

The Role of Urban Oyster Reefs on their Impact on Sewage Pollution In the Bush Terminal Park Estuary



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Objectives

- Determine what types of bacteria are present within each lagoon
- Determine if oysters make a difference in the quantity of sewage bacteria between each lagoon

New York Harbor

- Oyster reefs were abundant in the Hudson.
- When Henry Hudson arrived he brought people and pollution.
- This caused water quality to decline and all oyster reefs were destroyed.
- In 1972 Clean Water Act was issued by the EPA.
- Today, it contains large amounts of sewage pollution and bacterial contamination.



Billion Oyster Project

- **Goal:** Use oysters to filter substances like sewage bacteria from the waters
- They have been introducing oyster reefs around the New York Harbor.
- They are testing their efficiency.
- In 2016, they placed oyster cages in the Bush Terminal Park Estuary.



Bush Terminal Park Estuary (Sampling site)

- Samples were collected bi-weekly from the end of May 2019 to the end of July 2019.
- They were collected during low tide.
- Samples were collected from two lagoons
- **Lagoon 1:** Contains oyster cages
- **Lagoon 2:** Contains no oyster cages
- Each lagoon has two collection sites
- Edge, indicated by the “E” and Center indicated by the “C”.

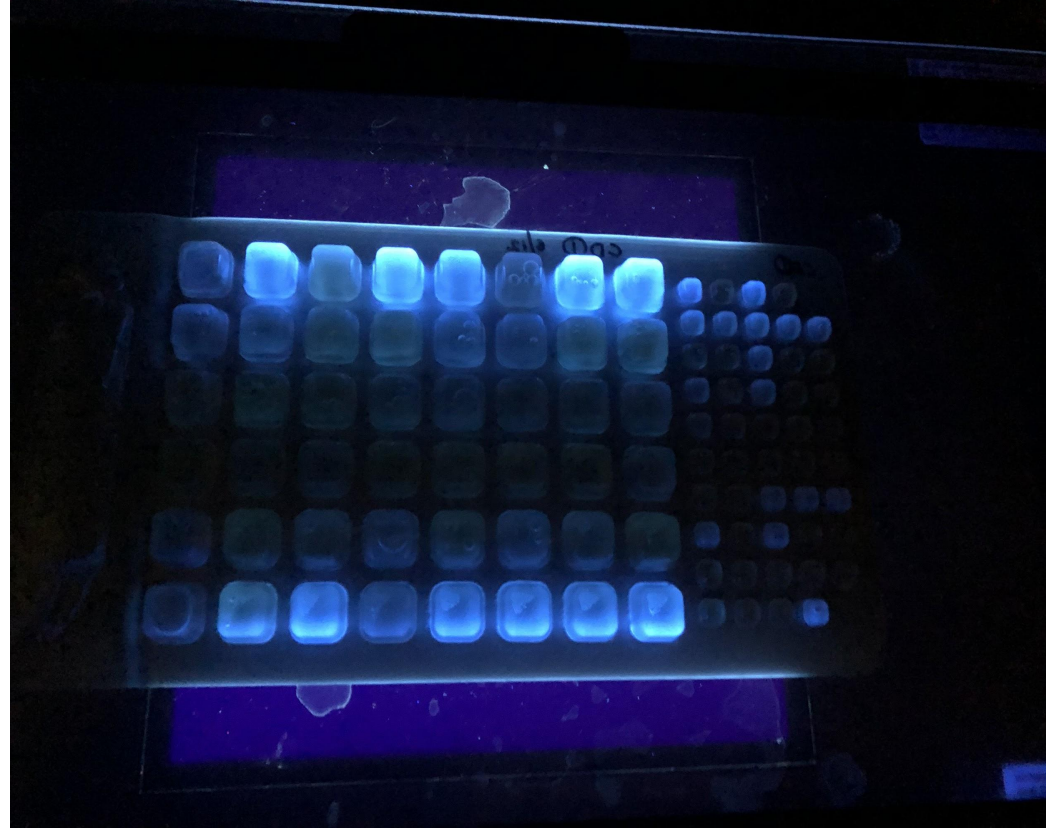
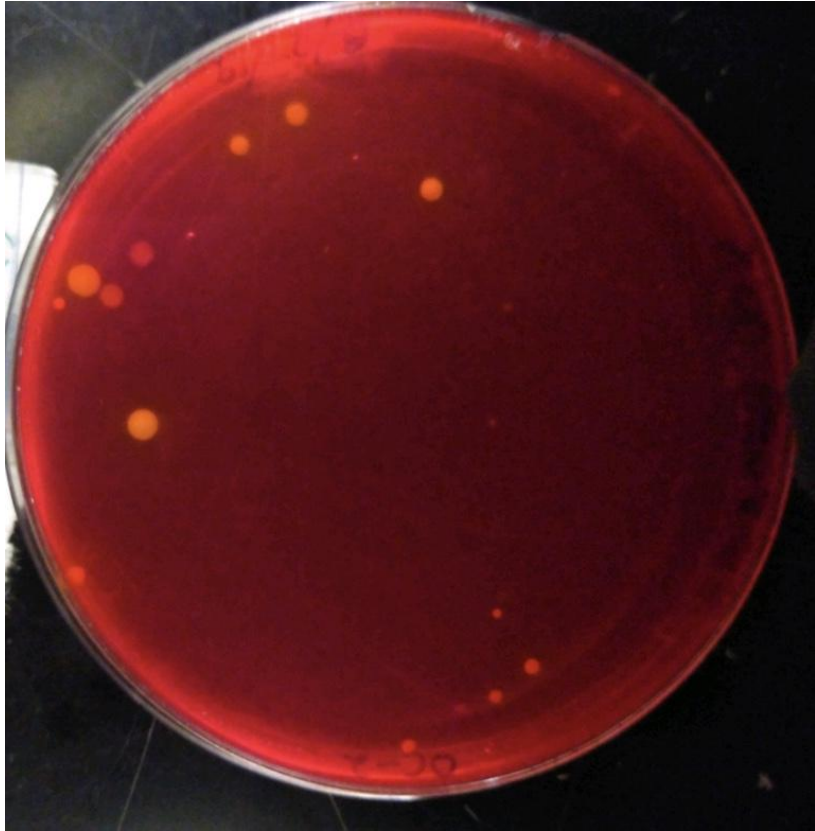


