

# BACHMAN LAKE DAM REHAB PROJECT

Water Facilities Project Management &  
Stormwater Operations Dallas Water Utilities



# AGENDA

- Background
- Dredging 101
- Dam 101
- Project Goals & Timelines
- Project Progress
- Community Engagement
- Stormwater Operations Update
- Questions



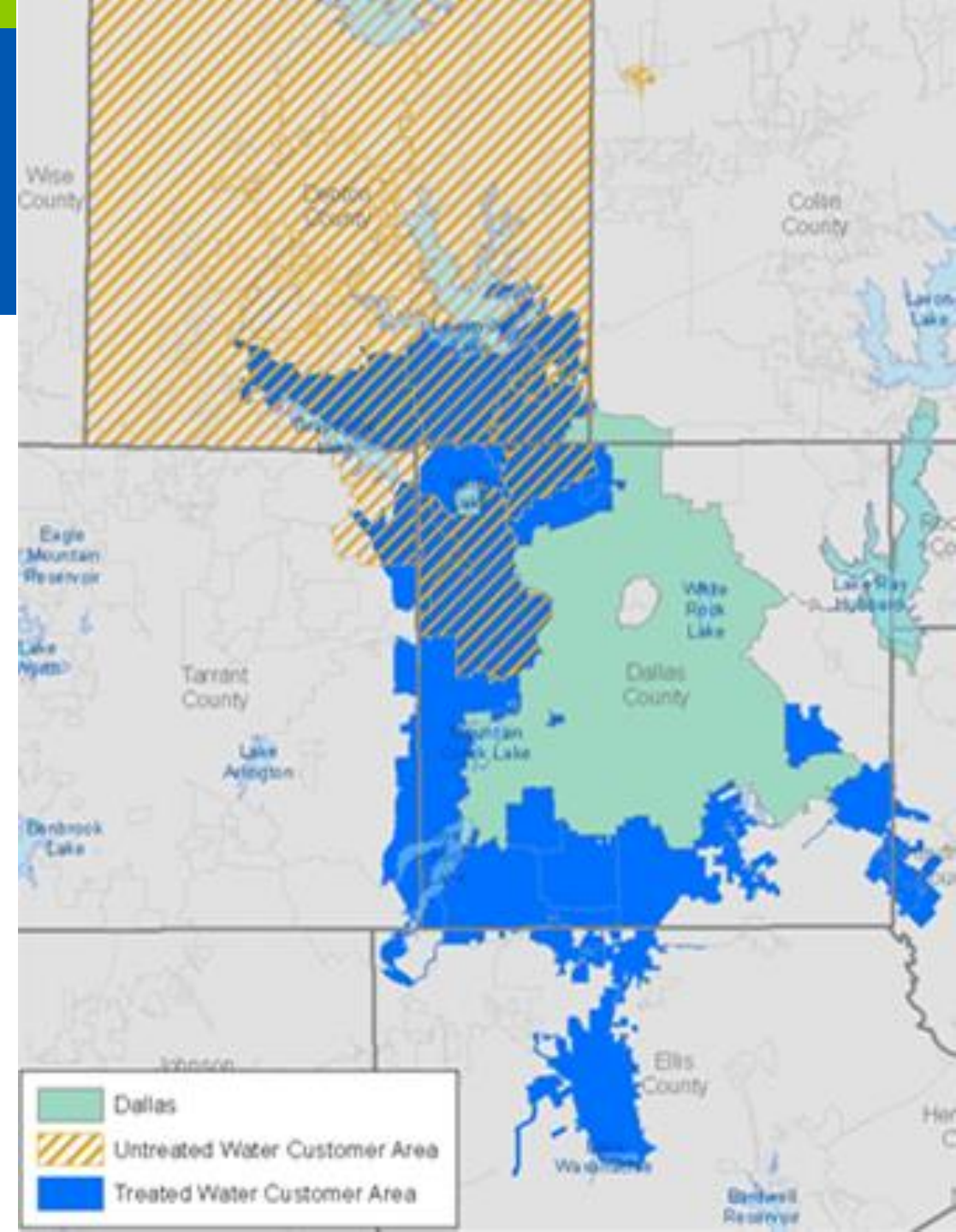
# BACKGROUND





# DWU FACT SHEET

- Founded in 1881
- Regional provider of water, wastewater and stormwater services
- Funded from wholesale and retail water and wastewater revenues and stormwater fees (receives no tax dollars)
- Combined operating and capital budgets of \$1.1B
- 699 square mile service area
- Approximately 1,650 employees
- 2.5 million treated water customers
  - 1.3 million - Retail (City of Dallas)
  - 1.2 million - Wholesale



# PROJECT TEAM

Dallas Water Utilities

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# DAM HISTORY

- Dam was built in 1901
- Originally used for water supply
- Converted to recreational use in 1960s
- 35' tall earthen embankment
- 180 foot long concrete overflow spillway





KEY FEATURES

# Bachman Lake Dam



Recreation Center

Emergency Spillway

Embankment,  
Upstream Slope

Embankment, Crest

Wetland

Pond

Embankment,  
Downstream Slope

Intake Tower

Downstream Channel

Service Spillway

Railway

Bachman Water  
Treatment Plant





Railroad  
Bridge

Underwater  
Apron

Apron

Toe

Crest

Concrete  
Wing Wall

KEY FEATURES

# Spillway



# WHY THESE PROJECTS ARE IMPORTANT

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# DREDGING 101





# THE PROCESS



# WHY IS DREDGING NEEDED?

- Why? A naturally occurring process called sedimentation – buildup of silt, sand, and other debris



