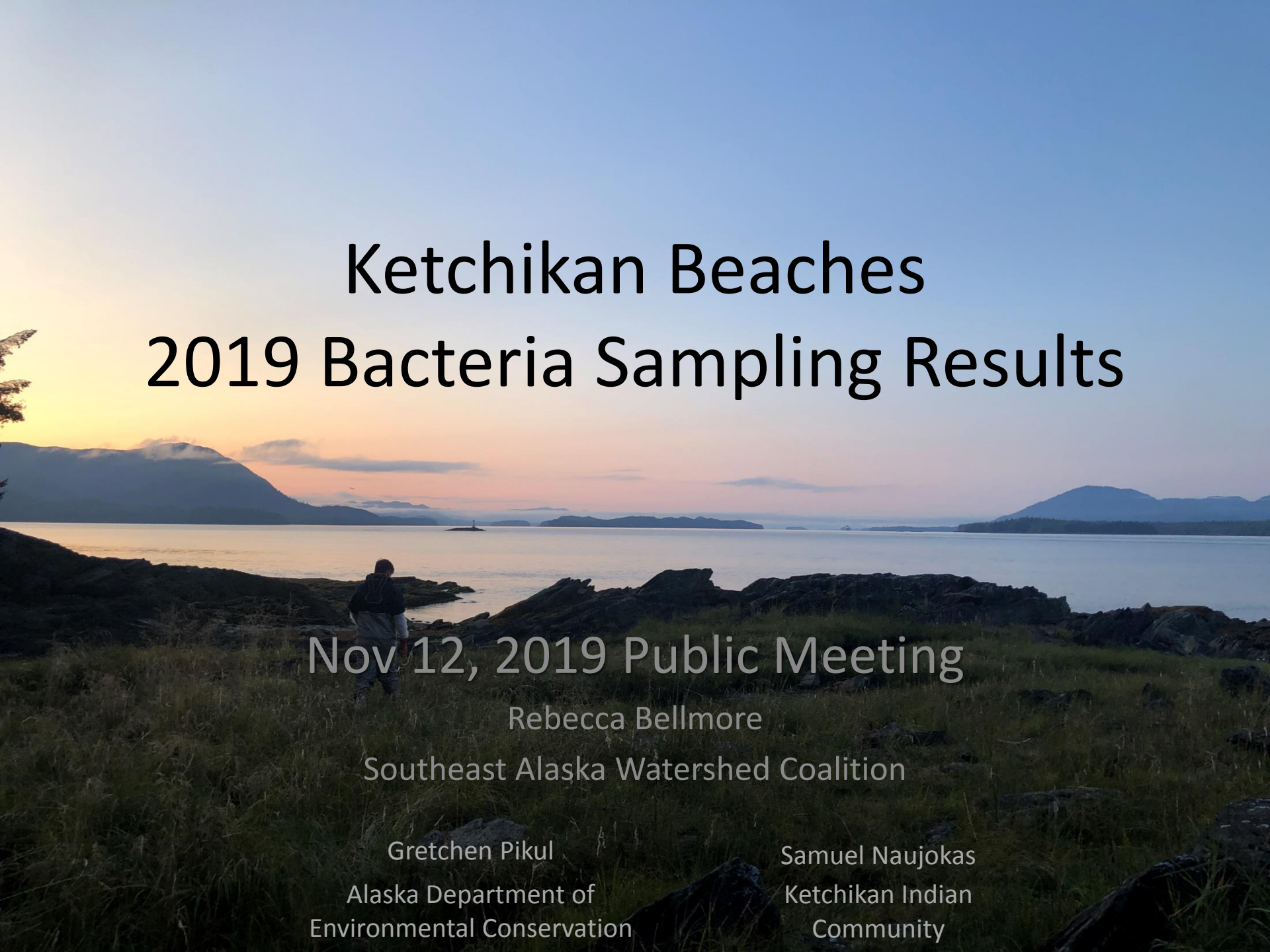


Ketchikan Beaches 2019 Bacteria Sampling Results

Nov 12, 2019 Public Meeting

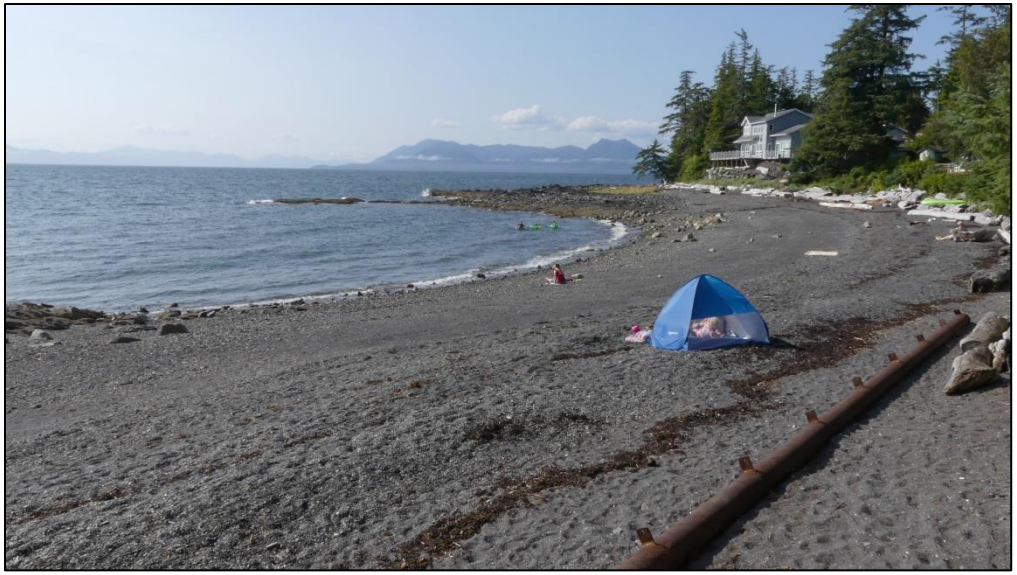
Rebecca Bellmore
Southeast Alaska Watershed Coalition

