

Green Lake Beach Bacteria Monitoring

FOGL Meeting July 27, 2021



Rob Zisette

King County Beach Bacteria Monitoring Program

Weekly grab samples collected in triplicate on Tuesdays May –Sept. at east and west beach

Closures and results posted at:

<https://green2.kingcounty.gov/swimbeach/default.aspx>

Spotty data records:

- Fecal coliform at east beach for 1996-2002 and 2014-2019
- Fecal coliform at west beach for 2003-2019
- E. coli at east beach for 1998-2002 and 2019-2020
- E. coli at west beach for 2003-2008 and 2019-2020

Lake Swimming Beach Bacteria

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[Weekly FW
BEACH STATUS](#)

Current Beach Closures:

Juanita Beach
Matthews Beach

Lake Marcel and Hicklin
Lake Toxic Algae
Warning

King County Beach Bacteria Closure Protocol

Low concern daily average <200 CFU/100 mL

Moderate concern and safe for swimming daily average > 200 and < 1000 CFU/100 mL

Beach usually **closed** if one or both of these criteria are met:

- Daily average > 1000 CFU/100 mL
- 3-Day geomean > 200 CFU/100 mL.

Beach usually **reopened** if both of these criteria are met:

- 3-Day geomean < 200 CFU/100 mL
- Daily average for previous 2 days < 200 CFU/100 mL.

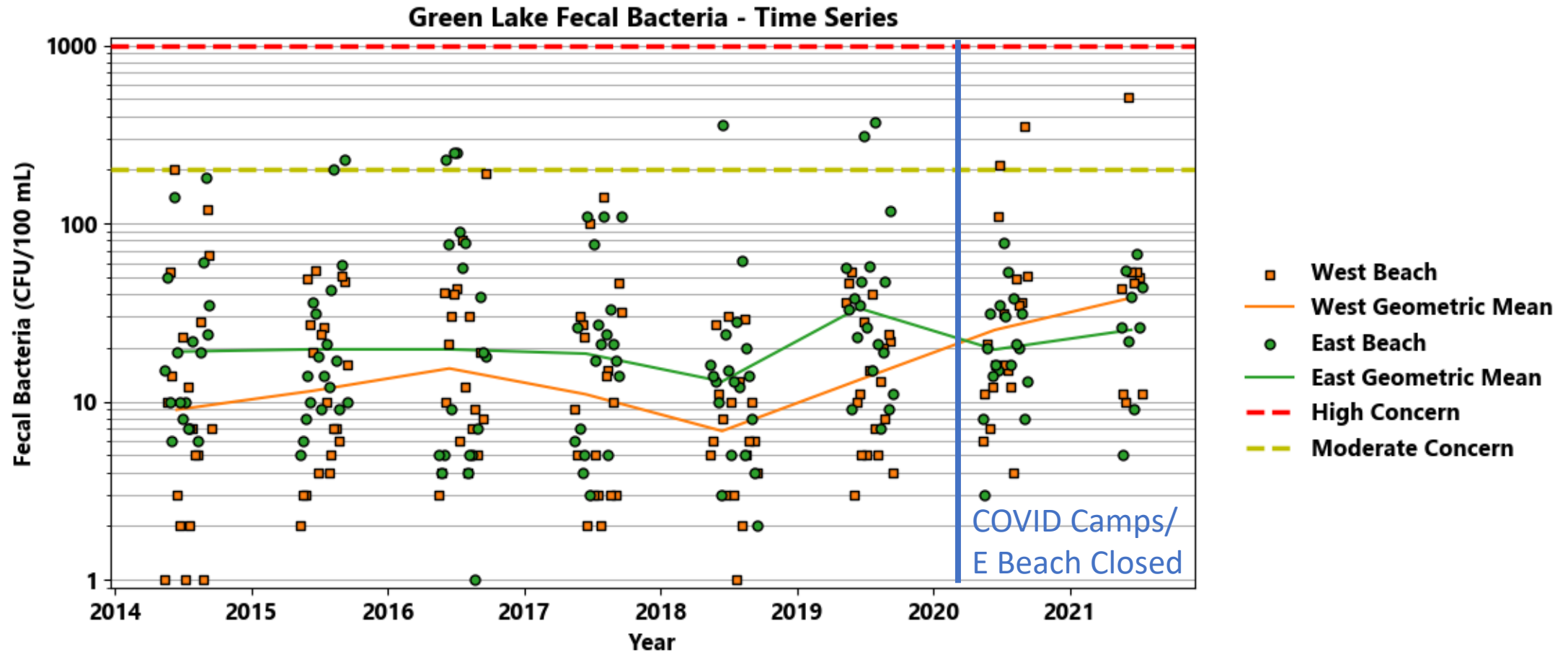
Green Lake- West A734WSB

For **algal toxin data** please visit the [State Toxic Algae web page](#) and follow the "Find Lake" menu.

