



# Nearshore Health & Nonpoint Source Pollution

Focus Area

# Nearshore Health & Nonpoint Source Pollution

Process Based Predictive Models for Complex  
Urban Beaches

Rapid Method Data Comparison at Bathing  
Beaches in Ohio

Mark Citriglia

Manager of Analytical Services

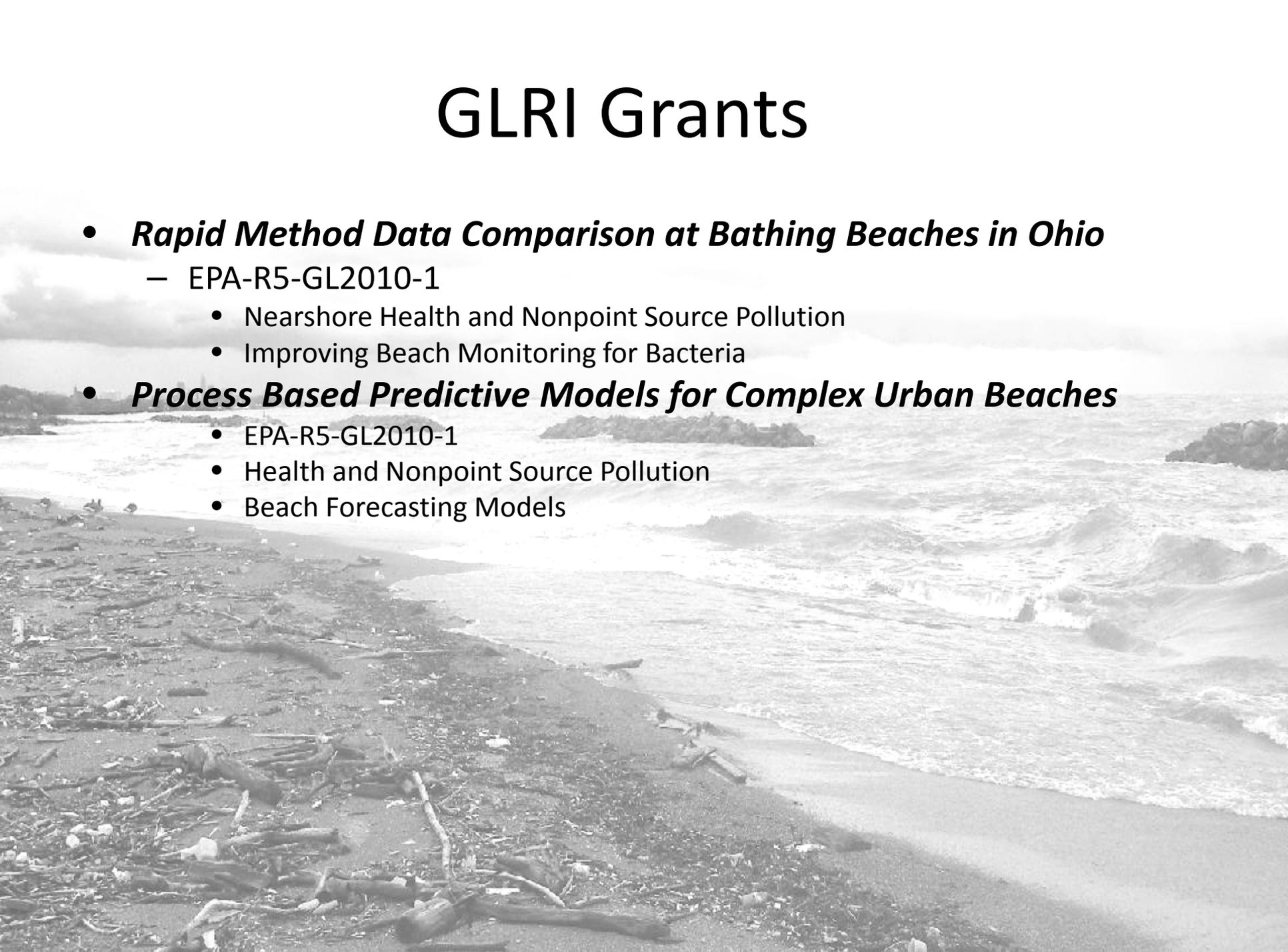
216-641-6000

[citrigliam@neorsd.org](mailto:citrigliam@neorsd.org)