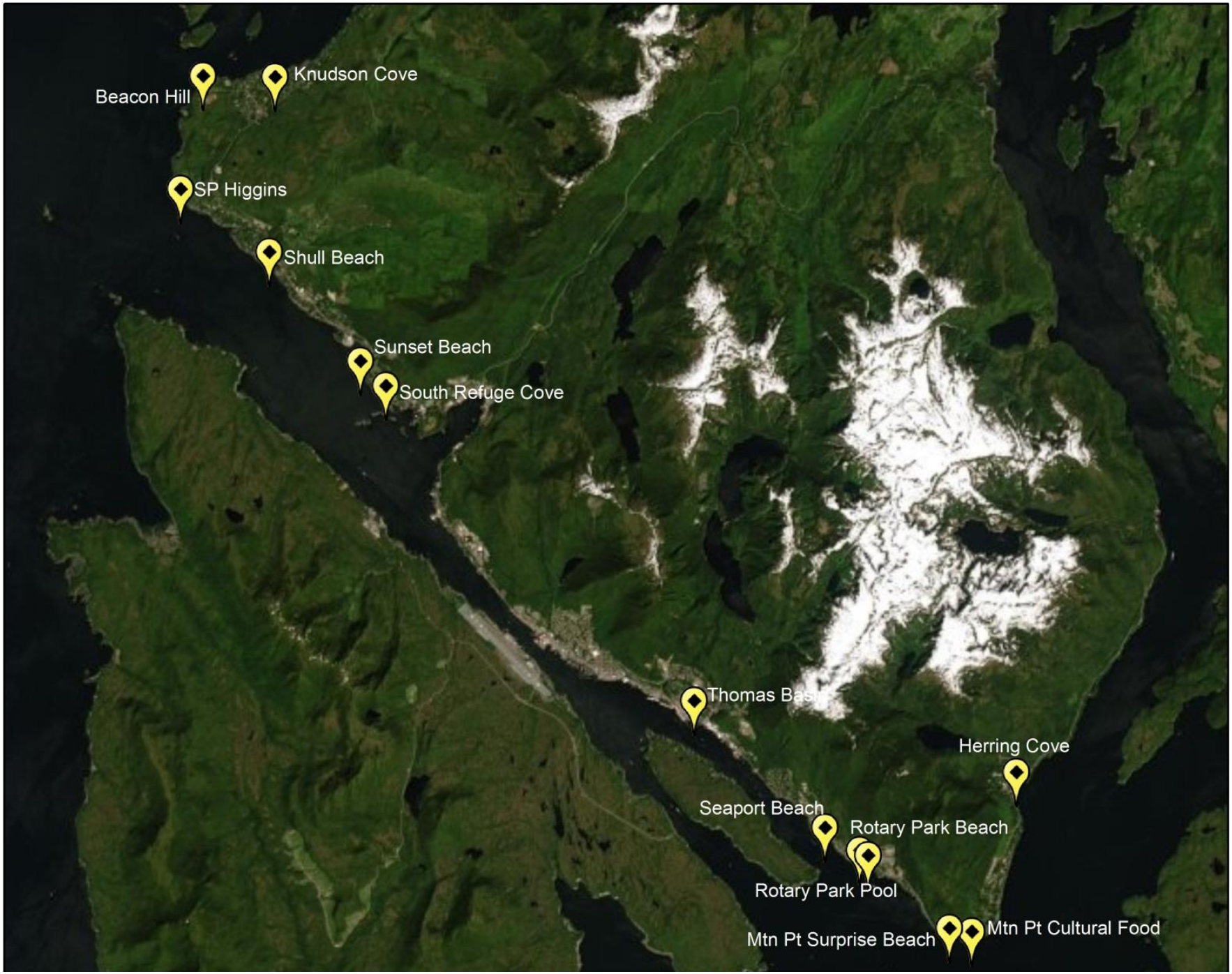
Gretchen Pikul
Alaska Department of Environmental Conservation

Samuel Naujokas
Ketchikan Indian Community

AK BEACH Grant Program

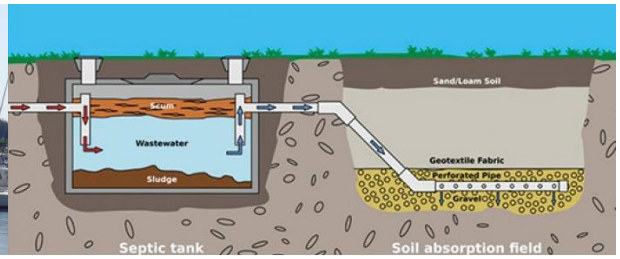
- Recreation areas and season
- Monitor for bacteria that may pose a health risk and inform the public
- EPA-funded




Beacon Hill
Knudson Cove
SP Higgins
Shull Beach
Sunset Beach
South Refuge Cove
Thomas Basin
Herring Cove
Seaport Beach
Rotary Park Beach
Rotary Park Pool
Mtn Pt Surprise Beach
Mtn Pt Cultural Food

Potential Bacteria Sources

- Public and private sewer treatment system outfalls
- Private boats at boat launches, in harbors, at sea
- Individual septic tanks
- Sewer line breaks
- Wildlife/pet feces
- Cruise ships, ferries

