

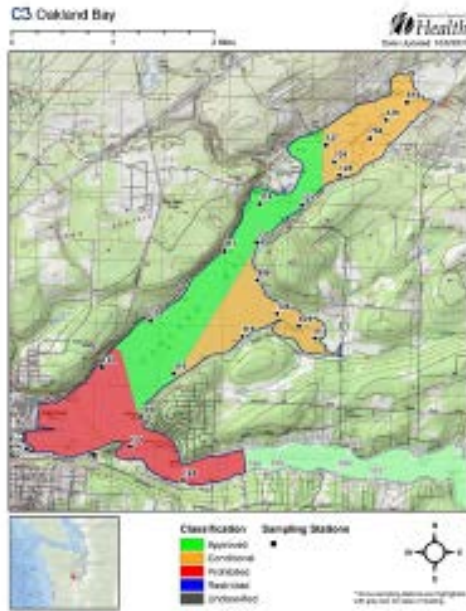


SHELTON WWTP DYE AND MICROBIAL STUDY: PART 2



Mark Toy, Shellfish Growing Area Section, Office of
Environmental Health and Safety

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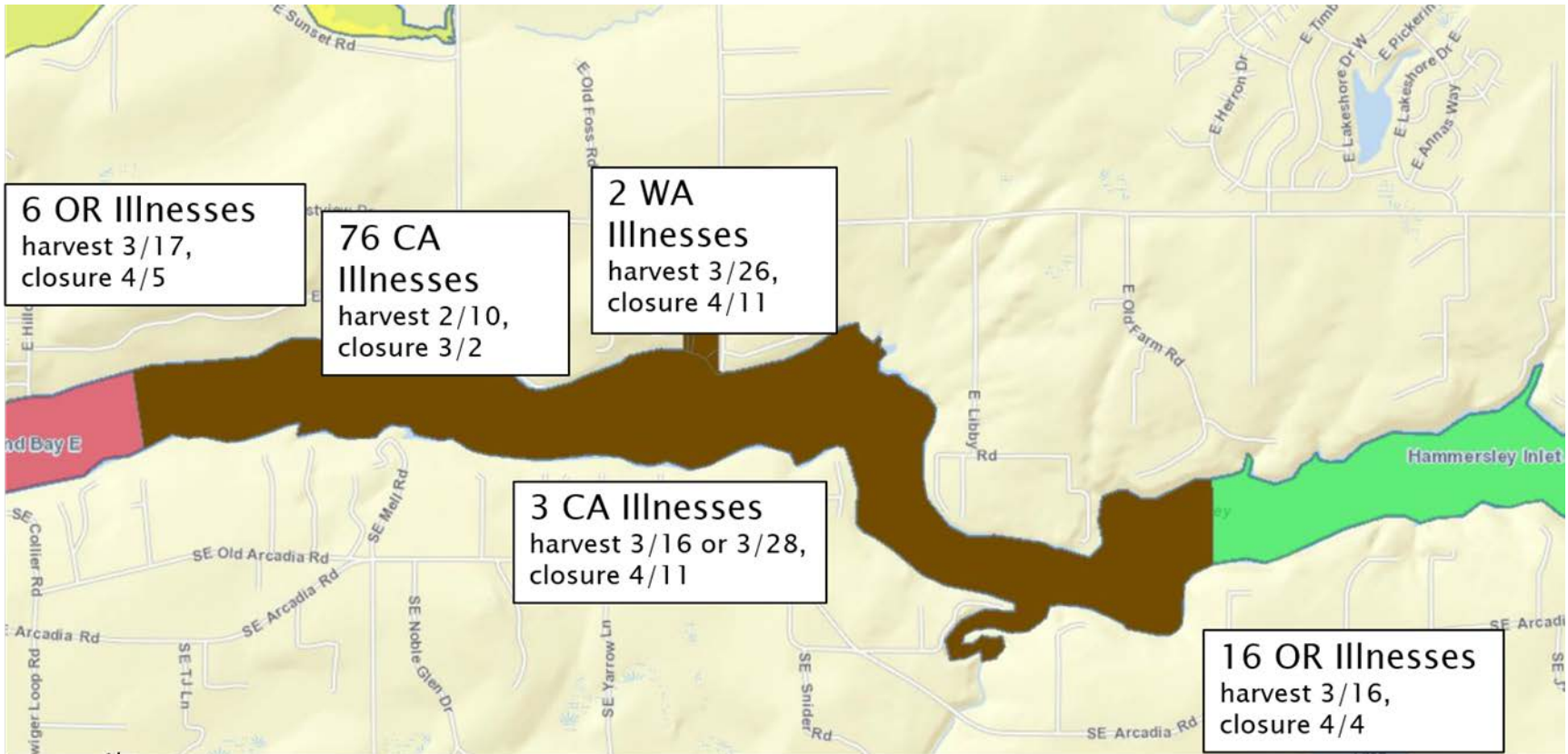


DYE AND MICROBIAL STUDY IN RESPONSE TO OUTBREAK OF NOROVIRUS-LIKE ILLNESSES FROM CONSUMPTION OF SHELLFISH FROM HAMMERSLEY INLET, WASHINGTON

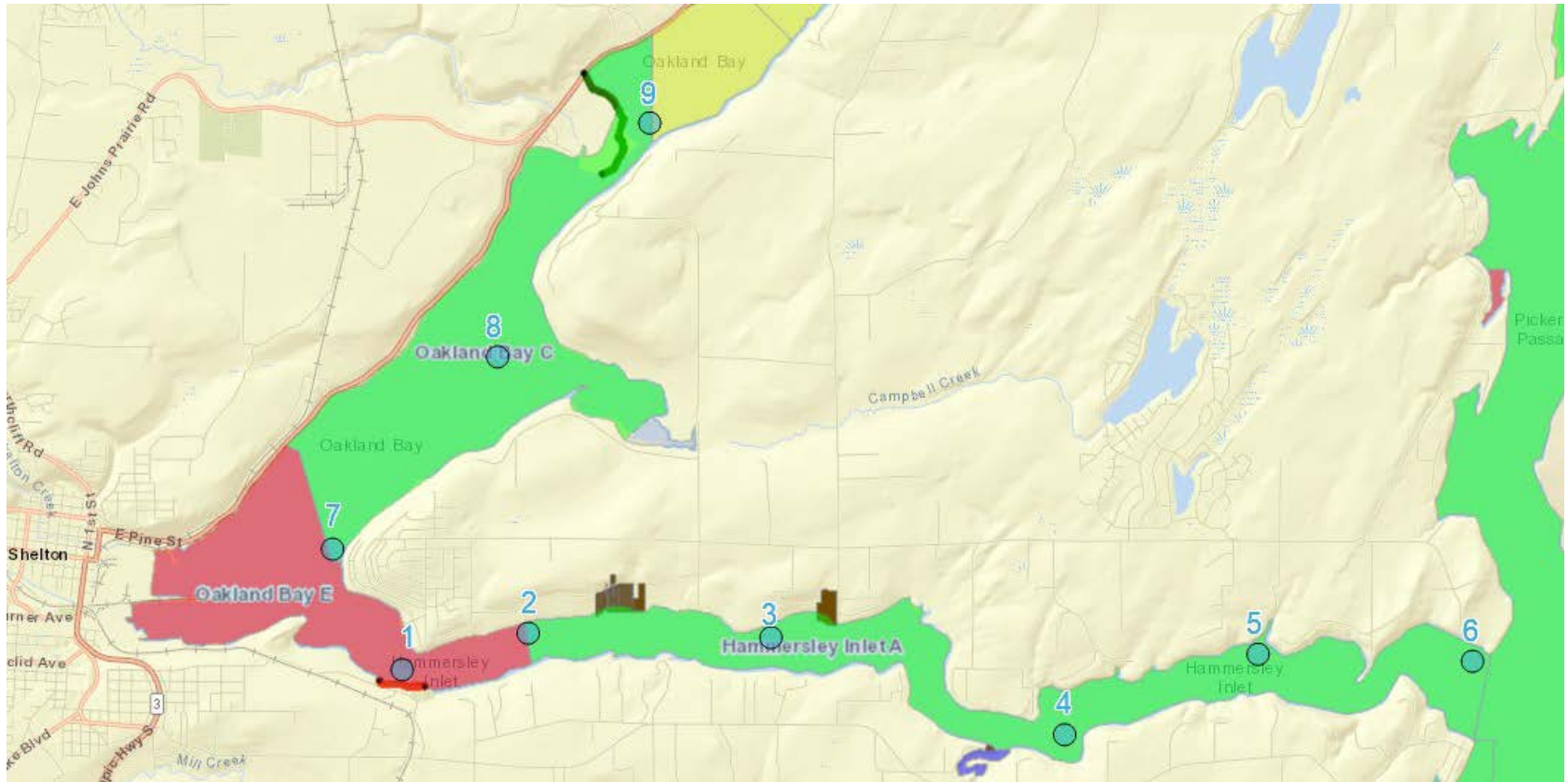
Mark Toy, Environmental Engineer
Office of Environmental Health & Safety



