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

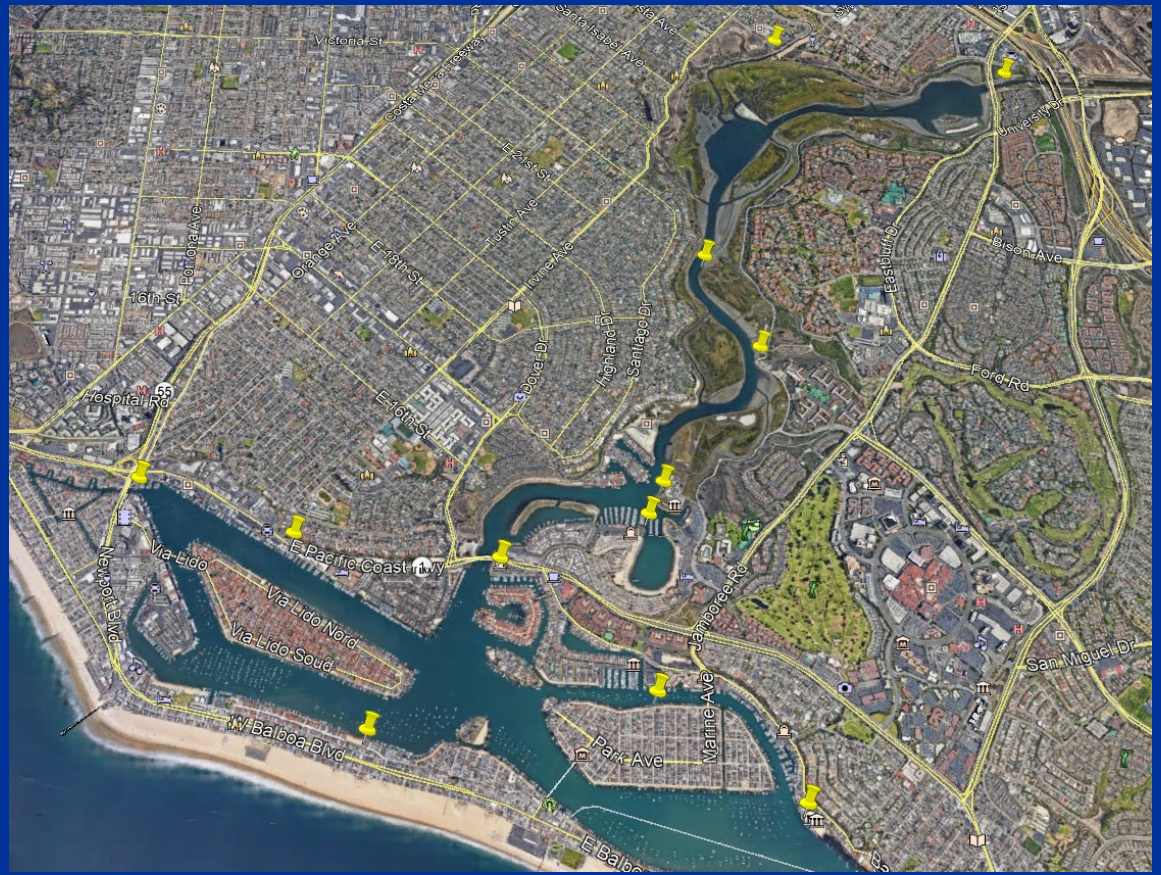
- **Assess validity of SHEL standards in Newport Bay**
- **Determine if shellfish deployed in Newport Bay bioaccumulate pathogens or surrogate indicators**
- **Determine if water column measurements reflect what's in the shellfish tissues**
  - Examine existing standard and alternative water column parameters

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

SITES

- **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
    - Adenovirus
    - Norovirus 1
    - Norovirus 2
    - 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

