Dye and microbial study in response to outbreak of norovirus-like illnesses from consumption of shellfish from Hammersley Inlet, Washington

Mark Toy  
*Washington Dept. of Health, United States, mark.toy@doh.wa.gov*

Follow this and additional works at: [https://cedar.wwu.edu/ssec](https://cedar.wwu.edu/ssec)

Part of the [Fresh Water Studies Commons](https://cedar.wwu.edu/ Fresh Water Studies Commons), [Marine Biology Commons](https://cedar.wwu.edu/ Marine Biology Commons), [Natural Resources and Conservation Commons](https://cedar.wwu.edu/ Natural Resources and Conservation Commons), and the [Terrestrial and Aquatic Ecology Commons](https://cedar.wwu.edu/ Terrestrial and Aquatic Ecology Commons)


This Event is brought to you for free and open access by the Conferences and Events at Western CEDAR. It has been accepted for inclusion in Salish Sea Ecosystem Conference by an authorized administrator of Western CEDAR. For more information, please contact [westerncedar@wwu.edu](mailto:westerncedar@wwu.edu).
Dye and microbial study in response to outbreak of norovirus–like illnesses from consumption of shellfish from Hammersley Inlet, Washington

Mark Toy, Environmental Engineer
Office of Environmental Health & Safety
Salish Sea Ecosystem Conference
April 5, 2018
Hammersley Inlet

76 CA Illnesses
harvest 2/10, closure 3/2

16 OR Illnesses
harvest 3/16, closure 4/4
Hammersley Inlet

6 OR Illnesses
harvest 3/17,
closure 4/5

76 CA Illnesses
harvest 2/10, closure 3/2

6 OR Illnesses
harvest 3/17,
closure 4/5

76 CA Illnesses
harvest 2/10, closure 3/2

2 WA Illnesses
harvest 3/26, closure 4/11

3 CA Illnesses
harvest 3/16 or 3/28, closure 4/11

16 OR Illnesses
harvest 3/16, closure 4/4
Study Objectives

- Determine steady state dilution, time of travel (ToT) to Hammersley Inlet sanitary line from Shelton WWTP outfall
- Determine treatment efficiencies of Shelton WWTP under different operational conditions
- Measure microbial accumulation in oysters in Hammersley Inlet
- Determine potential of WWTP and other pollution sources to contaminate oysters in Hammersley Inlet
Elements of Study

- Sentinel oyster cages + instruments
- Testing of wastewater along treatment train
- Testing surface discharges in growing area for bacteria and viruses
- Dye injection at WWTP and tracking of plume
- Study participants: DOH, FDA, Ecology, WDFW, Squaxin Tribe, Mason County, and City of Shelton
Sampling 11/29 to 12/2 every few hours along treatment train
Flows 3.7–3.9 MGD (MMDF 4.41 MGD)
0.25” rain on 11/30, 0.74” on 12/1 (7.15” in week prior to study)
Generally, influent FC $10^6$–$10^7$, 2–3 log inactivation prior to disinfection, 5–6 log inactivation with disinfection.
Generally, influent MSC $10^4$–$10^6$. 2–4 log inactivation prior to disinfection, <10 after disinfection
### Oyster sampling results

#### MSC Results (PFU/100 g)

<table>
<thead>
<tr>
<th>Date</th>
<th>Station 1</th>
<th>Station 2</th>
<th>Station 3</th>
<th>Station 4</th>
<th>Station 5</th>
<th>Station 6</th>
<th>Totten</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec. 11</td>
<td>&lt;10.9</td>
<td>476</td>
<td>191</td>
<td>51</td>
<td>Lost</td>
<td>106</td>
<td>&lt;8.9</td>
</tr>
<tr>
<td>Jan. 10</td>
<td>Lost</td>
<td>2554</td>
<td>1692</td>
<td>Lost</td>
<td>369</td>
<td>Lost</td>
<td>&lt;10.9</td>
</tr>
</tbody>
</table>

#### FC Results (CFU/100 g)

<table>
<thead>
<tr>
<th>Date</th>
<th>Station 1</th>
<th>Station 2</th>
<th>Station 3</th>
<th>Station 4</th>
<th>Station 5</th>
<th>Station 6</th>
<th>Totten</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec. 11</td>
<td>&lt;17.9</td>
<td>&lt;17.9</td>
<td>&lt;17.9</td>
<td>45</td>
<td>Lost</td>
<td>78</td>
<td>40</td>
</tr>
<tr>
<td>Jan. 10</td>
<td>Lost</td>
<td>20</td>
<td>20</td>
<td>Lost</td>
<td>&lt;17.9</td>
<td>Lost</td>
<td>&lt;17.9</td>
</tr>
</tbody>
</table>
Observations

- Reflux ‘bathtub’ effect – vulnerable to pollution
- Good WWTP performance
- Higher concentrations in Oakland Bay
- Surprisingly high dye readings in some locations/times
Next Steps

- Microbial Testing
- PIC work
- Continue to evaluate data and (if necessary) re-evaluate growing area classification
Thank You

Mark Toy
Office of Environmental Health & Safety
Mark.Toy@doh.wa.gov
Website: https://www.doh.wa.gov/CommunityandEnvironment/Shellfish/GrowingAreas