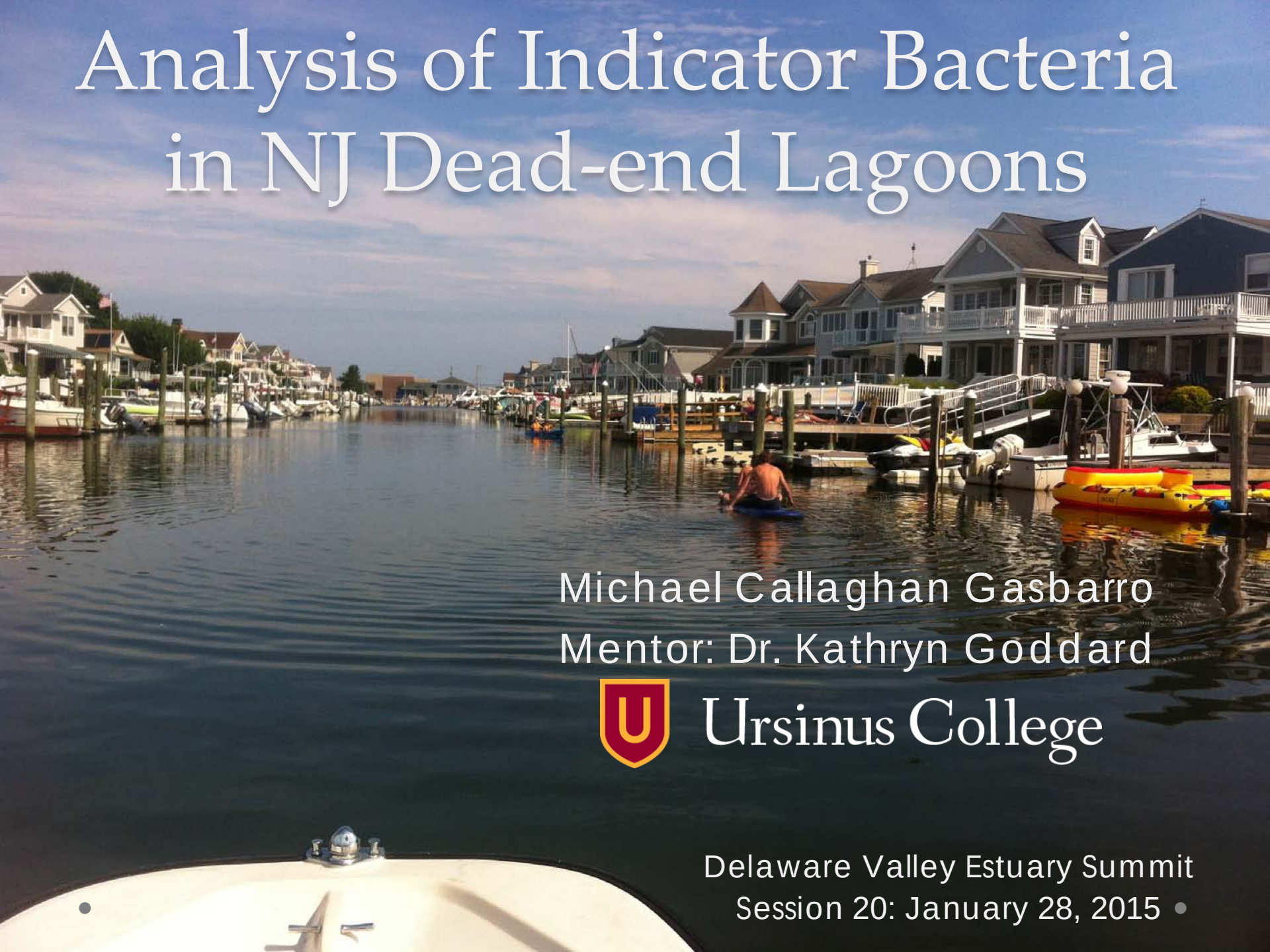
Analysis of Indicator Bacteria in NJ Dead-end Lagoons



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Delaware Valley Estuary Summit
Session 20: January 28, 2015

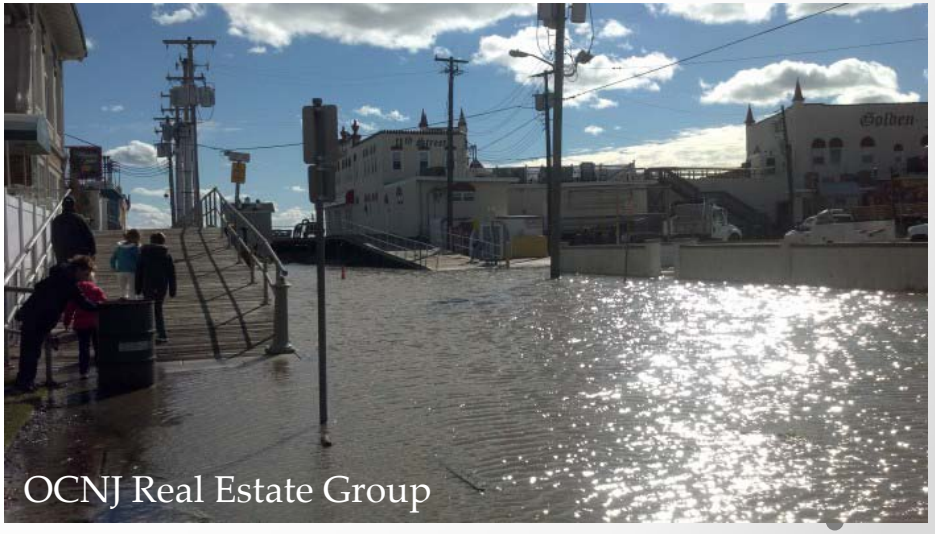
Dead-end Canals or Lagoons

- Popular design in coastal areas to increase the number of waterfront lots
- Design inhibits water exchange and promotes stagnation
- Roughly 40 lagoons between Atlantic City and Cape May

- Dense concentration of houses and recreational activity increases exposure to contamination from bacterial and chemical sources
- Storm drains empty into the dead end of many lagoons

Storm Water Runoff

- Bacteria and other pathogens can wash into swimming areas and create health hazards, resulting in beach closures
- Can carry debris, chemicals, dirt, and other pollutants directly into a wetland, or coastal water
- Usually it flows untreated, into local water bodies