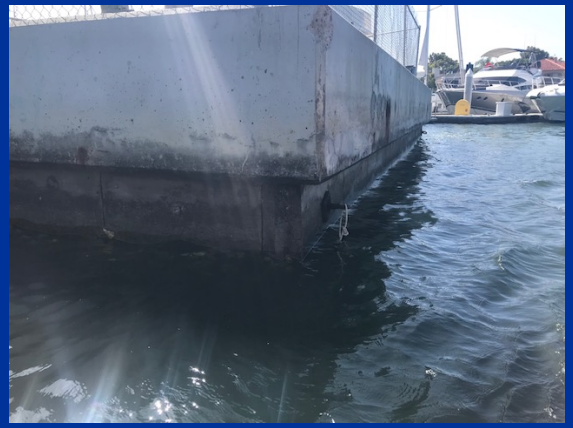
STUDY SCHEDULE

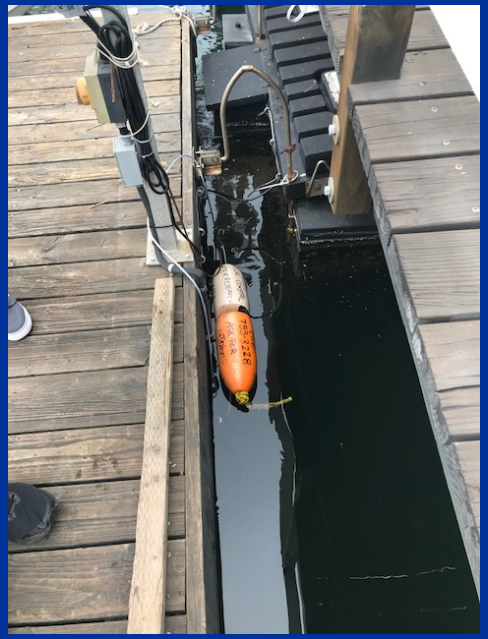
1. **Optimize and refine shellfish processing methods at SCCWRP (May-July 2019)**

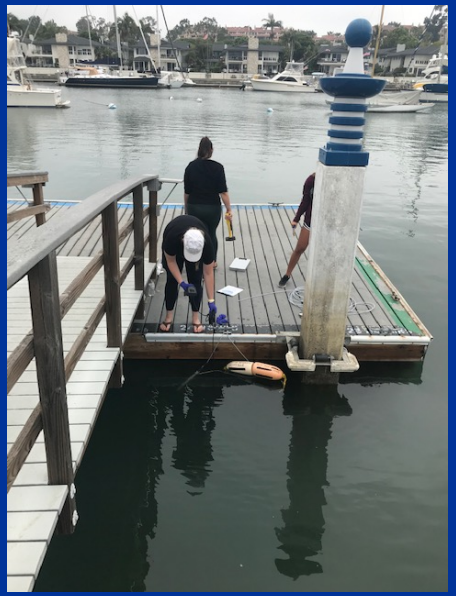
2. **Conduct Pilot Study (July 9th - 24th)**
   - Collect shellfish (~120)
   - Depurate shellfish (7 days)
   - Deploy shellfish (7 days)

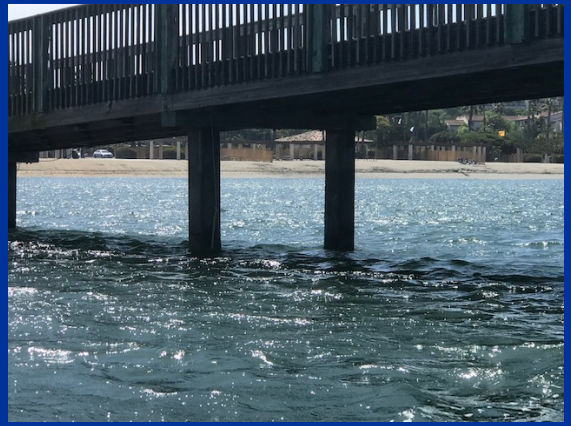
3. **Full Scale Study (Aug 1st - Sept 26th)**
   - Collect shellfish (~1200)
   - Depurate shellfish (10 days)
   - Deploy shellfish (6 weeks)

