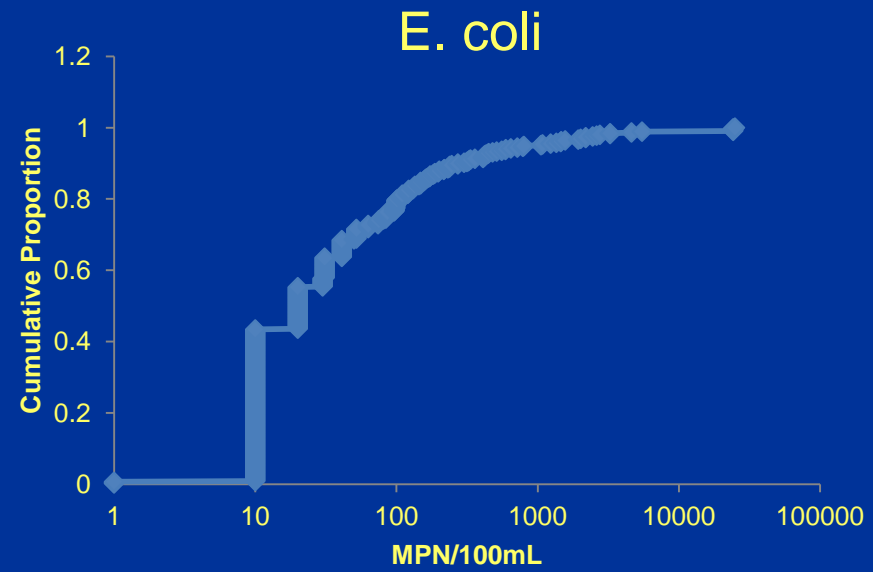
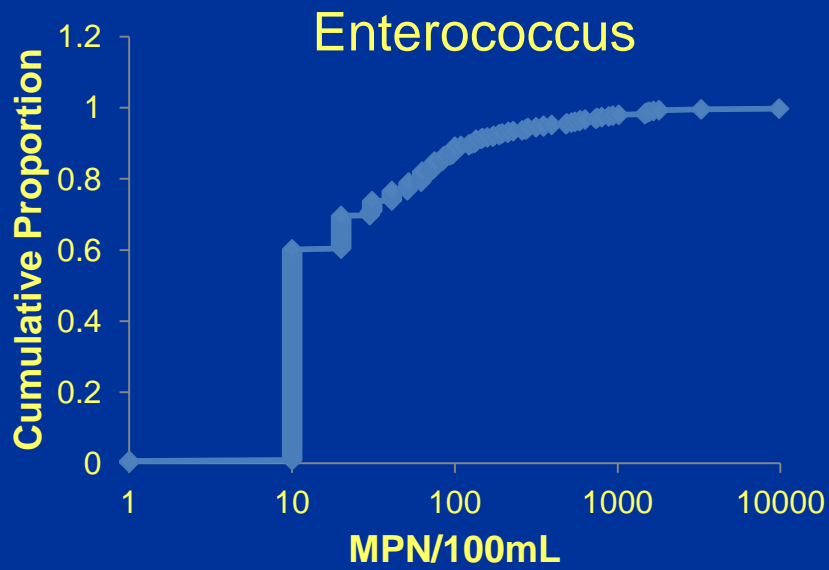