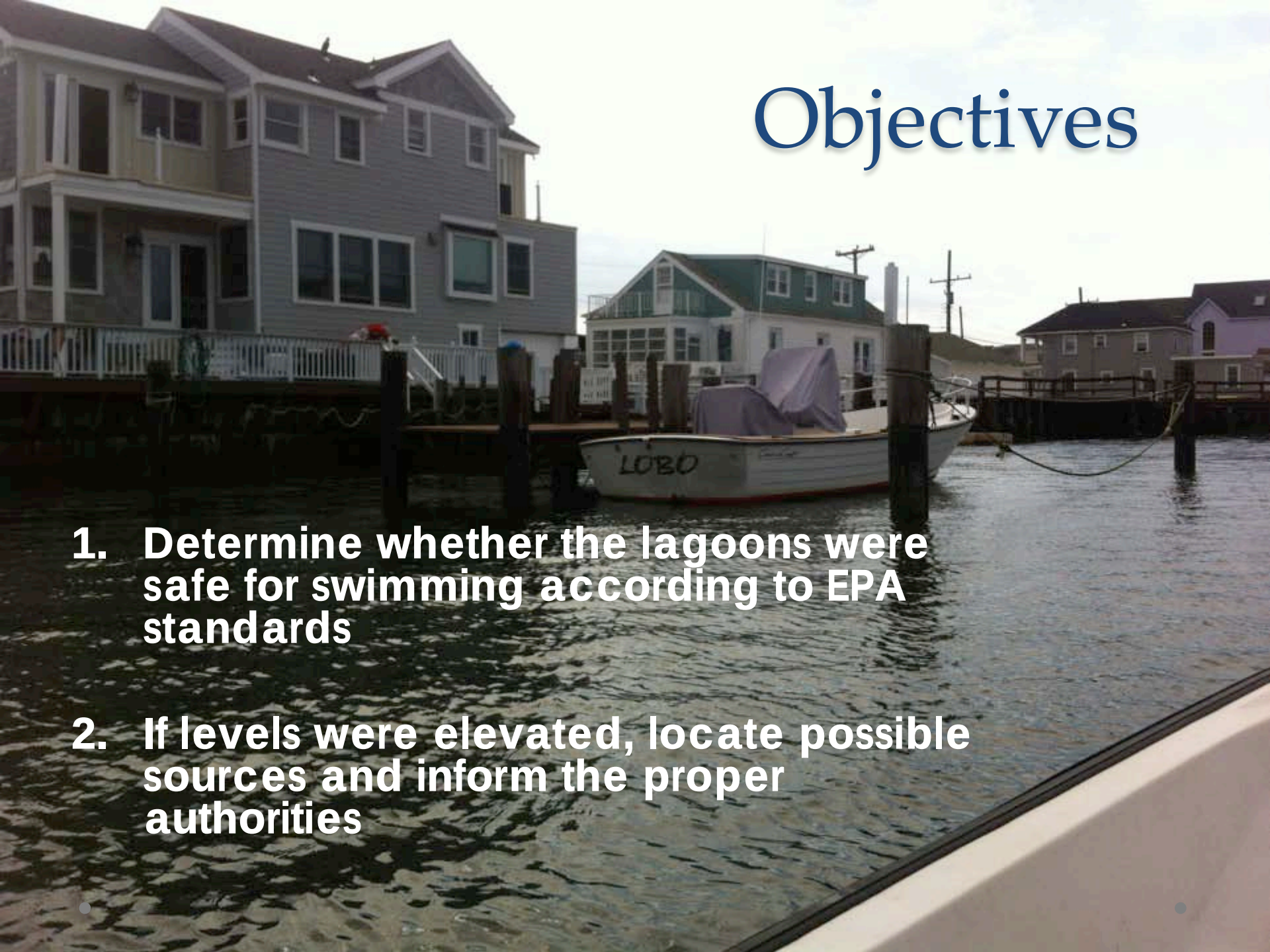
Health Risks

"Samples that are above the water quality standard indicate water that presents an increased risk of illness."

- NJ DEP Cooperative Coastal Monitoring Program

- Swimming in or contact with polluted water can cause…
  - gastrointestinal symptoms, including nausea, vomiting, diarrhea, abdominal pain
  - respiratory symptoms
  - sore throat, cough, runny nose, and sneezing
  - eye and ear symptoms including irritation, earache, and itchiness,
  - dermatological symptoms like skin rash and itching
  - flu-like symptoms such as fever and chills.
- These symptoms are minor most of the time
- Children and elderly at a higher risk

Objectives



1. Determine whether the lagoons were safe for swimming according to EPA standards

2. If levels were elevated, locate possible sources and inform the proper authorities

Initial Seven Lagoons Sampled

Methods and Testing Procedures

- Samples were collected from the center of the canals 18 inches below the surface
- Samples were prepared on m-EI and m-TEC agar using membrane filtration according to NJ DEP standards.

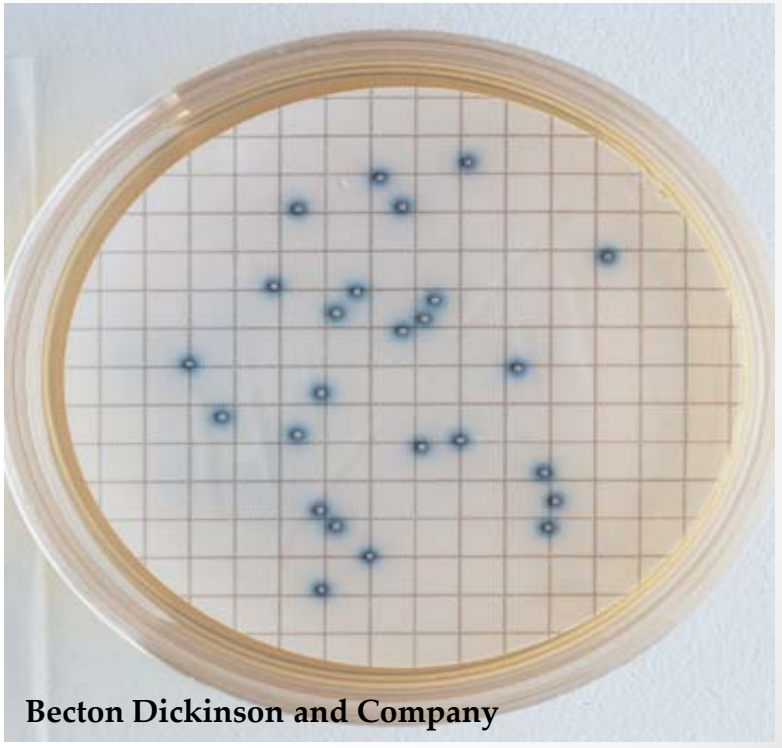
Background and Standards

- Enterococci and Fecal Coliforms are indicator organisms
- They are used to indicate human or animal waste contamination
- They can predict if more serious pathogens are present
- Maximum levels are the state and federal standards