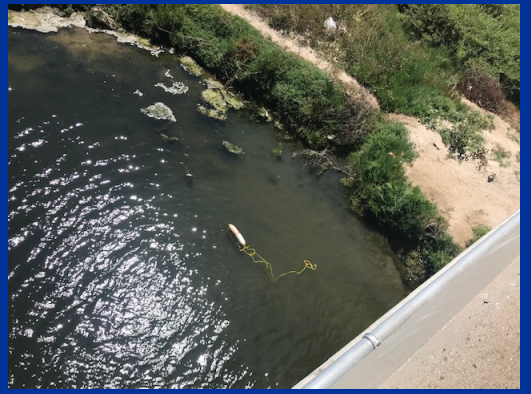
PILOT STUDY DEPLOYMENTS



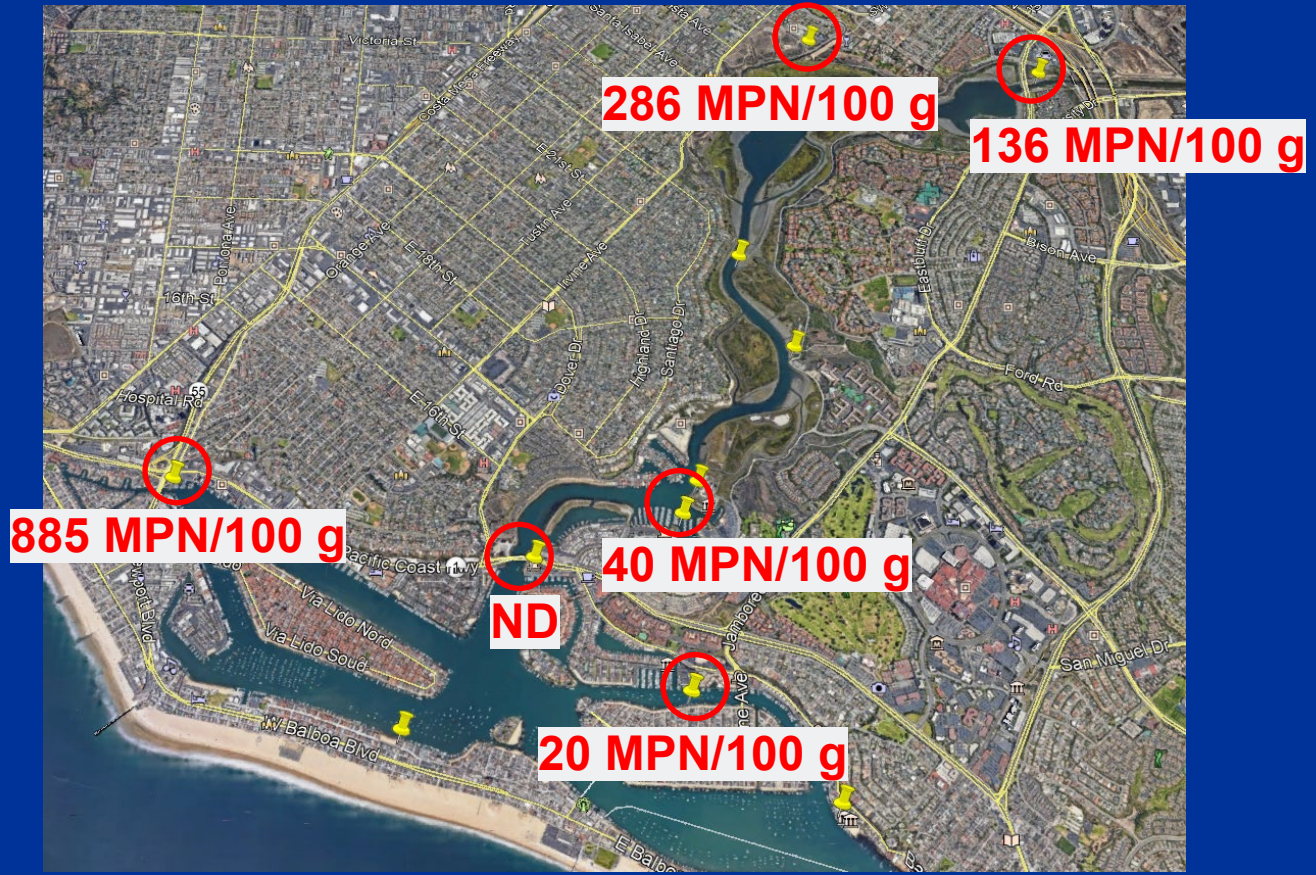








PILOT STUDY- PRELIMINARY DATA

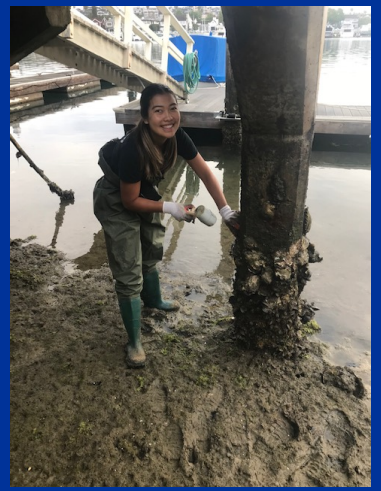