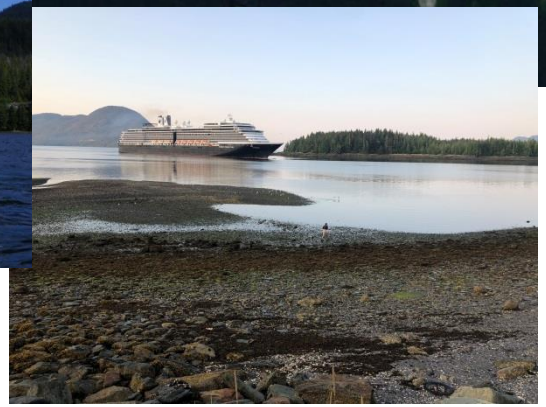


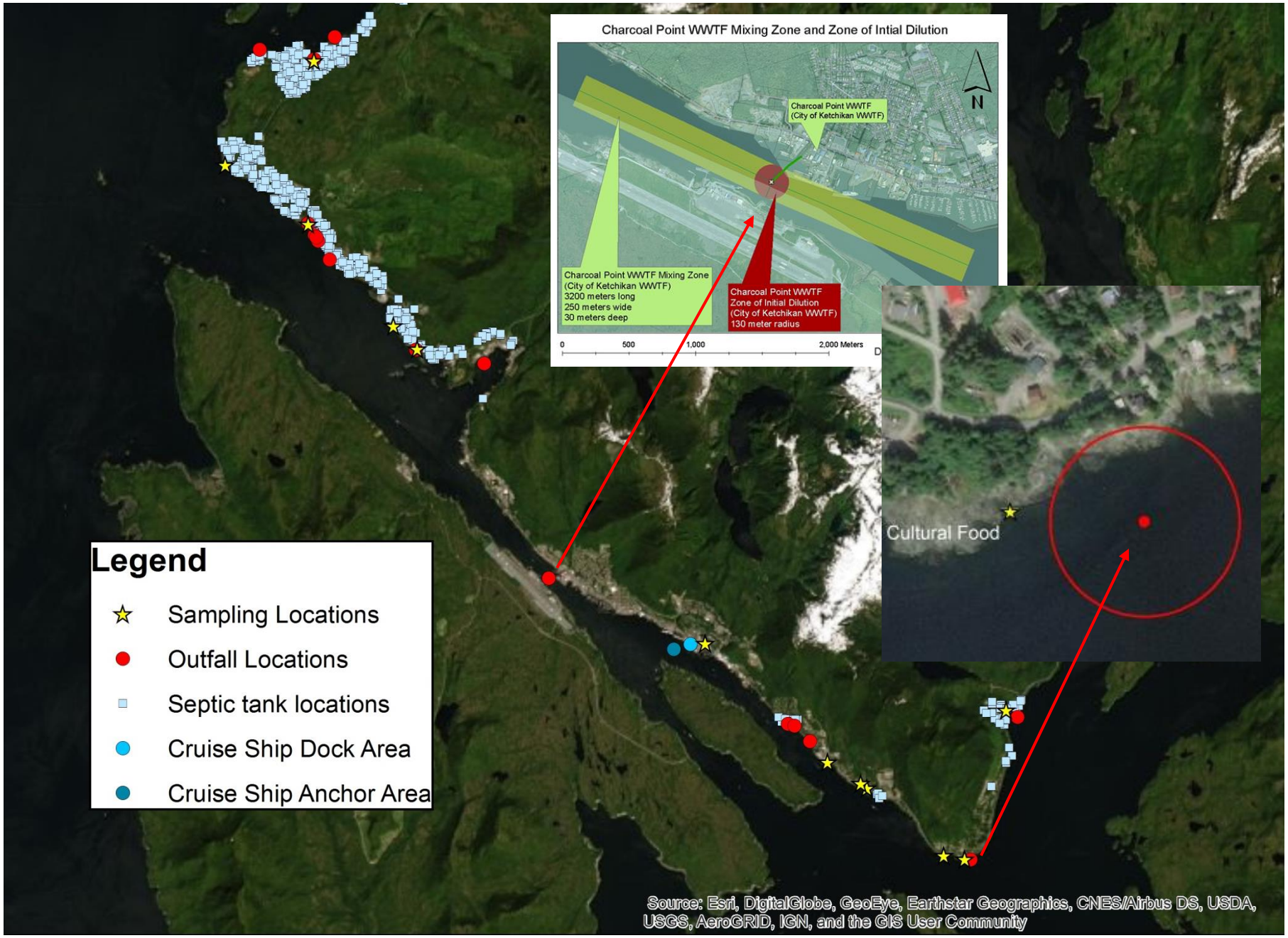
Potential Bacteria Sources

	Individual septic tanks	Private sewer treatment system outfall(s)	Wildlife Pet feces	Private water-craft	Public sewer treatment system outfall(s)	Sewer line breaks	Public treatment system emergency bypasses	Boats at boat launches & in harbor areas	Cruise ships, Ferries
Knudson Cove	✓	✓	✓	✓				✓	
Beacon Hill	✓	✓	✓	✓					
S Point Higgins	✓	✓	✓	✓					✓
Shull	✓	✓	✓	✓					✓
Sunset	✓	✓	✓	✓					✓
S Refuge Cove	✓	✓	✓	✓					✓
Thomas Basin			✓	✓		✓	✓	✓	
Seaport			✓	✓		✓	✓		✓
Rotary Pool			✓	✓		✓			✓
Rotary Beach			✓	✓		✓	✓		✓
Mt Pt Surprise Beach			✓	✓	✓	✓		✓	✓
Mt Pt Cultural Food			✓	✓	✓	✓		✓	✓
Herring Cove	✓	✓	✓	✓		✓			

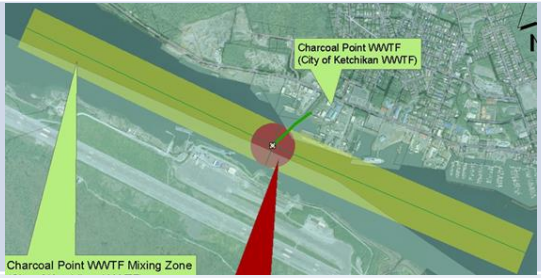
Potential Bacteria Sources

- At least 4 potential sources at each location




Charcoal Point WWTF Mixing Zone and Zone of Intial Dilution
Charcoal Point WWTF
(City of Ketchikan WWTF)
N
Charcoal Point WWTF Mixing Zone
(City of Ketchikan WWTF)
3200 meters long
250 meters wide
30 meters deep
Charcoal Point WWTF
Zone of Initial Dilution
(City of Ketchikan WWTF)
130 meter radius
0
500
1,000
2,000 Meters
Cultural Food
Legend
Sampling Locations
Outfall Locations
Septic tank locations
Cruise Ship Dock Area
Cruise Ship Anchor Area
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Permitted Effluent Levels Comparison

Source	Treatment Type	Max daily discharge (gpd)	Permitted effluent levels of fecal coliform (cfu/100 ml)	Mixing zone
Charcoal Point Wastewater Treatment Facility (City)	Primary	7.2 million	30-day avg = 1,000,000 7-day avg = 1,250,000 Daily max = 1,500,000	
Mountain Point Wastewater Treatment Facility (Borough)	Secondary	700,000	30-day avg = 200 Daily max = 800	
Cruise Ships (May-Sep only)	Tertiary Advanced Wastewater Treatment Systems	303,800 174,400	30-day avg = 14 Daily max = 40	None

AK Water Quality Standards (cfu/100 ml)

Raw shellfish consumption avg = 14

Raw shellfish consumption max = 31

Secondary recreation avg = 200

Secondary recreation max = 400

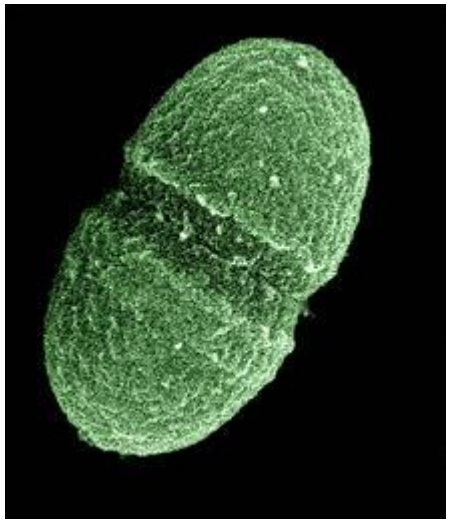
Sampling Methods

- Written protocols
- Ketchikan Indian Community staff conducted sampling

What are we looking for?

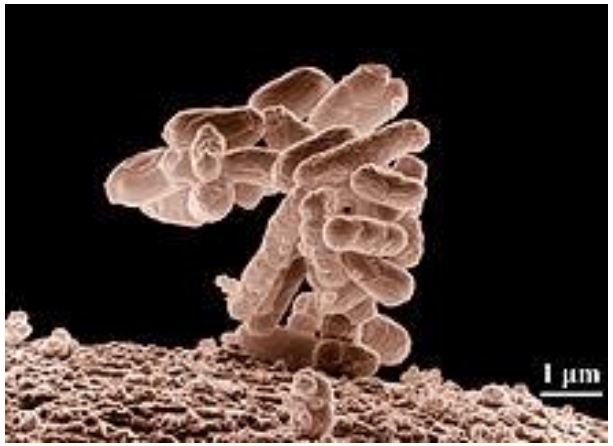
Enterococci

- Bacteria found in mammal and bird guts



Fecal Coliform

- Bacteria found in mammal and bird guts
- Includes E. coli

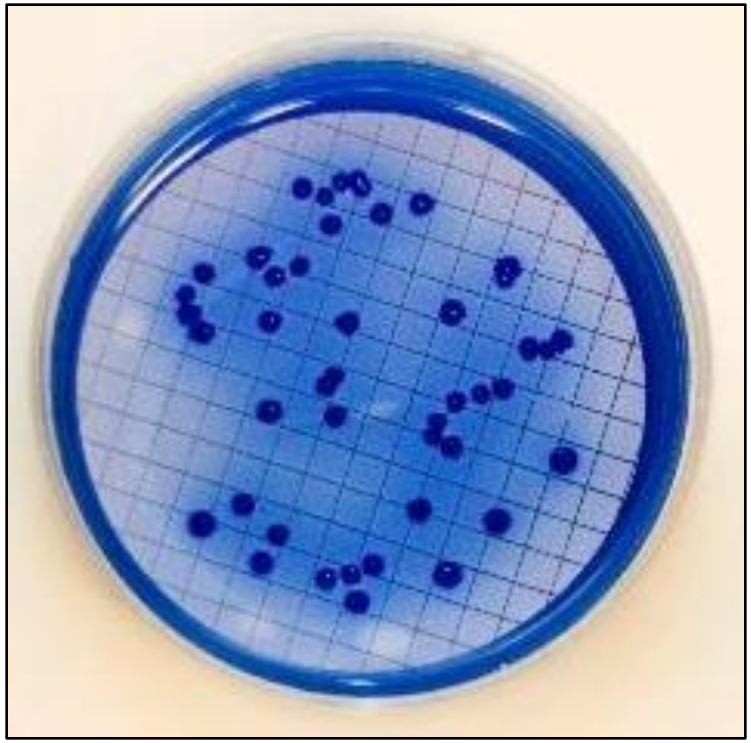


Most of these bacteria species aren't harmful themselves but provide an indication of fecal contamination in water that may be associated with pathogens.