2018 AEC Presentation



2017 NOROVIRUS OUTBREAK



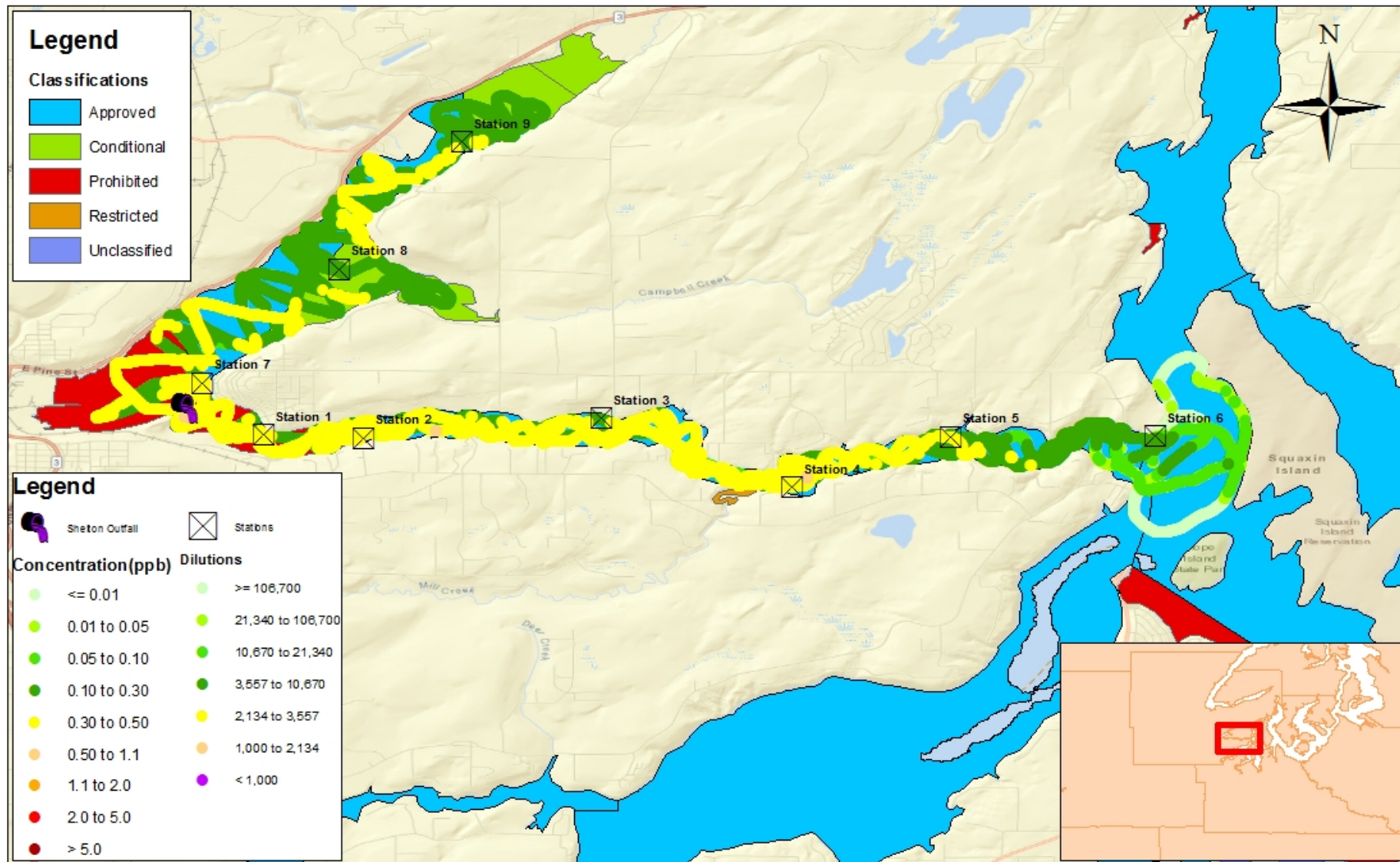
2017 DYE STUDY STATIONS

2017-18 Sentinel Oyster Results

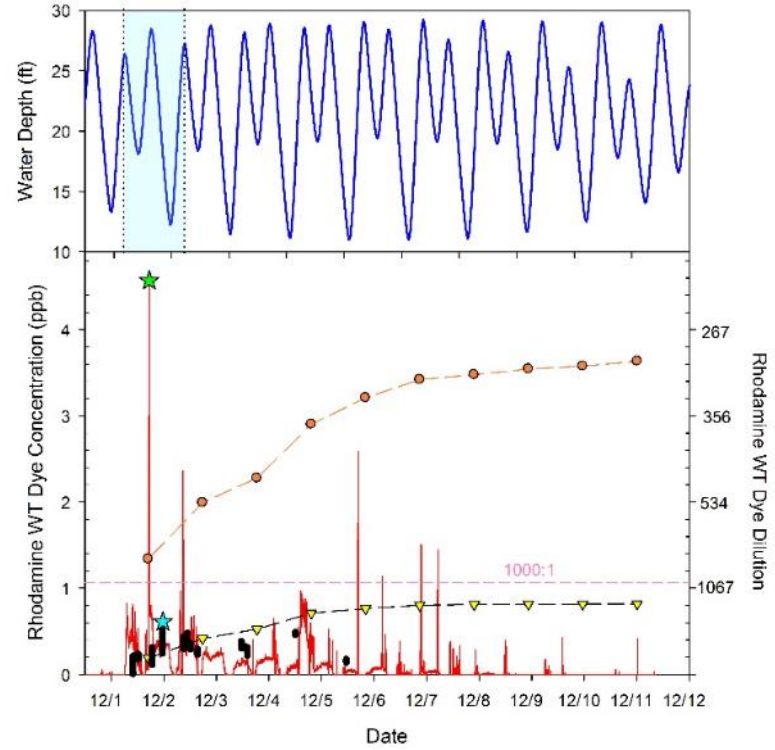
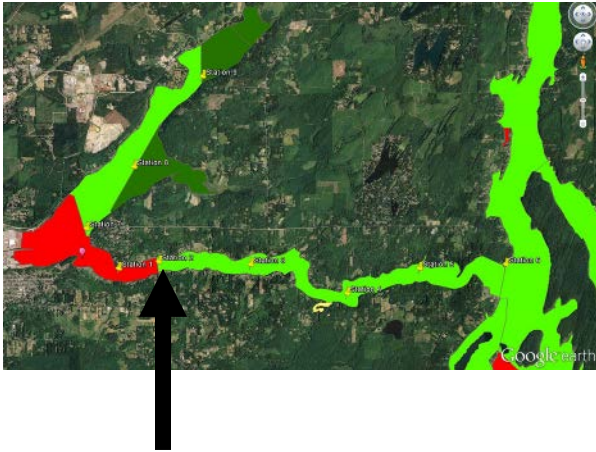
MSC Results (PFU/100 g)							
Date	Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	Totten
Dec. 11	<10.9	476	191	51	Lost	106	<8.9
Jan. 10	Lost	2554	1692	Lost	369	Lost	<10.9
FC Results (CFU/100 g)							
Date	Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	Totten
Dec. 11	<17.9	<17.9	<17.9	45	Lost	78	40
Jan. 10	Lost	20	20	Lost	<17.9	Lost	<17.9