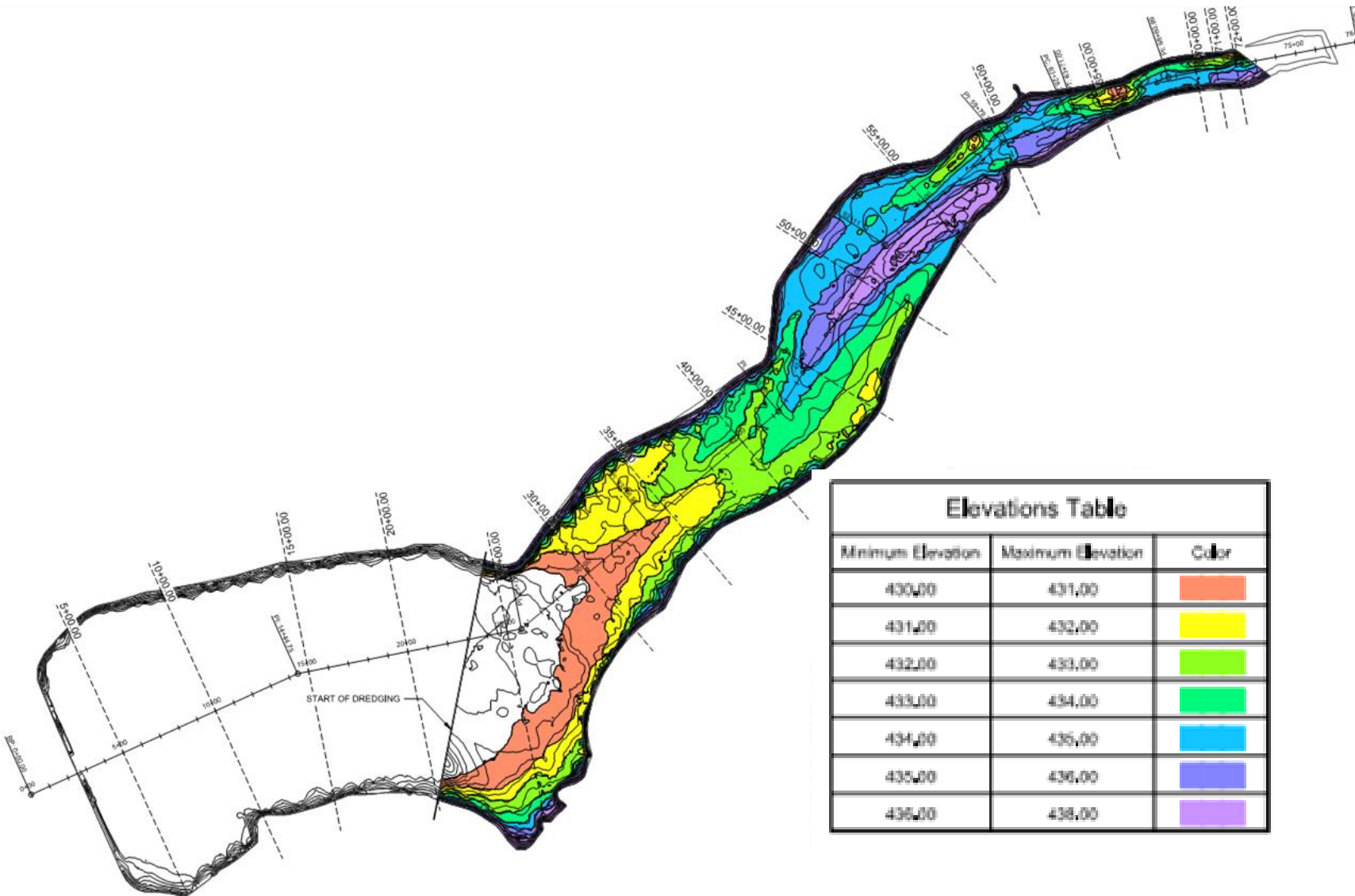


# EFFECTS OF SEDIMENTATION

- Excessive debris buildup from sedimentation can reduce lake depths
- High sediment levels affect recreational activities and reduce reservoir capacity
- Shallow water depth can lead to invasive aquatic vegetation problems



# BACHMAN LAKE'S CONDITION



Minimum Elevation	Maximum Elevation	Color
430.00	431.00	Orange
431.00	432.00	Yellow
432.00	433.00	Light Green
433.00	434.00	Green
434.00	435.00	Cyan
435.00	436.00	Blue
436.00	438.00	Purple



# WHAT IS DREDGING?

- Removal of accumulated debris from the bottom of the lake via mechanical equipment



# DREDGING IN MOTION

## CUTTERHEAD DREDGE ANIMATION



[youtu.be/13RvRSFloeo](https://youtu.be/13RvRSFloeo)



# TRANSPORTING WHERE?

- Loosened material removed by dredging equipment will be transported for dewatering
- Dredged material from Bachman Lake to be transported to the offsite dewatering area



# PROPOSED PROCESSING SITE





# WHAT IS DEWATERING?

- Removal of water from dredged sediment and other solid material
- Why? For ease of transport of dredged material and save hauling costs
- Excavated material will be trucked to a landfill for daily cover





# DAM 101

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# WHAT IS A DAM?

- A barrier that restricts water flow to create reservoirs
- Bachman Lake is a reservoir used for flood control and recreation
- Bachman Lake Dam is over 100 years old





