

Background on Current Methods and Research Needs to Support Shellfish Harvesting Objectives

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CALIFORNIA'S CURRENT STANDARDS FOR SHELLFISHING WATERS

- **The median total coliform density shall not exceed 70 per 100 mL, and not more than 10 percent of the samples shall exceed 230 per 100 mL.**
- **Some local TMDL's include the National Standard for fecal coliform**
 - “median (or geometric mean MPN or MF (mTEC) of the water sample results shall not exceed fourteen (14) per 100 ml and the estimated 90th percentile shall not exceed an MPN or MF (mTEC) of:
 - (a) 43 MPN per 100 ml for a five-tube decimal dilution test;
 - (b) 49 MPN per 100 ml for a three-tube decimal dilution test;
 - (c) 31 CFU per 100 ml for a MF (mTEC) test.”

WHAT CURRENT INDICATORS HAVE IN COMMON

- **Always found in high numbers feces (sewage)**
- **Non-specific**
 - Tell us nothing about the source of the contamination

RELIABILITY OF INDICATORS IN CALIFORNIA

- **May be adequate for some areas**
 - Embayments with non-disinfected POTW discharges
 - Known sources of human, cattle, dog feces

- **Unclear if FIB-based standards are meaningful in non-human impacted areas**
 - Embayments with no point source discharges
 - Open coast beaches

NEED FOR SANITARY SURVEYS

- **A thorough sanitary survey can identify many potential sources of human pathogens to shellfish harvesting waters**
 - POTW discharges
 - Septic system malfunctions
 - Homeless encampments
 - Failed infrastructure

- **Often miss potential sources**
 - Aging infrastructure
 - Illegal dumping

MOLECULAR SOURCE IDENTIFICATION CAN HELP

- **SCCWRP validated many source-specific fecal markers for use in California**
 - Human
 - Bird
 - Dog
 - Cattle
- **Local labs have been trained and many are proficient in running these tests**
 - Interpretation of results can be tricky

BACTERIA MAY STILL EXCEED STANDARDS

- **Some water bodies may still exceed standards after all tractable sources have been identified and remediated**
- **Sources of FIB may be natural**
 - Wildlife
 - FIB growth in environment

NEW MEASUREMENTS FOR HUMAN CONTAMINATION ON THE HORIZON

- **Male-specific coliphage**

- FDA has proposed a male-specific coliphage rule

- **Norovirus**

- UK shellfish group (CEFAS) reference based methods for norovirus quantification
- Have been optimized for use in shellfish in the US (Dr. Rachel Noble, UNC Institute of Marine Science)

MALE-SPECIFIC COLIPHAGE

- **California has little in common with the gulf and east coast where this method was developed**
 - Cold water
 - Few shellfish areas impacted by POTW discharges

- **May be suitable in some locales**
 - Validation study will be required

NOROVIRUS

- **Direct measurement of disease- causing agent**
 - Most common cause of gastroenteritis
- **Highly human specific**
- **Good deal of measurement variability**
 - Methods would require validation in California

WHAT ABOUT SEASONALITY

- **Many areas may meet standards in dry weather**
 - Testament to your hard work

- **In wet weather, all bets are off**
 - Water quality is poor in most areas

NON-FECAL RISKS FROM SHELLFISH

- ***Vibrio spp.***

- Thrive in warm, brackish water
- Bioaccumulate in shellfish
- *V. parahaemolyticus* and *V. vulnificus* found in high concentrations in local estuaries during recent *El Nino* event
- Leading cause of illness from shellfish consumption

- **Algal Toxins (PSP, ASP)**

- Domoic acid (diatoms)
- Saxitoxins (dinoflagellates and cyanobacteria)
- Microcystins (cyanobacteria)

RECAP OF RESEARCH NEEDS

- **Continue to improve source identification capabilities**
 - Enable remediation efforts
- **Validate new indicator/pathogen measurement methods locally**
- **Assess extent and potential health risks related to non-fecal sources**
 - *Vibrio* spp.
 - Algal toxins

QUESTIONS?