Sampling

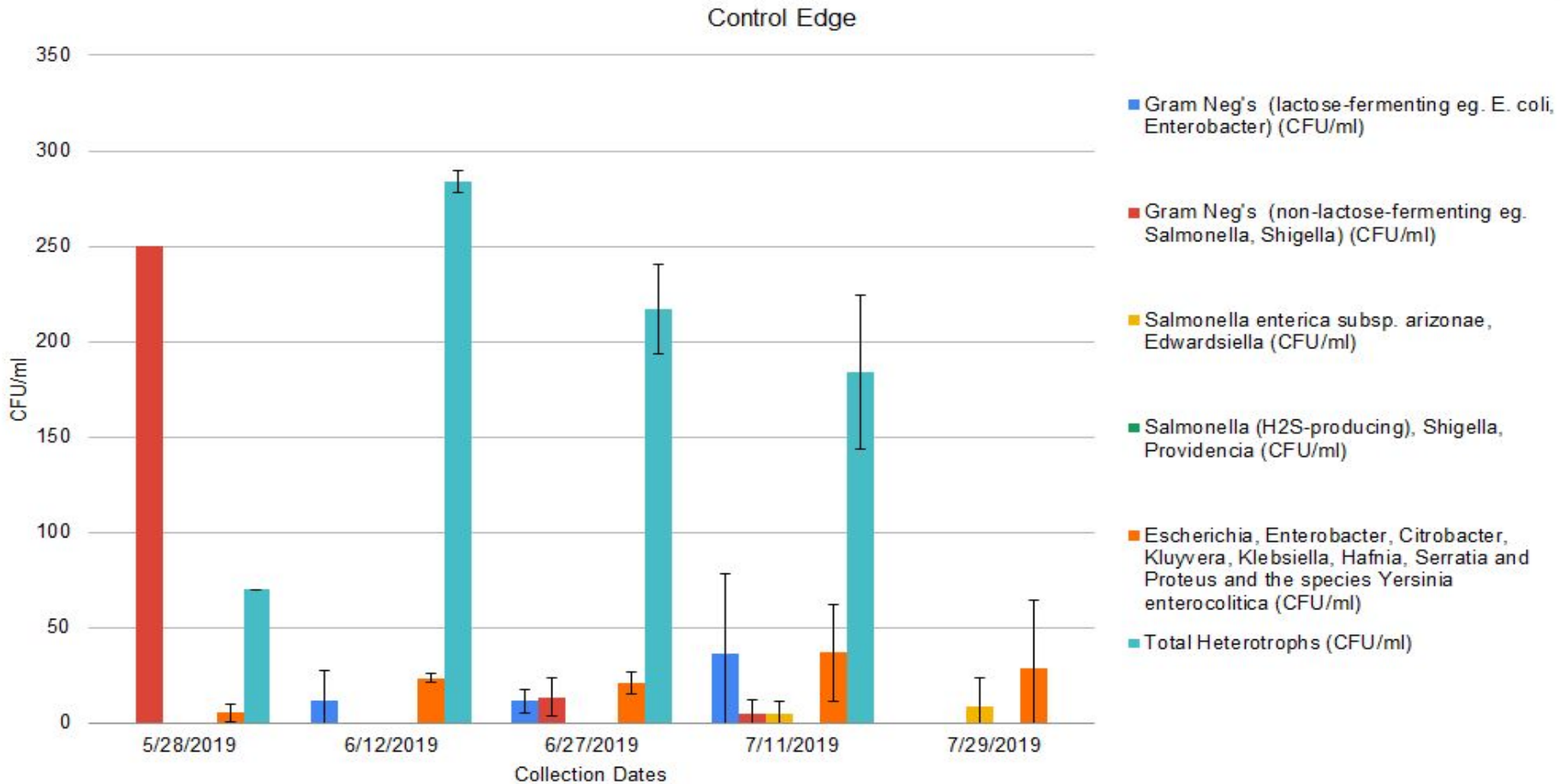
- Filled up four plastic containers, each from the four sampling positions
- Used an YSI which measured water parameters
 - Collected at the surface of the edge position of the oyster and control lagoons
 - Collected at both the surface and deeper without touching the ground of the center position of the oyster and control lagoons
- Used a secchi disk which measured cloudiness of the water
 - Used at the center positions of both the oyster and control lagoons
 - Measured in meters