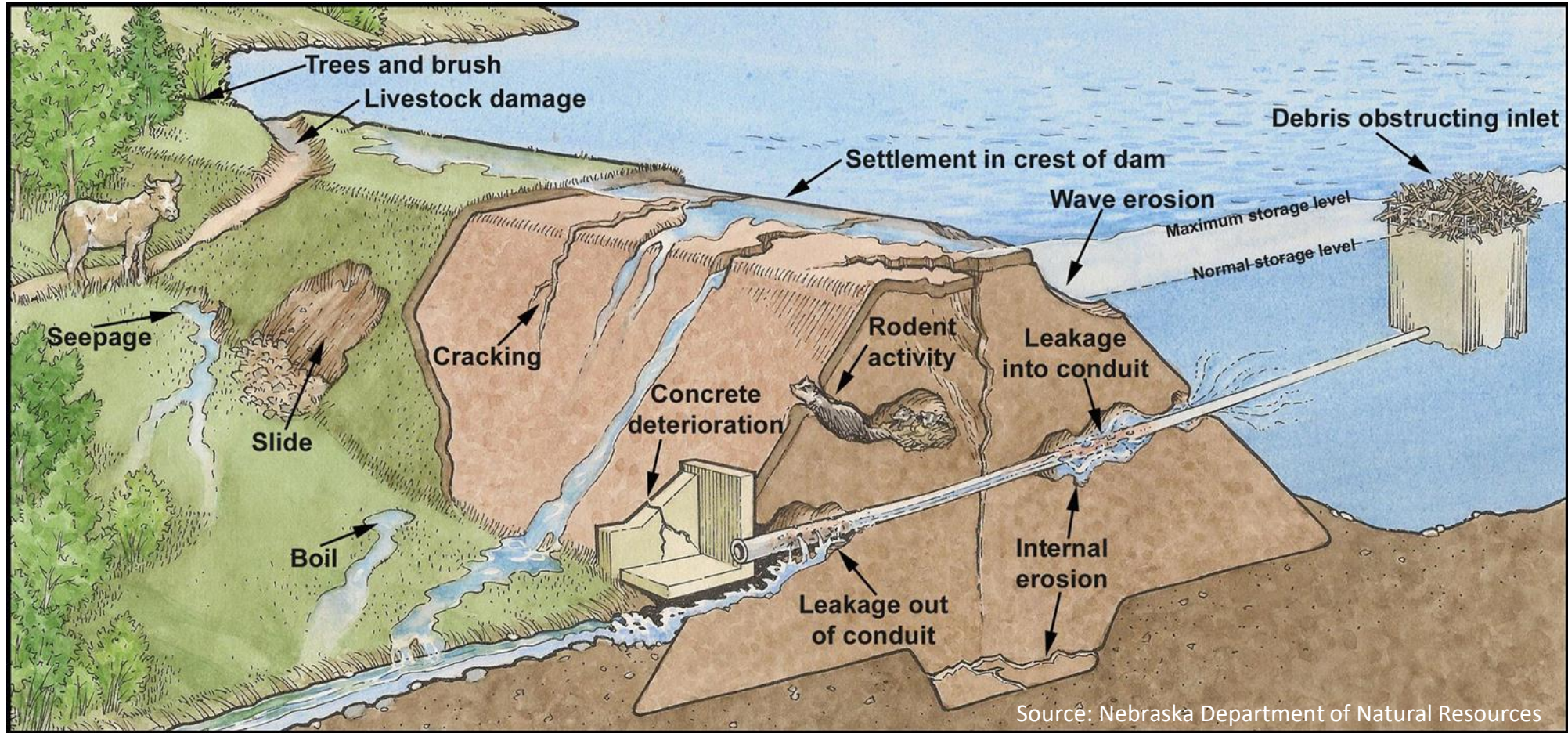
# VALUE OF DAM SAFETY PROJECTS

- Preserve dam integrity
- Maintenance of embankment & spillway
  - Trees / underbrush
  - Erosion
  - Seepage
- Protects downstream property and infrastructure





# COMMON DAM ISSUES





# PROJECT GOALS & TIMELINE





# PROJECT OBJECTIVES

- Update hydrology and hydraulics of the Bachman Dam and Spillway
- Meet required regulatory flood capacity
- Remove sediment to return lake to recreational levels
- Address Bachman Dam structural and stability recommendations

**DREDGING**

2021

2022

**DAM REHAB**

2023



# TIMELINE DETAILS

	Project Activity
Winter 2020/2021	<ul style="list-style-type: none"> <li>• Complete Dam Rehabilitation Design Basis Report</li> <li>• <b>Public &amp; Bachman Lake Stakeholders Meeting to present Project Update - February 8, 2021 with Friends of Bachman Lake (FoBL).</b></li> </ul>
Spring 2021	<ul style="list-style-type: none"> <li>• Complete Dredging Design and Advertisement for Dredging Bids.</li> </ul>
Summer 2021	<ul style="list-style-type: none"> <li>• Begin Final Design Phase of Dam Rehabilitation</li> <li>• Open Bids for Dredging Services</li> <li>• Council Consideration of Dredging Construction Contract</li> </ul>
Fall 2021	<ul style="list-style-type: none"> <li>• Begin Bachman Lake Dredging Work</li> </ul>
Spring/Summer 2022	<ul style="list-style-type: none"> <li>• Complete Dam Rehabilitation Design and Advertisement for Bids</li> </ul>
Summer 2022	<ul style="list-style-type: none"> <li>• Completion of Bachman Lake Dredging and Demobilization</li> </ul>
Summer 2022	<ul style="list-style-type: none"> <li>• Council Consideration of Dam Rehabilitation Construction Contract</li> </ul>
Fall 2022	<ul style="list-style-type: none"> <li>• Begin Dam Rehabilitation Construction</li> </ul>
Fall/Winter 2023	<ul style="list-style-type: none"> <li>• Completion of Dam Rehabilitation Construction and Demobilization</li> </ul>

# PROJECT PROGRESS





# FIELD ACTIVITIES

- Topographic Survey of the Lake
- Fresh Water Mussel Survey for USACE
- Bathymetric Survey to Estimate Dredging Volume
- Geotechnical Investigation for Dam Design
- Waters of the US Survey for Wetlands Delineation
- Cultural Resources Survey for Permitting



# DREDGING PERMIT

- US Army Corp of Engineers
- Approved on Dec. 18, 2020





# DREDGING & THE PARK

- 60% design completion, Construction Fall 2021
- South Parking Lot by Rowing Club
  - Deployment of dredging barge
  - Daily transportation of employees to barge
  - Assembly of dredge slurry pipe
  - Parking lot closed during project
  - Rowing/boating limited due to floating slurry pipe



# DAM REHAB

- Preliminary H&H completed
- Strengthen and stabilize embankment
- Currently evaluating regulatory requirements





# DAM REHAB

- Service Spillway to be replaced
- Currently evaluating design options and regulatory requirements





# COMMUNITY ENGAGEMENT





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# STORMWATER OPERATIONS UPDATE