Type of Bacteria	Maximum colonies per 100 mL
Enterococci	104
Fecal Coliforms	200

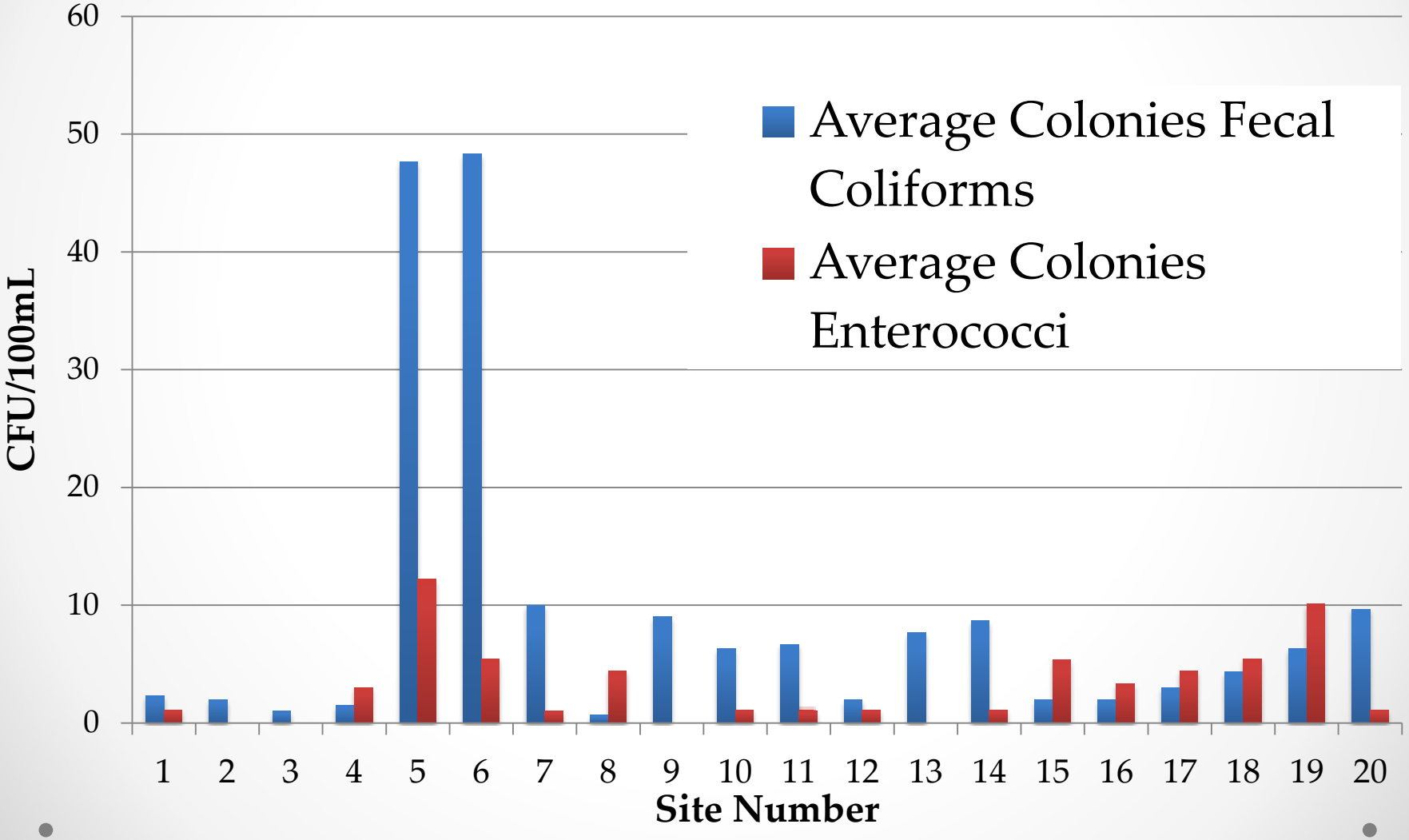
Fecal coliform colonies on m-TEC agar.

Enterococci colonies on m-EI agar.