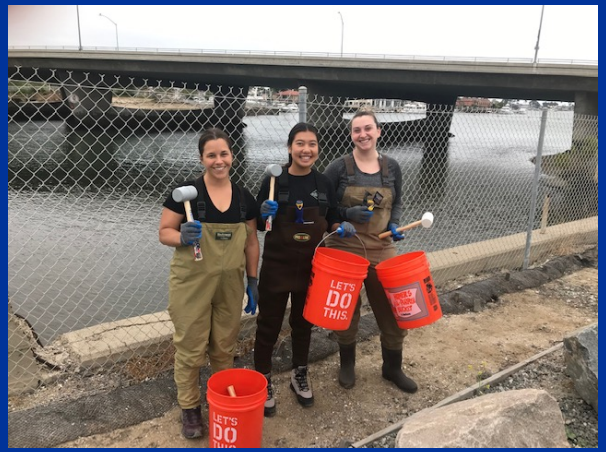
PILOT STUDY- LESSONS LEARNED

- ✓ 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

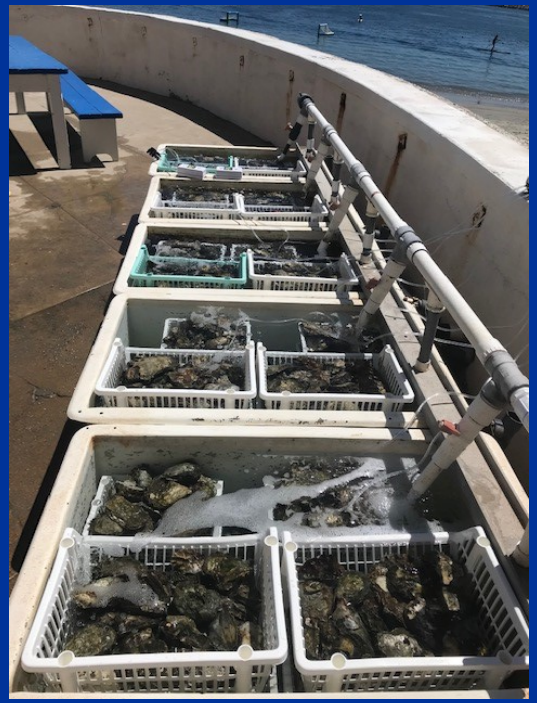
- ~1200 Pacific oysters collected from Newport Bay