# STORMWATER OPERATIONS PROJECT TEAM

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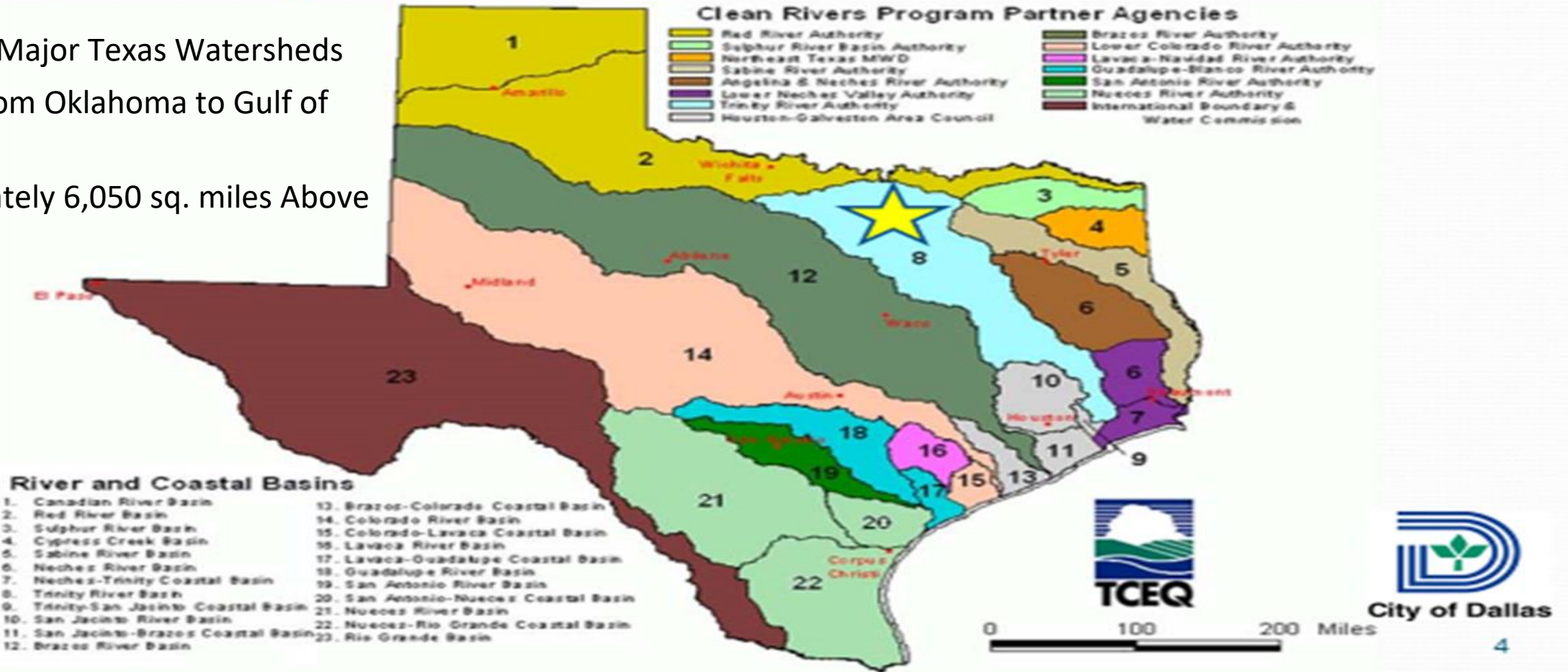
# STORMWATER OPERATIONS UPDATE

- The City of Dallas Stormwater Operations is obligated to regulatory compliance through the Texas Commission on Environmental Quality (TCEQ) via (MS4) permit and USACE for the Dallas Levee System and other improvements related to the Waters of the US.



# Trinity River Watershed

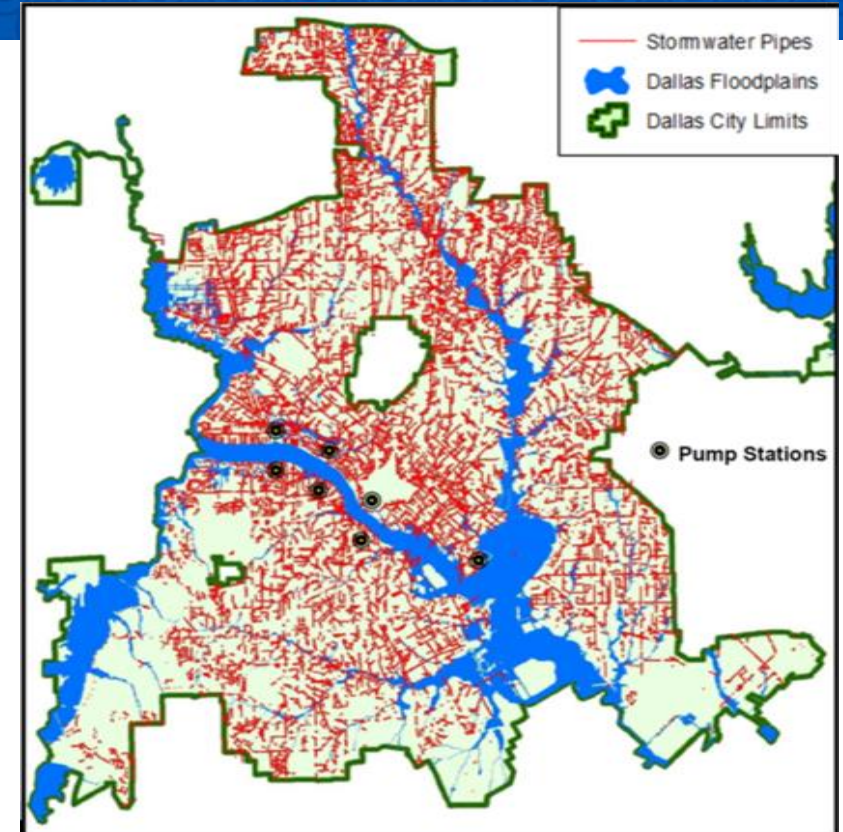
One of 23 Major Texas Watersheds  
 Extends from Oklahoma to Gulf of Mexico  
 Approximately 6,050 sq. miles Above Dallas



# DRAINAGE SYSTEM INFRASTRUCTURE

- 1,800 miles of storm sewers
- 30 miles of levee
- 13 pump stations at 8 locations
- 6 pressure sewers
- 8 street pump stations
- ~661 miles channel\*
- ~39,000 acres floodplain

\* Includes both public and private channels





# Bachman Lake Water Quality



# Objective

- The water quality samples were collected according to the sampling plan designed to obtain the water quality information for Bachman Lake located at 3500 W Northwest Hwy., Dallas, TX.
- Standard EPA methods and procedures were employed to collect data to determine the water quality of the lake while comparing the water quality of the upstream and downstream locations.



# BACHMAN LAKE SAMPLING LIST PARAMETERS

- The Sampling Plan includes the following parameters to be analyzed:
  - DO, pH, Conductivity, Ammonia, Nitrates-Nitrites, Total Phosphorus, Hardness, Chlorine, Metals (Cu, Fe), TSS, Turbidity and E. coli.
- No samples for TPH/BTEX and PAH were collected as no hydrocarbon sheen was observed on the water surface.