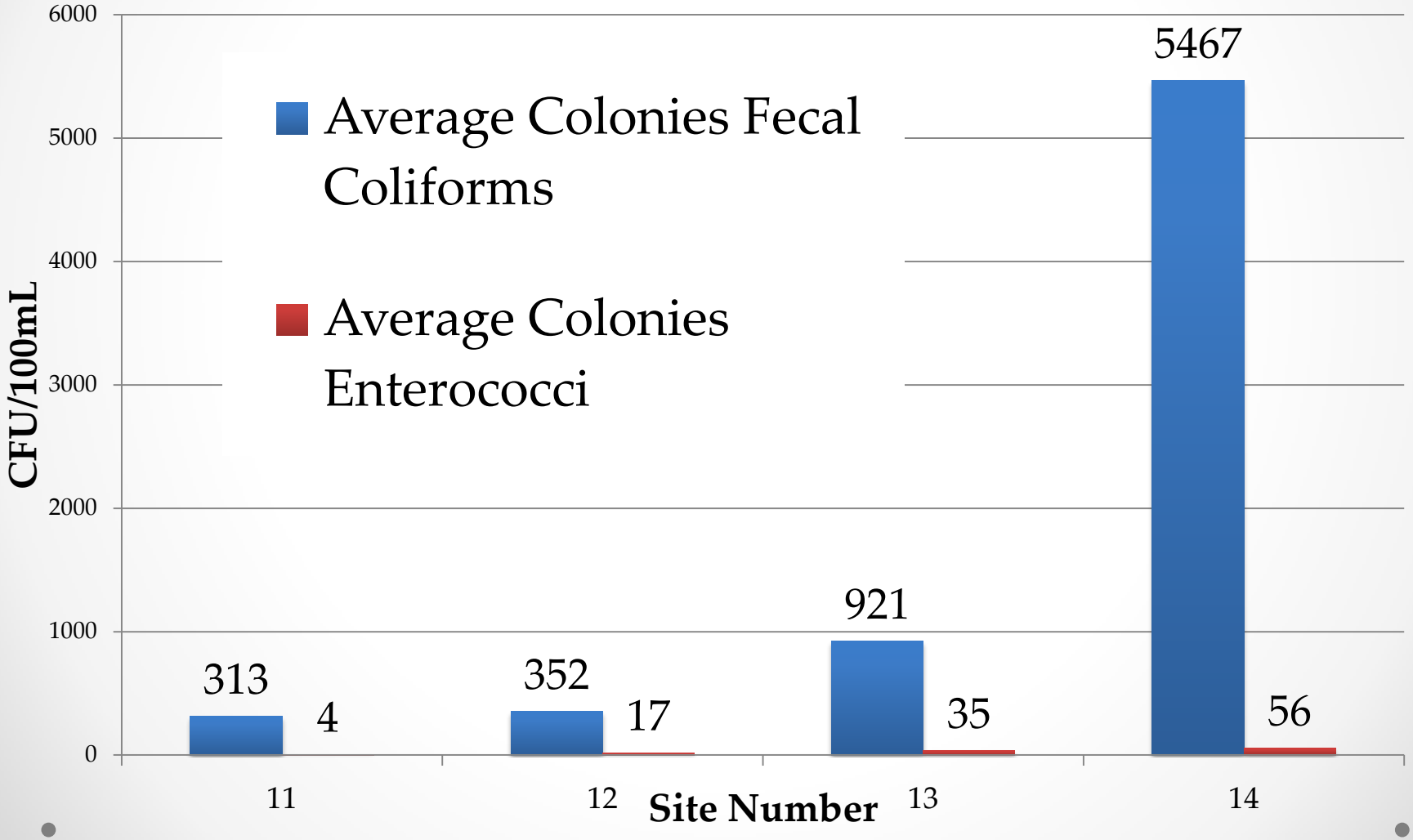


Sample Site Numbers

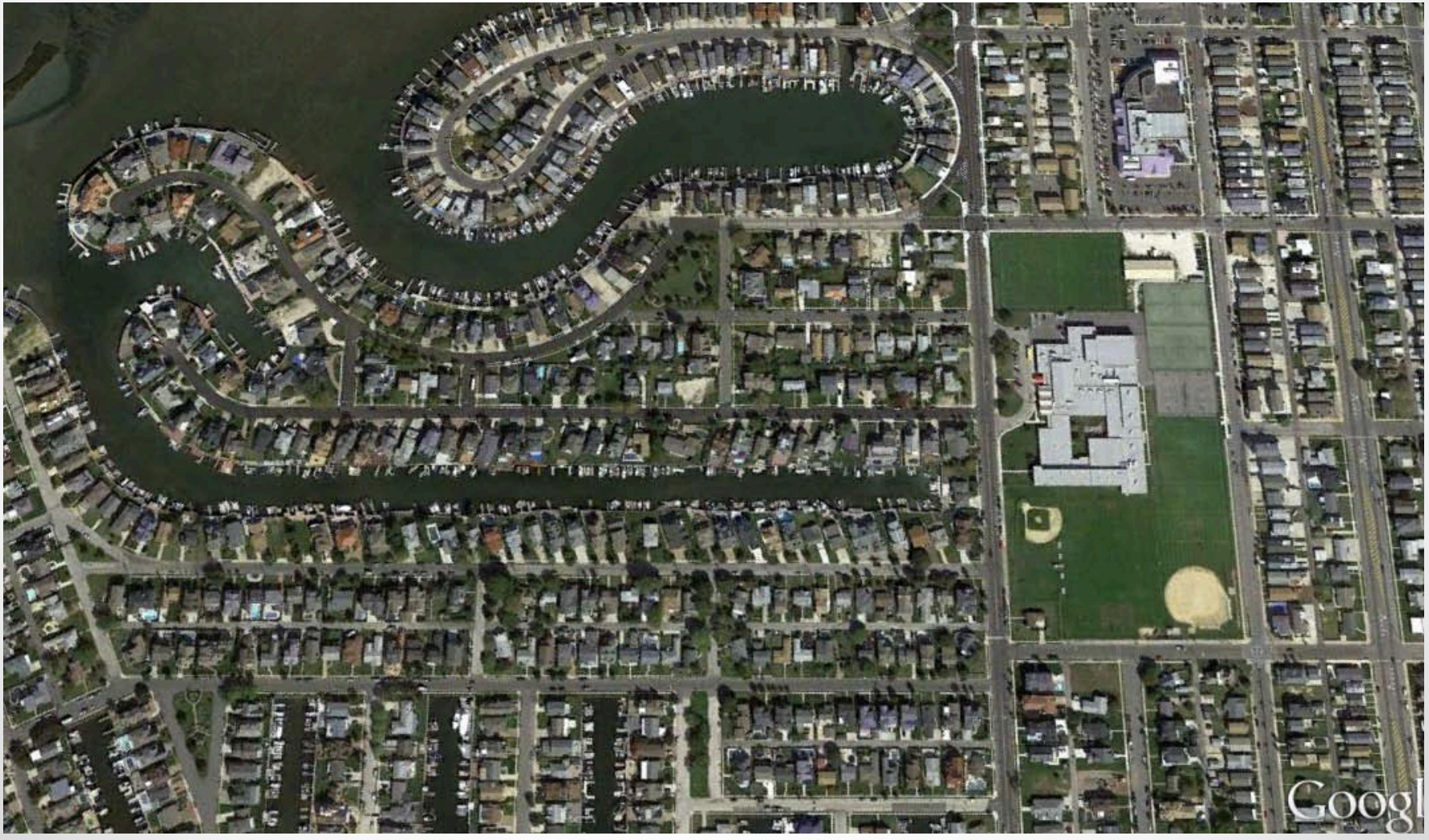
Bacterial Levels for Sites 1-10, 15-25 are within government guidelines