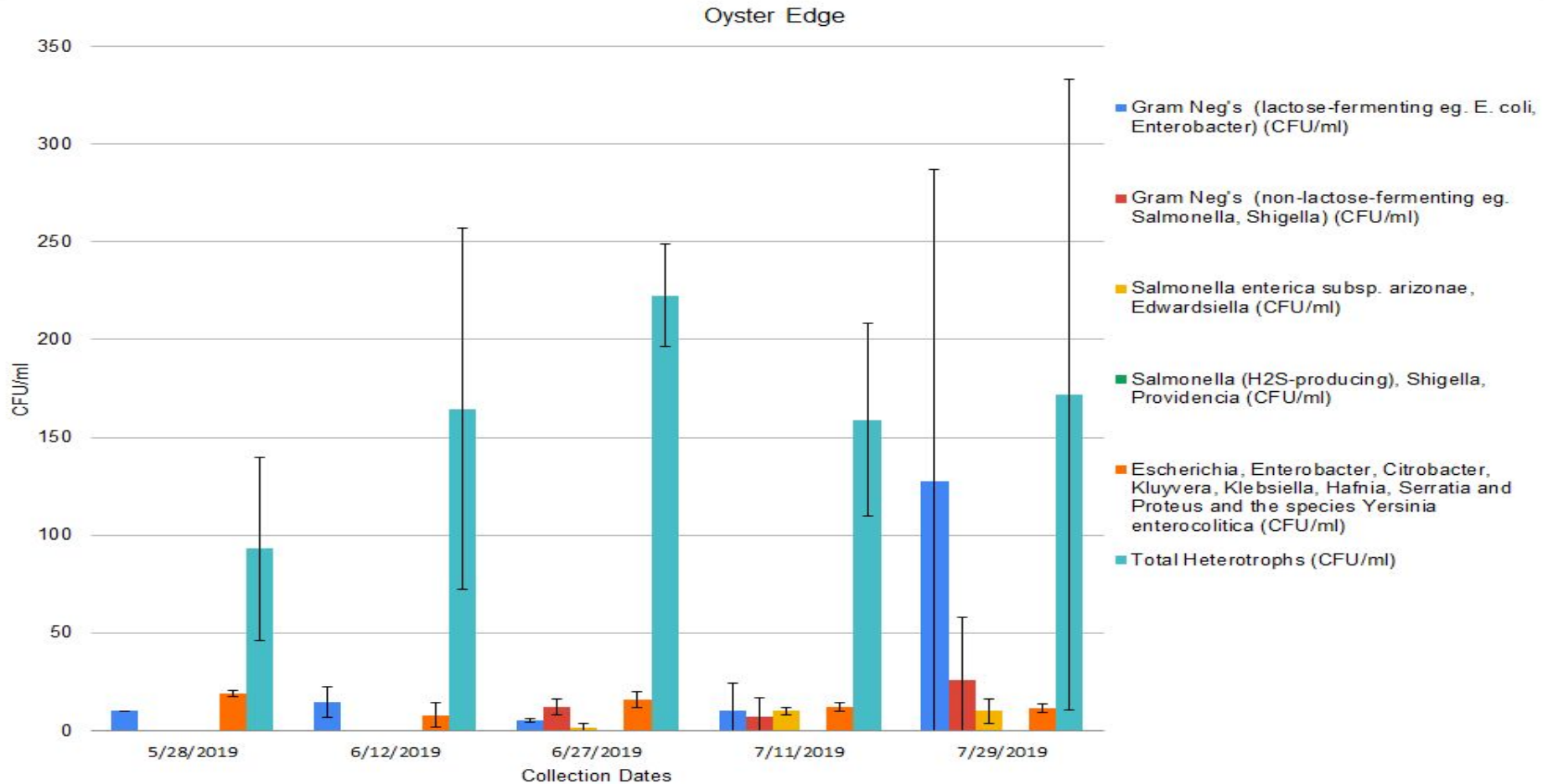
Lab Techniques