# Sampling Locations

- From January to June of 2020, samples were collected from three sites (BACL1, BACL2 & BACL3) located on the lake.
- Water Quality was compliant with Texas Surface Water Quality Standards during the first event of sampling. From July 2020 samples are collected from upstream and downstream sites only.





# Sample Results for Upstream

Sample ID	Collection Date	Total Coli MPN/100ml	E. coli MPN/100ml	DO mg/L	p/H S.U.	Specific Conductivity uS/cm	Sample Temp C	TSS mg/L	Turbidity mg/L	Copper mg/L	Iron mg/L	Hardness mg/L	Nitrogen mg/L	Ammonia mg/L	COD mg/L	Total Phosphorus mg/L
RL										0.02	0.5		0.05	0.1	35	0.05
MDL		1	1							0.0036	0.03		0.025	0.028	10	0.018
BACL-1	1/7/2020	>2419.6	125.9	6.3	7.14	700	11.9	39	34	ND	ND	242	0.4	0.2	ND	0.074
	2/4/2020	>2419.6	>2419.6	9.7	7.83	760	13	13	17	ND	ND	300	0.84	ND	ND	0.084
	2/7/2020	372.5	54.8													
	3/3/2020	1413.6	90.9	8.82	7.83	792	16	23	21	ND	ND	347	0.75	ND	ND	0.055
	4/7/2020	2419.6	32.3	11	8.57	480	22.5	44	45	ND	ND	218	0.32	ND	ND	0.15
	5/5/2020	>2419.6	325.5	3.9	7.56	650	23.7	28	31	ND	ND	250	0.28	ND	ND	0.089
	6/2/2020	>2419.6	17.3	6.84	8.2	385	29	42	44	ND	ND	145	ND	ND	ND	0.11
	7/7/2020	>2419.6	866.4	5.37	7.87	331	28.7	28	31	ND	ND	116	0.54	ND	ND	0.09
	8/4/2020	>2419.6	38.4	4.79	7.56	660	28.5	24	22	ND	ND	210	ND	ND	ND	0.056
	9/1/2020	>2419.6	770.1	5.43	7.68	611	28.2	18	21	ND	ND	220	1.4	ND	10	0.084
	9/8/2020	>2419.6	547.5													
	10/6/2020	>2419.6	42	7.93	7.33	755	19.8	19	23	ND	ND	283	0.32	ND	ND	0.062
	11/3/2020	>2419.6	214.1	6.79	6.76	570	14.1	24	27	ND	ND	227	0.57	ND	ND	0.056
12/1/2020	>2419.6	357.8	6.11	7.03	519	9.8	20	21	ND	ND	178	0.27	ND	ND	0.077	