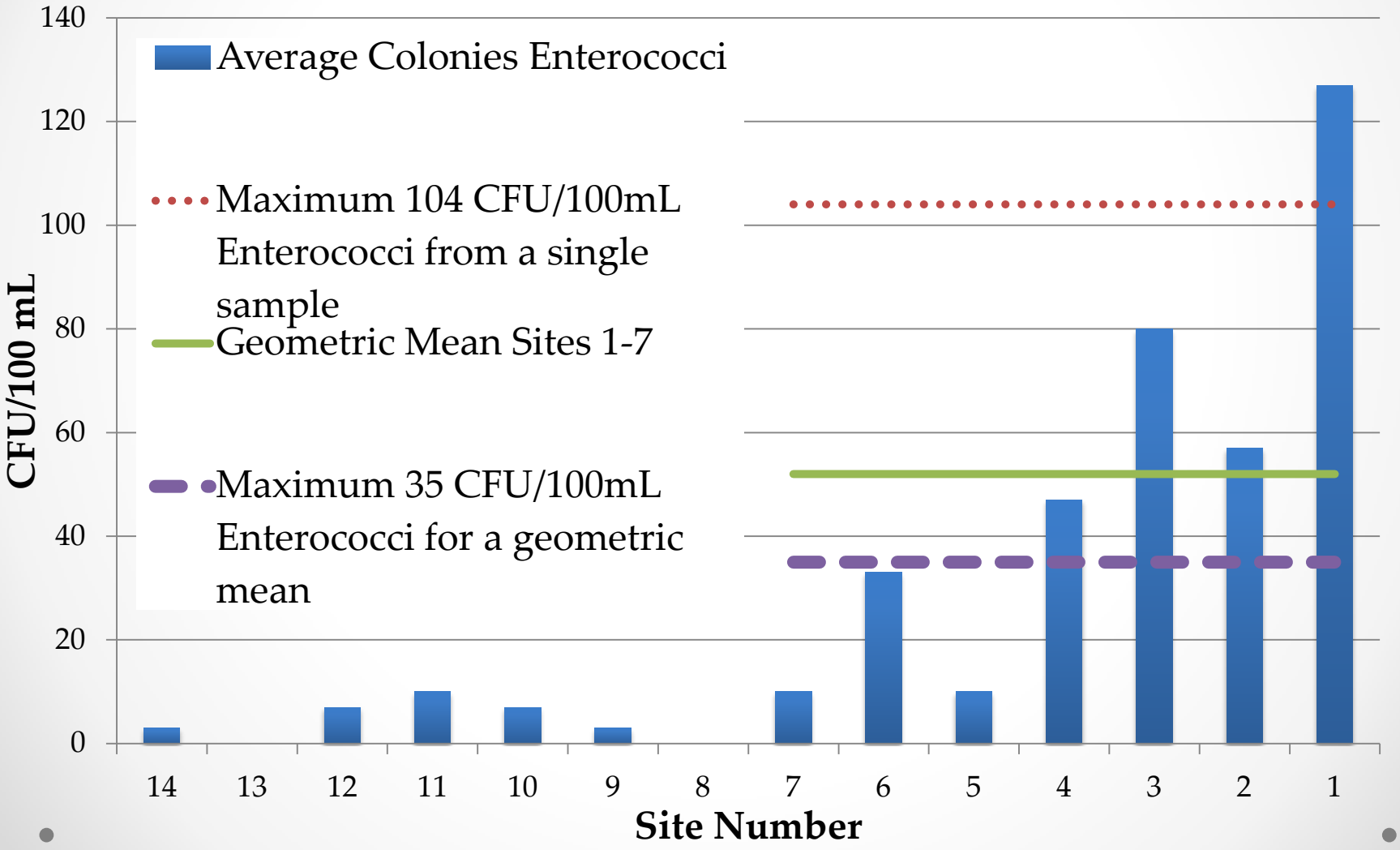
Bacterial Levels for Sites 11-14 in Sunny Harbor



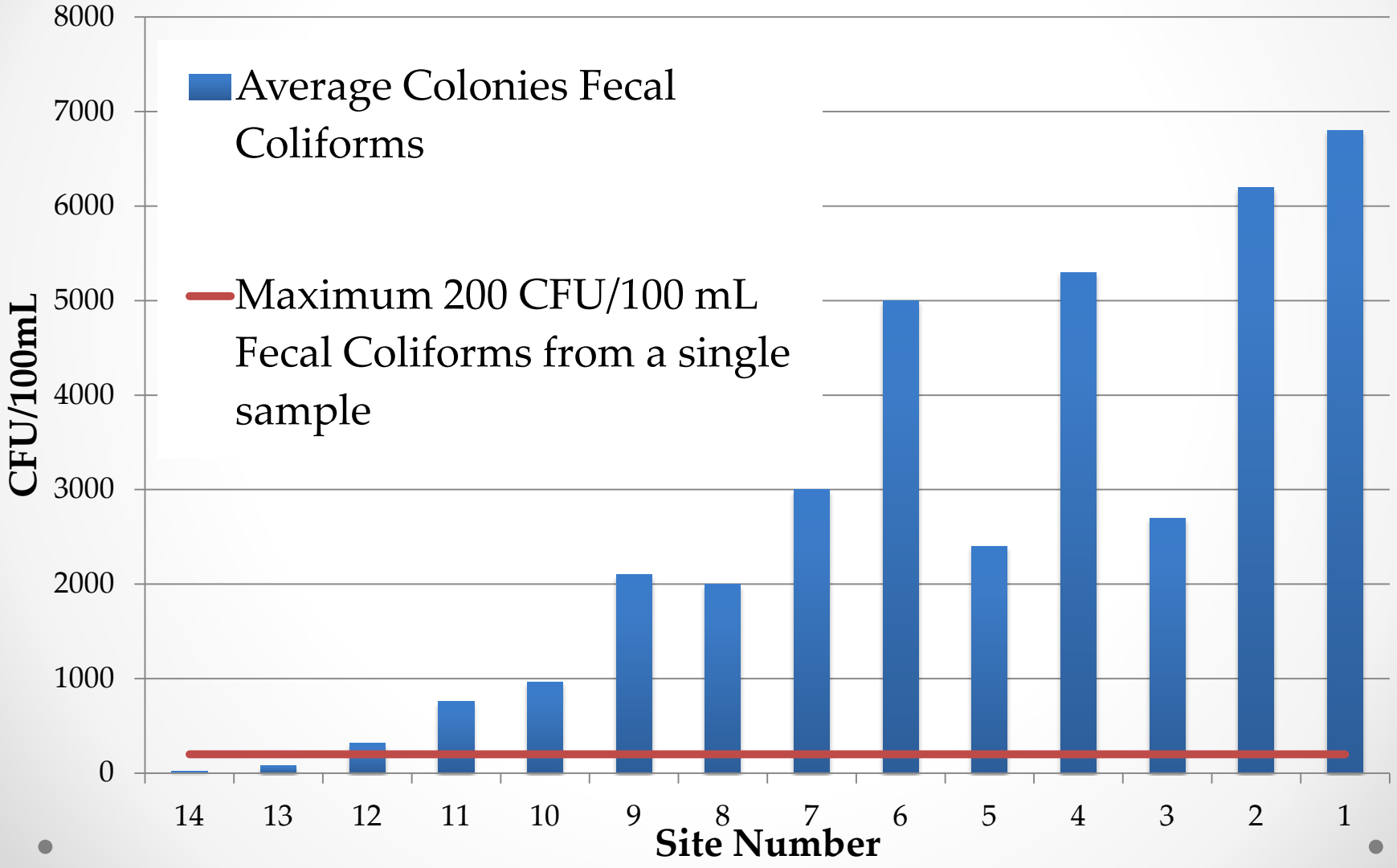
Redesigned Sample Sites in Sunny Harbor Lagoon



Enterococci levels decrease with increasing distance from the storm water outfall