(For MSC, 50 PFU/100 g reopening standard after sewage spill)

Shelton, WA, December 2, 2017

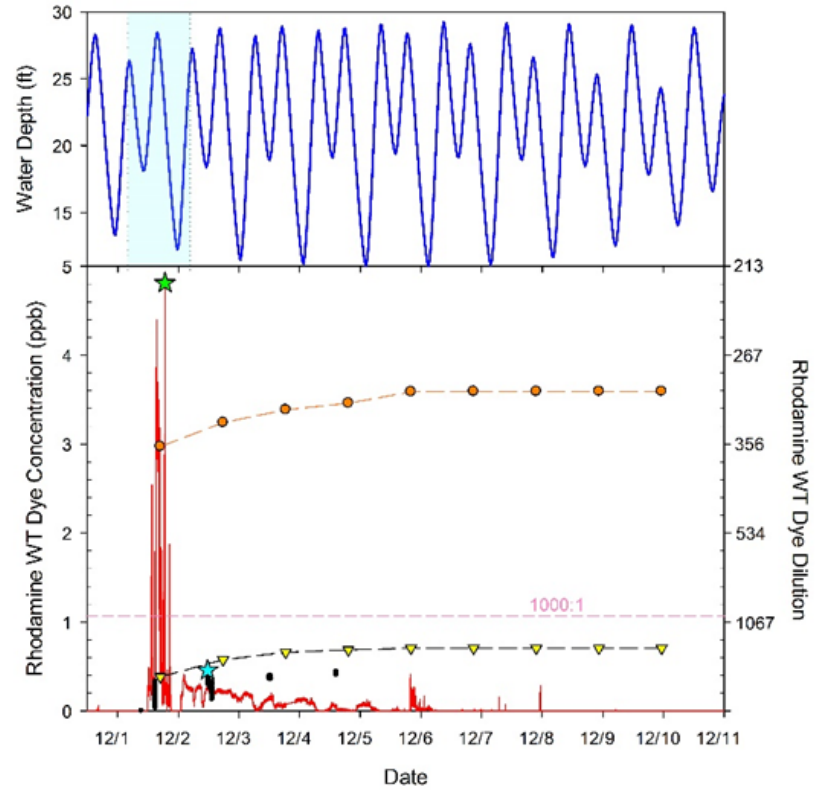
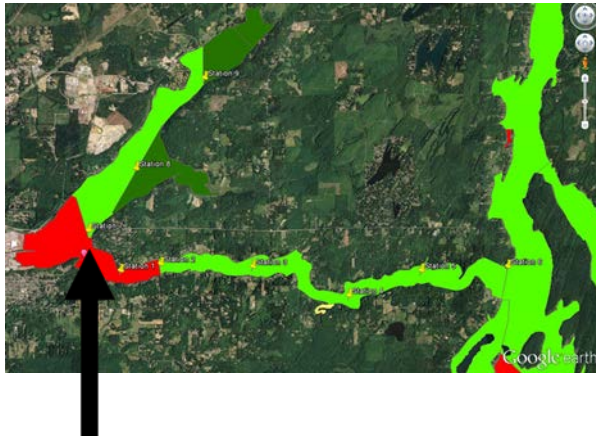


Hammersley, WA Station 2



- Continuous readings submersible fluorometer
- one full tidal day steady state concentration - Peak 1 hr
- △— one full tidal day steady state concentration - Avg
- Readings of tracking fluorometer - 200 meters buffer
- ★ Peak concentration of submersible fluorometer
- ★ Peak concentration of tracking fluorometer (200m buffer)

Hammersley, WA - Station 7



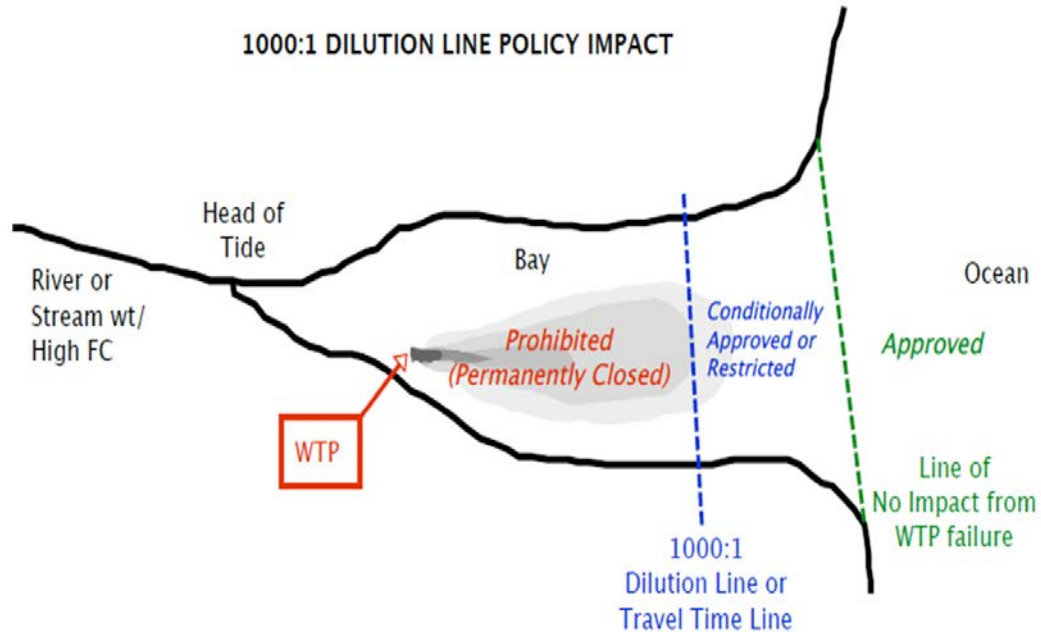
- Continuous readings submersible fluorometer
- — one full tidal day steady state concentration - Peak 1 hr
- ▽ — one full tidal day steady state concentration - Avg
- Readings of tracking fluorometer - 200 meters buffer
- ★ Peak concentration of submersible fluorometer
- ★ Peak concentration of tracking fluorometer (200m buffer)

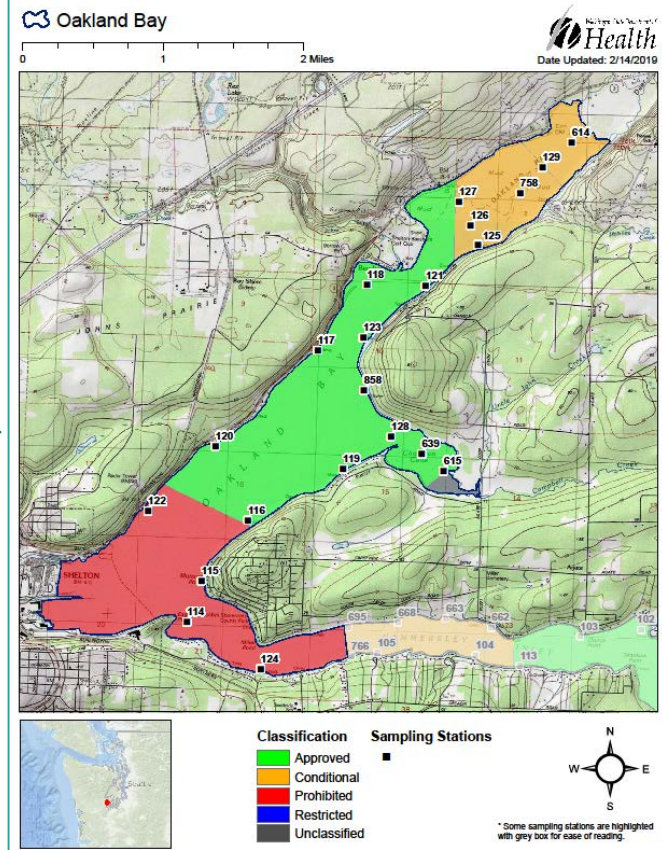
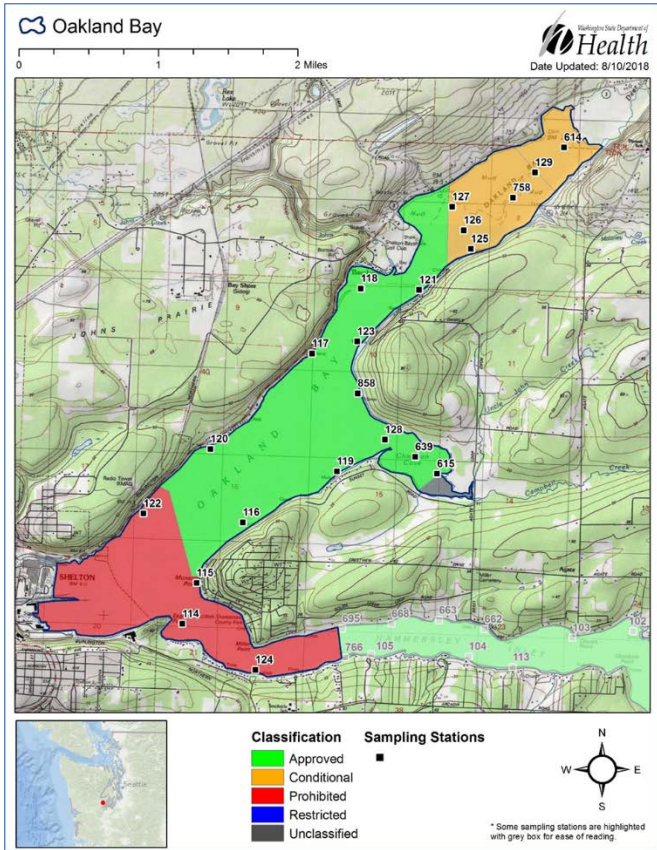
Observations