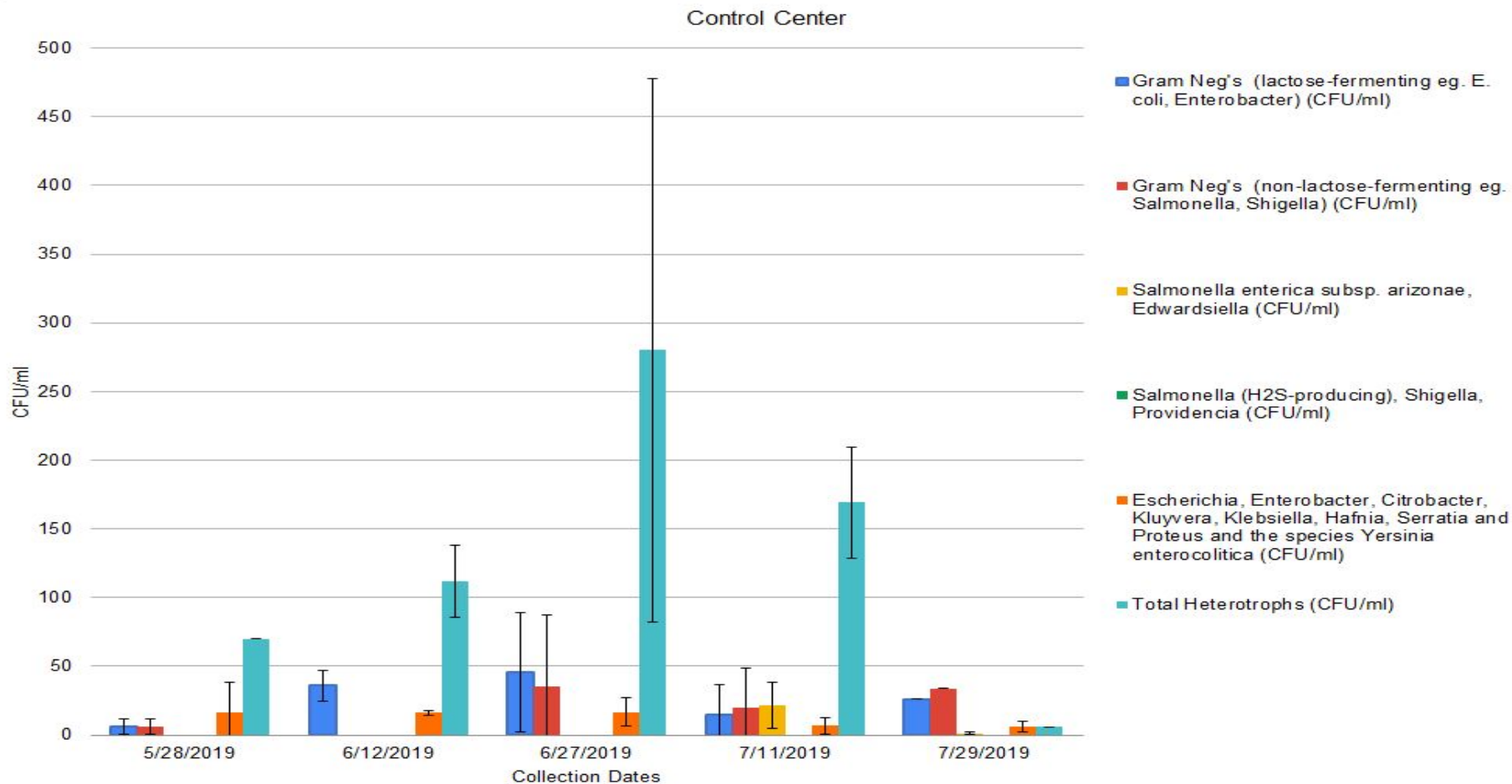
Edge Lagoon Results



