Development of a Tiered Approach to Microbial Source Tracking in NJ Coastal Watersheds

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Use Impairments Caused By Bacterial Contamination of Coastal Waters

- Monmouth County estuaries are classified as condemned or special restricted for shellfish harvest
- Monmouth County accounts for the majority of condemned waters statewide
- Relay and depuration programs are needed to allow hard clams from special restricted waters to be utilized

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Use Impairments Caused By Bacterial Contamination of Coastal Waters

- Clean coastal waters provide opportunities for recreation and tourism in coastal communities
- Monmouth County accounts for most of New Jersey's beach closures
- The majority of these closures occur at ocean beaches adjacent to watershed outflows during storm events

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Tier 1– GIS Analysis

- Selection of sampling stations
  - NJDEP Bureau of Marine Water Monitoring
  - NJDEP/County Health Department CCMP
  - NJDEP/County Health Department AMNET
  - Other Stations As Appropriate
- Land Use/Land Cover
- Density of marinas
- Locations of major tributaries
- Sewer service area; storm drain outfall locations
- Other potential land based sources of contamination

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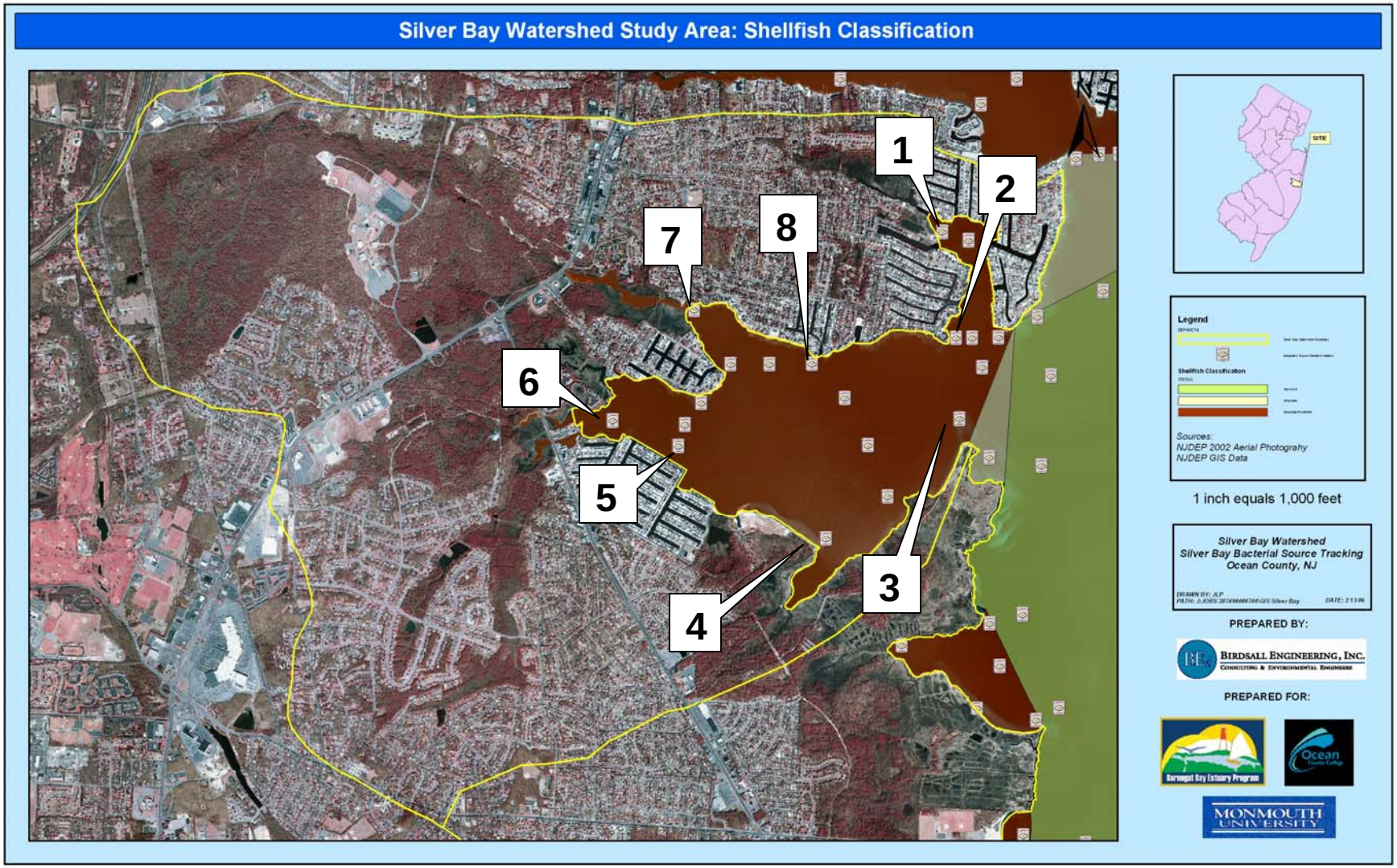