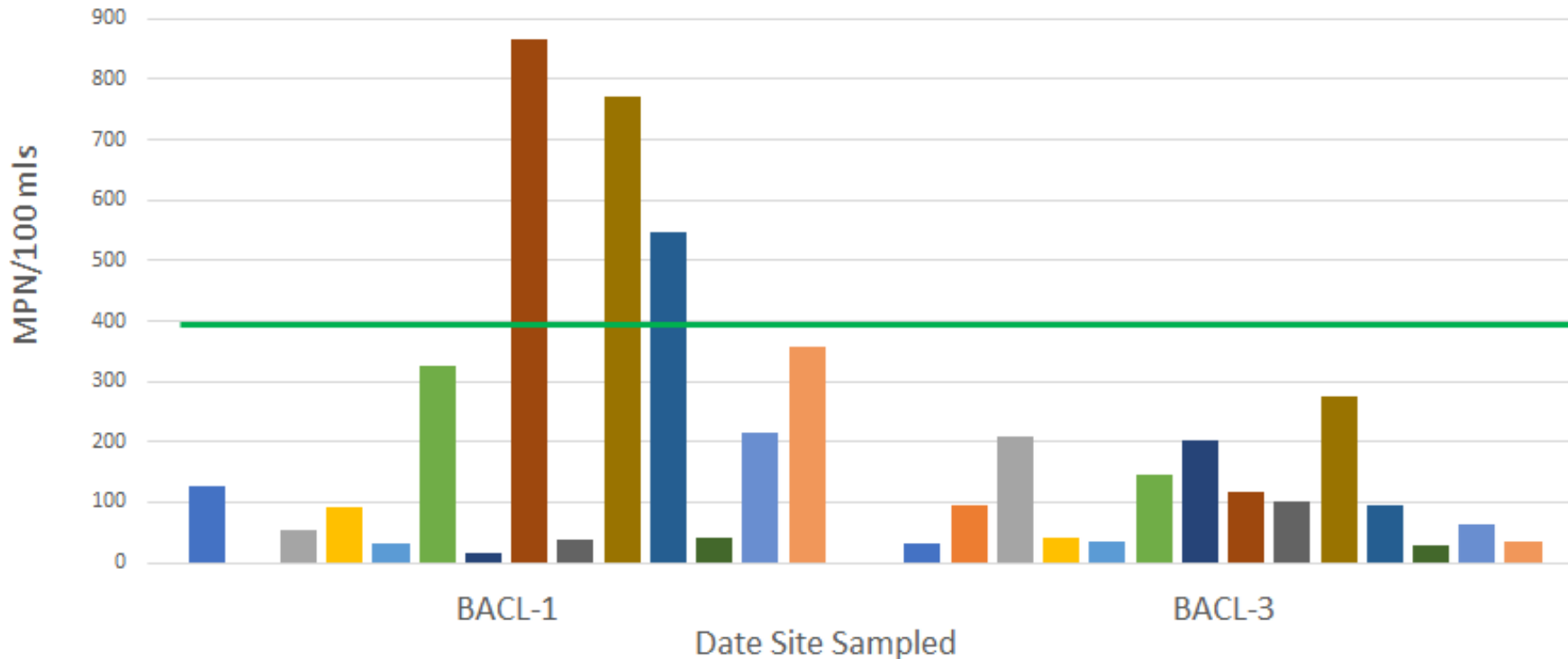
# Sample Result for Downstream

Sample ID	Collection Date	Total Coli MPN/100ml	E. coli MPN/100ml	DO mg/L	pH S.U.	Specific Conductivity uS/cm	Sample Temp C	TSS mg/L	Turbidity mg/L	Copper mg/L	Iron mg/L	Hardness mg/L	Nitrogen mg/L	Ammonia mg/L	COD mg/L	Total Phosphorus mg/L
RL	-	-	-	-	-	-	-	-	-	0.02	0.5	-	0.05	0.1	35	0.05
MDL	-	1	1	-	-	-	-	-	-	0.0036	0.03	-	0.025	0.028	10	0.018
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BACL-3	<u>1/7/2020</u>	<u>344.8</u>	<u>30.9</u>	<u>10.6</u>	<u>7.31</u>	<u>539</u>	<u>11.9</u>	<u>15</u>	<u>15</u>	<u>ND</u>	<u>ND</u>	<u>177</u>	<u>0.28</u>	<u>0.37</u>	<u>ND</u>	<u>ND</u>
	<u>2/4/2020</u>	<u>2419.6</u>	<u>95.9</u>	<u>10.6</u>	<u>8.26</u>	<u>418</u>	<u>12.1</u>	<u>17</u>	<u>18</u>	<u>0.024</u>	<u>ND</u>	<u>164</u>	<u>0.48</u>	<u>ND</u>	<u>ND</u>	<u>0.062</u>
	<u>2/7/2020</u>	<u>488.4</u>	<u>209.8</u>	-	-	-	-	-	-	-	-	-	-	-	-	-
	<u>3/3/2020</u>	<u>325.2</u>	<u>42.6</u>	<u>9.64</u>	<u>8.39</u>	<u>395</u>	<u>14.6</u>	<u>19</u>	<u>25</u>	<u>ND</u>	<u>ND</u>	<u>182</u>	<u>0.28</u>	<u>ND</u>	<u>ND</u>	<u>0.054</u>
	<u>3/3/2020</u>	<u>307.6</u>	<u>37.9</u>	<u>9.68</u>	<u>8.38</u>	<u>400</u>	<u>14.7</u>	<u>19</u>	<u>17</u>	<u>ND</u>	<u>ND</u>	<u>184</u>	<u>0.28</u>	<u>ND</u>	<u>ND</u>	<u>0.057</u>
	<u>4/7/2020</u>	<u>2419.6</u>	<u>36.4</u>	<u>8.6</u>	<u>8.22</u>	<u>458</u>	<u>21.5</u>	<u>39</u>	<u>34</u>	<u>ND</u>	<u>ND</u>	<u>197</u>	<u>0.34</u>	<u>0.13</u>	<u>ND</u>	<u>0.072</u>
	<u>5/5/2020</u>	<u>&gt;2419.6</u>	<u>143.9</u>	<u>7.8</u>	<u>8.11</u>	<u>482</u>	<u>24.2</u>	<u>28</u>	<u>31</u>	<u>ND</u>	<u>ND</u>	<u>180</u>	<u>0.071</u>	<u>ND</u>	<u>ND</u>	<u>0.13</u>
	<u>6/2/2020</u>	<u>&gt;2419.6</u>	<u>201.4</u>	<u>3.83</u>	<u>7.56</u>	<u>445</u>	<u>26.2</u>	<u>21</u>	<u>19</u>	<u>ND</u>	<u>ND</u>	<u>179</u>	<u>0.31</u>	<u>ND</u>	<u>ND</u>	<u>0.092</u>
	<u>7/7/2020</u>	<u>&gt;2419..6</u>	<u>116.9</u>	<u>6.33</u>	<u>7.92</u>	<u>346</u>	<u>29.6</u>	<u>6</u>	<u>18</u>	<u>ND</u>	<u>ND</u>	<u>111</u>	<u>0.088</u>	<u>ND</u>	<u>ND</u>	<u>0.12</u>
	<u>8/4/2020</u>	<u>&gt;2419..6</u>	<u>101.7</u>	<u>2.79</u>	<u>7.3</u>	<u>501</u>	<u>26.2</u>	<u>11</u>	<u>11</u>	<u>0.071</u>	<u>ND</u>	<u>179</u>	<u>0.37</u>	<u>0.16</u>	<u>ND</u>	<u>0.11</u>
	<u>9/1/2020</u>	<u>&gt;2419..6</u>	<u>275.5</u>	<u>6.27</u>	<u>7.89</u>	<u>236</u>	<u>27.5</u>	<u>29</u>	<u>33</u>	<u>ND</u>	<u>ND</u>	<u>91</u>	<u>0.34</u>	<u>0.17</u>	<u>ND</u>	<u>0.15</u>
	<u>9/8/2020</u>	<u>&gt;2419..6</u>	<u>95.9</u>	-	-	-	-	-	-	-	-	-	-	-	-	-
	<u>10/6/2020</u>	<u>&gt;2419.6</u>	<u>29.2</u>	<u>4.8</u>	<u>7.09</u>	<u>413</u>	<u>20.8</u>	<u>6</u>	<u>8</u>	<u>ND</u>	<u>ND</u>	<u>166</u>	<u>0.27</u>	<u>ND</u>	<u>ND</u>	<u>0.078</u>
	<u>11/3/2020</u>	<u>&gt;2419.6</u>	<u>61.7</u>	<u>9.15</u>	<u>7.28</u>	<u>413</u>	<u>14.4</u>	<u>20</u>	<u>25</u>	<u>ND</u>	<u>ND</u>	<u>160</u>	<u>0.25</u>	<u>ND</u>	<u>ND</u>	<u>0.081</u>
<u>11/3/2020</u>	<u>1732.9</u>	<u>64.4</u>	<u>9.15</u>	<u>7.44</u>	<u>423</u>	<u>14.1</u>	<u>20</u>	<u>26</u>	<u>ND</u>	<u>ND</u>	<u>165</u>	<u>0.24</u>	<u>ND</u>	<u>ND</u>	<u>0.054</u>	
<u>12/2/2020</u>	<u>1203.3</u>	<u>35.3</u>	<u>9.56</u>	<u>7.23</u>	<u>466</u>	<u>11</u>	<u>31</u>	<u>33</u>	<u>ND</u>	<u>ND</u>	<u>197</u>	<u>0.19</u>	<u>0.17</u>	<u>ND</u>	<u>0.12</u>	