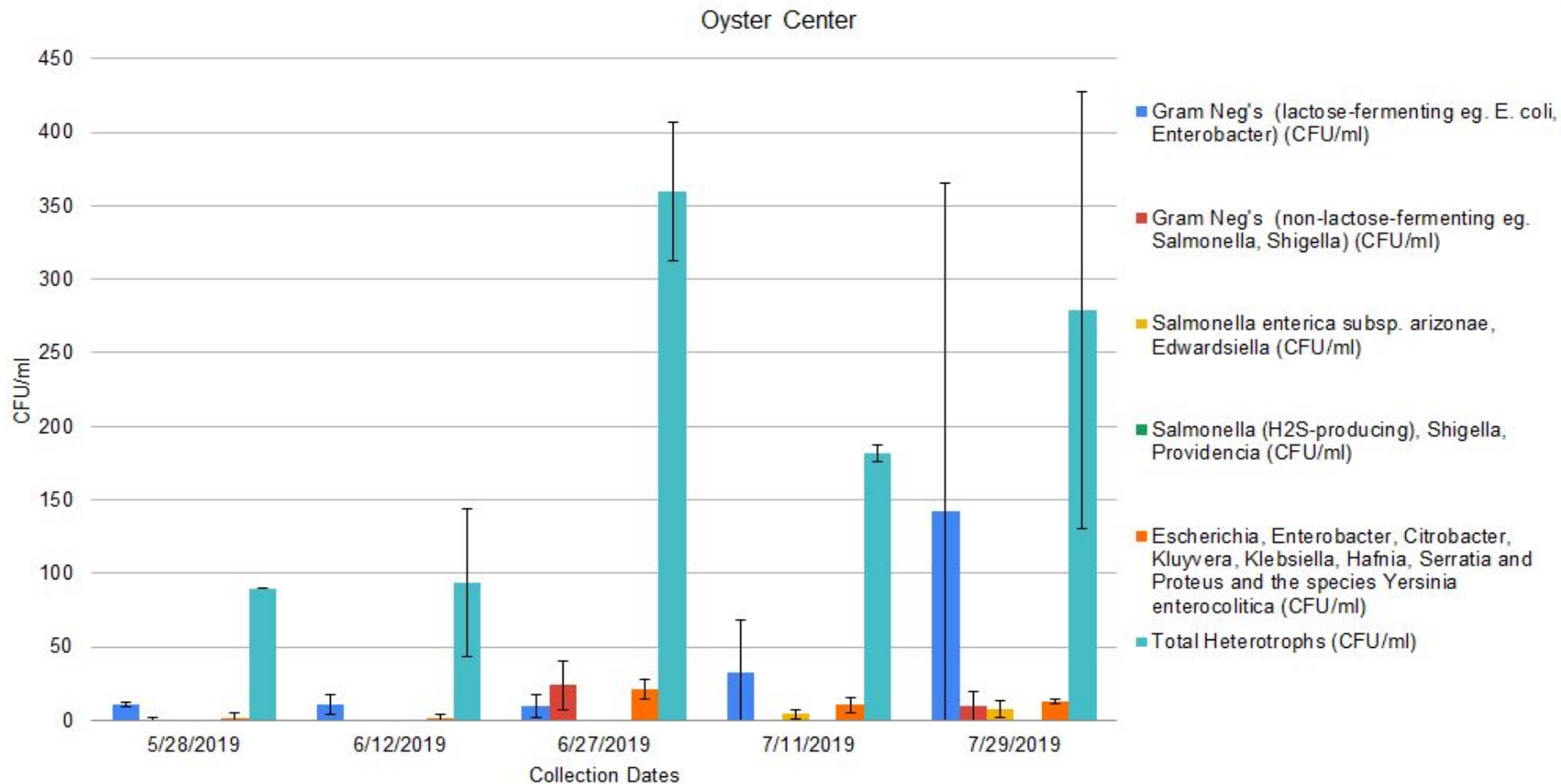
Edge Lagoon Results cont.