Analysis

Enterococci

Fecal Coliform



Water Quality Criteria

18 AAC 70 (14)

Recreation

- Enterococci
  - geometric mean of samples collected over 30 days can't exceed 35 CFU/100 mL
  - not more than 10% of samples may exceed 130 CFU/100 mL within 30 days

Harvest for Raw Consumption

- Fecal coliform
  - seasonal geometric mean can't exceed 14 CFU/100 mL
  - not more than 10% of samples may exceed 31 CFU/100 mL

Knudson Cove
S Pt Higgins
Shull
Sunset
S Refuge Cove
Exceeded Recreation Standards
No
Yes
Thomas Basin
Herring Cove
Seaport
Rotary Beach
Rotary Pool
Mt Pt Surprise Beach
Mt Pt Cultural Food
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Exceeded Harvest Standards
Yes
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

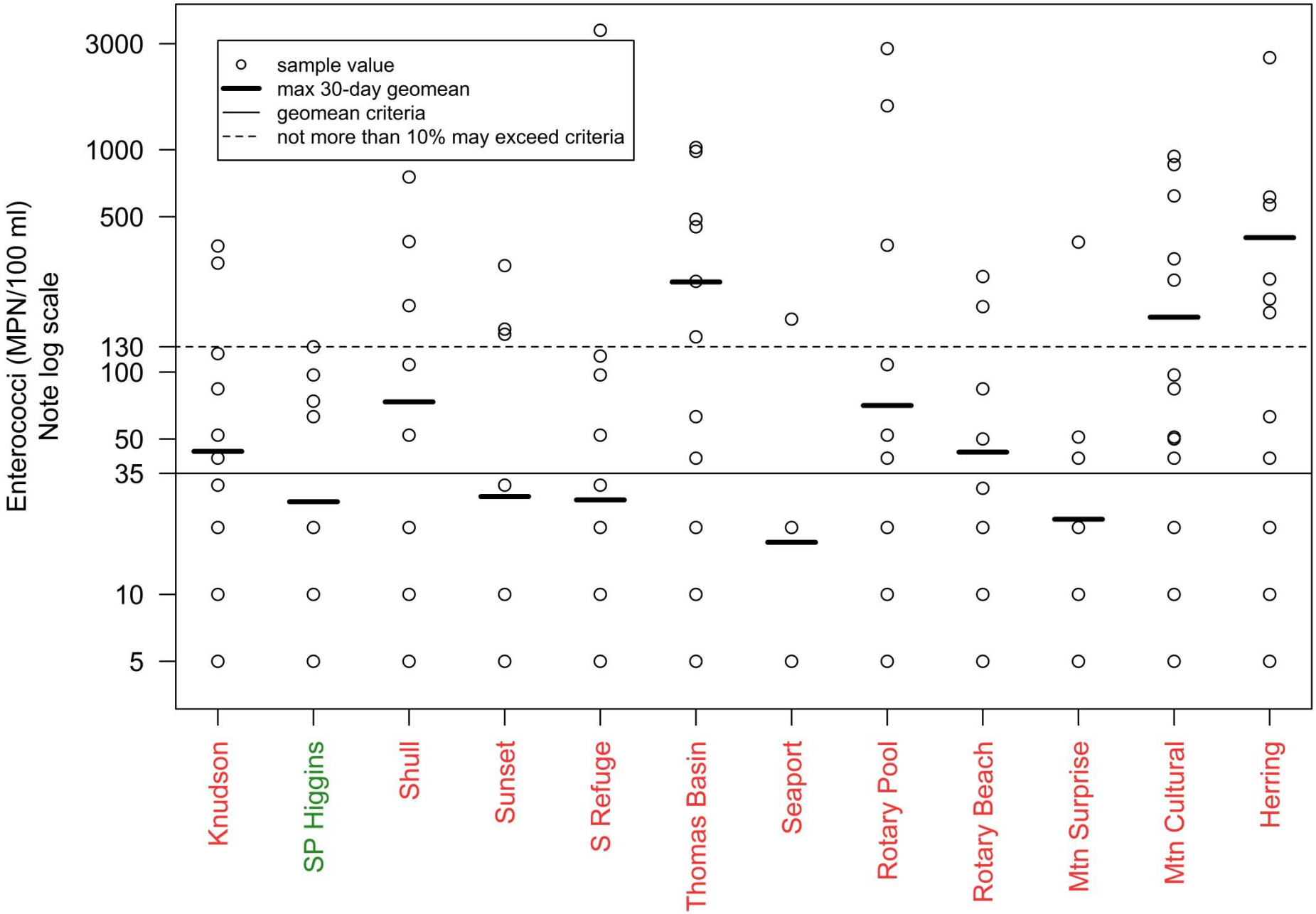

sample value
max 30-day geomean
geomean criteria
not more than 10% may exceed criteria
Enterococci (MPN/100 ml)
Note log scale
3000
1000
500
130
100
50
35
10
5
Knudson
SP Higgins
Shull
Sunset
S Refuge
Thomas Basin
Seaport
Rotary Pool
Rotary Beach
Mtn Surprise
Mtn Cultural
Herring

Table 9. 2019 Enterococci testing results (MPN/100 ml)

Sample Date	Knudson Cove	S Pt Higgins	Shull	Sunset	S Refuge Cove	Thomas Basin	Seaport	Rotary Pool	Rotary Beach	Mtn Point Cultural Food	Mtn Point Surprise Beach	Herring Cove
5/15	<10 (<10)	<10	<10	10	<10	256	<10	<10	<10	<10	<10	<10
5/22	<10	<10 (<10)	20	<10	<10	<10	<10	<10	<10	10	<10	<10
5/29	<10	<10	<10 (<10)	<10	<10	<10	<10	10	<10	41	<10	<10
6/5	31	<10	<10	<10 (<10)	<10	10	<10	10	<10	20	10	<10
6/11	52	130	199	<10	3448 2851)	487	20	1576	84	323	20	41
6/19	10	10	<10	<10	<10	20 (20)	<10	20	10	620	10	10
6/25	41	10	<10	10	<10	10	<10 (<10)	52	<10	50	<10	<10
7/2	121	97	52	301	31	41	20	52 (108)	197	857	51	213
7/10	<10	<10	<10	<10	<10	<10	<10	<10	<10 (<10)	<10	<10	<10
7/17	369	20	108	31	10	984	20	2851	269	934	384 (218)	565
7/23	<10	<10	<10	<10	<10	10	<10 (<10)	<10	10	259	<10	10
7/29	<10	10	20	10	97	<10	<10	41	30	41	<10	20 (20)
8/7	<10 (<10)	<10	10	<10	20	<10	<10	<10	<10	20	<10	<10
8/13	84	10 (10)	10	<10	<10	10	20	<10	<10	51	10	613
8/21	309	74	386 (379)	156	118	450	<10	372	50	84	41	63
9/4	20	10	<10	<10	10	1024	<10	52	20	20 (20)	<10	262
9/10	<10	10	754	<10	<10 (<10)	63	20	<10	10	<10	<10	2595
9/18	121	63	20	148	52	144	173	<10	20	97	10	185 (173)
Max 30-Day Geometric Mean	44	26	73	28	27	254	17	71	44	177	22	402