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

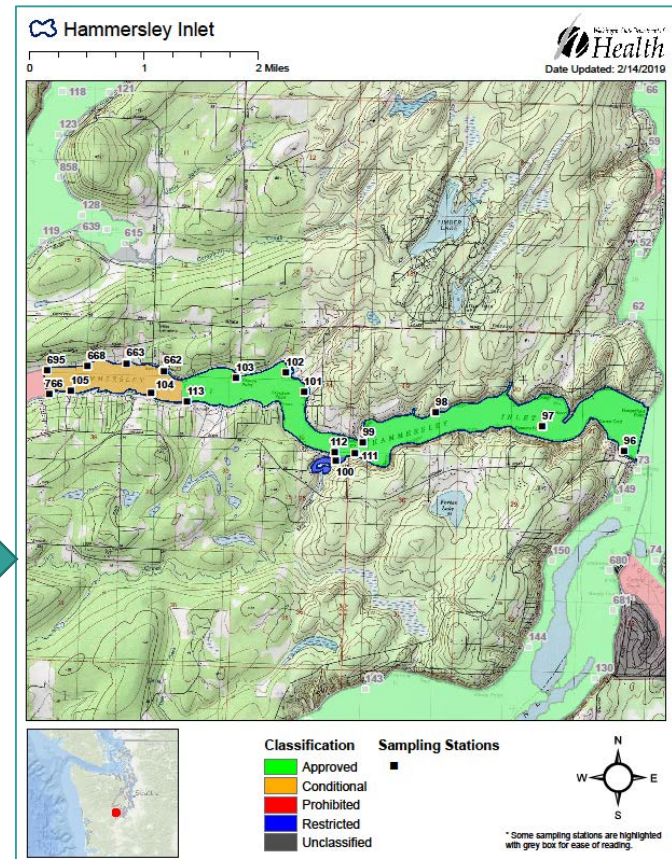
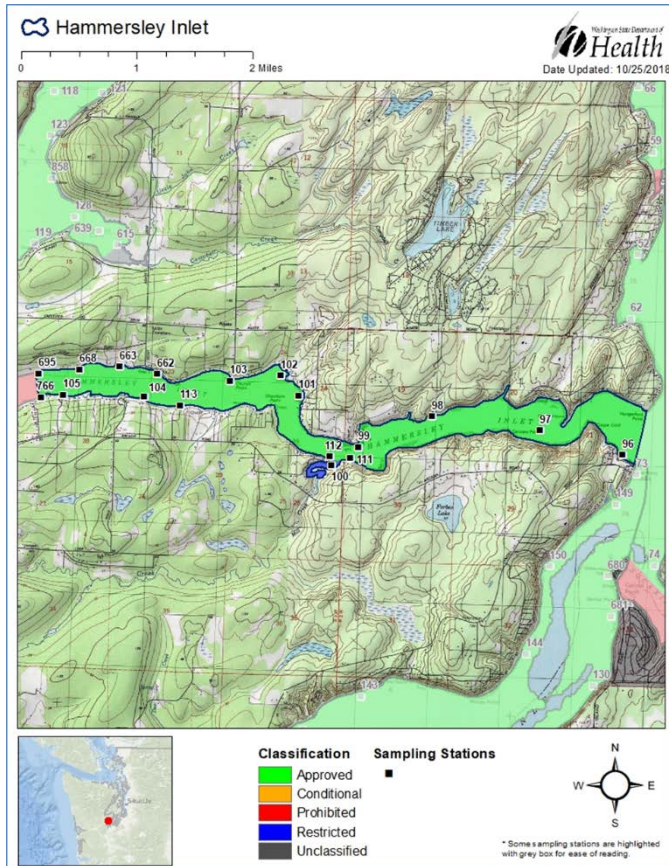
NSSP Requirements