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- Tier 2 - Coliphage Analysis
  - Used to distinguish human and animal waste contaminants by grouping isolates into one of four subgroups
  - Subgroups I and IV are generally associated with animal waste
  - Subgroups II and II are generally more sewage specific

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- Tier 3 – Antibiotic Resistance Analysis
  - Used to discriminate among fecal bacteria from various host groups
    - Human vs. Nonhuman
    - Nonhuman
      - Livestock
      - Wild animals
      - Avifauna (birds)
      - Domestic pets

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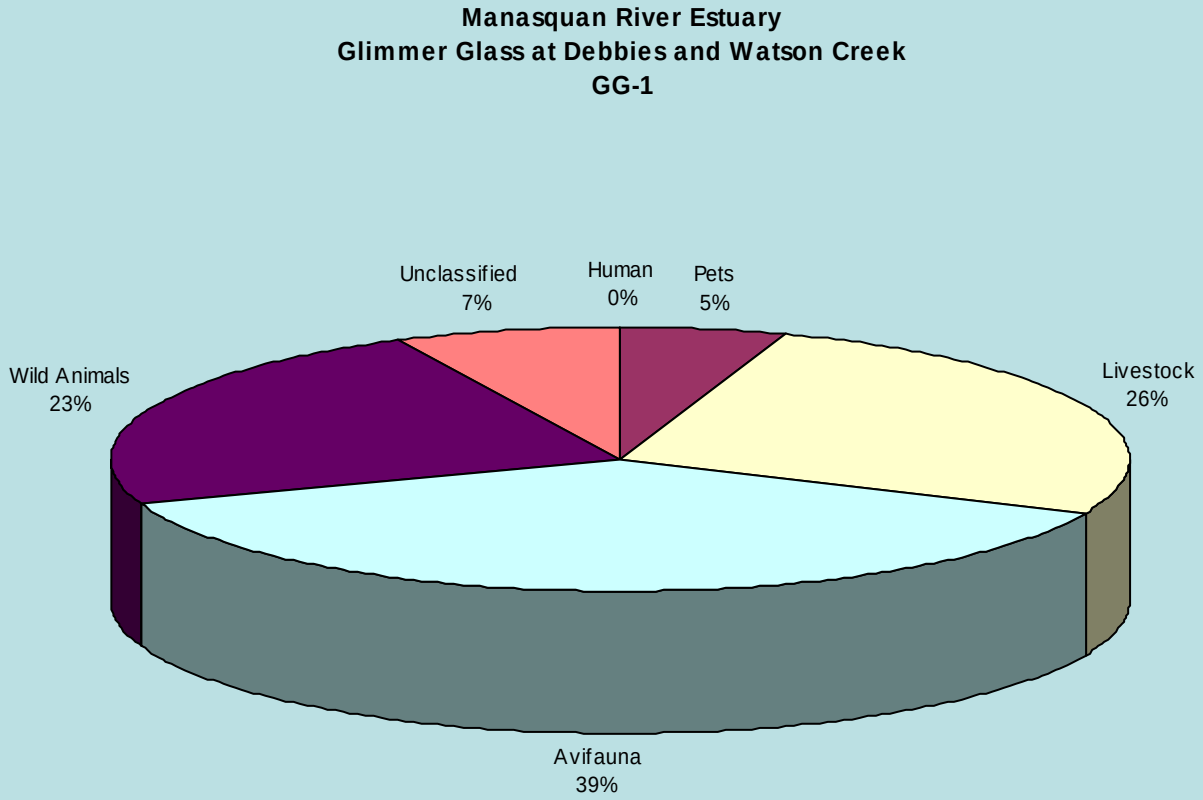