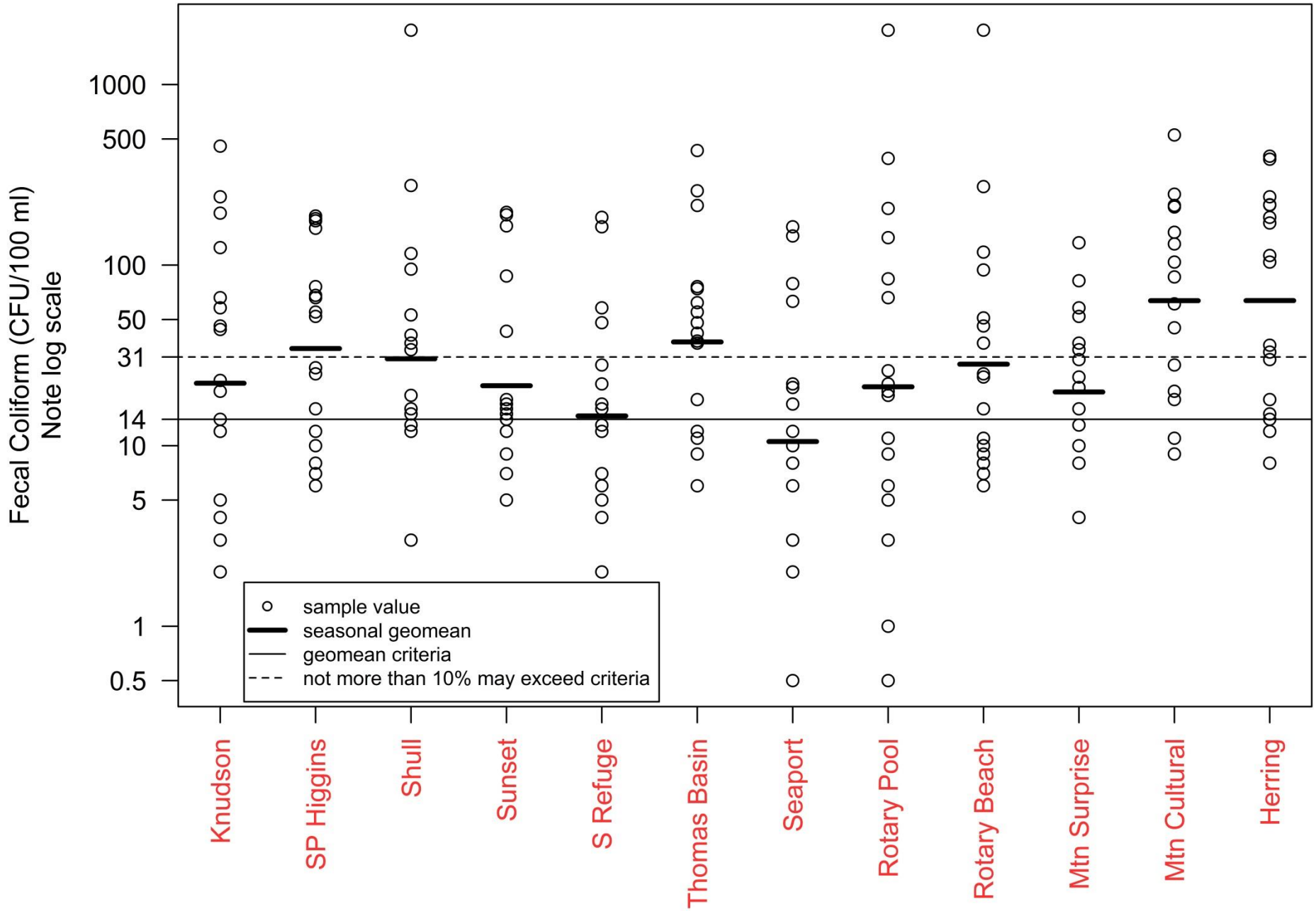
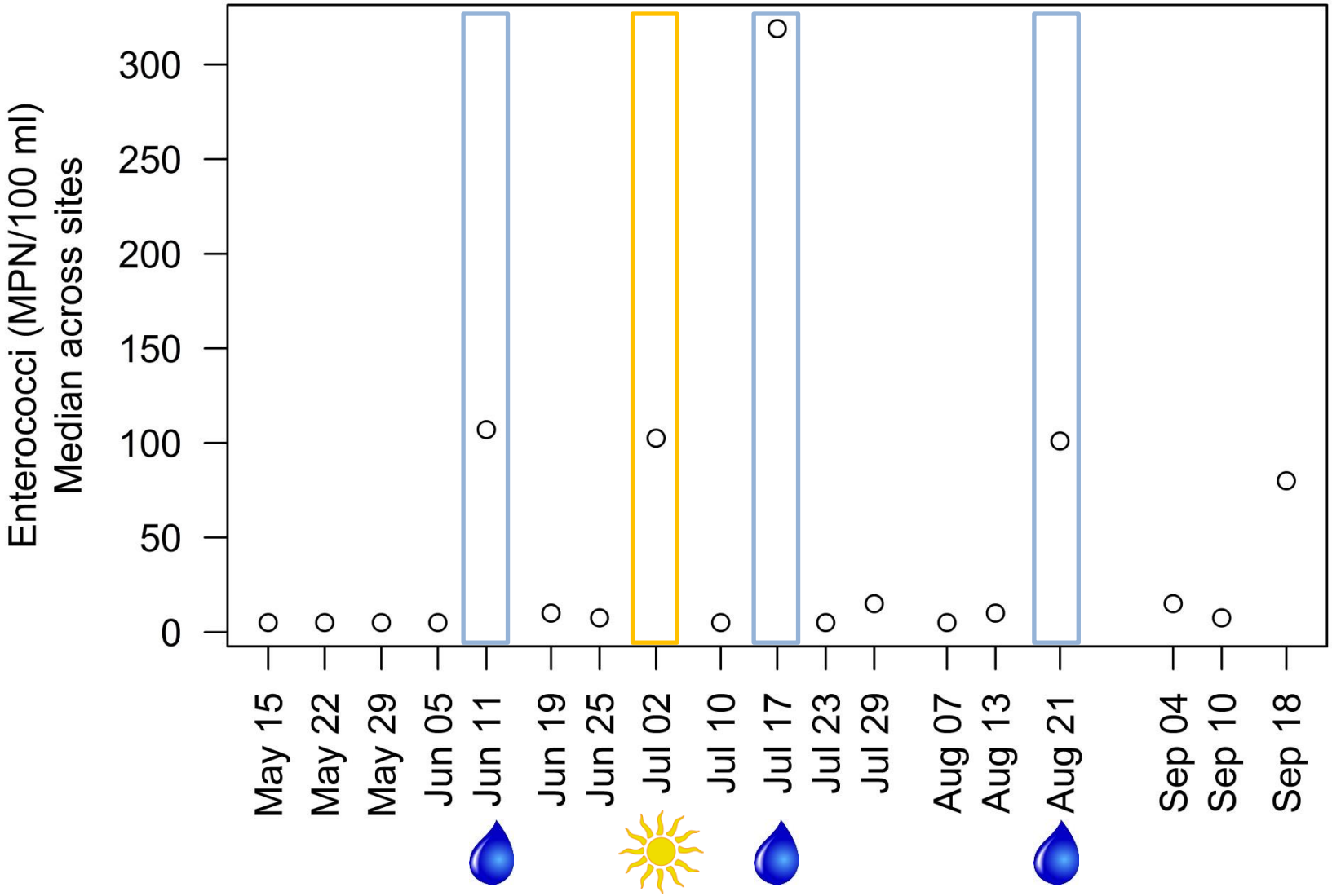

Fecal Coliform (CFU/100 ml)
Note log scale
1000
500
100
50
31
14
10
5
1
0.5
sample value
seasonal geomean
geomean criteria
not more than 10% may exceed criteria
Knudson
SP Higgins
Shull
Sunset
S Refuge
Thomas Basin
Seaport
Rotary Pool
Rotary Beach
Mtn Surprise
Mtn Cultural
Herring