(NEORS D)

# GLRI Grants

- ***Rapid Method Data Comparison at Bathing Beaches in Ohio***
  - EPA-R5-GL2010-1
    - Nearshore Health and Nonpoint Source Pollution
    - Improving Beach Monitoring for Bacteria
- ***Process Based Predictive Models for Complex Urban Beaches***
  - EPA-R5-GL2010-1
  - Health and Nonpoint Source Pollution
  - Beach Forecasting Models



# *Process Based Predictive Models for Complex Urban Beaches*

Dedicated to the research work performed by Lester Stumpe

Project Managed by  
Mark Citriglia

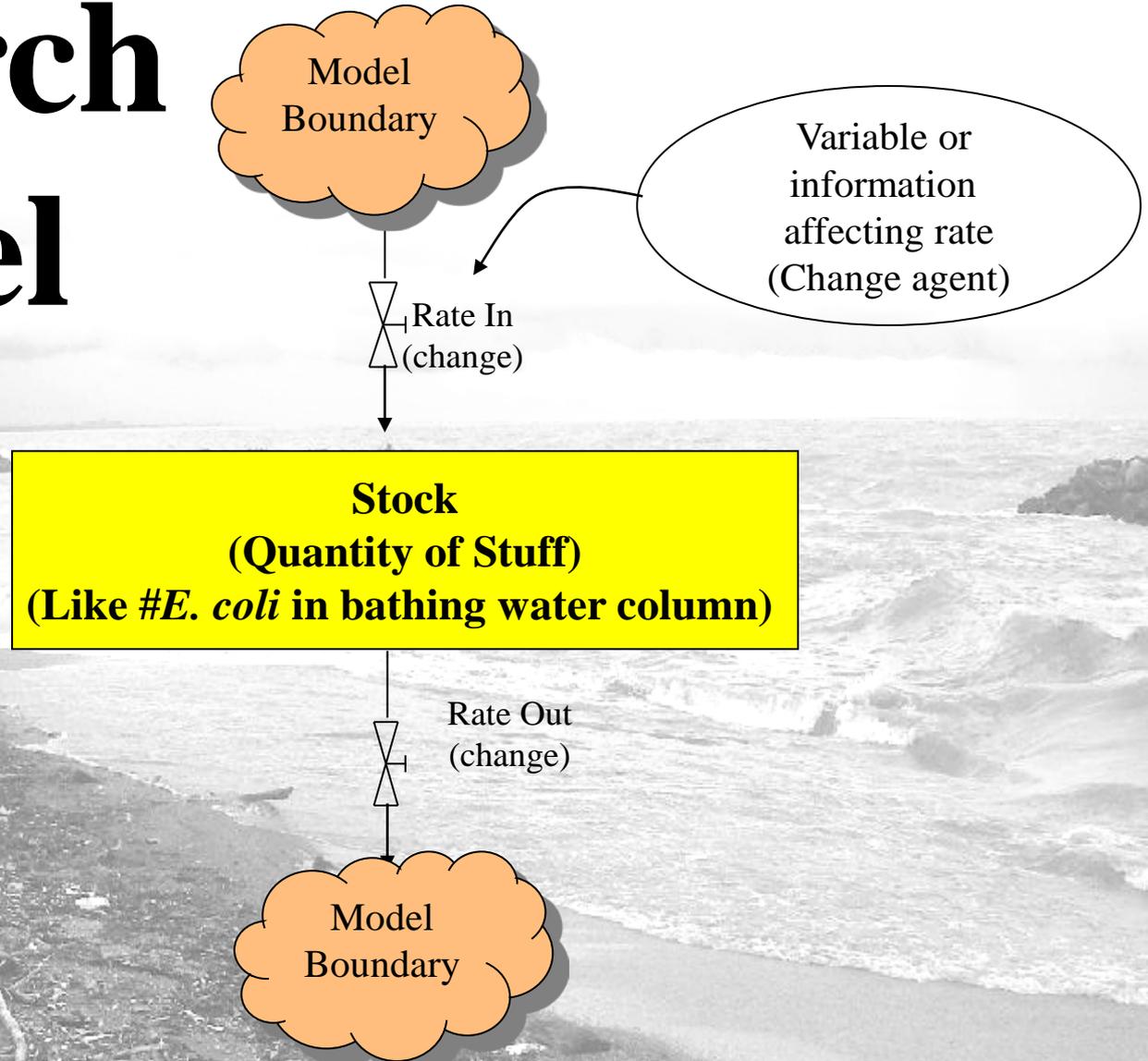




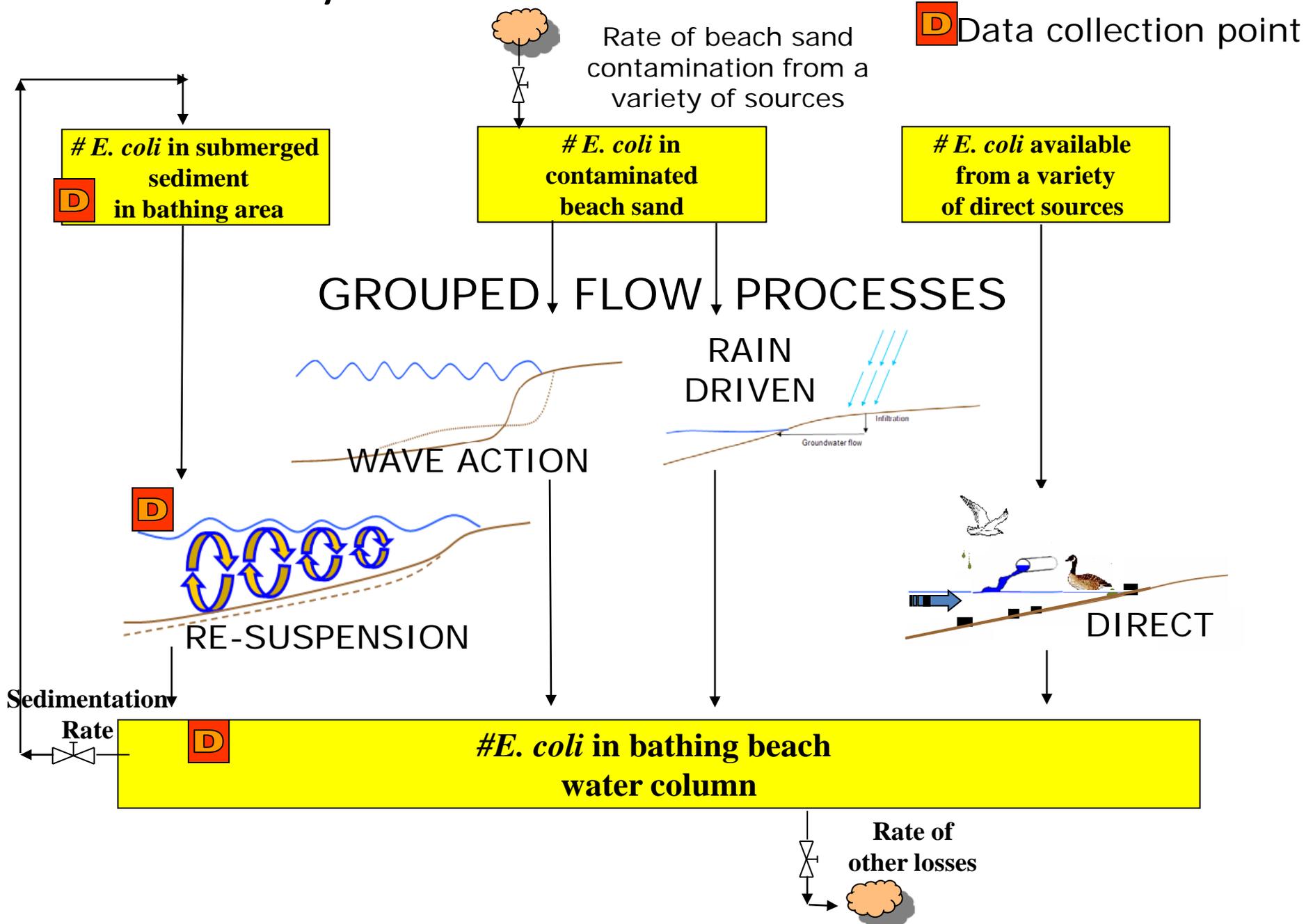
# *Process Based Predictive Models for Complex Urban Beaches*