ENTEROCOCCUS

MAGNITUDE OF EXCEEDANCE





HUMAN MARKERS

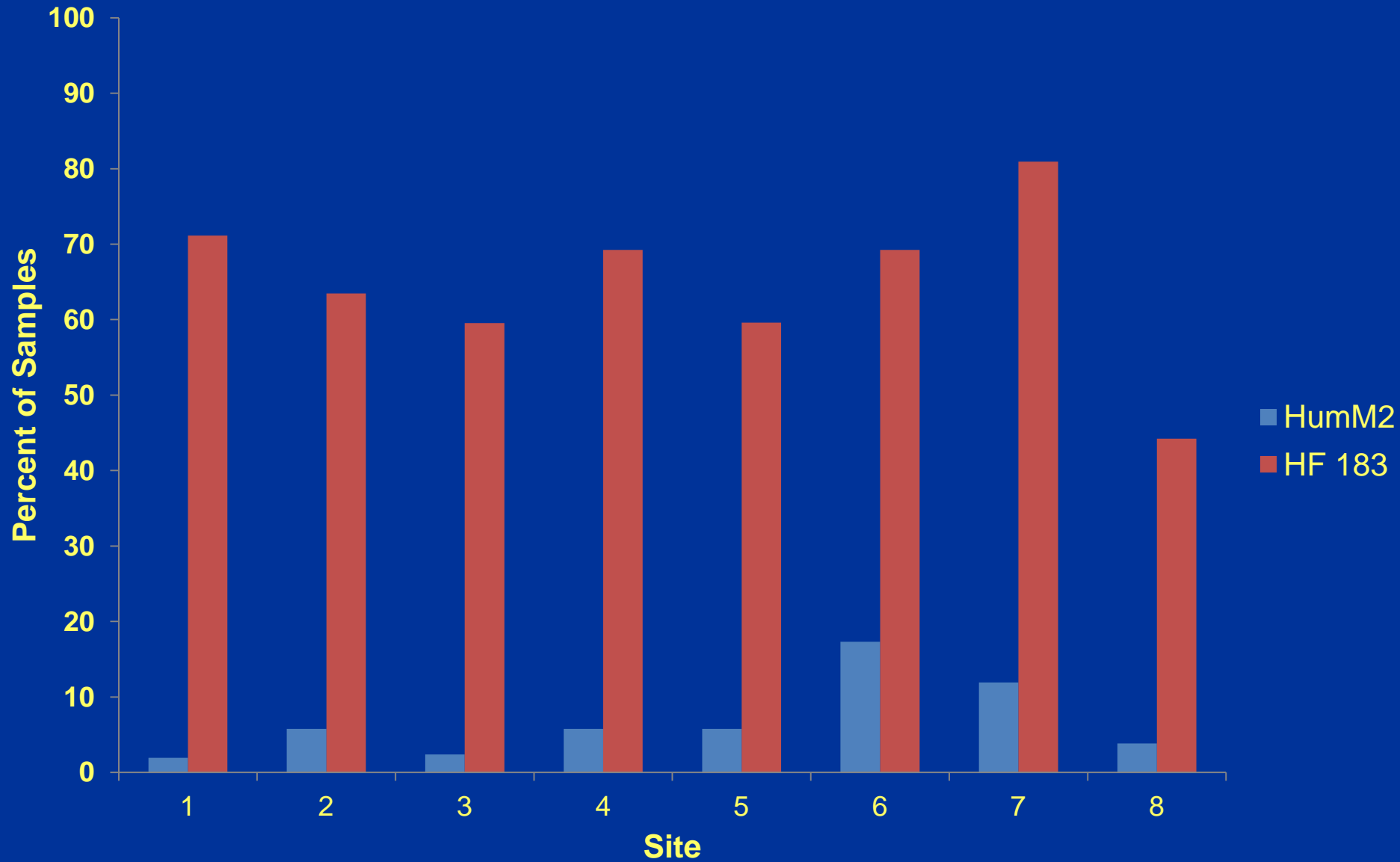
- **HF 183**

- More sensitive
- Cross reaction with nonhuman sources rare

- **HumM2**

- Less sensitive
- More specific

PRESENCE OF HUMAN MARKERS



SUMMARY OF PRELIMINARY RESULTS

- **Greater level of FIB exceedences than observed in historical data**
- **Frequent detection of human marker HF183**
 - Subset of samples confirmed with second marker, HumM2
- **Appears to be a persistent diffuse source of human material to the beach**

NEXT STEPS

- **QMRA effort suspended**
- **Agreed to assist Ventura County with locating source of human signal**