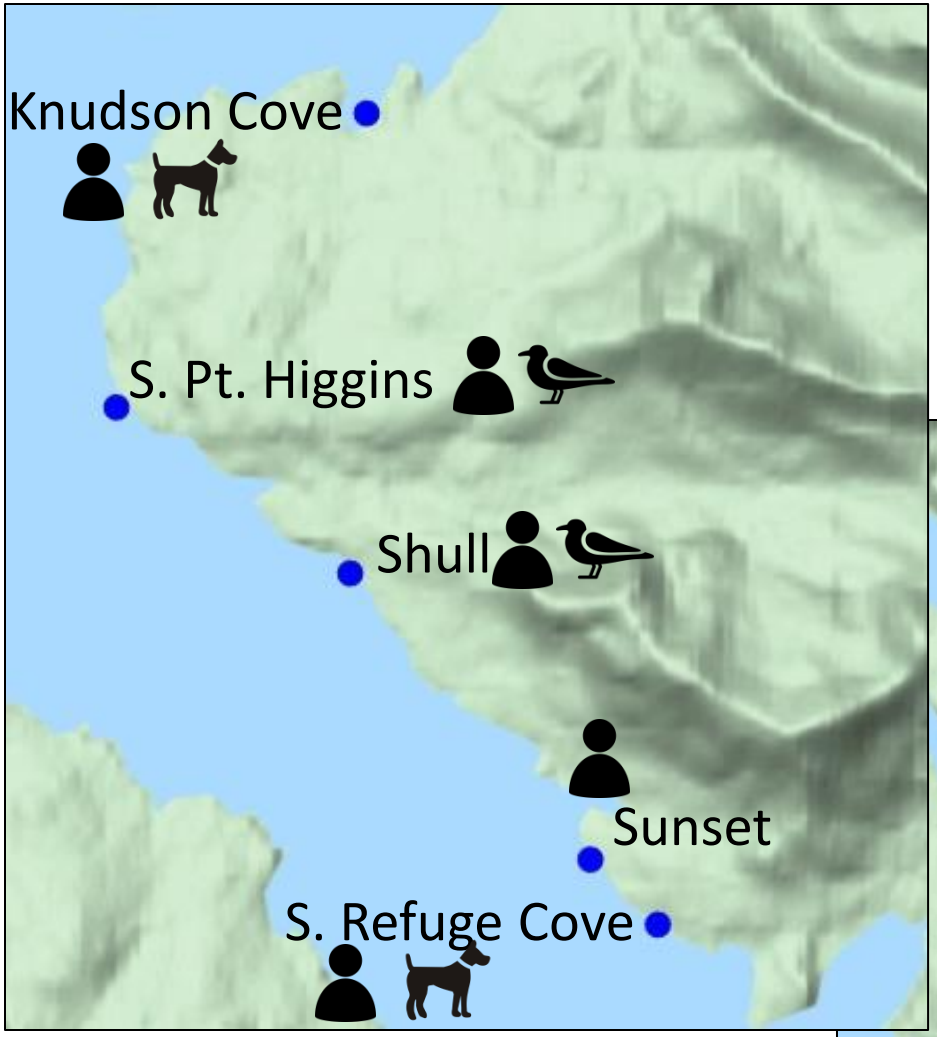
Table 6. 2019 Fecal coliform results (CFU/100 ml)

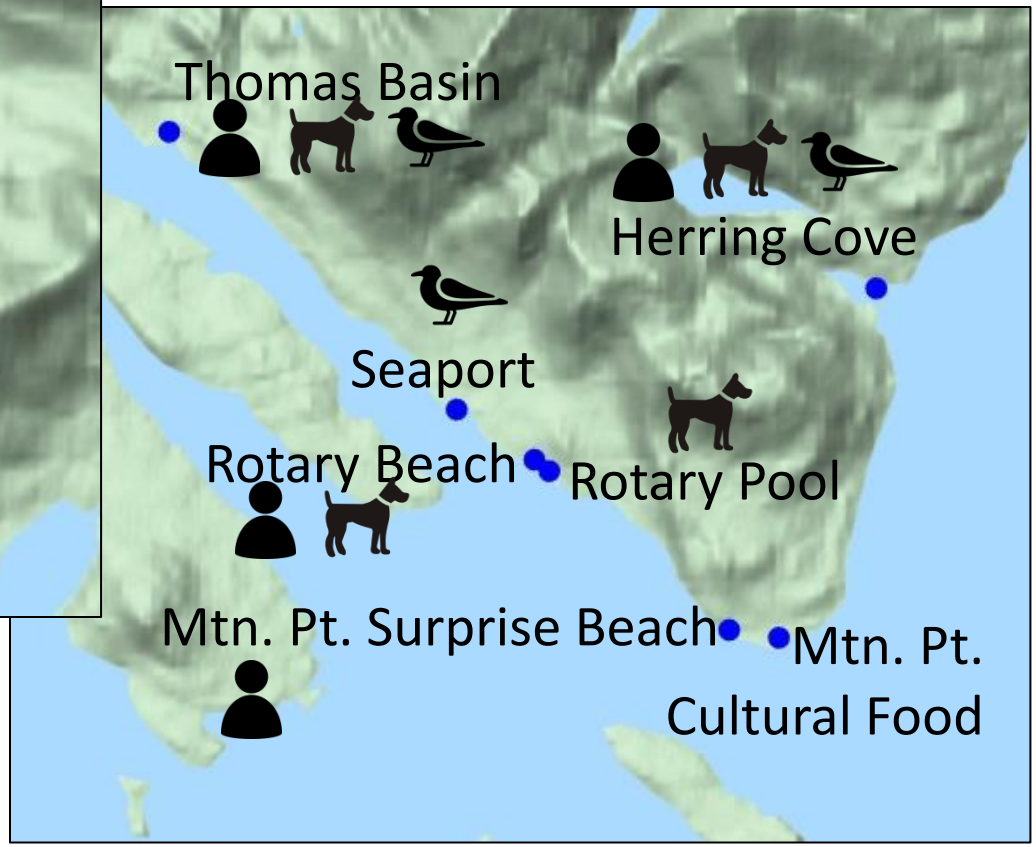
Sample Date	Knudson Cove	S Pt Higgins	Shull	Sunset	S Refuge Cove	Thomas Basin	Seaport	Rotary Pool	Rotary Beach	Mtn Point Cultural Food	Mtn Point Surprise Beach	Herring Cove
5/15	5 (4)	52	3	17	6	55	2	6	10	18	21	30
5/22	3	7 (8)	13	15	6	11	<1	<1	8	9	8	12
5/29	20	12	3 (2)	7	48	6	3	9	11	61	4	14
6/5	2	25	15	43 (39)	7	12	3	6	7	11	34	18
6/11	58	181	276	18	163 (155)	214	79	206	>2000 CG	86	37	113
6/19	14	76	34	12	2	16 (18)	6	<2	10	526	24	36
6/25	23	16	15	12	13	12	6 (8)	19	9	28	8	15
7/2	239	68	37	165	58	74	145	142 (112)	46	214	13	171
7/10	3	6	12	7	5	9	3	11	16 (8)	9	4	8
7/17	194	66	116	87	28	431	63	390	272	247	133 (118)	386
7/23	4	10	16	14	4	42	22 (18)	26	24	152	10	36
7/29	46	160	41	14	16	38	12	66	37	131	82	104 (92)
8/7	3 (1)	7	19	5	7	11	6	84	8	45	30	33
8/13	125	43 (55)	15	16	17	37	21	20	51	104	58	215
8/21	456	176	>2000 CG	190	184	258	10	>2000 CG (>2000 CG)	94	86	52	184
9/4	66	27	53	196	12	62	3	22	118	209 (210)	16	239
9/10	44	187	95	9	8 (22)	76	163	3	6	20	13	>400
9/18	12	12	19	9	6	48	17	5	25	131	13	216 (202)
Seasonal Geometric	22	35	30	21	15	38	11	21	28	64	20	64