- Minimum dilution
- Minimum time of travel





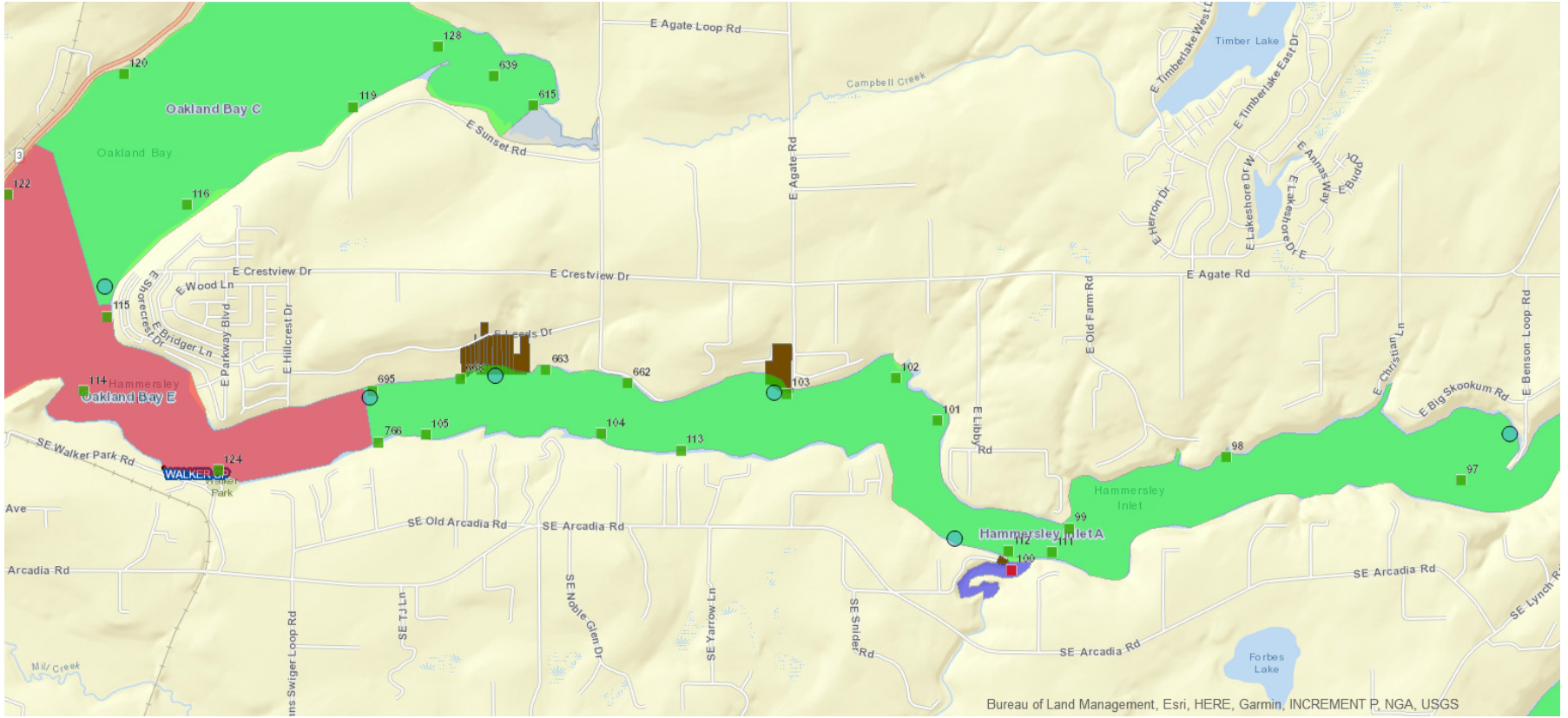
Oakland Bay downgrade



Hammersley Inlet downgrade

Next Steps

- Shelton WWTP Operational Upgrades
 - Continuous UV disinfection monitoring
 - Modify use of slack tide tank
 - Other options for added reliability
- Water Quality Studies
 - Sentinel Oyster Study
 - Wastewater Effluent Sampling
 - Mason County PIC program