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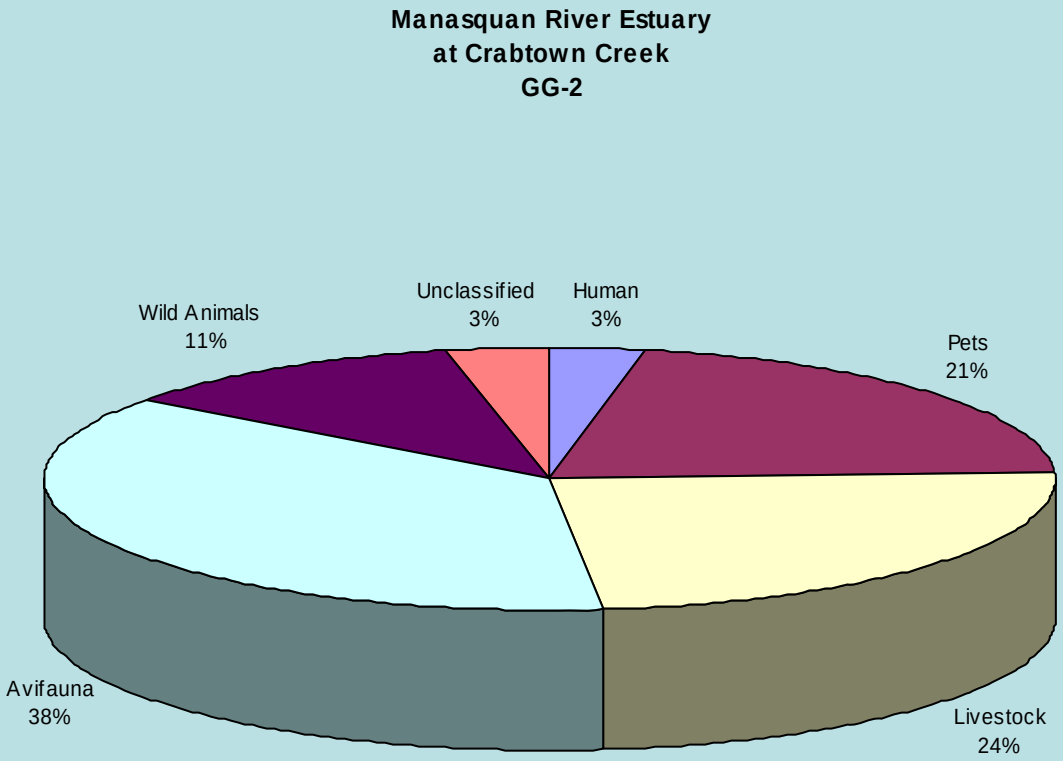

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- Tier 4 – Other Advanced Techniques
  - Detection of host-specific molecular markers
    - Target specific polymerase chain reaction (PCR)-based methods
      - Quantitative PCR
        - » qPCR

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- Chemical Methods?
  - Caffeine: Excreted in urine; however, levels of caffeine in receiving waters may be low due to dilution and the fate of caffeine in aquatic environments is uncertain
  - Optical Brighteners/Fluorescent Whitening Agents: Chemicals found in laundry detergents; may generally indicate a domestic source by not reliable as an indicator of sewage or fecal pollution

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