Results related to weather

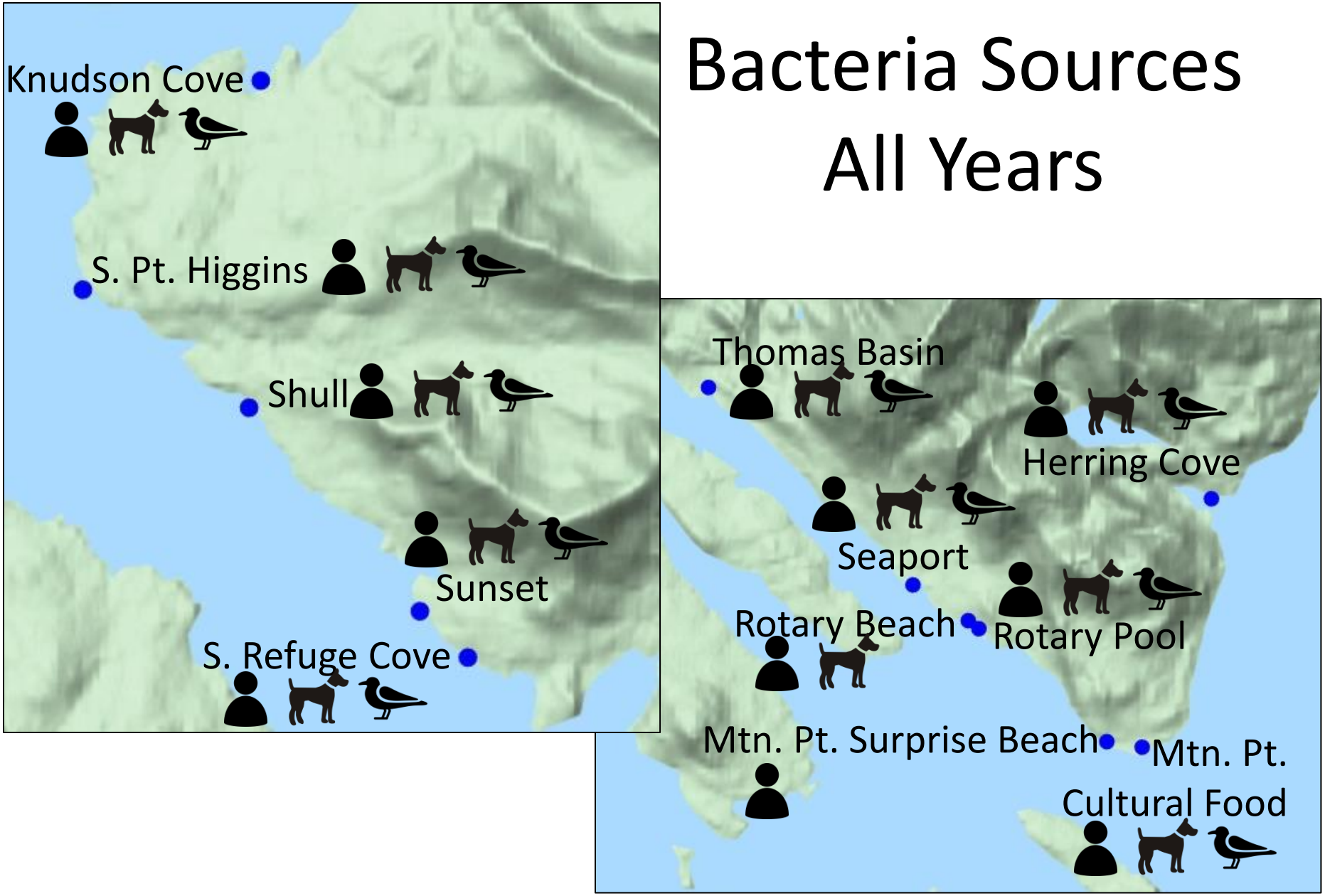


Bacteria Sources 2019





Bacteria Sources All Years

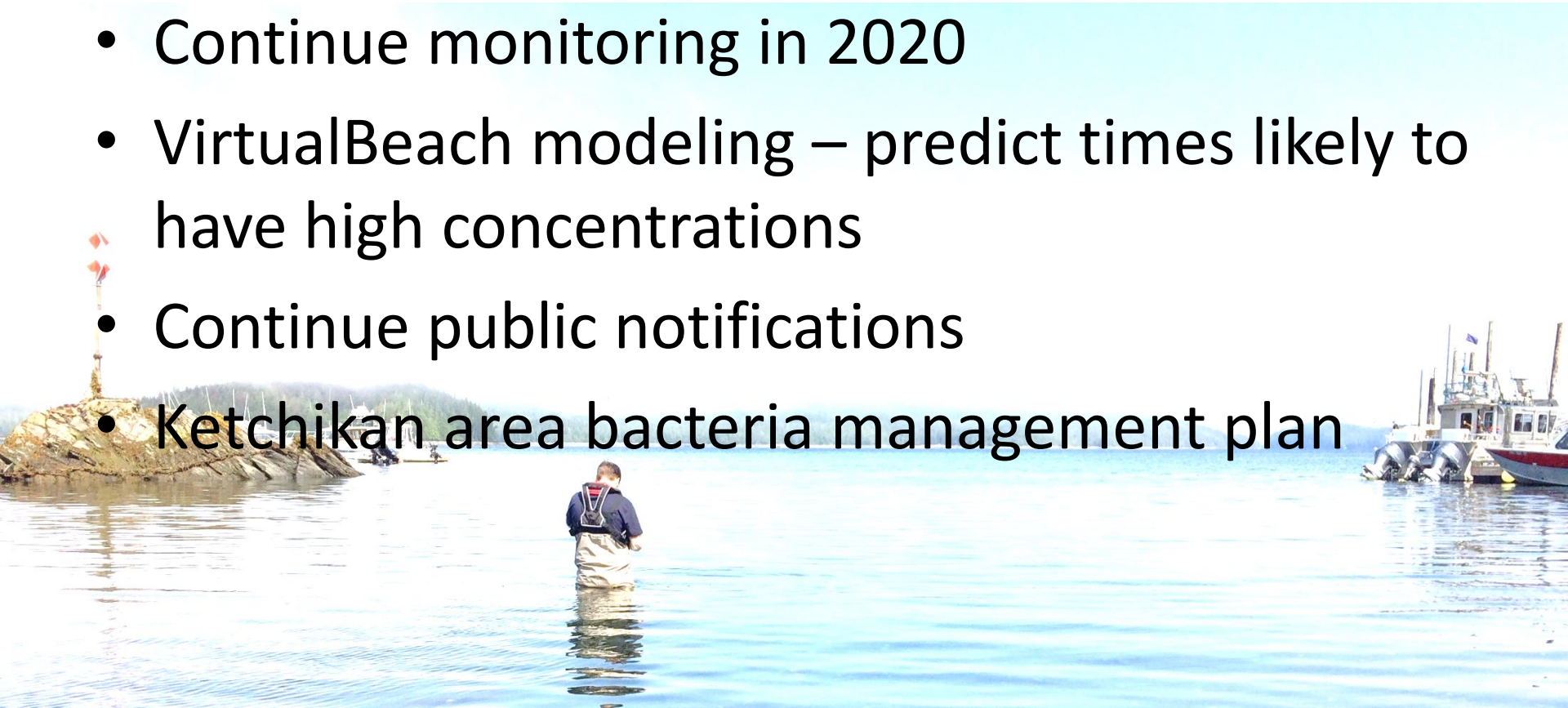


2019 Beach Results Summary

- All beaches exceeded recreation and/or harvest standards
- Bacteria concentrations more chronically elevated at Thomas Basin, Herring Cove, and Mt. Pt. Cultural Food
- Bacteria concentrations generally lower at S. Refuge, Seaport, and Mt. Pt. Surprise
- Analyses point to multiple sources of bacteria at all locations, including human