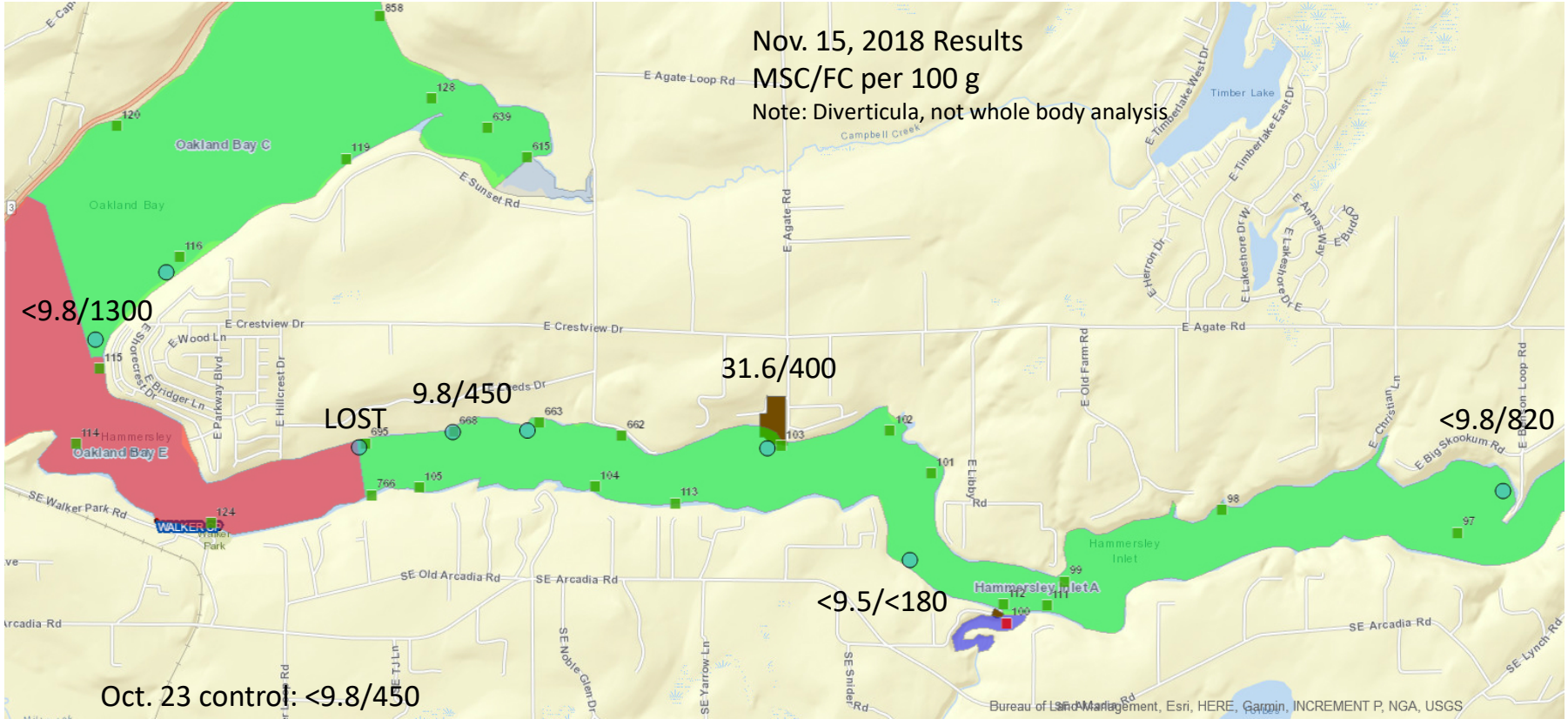


SENTINEL CAGE LOCATIONS

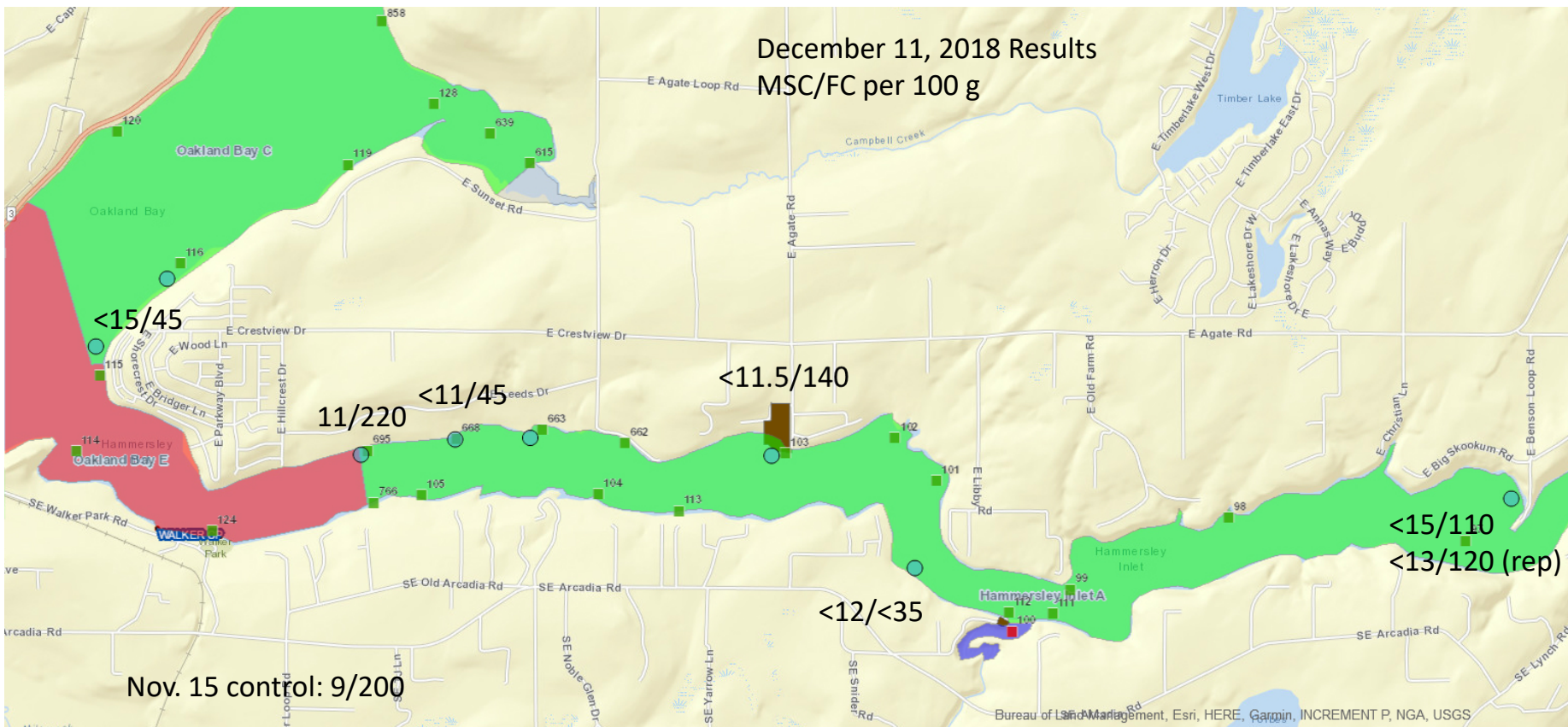


Oyster Sentinel Cages

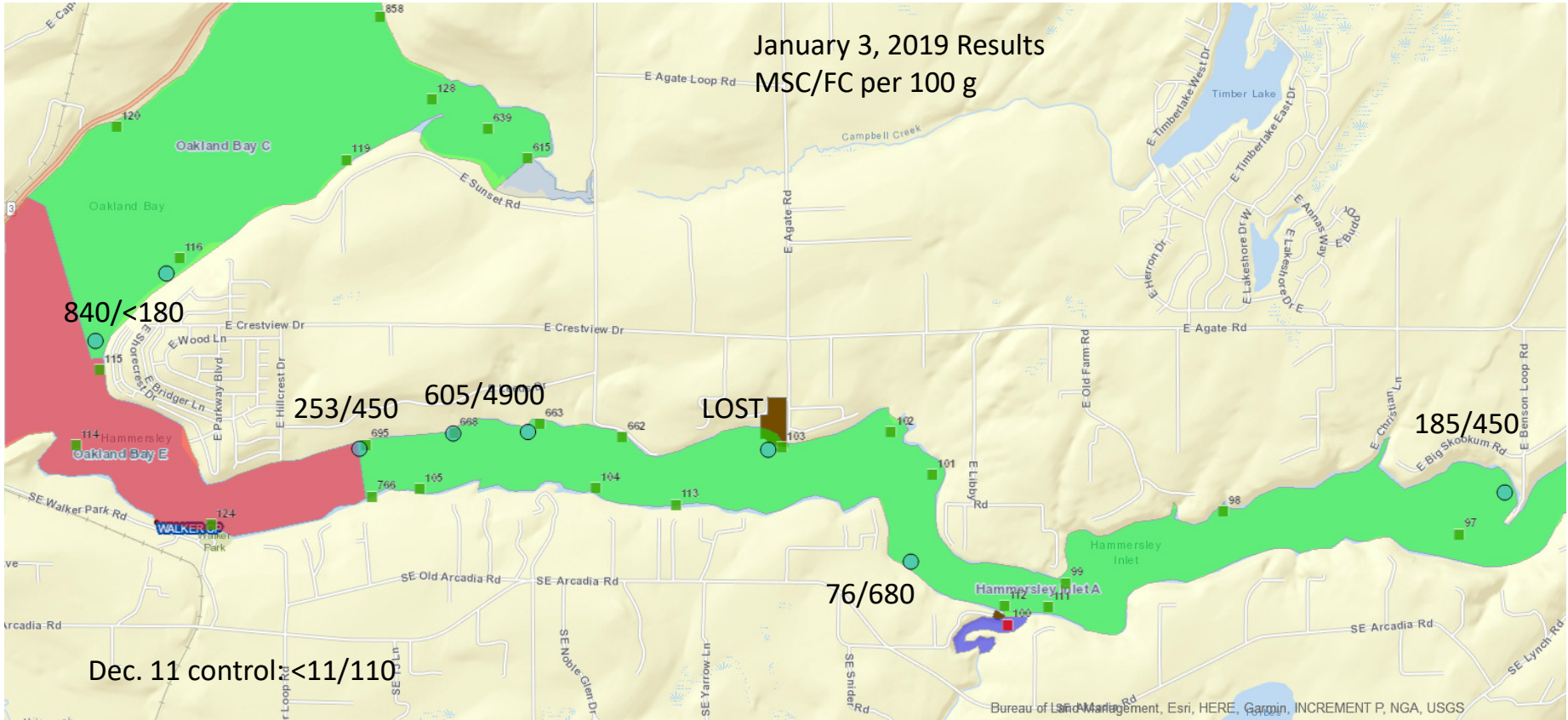
- Study from October 2018 to July 2019
- Cages rotated every 3 to 4 weeks
- MSC/FC analyzed at UW
- PCR for enteric viruses analyzed at FDA Dauphin Island lab



