Aquaculture and Public Health

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Bird and Mammal Congregations on Aquaculture Gear

- **Public Health Significance :** Bird and mammal waste potentially containing human pathogens can concentrate in shellfish tissues and result in human illness.

- **Relevance to Aquaculture:** Direct- Floating and suspended aquaculture gear can serve as roosting habitat for birds and/or pullouts for marine mammals,. Their waste can be concentrated in shellfish tissues due to the proximity. Indirect- Waste associated with congregations of birds and mammals can impact water quality in the harvest area, possibly requiring re-classification. May increase levels of indicator bacteria above threshold levels of some countries/ buyers.

- **Strategies for Control:** Bird deterrents, gear modifications, purging prior to harvest, monitoring.

- **Current requirement(s):**
  - The 2017 NSSP MO requires States to evaluate when aquaculture structures attracts birds or mammals, their presence should be considered for possible adverse effects on growing area water quality and that each aquaculture site that the Authority determines may attract sufficient birds and/or mammals that their waste presents a human health risk shall have a written operational plan. The plan shall be approved by the Authority prior to its implementation
  - No NSSP upper limit on e-coli/fecal coliform in shellfish tissues (previously 230/100 g)
  - Some states, countries have upper limit on fecal coliform/e-coli in shellfish tissues.
  - Some buyers have upper limit or zero tolerance for fecal coliform in shellfish

CLAMS, OYSTERS, MUSSELS, AND WHOLE AND ROE-ON SCALLOPS, FRESH OR FROZEN	Microbiological - 1. E. coli or fecal coliform - 1 or more of 5 subs exceeding MPN of 330/100 g or 2 or more exceeding 230/100 g; 2. APC - 1 or more of 5 subs exceeding 1,500,000/g or 2 or more exceeding 500,000/g.

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Extended exposure during culture activities- Resubmergence

- **Public Health Significance :** Exposure to elevated ambient air conditions can increase levels of some pathogenic bacteria in shellfish.

- **Relevance to Aquaculture:** Shellfish related infections can result in the implementation of costly controls on the harvest and handling of shellfish, growing area closures, recalls, and impacts to product reputation.

- **Strategies for Control:** Resubmergence following culture activities, limiting exposure, PHP.

- **Current requirement(s):** When pre-harvest culture practices have the potential to elevate *Vp.* levels in market size product intended for immediate harvest, the Authority shall establish *Vp.* control measures and include the measures in the State Vibrio Control Plan.
  - Such control measures may be implemented on a State-wide, regional, geographic, or farm or growing area-specific basis. When shellfish are re-immersed as a control measure the Authority should consider inclusion of record keeping requirements such as means of shellfish segregation/identification procedures, date re-immersed in water and date of final harvest. The Authority may require growers to have a control plan approved by the Authority

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Shellfish Seed from Prohibited Waters

- **Public Health Significance :** Prohibited waters may contain high levels PCBs/ heavy metals, viruses and bacteria that can contaminate shellfish and result in consumer infections.

- **Relevance to Aquaculture:** Often ideal locations for nursery growout (marinas) are classified as prohibited (i.e. marinas, harbors)

- **Strategies for Control:** Moving shellfish to clean areas as seed can reduce pathogens and contaminates in shellfish tissues to acceptable levels prior to harvest.

- **Current requirement:** The 2017 NSSP MO requires States to establish a maximum seed size for seed in prohibited areas.
  - –The maximum size should reflect a size that would require a minimum of 4 months before the seed reaches the legal harvest size.
    - •This is a reduction from the last MO which required six months

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Time to temperature requirements

- **Public Health Significance :** Exposure to elevated ambient air conditions following harvest and prior to temperature control can increase levels of some pathogenic bacteria in shellfish.

- **Relevance to Aquaculture:** Shellfish aquaculturists are required to adhere to time temperature requirements. The requirements can impose restrictions on production, or require costly on-board refrigeration/ cooling.

- **Strategies for Control:** Rapid cooling of shellstock

- **Current requirement:** NSSP Time Temp Matrix- State requirements may be different

Action Level	Average Monthly Maximum Air Temperature	Maximum Hours from Exposure
Level 1	<50 °F (10 °C)	36 hours
Level 2	50 - 60 °F (10 - 15 °C)	24 hours
Level 3	>60 - 80 °F (15 - 27 °C)	18 hours
Level 4	>80 °F (27 °C)	12 hours