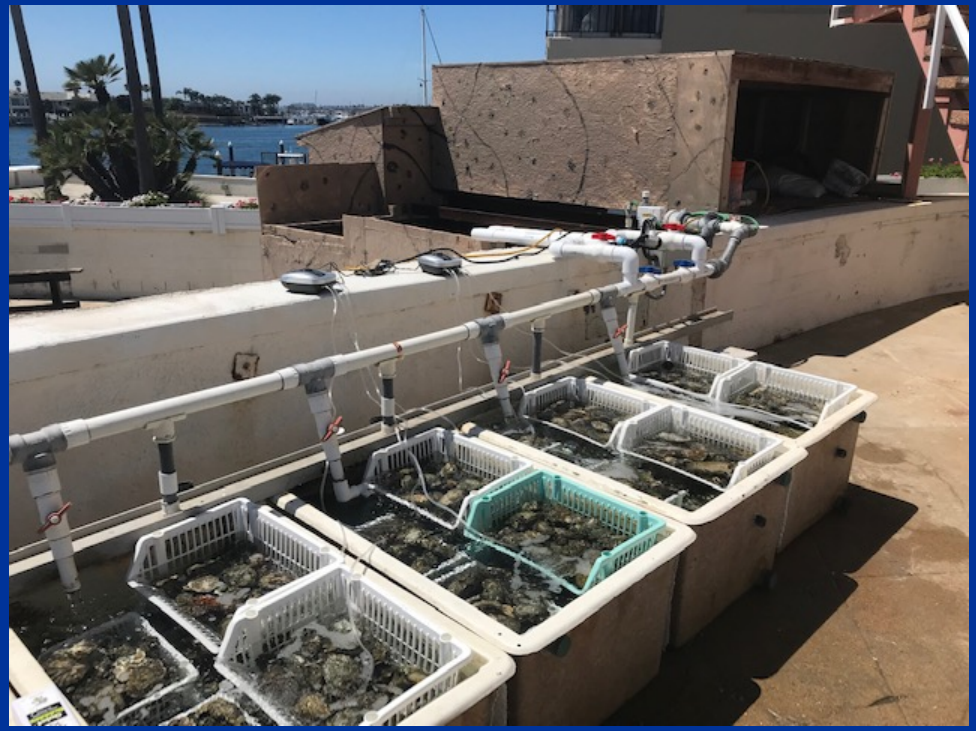




NEWPORT BAY STUDY- PROGRESS

- Pacific oysters depurated at Kerckhoff Marine Laboratory



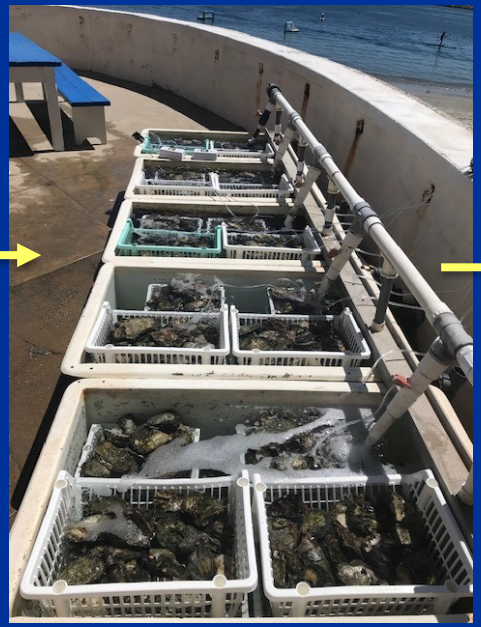


NEWPORT BAY STUDY- PROGRESS

- Pacific oysters depurated at Kerckhoff Marine Laboratory

2 weeks in holding tanks

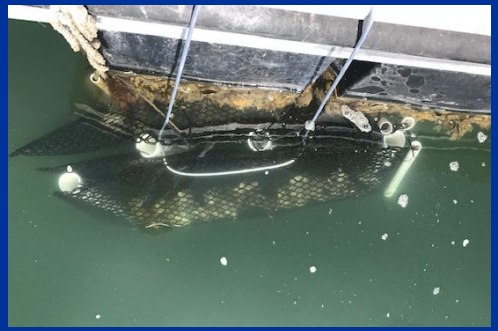
Fecal coliform:
272 MPN/100 g

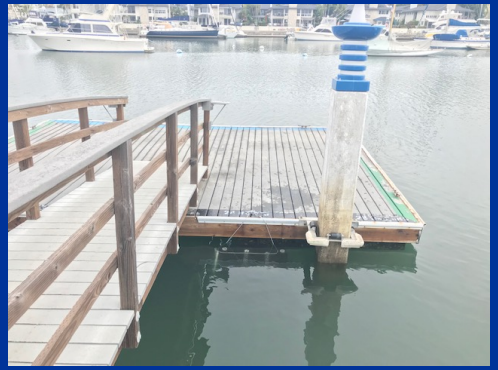


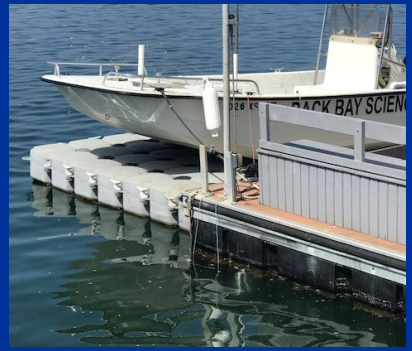
Fecal coliform:
0 MPN/100 g

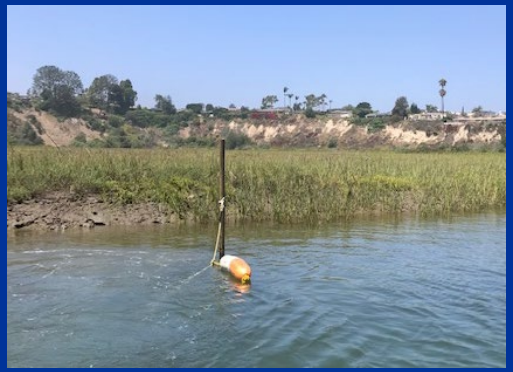
NEWPORT BAY STUDY- PROGRESS

- 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

QUESTIONS?