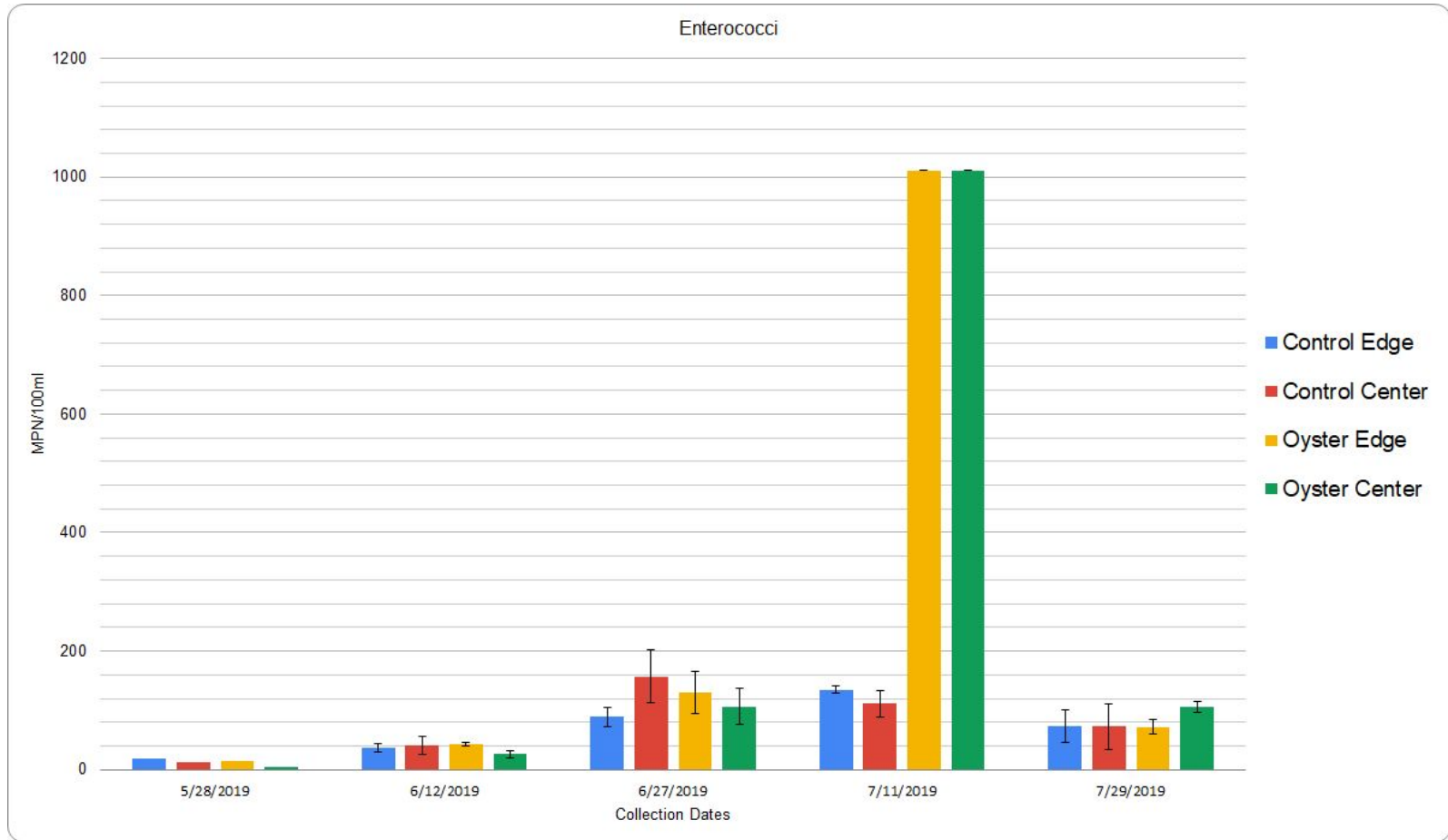
Center Lagoon Results



Center Lagoon Results cont.