Next Steps

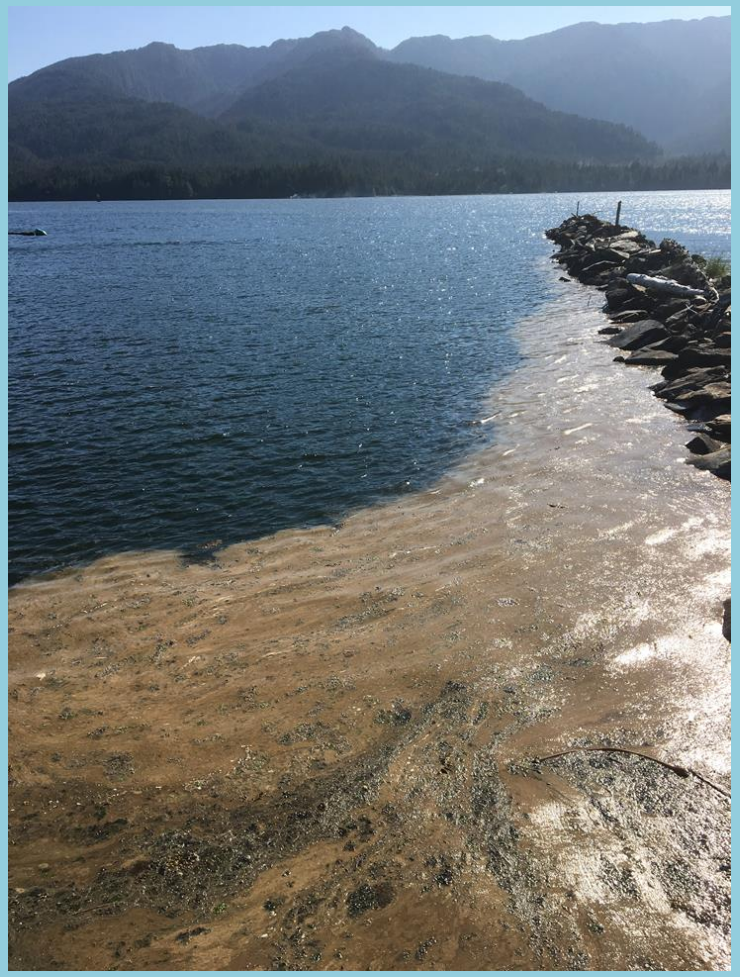
- Comprehensive 3 year beach monitoring report
- Continue monitoring in 2020
- VirtualBeach modeling – predict times likely to have high concentrations
- Continue public notifications
- Ketchikan area bacteria management plan



Next Steps in 2020

- Watershed Management Plan
- Weekly beach sampling
- Virtual Beach model

August Algal Bloom



Alexandrium spp and Prorocentrum spp

Dinoflagellates with Alexandrium producing saxitoxin

Thanks to our partners - people helping out

Ketchikan Indian Community

Southeast Alaska Watershed Coalition

Ketchikan Community

City of Ketchikan

Ketchikan Gateway Borough

Ketchikan City Council

R&M Engineering – local laboratory

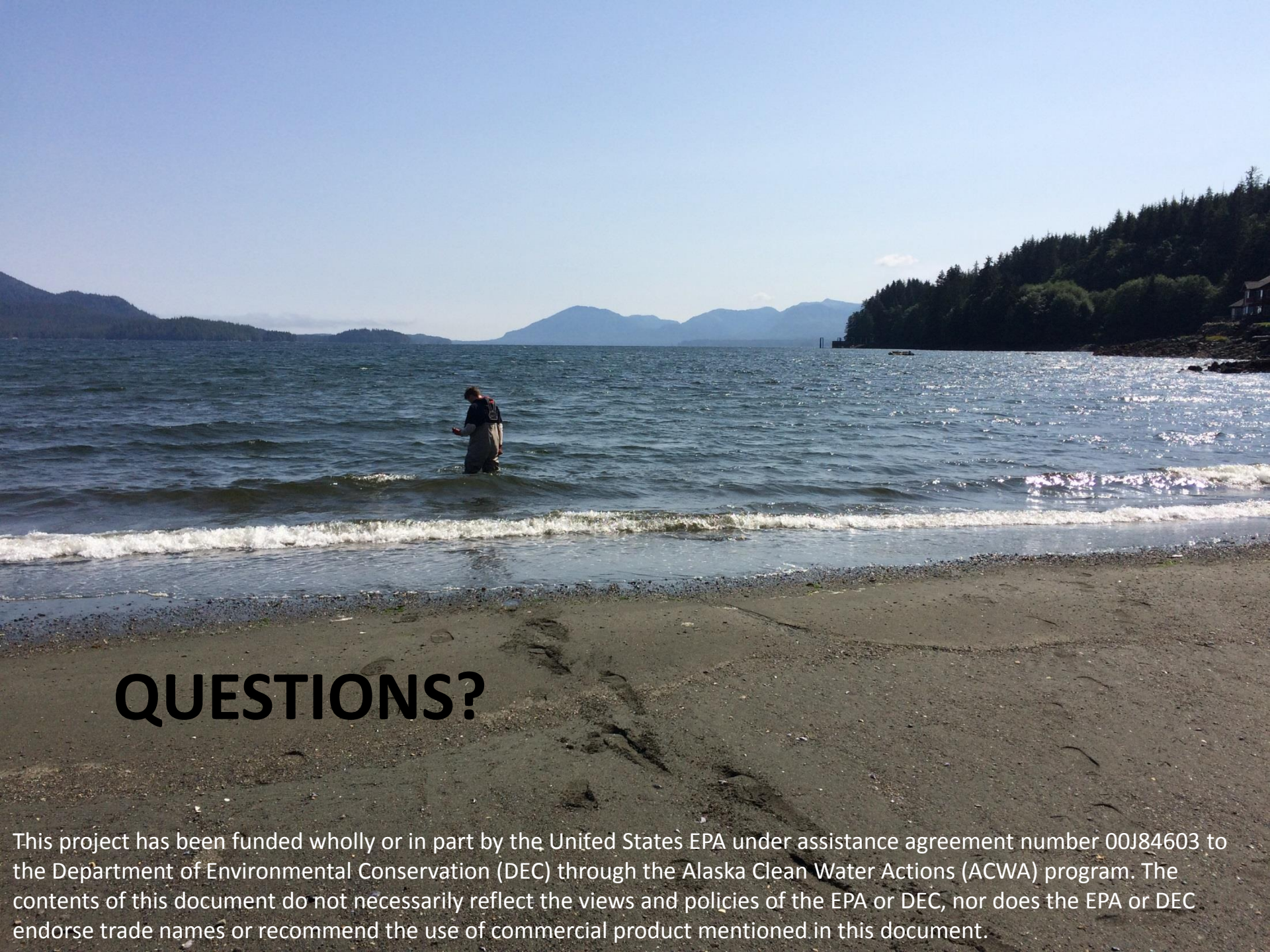
Southeast Alaska Regional Dive Fisheries Association

Department of Fish & Game

Department of Natural Resources

DEC - Division of Water, Cruise Ship, Compliance, Wastewater Discharge Permitting

EPA guidance & funding through AWCA/Beach Grants



QUESTIONS?

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