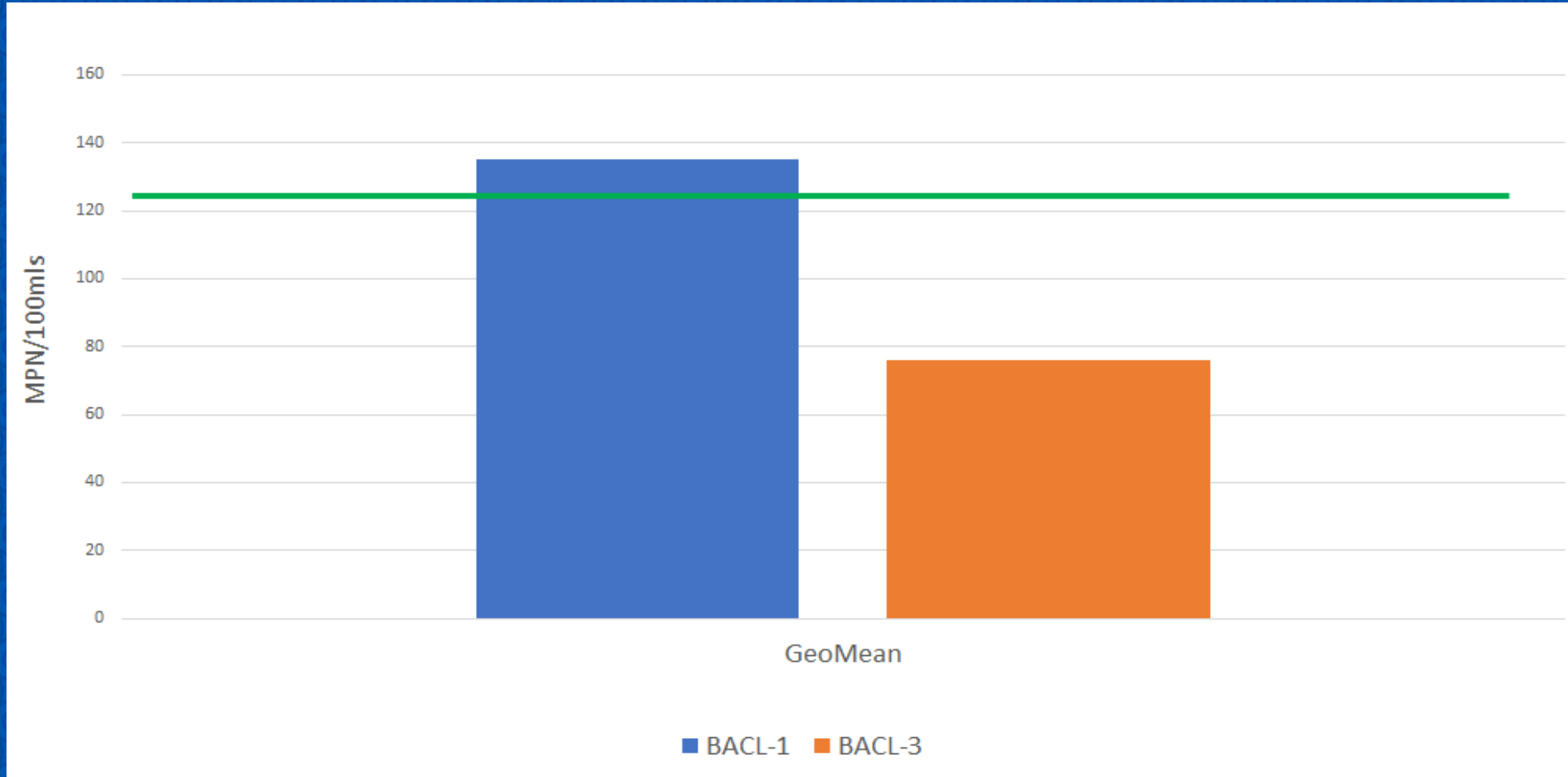
# MONTHLY SAMPLES

E. coli Results



Collection Date	BACL-1	BACL-3
1/7/2020	125.9	30.9
2/4/2020	>2419.6	95.9
2/7/2020	54.8	209.8
3/3/2020	90.9	42.6
4/7/2020	32.3	36.4
5/5/2020	325.5	143.9
6/2/2020	17.3	201.4
7/7/2020	866.4	116.9
8/4/2020	38.4	101.7
9/1/2020	770.1	275.5
9/8/2020	547.5	95.9
10/6/2020	42	29.2
11/3/2020	214.1	61.7
12/2/2020	357.8	35.3