Enterolert Test Results



Metadata

- Temperature of the water increased
- Dissolved oxygen was low when Enterococci was high on the day of a sewage spillage
- Dissolved oxygen is affected by photosynthesis and respiration
- Total dissolved solids are affected by disturbing the clay at the bottom of the lagoon and into the water

Location	Date	Temperature (°C)	Salinity (PSU)	DO (%)	DO (mg/L)	TDS (mg/L)	pH
Control Edge	5/28/2019	17.7	17.6	192-189	16		8.48
	6/12/2019	18.9	21.53	97.8	7.7	22256	7.75
	6/27/2019	23.6	17.94	96	7.43	18928	7.78
	7/11/2019	23.8	24.72	66.5	4.82	25252	7.9
	7/29/2019	26.6	23.8	113	7.91	24505	8.3
Control Center	5/28/2019	S: 17.8 D: 17.6	S: 17.9 D: 18	S: ~230 D: 217-205	S: 19.8-20.2 D: 17.3	S: 1800-1900 D:18895	S: 8.7 D: 8.6
	6/12/2019	S: 18.6 D: 18.7	S: 21.55 D: 21.67	S: 87.2 D: 85.8	S: 7.03 D: 7.26	S: 22243 D: 22360	S: 7.65 D: 7.71
	6/27/2019	S: 23.2 D: 23.2	S: 19.27 D: 18.99	S: 105.8 D: 57.2	S: 8.37 D: 4.20	S: 20137.5 D: 19877	S: 8.13 D: 7.6
	7/11/2019	S: 23.9 D: 23.5	S: 24.73 D: 24.73	S: 66.5 D: 65.4	S: 4.65 D: 4.8	S: 25252.5 D: 25252.5	S: 7.92 D: 7.95
	7/29/2019	S: 26.5 D: 24.7	S: 24.57 D: 24.67	S: 150 D: 139.2	S: 10.73 D: 9.8	S: 25129 D: 25259	S: 8.73 D: 8.7
Oyster Edge	5/28/2019	19.4	15.76	~142	11.8	16731	8.25
	6/12/2019	20.3	21.78	92.3	7.26	22483.5	7.6
	6/27/2019	24.4	18.6	96	7.29	19545	7.99
	7/11/2019	25	24.58	63.4	4.46	25155	7.78
	7/29/2019	28.3	23.59	144.9	9.98	24284	8.69
Oyster Center	5/28/2019	S:19.4 D:19.4	S:15.87 D:15.87	S:147 D:147.9	S:12.3 D:12.3	S:16828 D:16841	S:8.27 D:8.23
	6/12/2019	S:20.2 D:19.9	S:21.73 D:21.74	S:90.7 D:90.2	S:7.17 D:7.12	S:22412 D:22451	S:7.63 D:7.63
	6/27/2019	S:24 D:22	S:18.67 D:19.77	S:95.7 D:128.3	S:6.93 D:9.28	S:19656 D:20650	S:7.89 D:8.26
	7/11/2019	S:25 D:25	S:24.7 D:24.7	S:62.1 D:58.2	S:4.41 D:4.11	S:25252.5 D:25239.5	S:7.75 D:7.74
	7/29/2019	S:28.2 D:27.3	S:23.56 D:23.59	S:156.4 D:148.1	S:10.53 D:10.18	S:24245 D:24245	S:8.6 D:8.59

Secchi Disk

- Showed that the oyster lagoon was clearer than the control lagoon
- Oyster lagoon was more shallow than the control lagoon
- Affected by disturbing the clay and sand at the bottom of the lagoons

	5/28/2019	6/12/2019	6/27/2019	7/11/2019	7/29/2019
Control Center	~0.75m	~0.6m	~0.95m	~0.9m	0.75m
Oyster Center	~0.8m (clear to bottom)	~0.85m (clear to bottom)	~0.9m (clear to the bottom)	~0.85m (clear to bottom)	~0.7m (clear to bottom)

Possible Future Work

- Have more sampling days
- When it rains, samples should be collected to differentiate between runoff or sewage contamination

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