Fecal Coliforms levels decrease with distance from the storm water outfall



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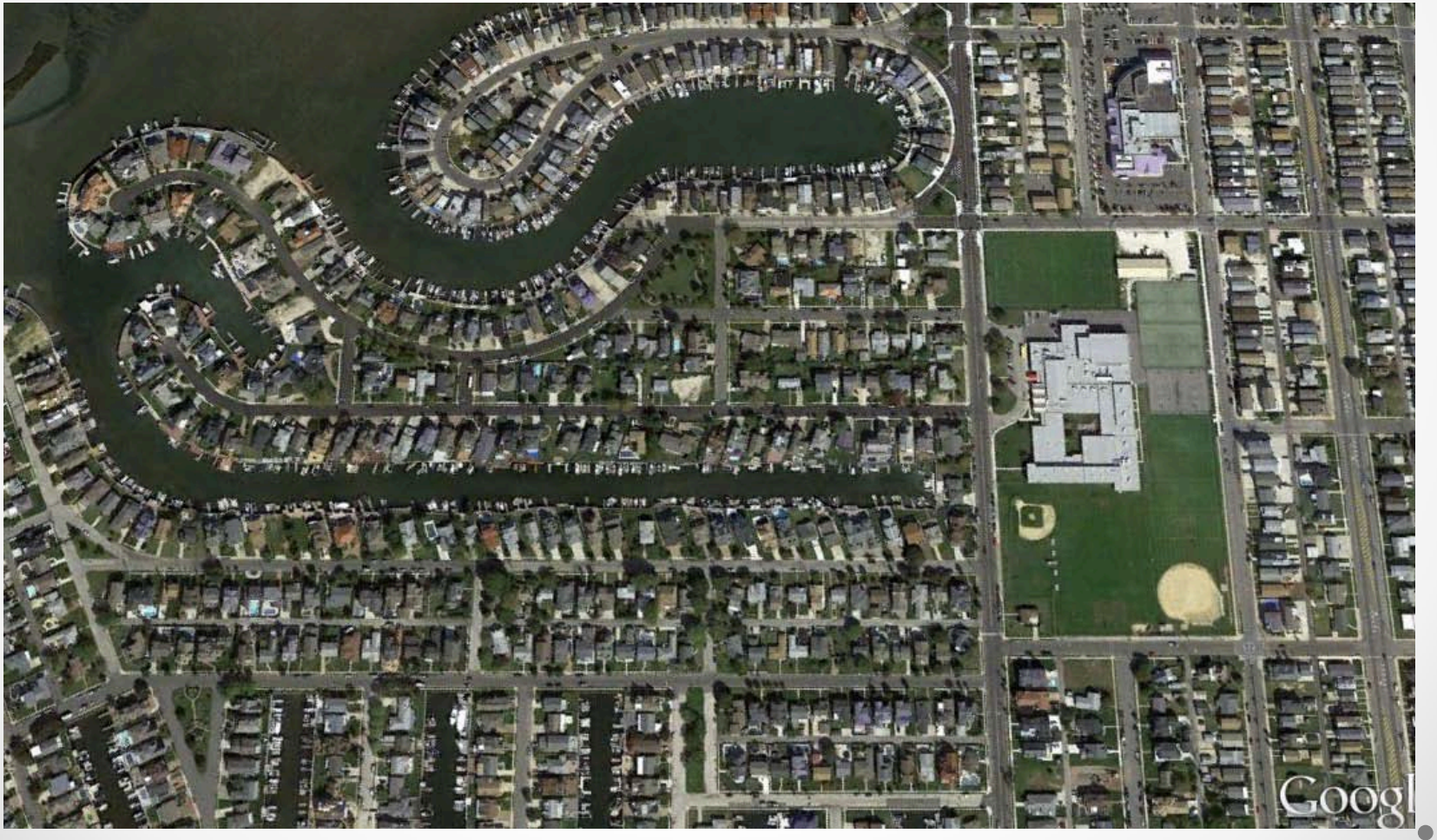
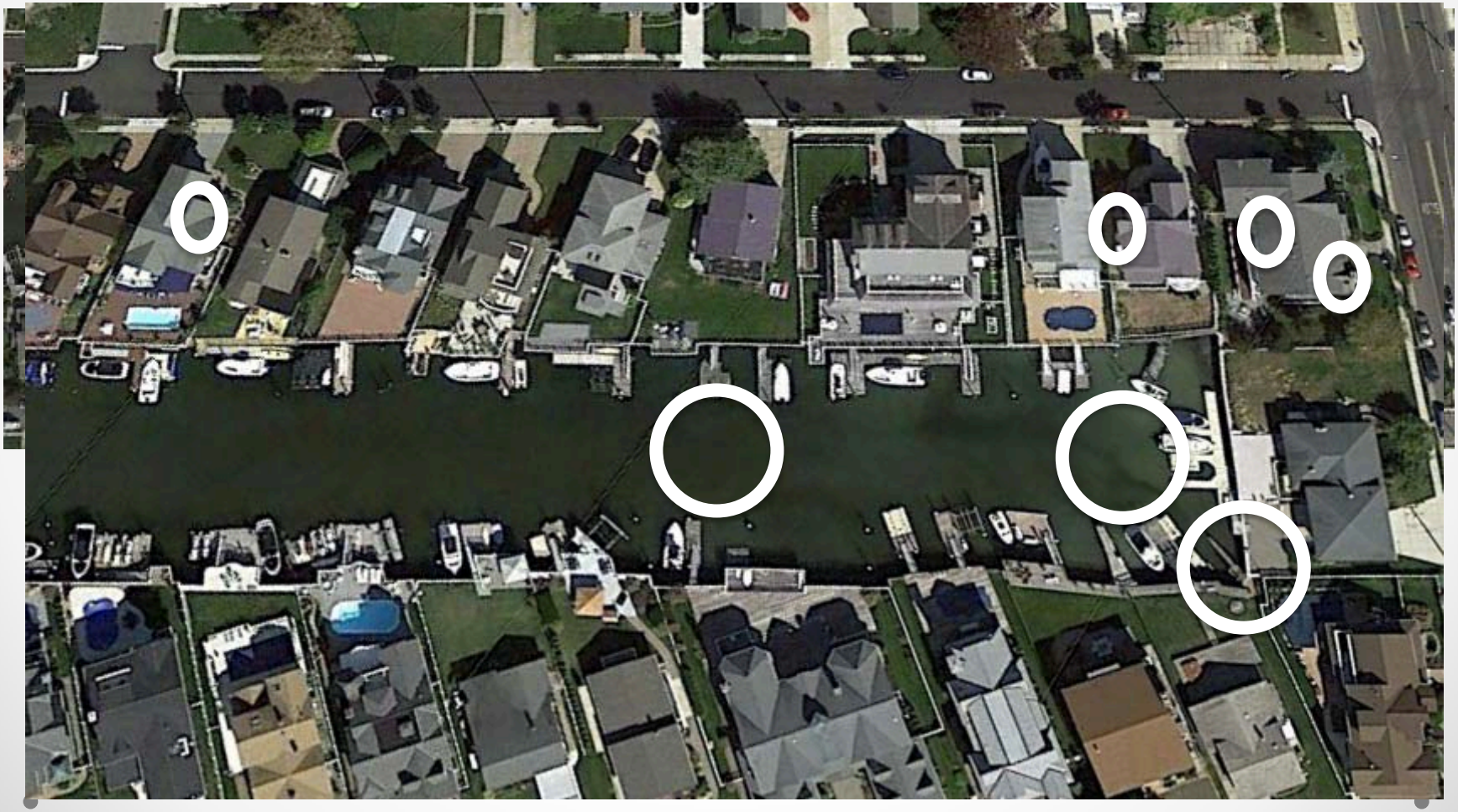
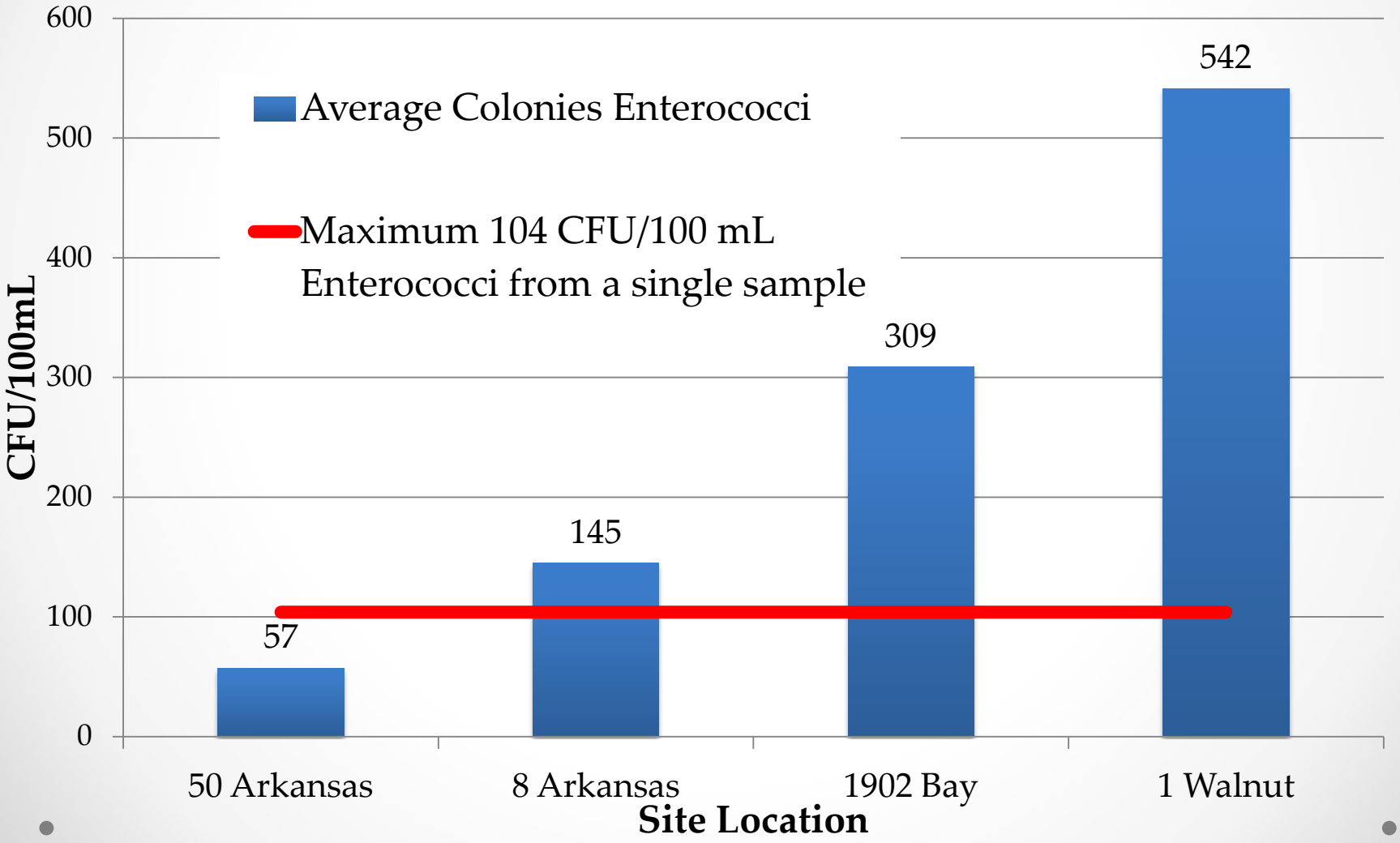