- Existing linear regression models do not incorporate all the complex mechanisms driving water contamination at urban beaches
- NEORSD plans to develop a process-based model for predicting water quality
  - Capture new variables that appear to be critical in determining water quality
    - Quantify processes leading to contamination of beach sand
    - Quantify processes leading to contamination of water column

# Research Model



# Key Beach Stocks and Flow Processes



# *Process Based Predictive Models for Complex Urban Beaches*

- Characteristics

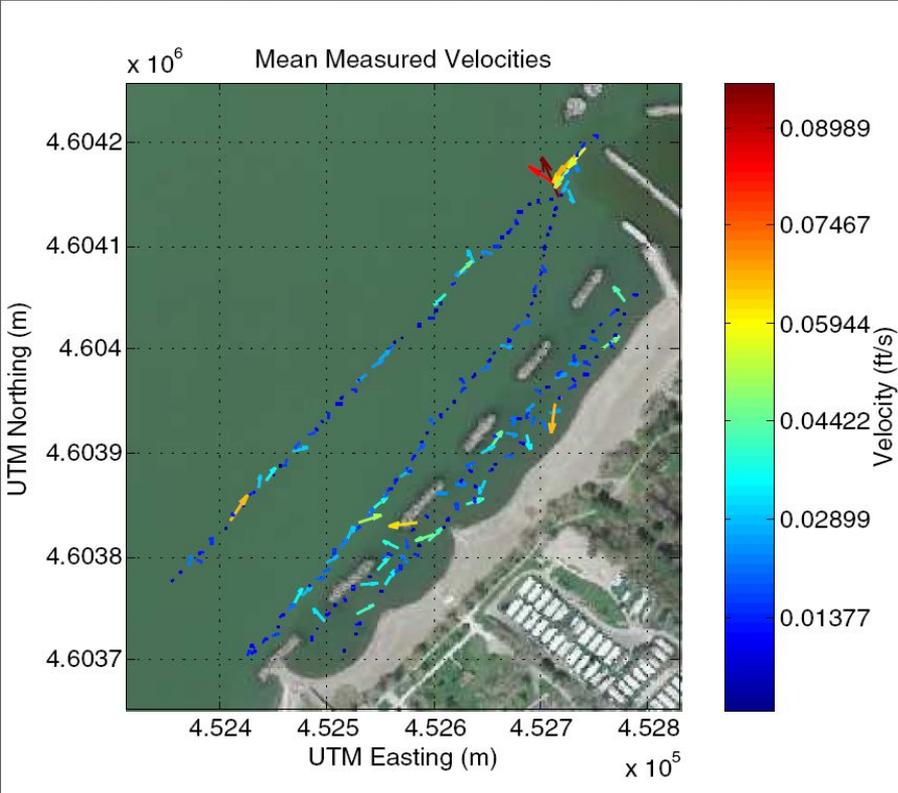
- Sand grain size
- Beach slope
- Hydraulic conductivity
- Currents



- Attributes

- Contaminated Sediment & Sand
- Waterfowl Population
- Stormwater Influences
- Combine Sewer Overflows
- Algae and Debris