Please select a site and a year

Bacteria and Temperature					
Charts					
Algal Toxin Data					
Sample Date	Temperature (°C)	Temperature (°F)	Included in Bacteria Geomean Calculation?	Daily Average Bacteria	Bacteria Geometric Mean - using the three most recent samples
07/20/2021	24.0	75.2	Yes	14	19
07/13/2021	24.0	75.2	Yes	11	30
07/06/2021	25.0	77.0	Yes	50	49
06/29/2021	27.0	80.6	Yes	53	50
06/22/2021	23.0	73.4	Yes	46	107
06/15/2021	20.0	68.0	Yes	53	64
06/08/2021	19.0	66.2	Yes	513	38
06/01/2021	19.0	66.2	Yes	10	16

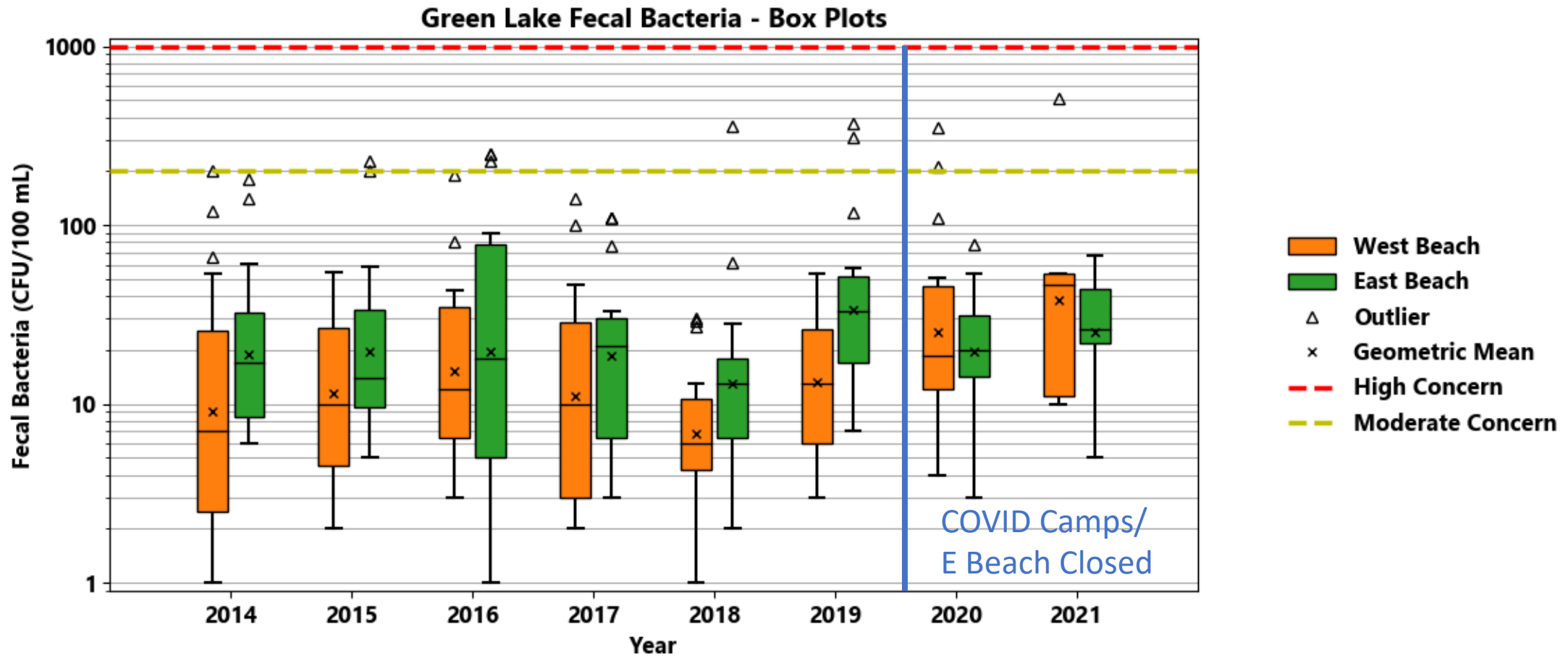
King County Beach Fecal Bacteria Time Series/Trend Analysis



Kendall's Tau Temporal Trend Analysis:

- West Beach (Impact) significant increasing trend ($p = 0.005$)
- East Beach (Control) no significant trend ($p = 0.18$)

King County Beach Fecal Bacteria Box Plot



Wilcoxon Rank Sum Test Between 2014-2019 and 2020-2021:

- West Beach (Impact) significantly higher in COVID Camp period ($p = 0.0003$)
- East Beach (Control) not significantly different between periods ($p = 0.36$)