Fall Sampling Sites

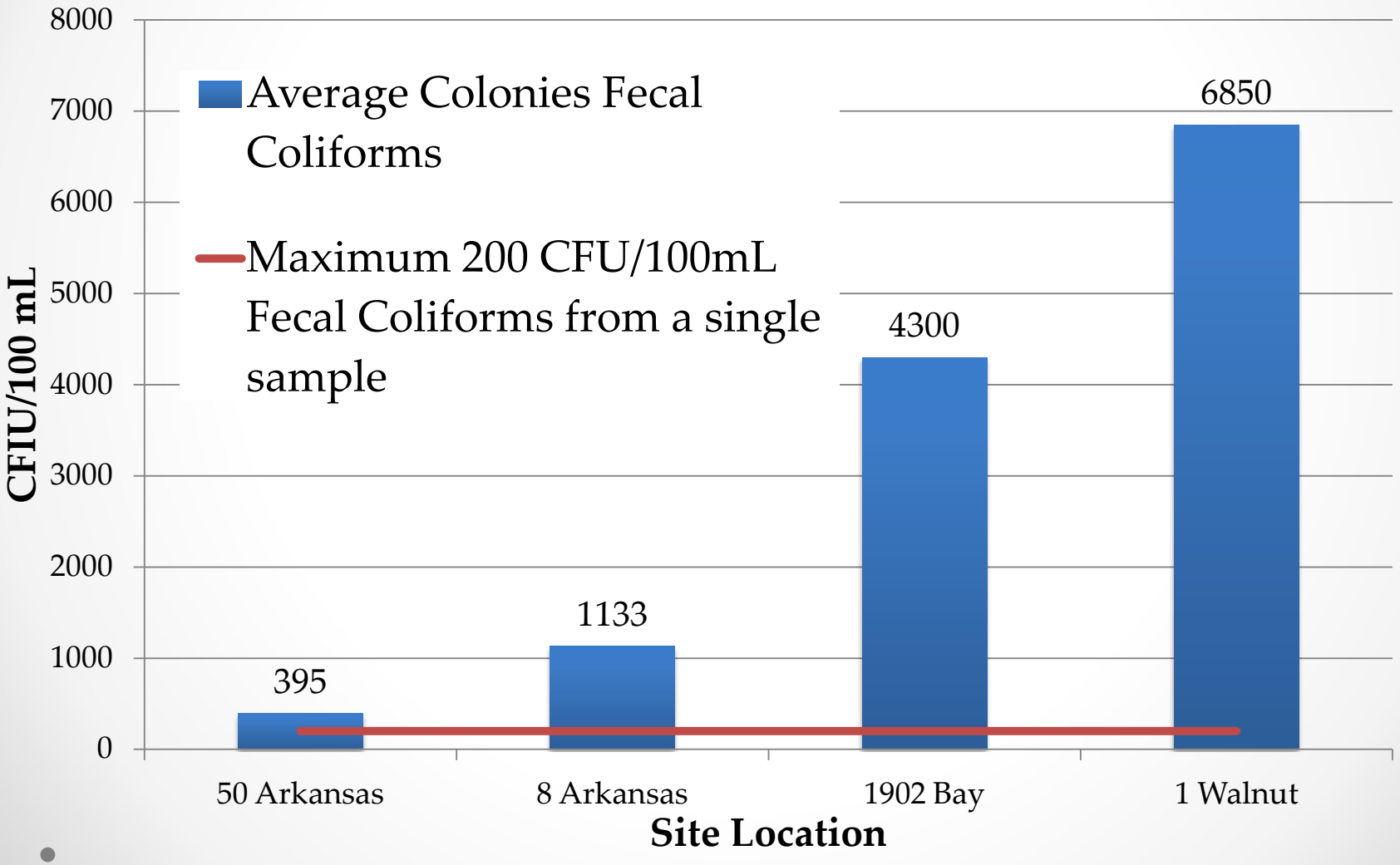
in Sunny Harbor Lagoon



Enterococci in Autumn 2015 decrease with increasing distance from outfall

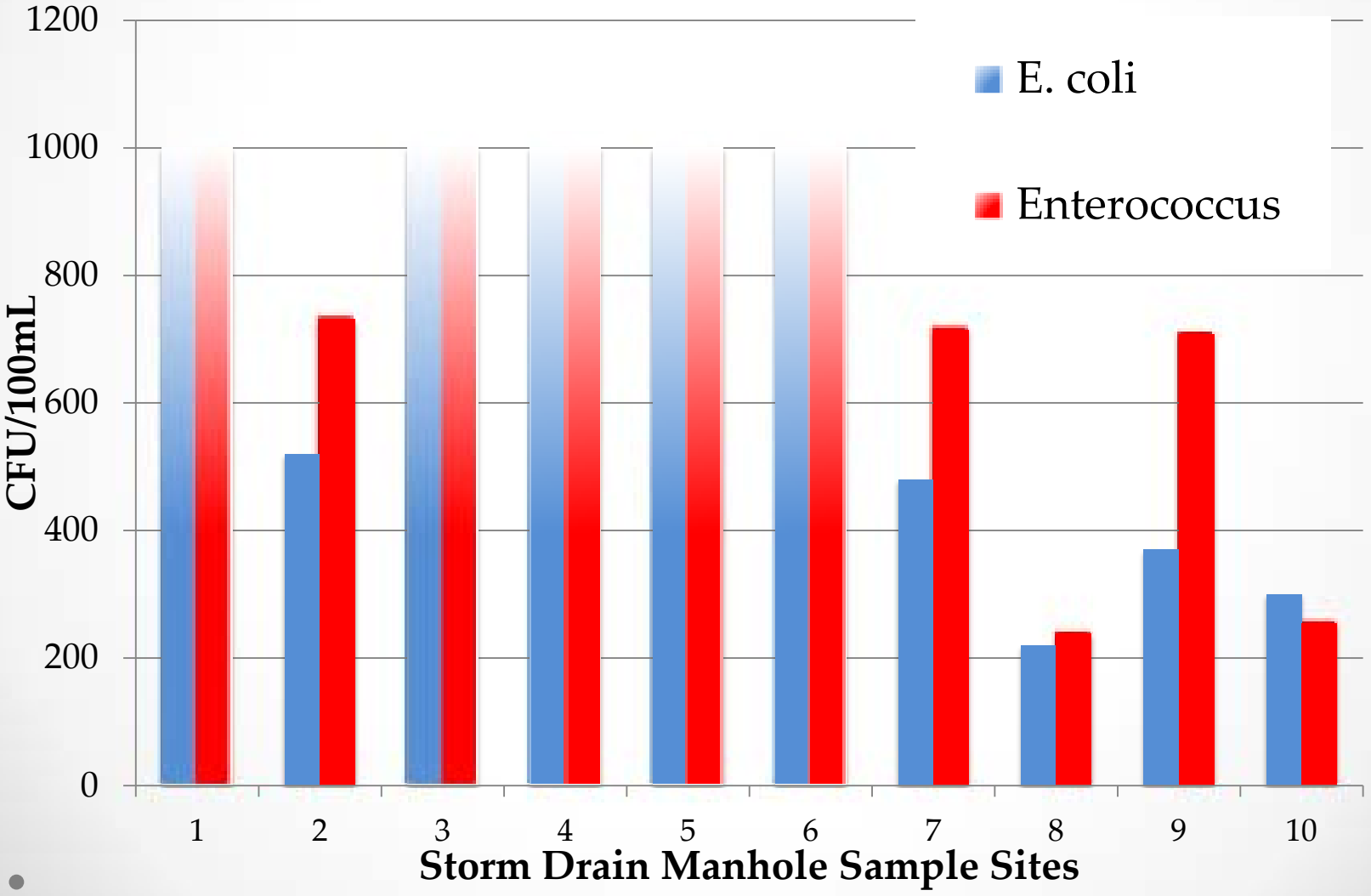


Fecal Coliforms in Autumn 2015 decrease with increasing distance from outfall



Network of drainage pipes that connect to the outfall located at 1 Walnut

Levels of Bacteria from samples collected from the storm drain



Conclusions

- Source of contamination most likely from the drainage are connected to the outfall pipe at the end of lagoon.
- Contamination is isolated to Sunny Harbor
- Other Lagoons and Bays were below the standard safe for swimming
- The residents of this lagoon should be informed by their government of the contamination levels.

Significance

- Residents of coastal communities could unknowingly expose themselves to bacterial contamination by swimming or boating in waters they consider to be their backyard.

Future Plans

- Use Antibiotic Resistance Tests to determine whether a human or animal source
- Genetic testing of bacteria
- Work with officials to bring attention to areas not monitored but heavily utilized by the public

Questions?