December 11, 2018 Results MSC/FC per 100 g

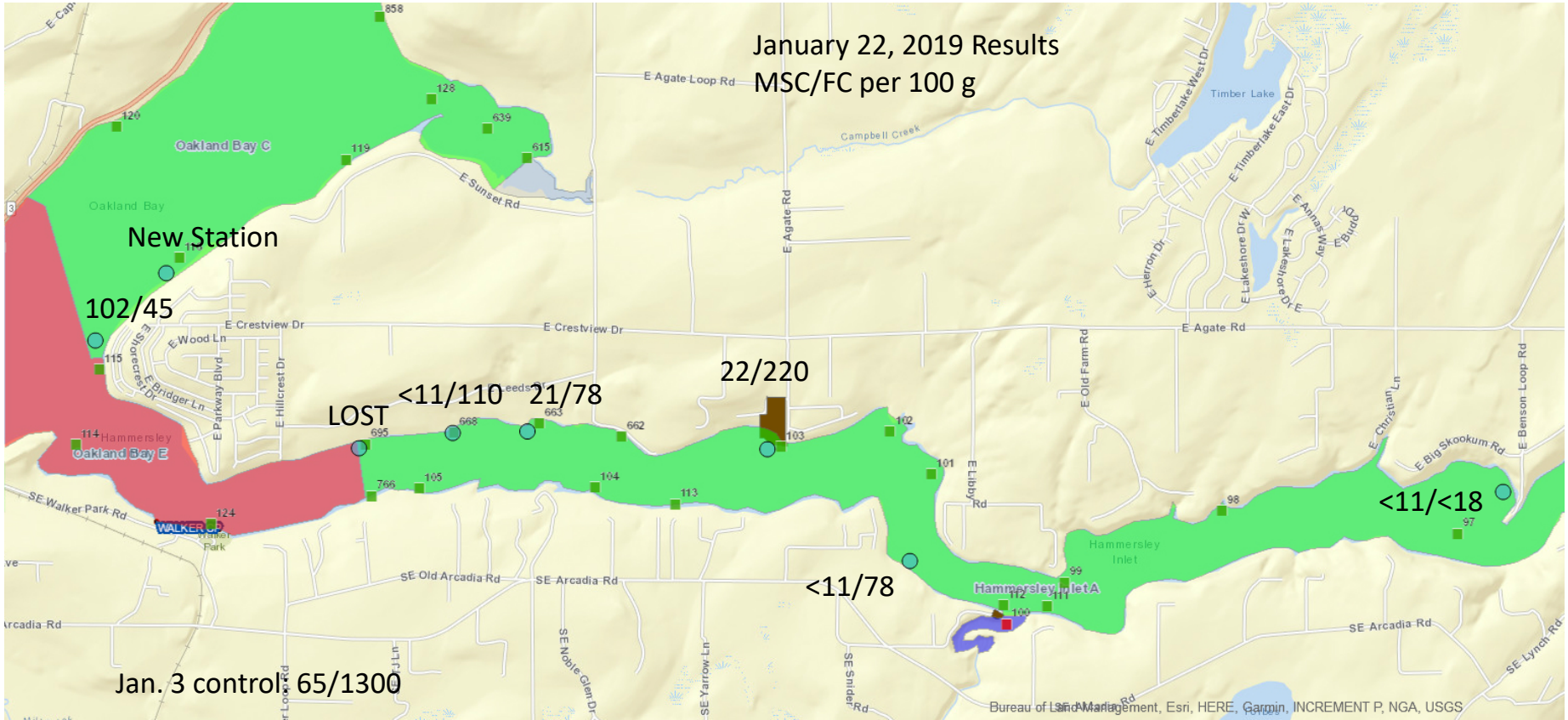


January 3, 2019 Results
MSC/FC per 100 g

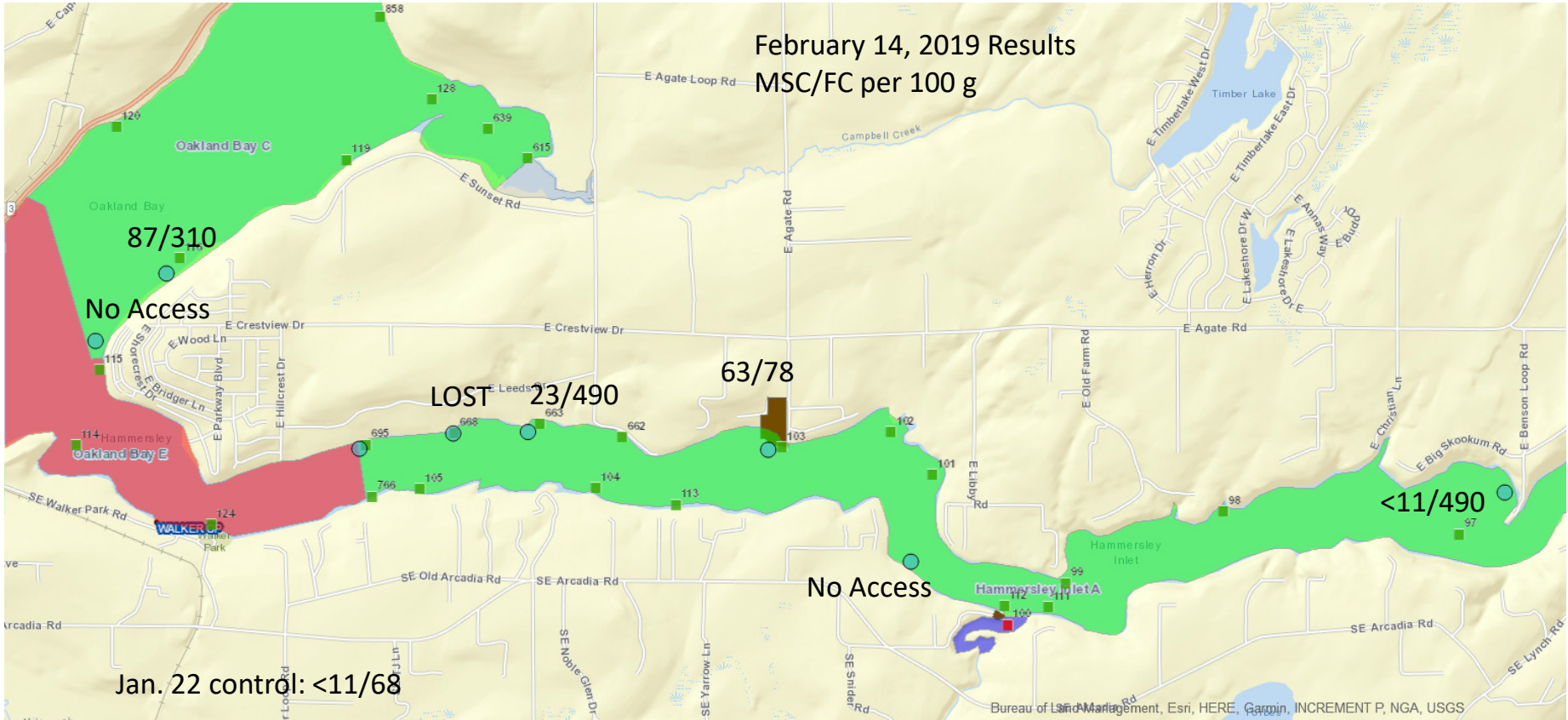


Dec. 11 control <11/110

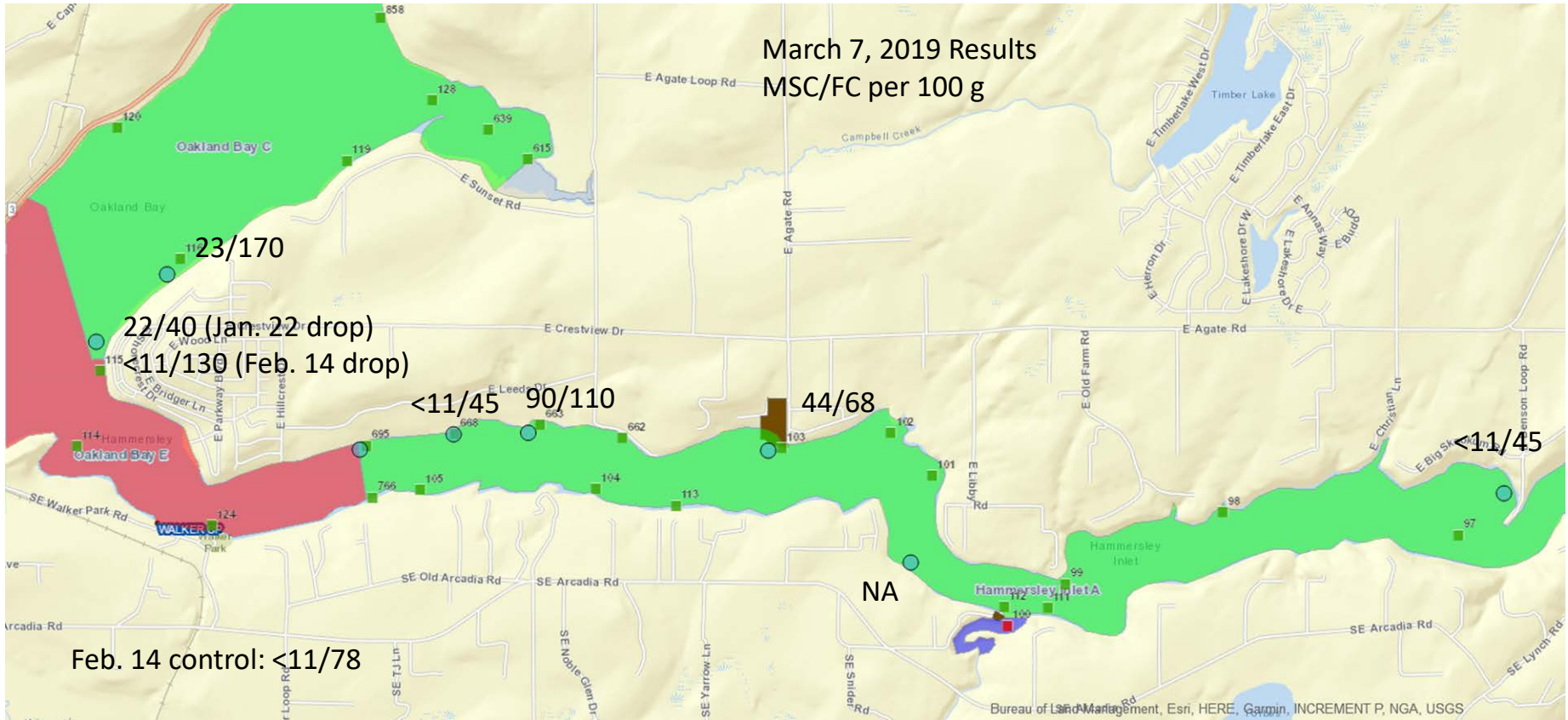
January 22, 2019 Results
MSC/FC per 100 g