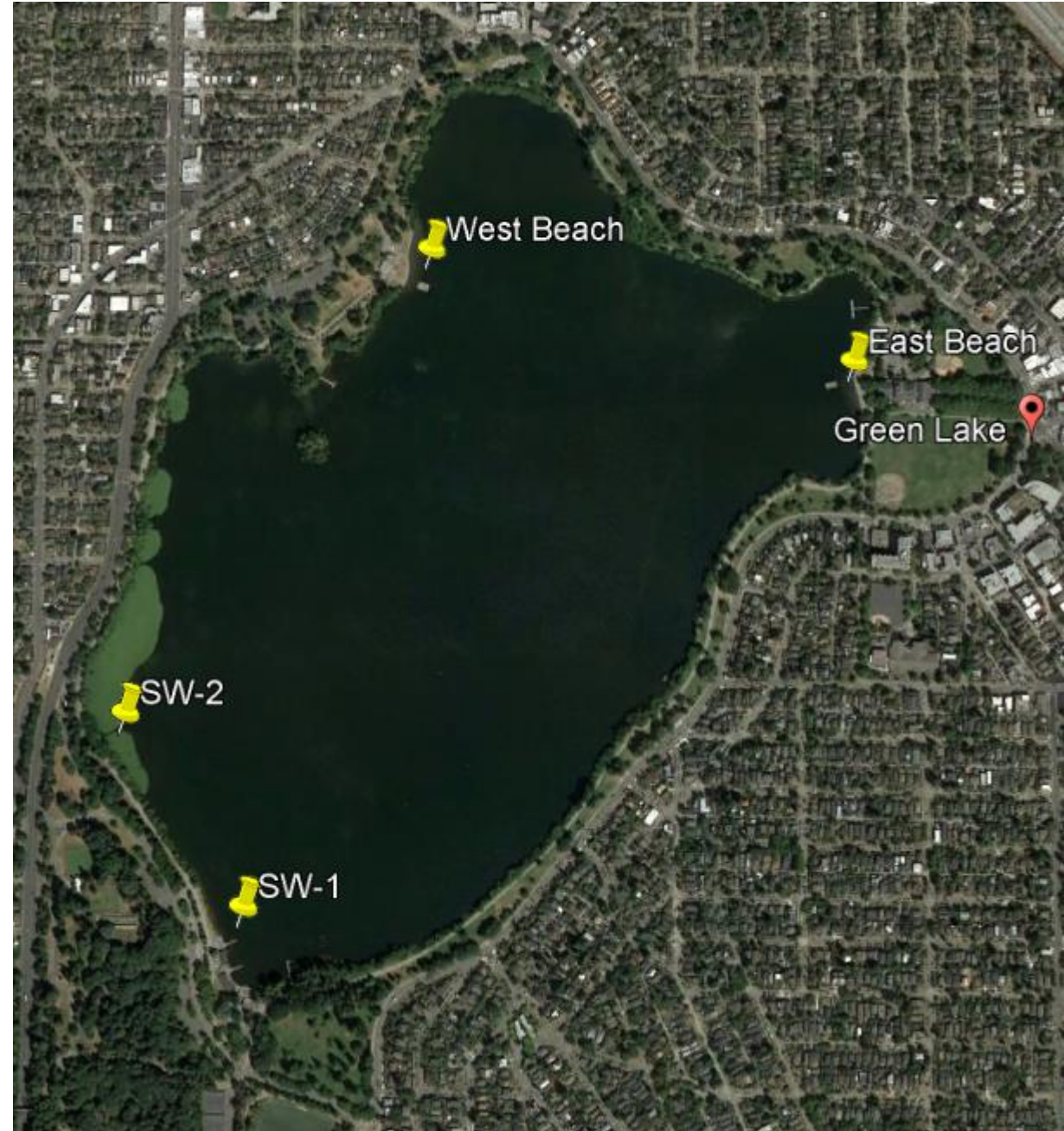
Seattle Parks Test Plan

Plan by Jean Lee on 7/23/21:

- Collect triplicate samples at two SW shore locations ~15 feet from shore on July 27, 2021.
- Decide actions or further testing based on these results.

My recommendation:

- Sample two distances at 3+ locations (e.g., 10 and 20 feet)
- Time collection with beach sampling
- Sample on 3+ occasions
- Also analyze for human biomarker HU2 at SW shore and both beaches.



King County Beach Fecal Bacteria Conclusions

- Fecal bacteria have significantly increased at West Beach but not East Beach during 2020-2021 COVID Camp period.
- Fecal bacteria reached a moderate level of concern twice in 2020 and once so far in 2021, and not at all before COVID camps.
- West Beach increase is not due to waterfowl because waterfowl have increased at East Beach due to closure and had no apparent effect.
- RV waste dump takes 12 hours to flow north to West Beach in slight southerly wind.
- Posting weekly beach sample results 2 days after collection is not sufficient to insure safe conditions during lake use.



Green Lake Swimming Risk Factors

- Human fecal contamination and hypodermic needle sources on west shore are a significant concern to all contact recreation due to RVs and camps.
- Waterfowl fecal contamination also pose risks for gastrointestinal disease (Salmonella) from water ingestion, while human diseases can be more serious.
- Avoid swimming along west shore and water ingestion anywhere during RV and camps are present.
- Beach bacteria results on website are not current.