# Villa Angela and Euclid Beaches





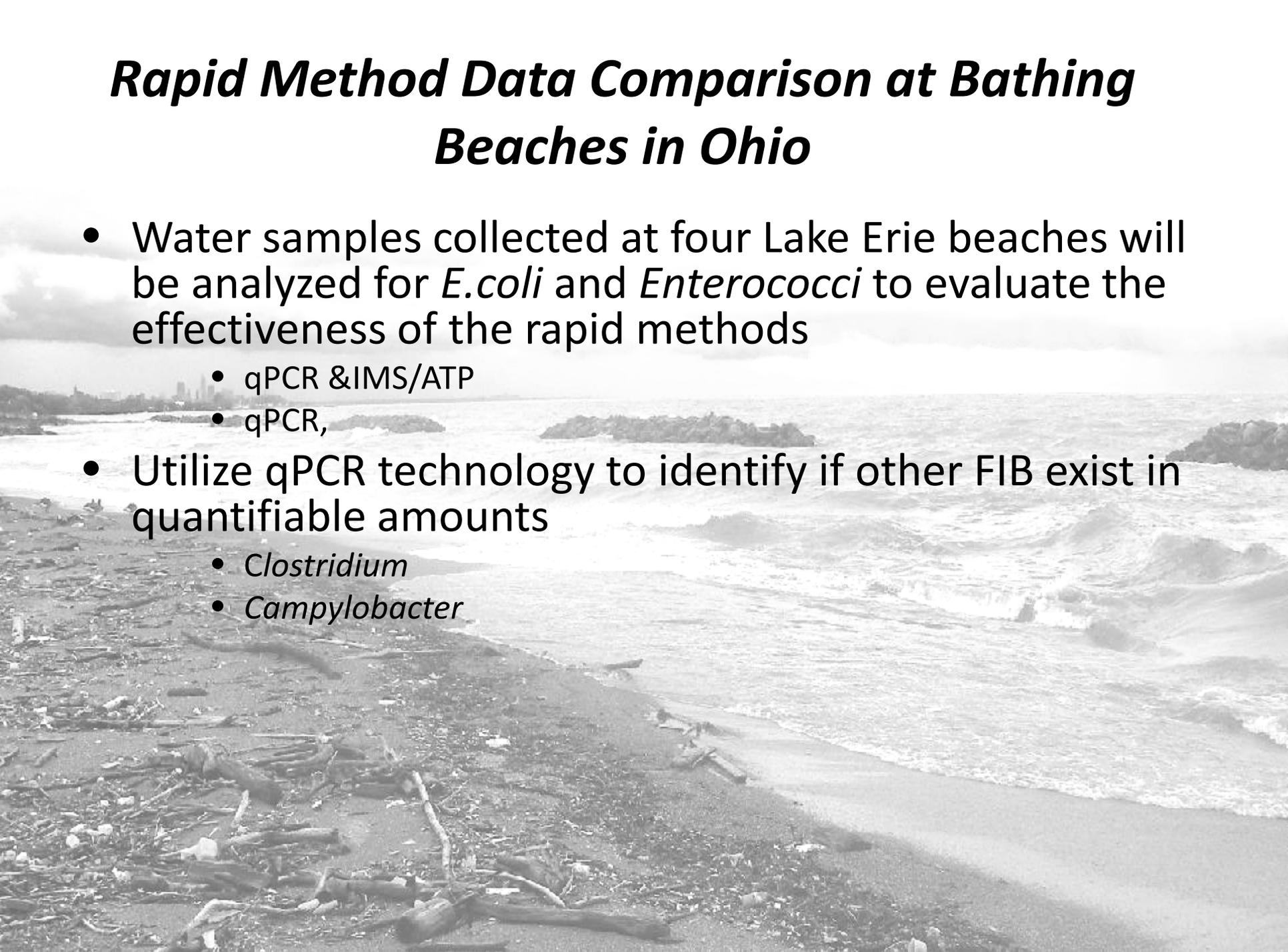
# Research Methods

- Lester and his Co-ops pioneered a variety of research methods to compile data points to support the stock and flow models



# ***Rapid Method Data Comparison at Bathing Beaches in Ohio***

- Water samples collected at four Lake Erie beaches will be analyzed for *E.coli* and *Enterococci* to evaluate the effectiveness of the rapid methods
  - qPCR & IMS/ATP
  - qPCR,
- Utilize qPCR technology to identify if other FIB exist in quantifiable amounts
  - *Clostridium*
  - *Campylobacter*