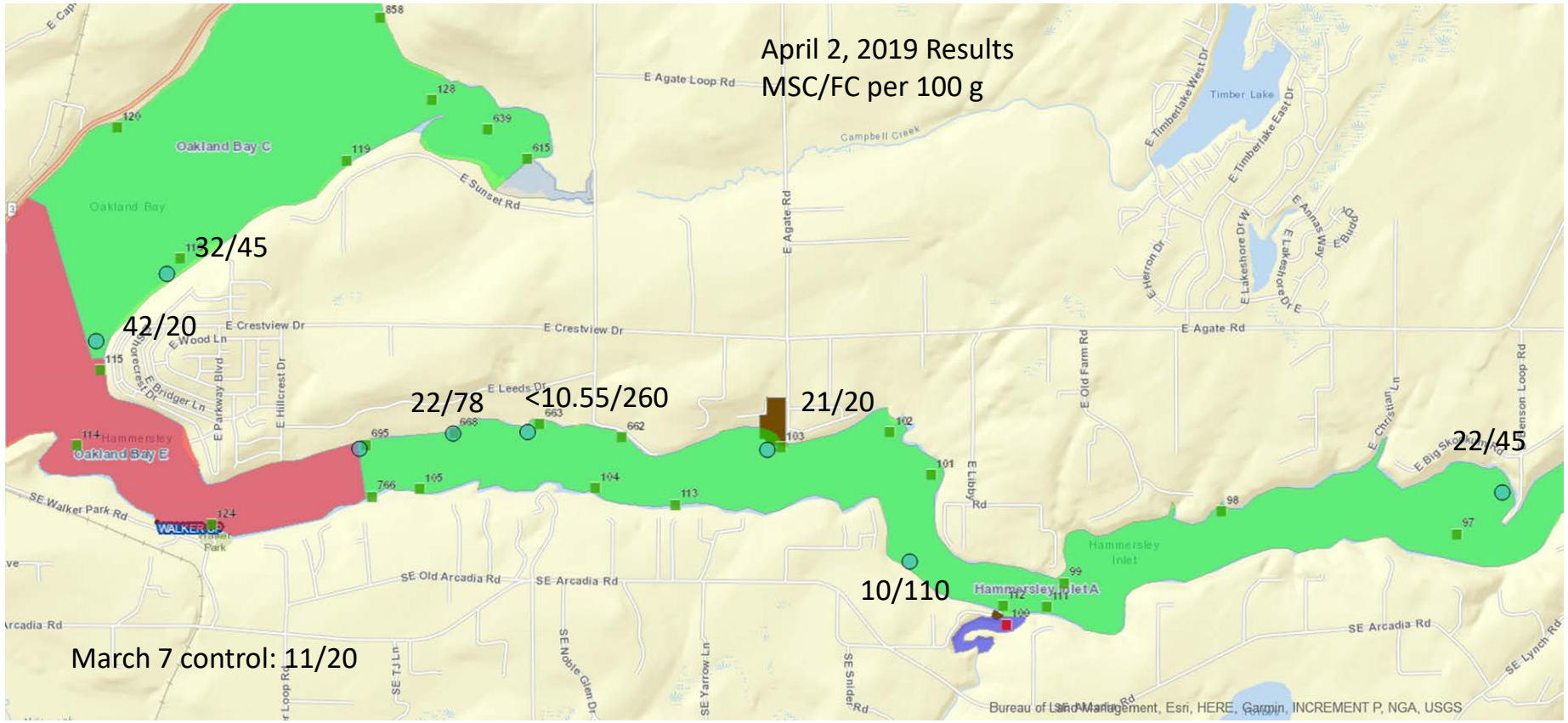
February 14, 2019 Results
MSC/FC per 100 g



March 7, 2019 Results
MSC/FC per 100 g

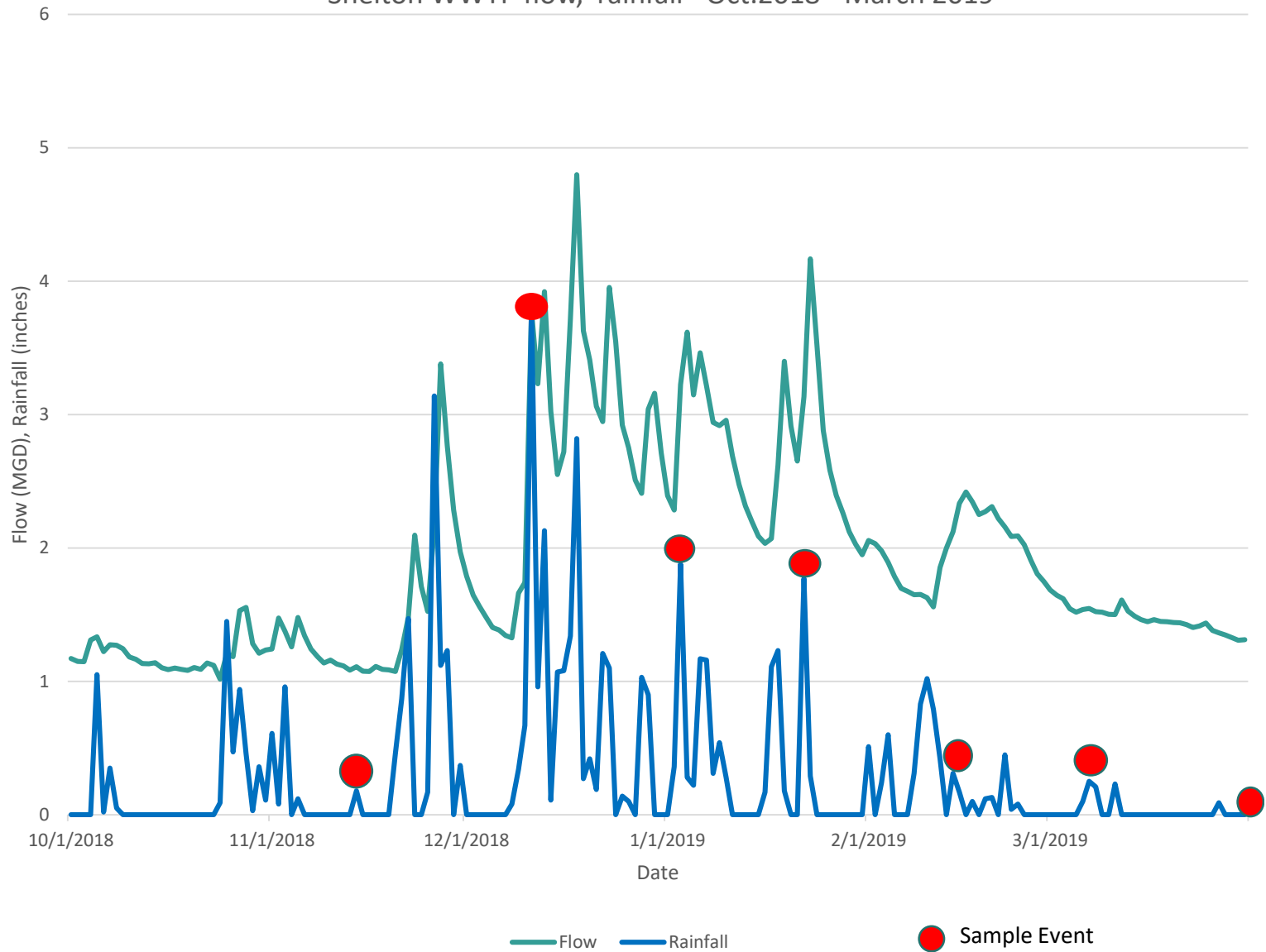


April 2, 2019 Results
MSC/FC per 100 g



March 7 control: 11/20

Shelton WWTP flow, rainfall - Oct.2018 - March 2019



WWTP Effluent Study

- Target dilution based on WQ study in 1999
- Assumption that WWTP treatment efficiency better now
- If secondary effluent counts lower than 1999 study, target dilution will be adjusted
- May impact location of sanitary lines

WWTP Effluent Study Results So Far

- Secondary effluent sampling December 2018 to April 2019 lower than in 1999
- Potential to upgrade Hammersley later in year
- Still need continuous monitoring, other reliability features to upgrade Oakland Bay

Longer Term Steps

- Reducing I/I - ongoing
- Reducing inflows
- Seasonal (dry season) studies
 - Lower WWTP flows (higher dilution)
 - Lower virus risk (longer days, higher temperatures)
 - No provision for seasonal WWTP effluent changes in current DOH policy (set at adverse condition)

Questions?



Washington State Department of Health is committed to providing customers with forms and publications in appropriate alternate formats. Requests can be made by calling 800-525-0127 or by email at civil.rights@doh.wa.gov. TTY users dial 711.