NEWPORT BAY
SHELLFISH PATHOGEN STUDY UPDATE

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BACKGROUND

• Most management effort focused on REC 1 standard for Enterococci and *E. coli*
  – Monthly Geomean: 30/100 mL (ENT); 100/100 mL (EC)
  – Statistical Threshold Value: 110/100 mL (ENT); 320/100 mL (EC)

• Additional standard for recreational shellfish harvesting (SHEL) beneficial use
  – Monthly median Fecal coliform <14 MPN/100 mL
  – Not more than 10% of samples to exceed 43 MPN/100 mL

• Newport Bay Bacterial TMDL includes standards for SHEL
  – Must be implemented by 2022
STATEMENT OF THE PROBLEM

- Existing shellfish standard for recreational shellfish harvesting (SHEL) beneficial use difficult to meet

- Standard applies to almost all marine and estuarine areas in California

- May not ensure that recreationally harvested shellfish are safe to consume
GOALS

• Assess validity of SHEL standards in Newport Bay

• Determine if shellfish deployed in Newport Bay bioaccumulate pathogens or surrogate indicators

• Determine if water column measurements reflect what’s in the shellfish tissues
  – Examine existing standard and alternative water column parameters
STUDY APPROACH

• Shellfish are deployed at different sites within Newport Bay with varied water quality conditions

• Fecal indicators in the water column are sampled concomitantly with pathogens and indicators in bivalves

• Hypothesis: There is a disconnect between water column fecal coliform measurements and the beneficial use they are intended to protect
12 sites chosen

- Four sites at places with high fecal coliform counts
- Four sites where there are low coliform counts
- Last four sites to ensure geographic representation
- Sites representative of varied shellfish habitat: rip rap, mud flats
MEASUREMENTS

• Measurements in water:
  – Enterococcus
  – Fecal coliform
  – E. coli
  – Male-Specific Coliphage
  – HF183 Human marker

• Measurements in shellfish:
  – Fecal coliform
  – Male-Specific Coliphage
  – Viruses
    o Adenovirus
    o Norovirus 1
    o Norovirus 2
    o Pepper Mild Mottle Virus
SHELLFISH TYPE

• Deployed shellfish
  – Allows us to standardize species and size class across locations

• Collected locally from Newport Bay

• Pacific oyster (Crassostrea gigas)
  – Introduced species
  – More robust than the native oyster (Olympia) to relocation
  – Larger in size, more material to process and sample
  – High prevalence throughout Newport Bay
STUDY SCHEDULE

1. Optimize and refine shellfish processing methods at SCCWRP (May-July 2019)

2. Conduct Pilot Study (July 9th - 24th)
   - Collect shellfish (~120)
   - Depurate shellfish (7 days)
   - Deploy shellfish (7 days)

3. Full Scale Study (Aug 1st - Sept 26th)
   - Collect shellfish (~1200)
   - Depurate shellfish (10 days)
   - Deploy shellfish (6 weeks)
PILOT STUDY DEPLOYMENTS
PILOT STUDY- PRELIMINARY DATA

- 885 MPN/100 g
- 286 MPN/100 g
- 136 MPN/100 g
- 40 MPN/100 g
- ND
- 20 MPN/100 g
✓ Deployments were successful and cages were not tampered with even at “high-risk” locations

✓ Oyster mortality rates during deployment ranged 0-20% and were site dependent

✓ Preliminary data suggests oysters accumulating FIBs at varying levels
NEWPORT BAY STUDY- PROGRESS

• ~1200 Pacific oysters collected from Newport Bay
NEWPORT BAY STUDY- PROGRESS

- Pacific oysters depurated at Kerckhoff Marine Laboratory
NEWPORT BAY STUDY- PROGRESS

- Pacific oysters depurated at Kerckhoff Marine Laboratory

2 weeks in holding tanks

Fecal coliform: 272 MPN/100 g

Fecal coliform: 0 MPN/100 g
NEWPORT BAY STUDY- PROGRESS

- Pacific oysters deployed at 12 sites within Newport Bay
NEWPORT BAY STUDY- NEXT STEPS

- Complete 4 and 6 week collections
- Process oyster tissue and water samples for molecular targets
- Analyze data and any correlations between water column and oyster tissue measurements
- Draft report expected: Spring 2020