# ***Rapid Method Data Comparison at Bathing Beaches in Ohio***

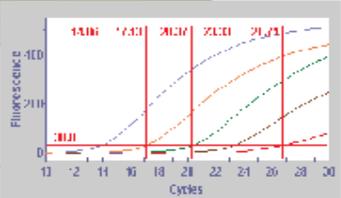
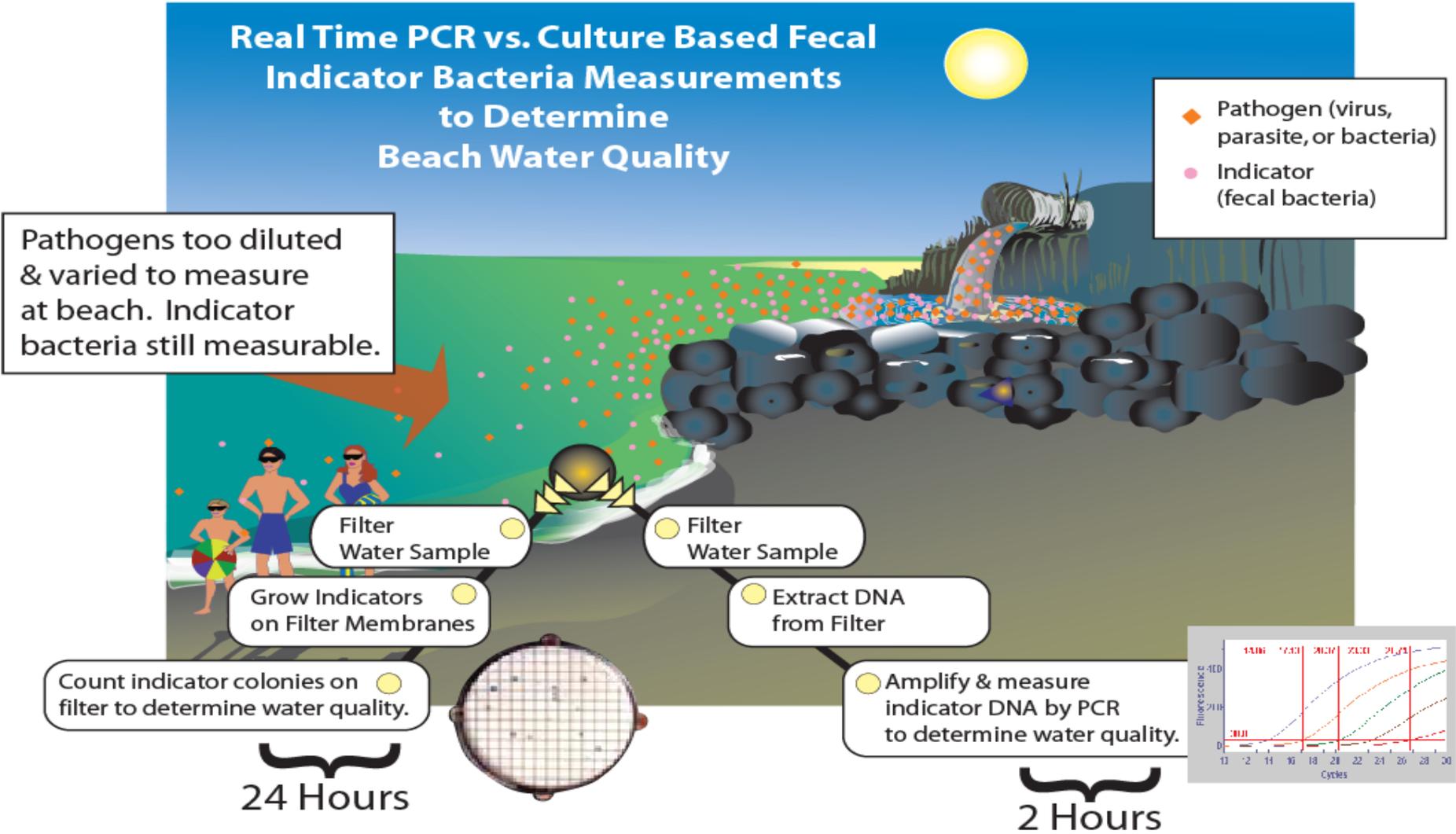
- Monitoring
  - May – September 2011
  - Edgewater, Euclid, Villa Angela and Huntington Beaches
  - Sampling Monday through Thursday
  - Event Based sampling
  - Both sand and water samples will be collected
- Correlation / Comparison
  - *E. coli* vs. *Enterococci*
  - *IMS/ATP* vs. *qPCR*

# Method Research

## Real Time PCR vs. Culture Based Fecal Indicator Bacteria Measurements to Determine Beach Water Quality

- ◆ Pathogen (virus, parasite, or bacteria)
- Indicator (fecal bacteria)

Pathogens too diluted & varied to measure at beach. Indicator bacteria still measurable.



# *Questions*