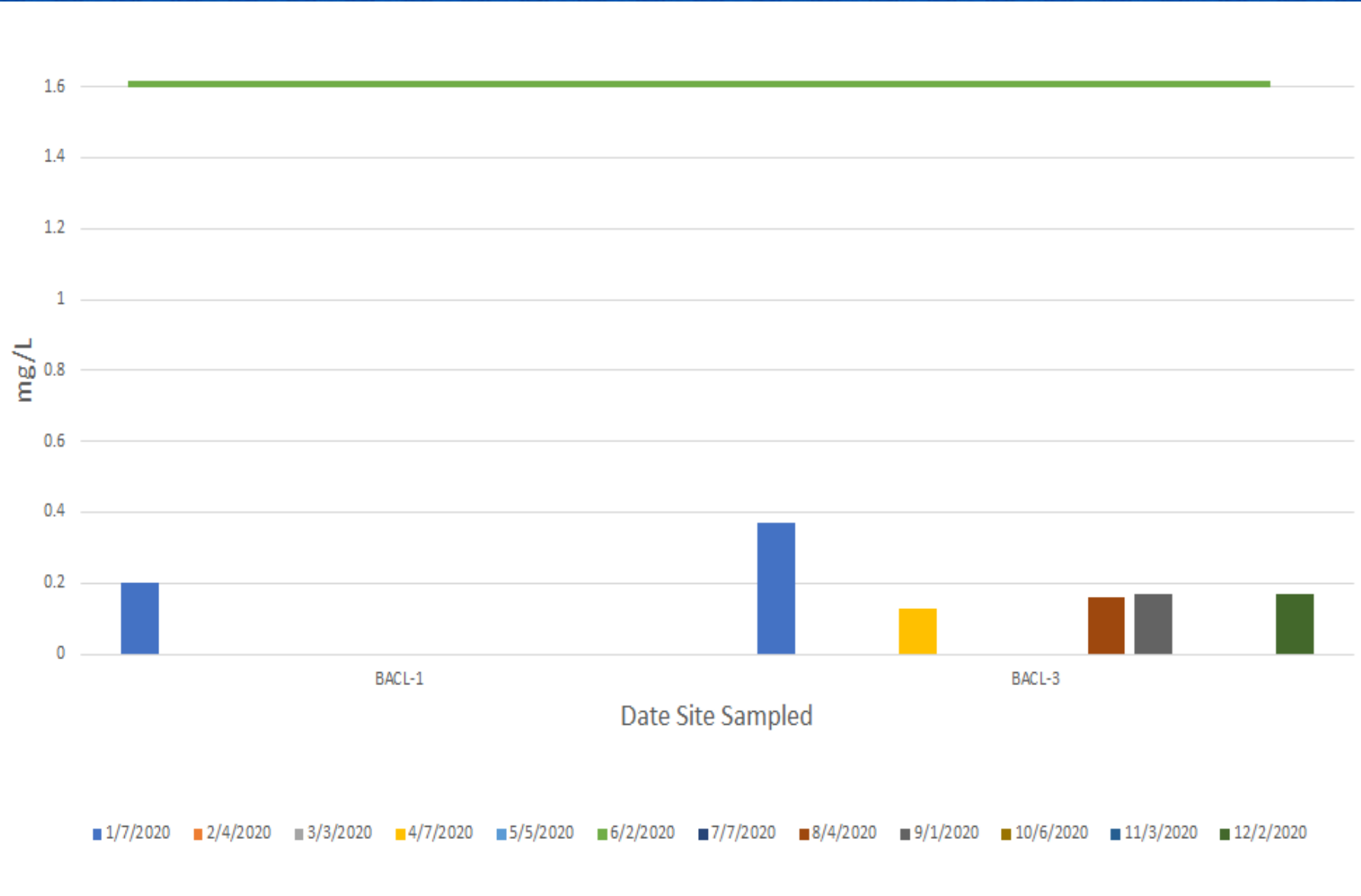
# SITE GEOMEANS



Site ID	GeoMean
BACL-1	135
BACL-3	76

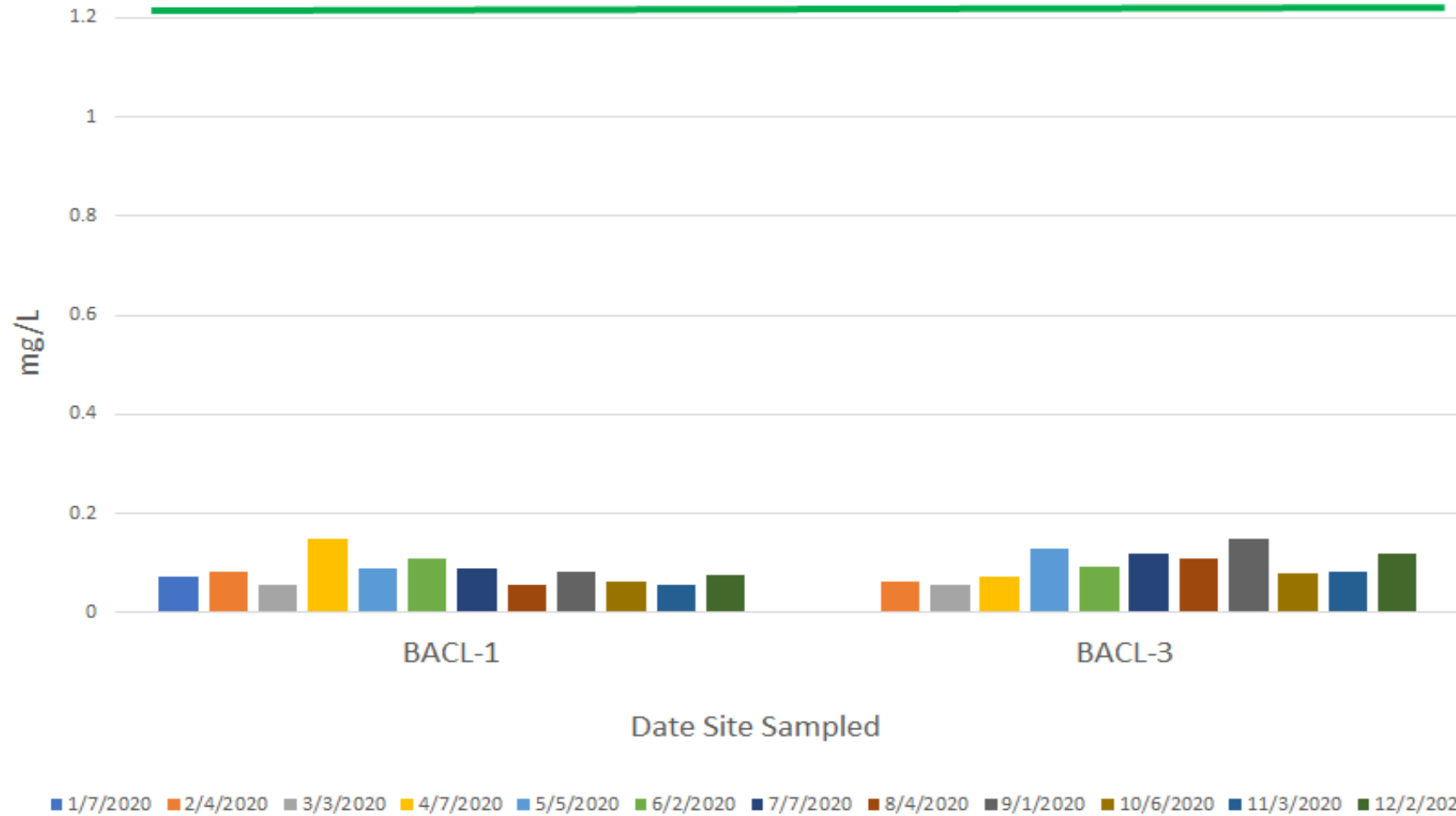


# MONTHLY AMMONIA RESULTS



Collection Date	BACL-1	BACL-3
1/7/2020	0.2	0.37
2/4/2020	0	ND
3/3/2020	0	ND
4/7/2020	0	0.13
5/5/2020	0	ND
6/2/2020	0	ND
7/7/2020	ND	ND
8/4/2020	ND	0.16
9/1/2020	ND	0.17
10/6/2020	ND	ND
11/3/2020	ND	ND
12/2/2020	ND	0.17

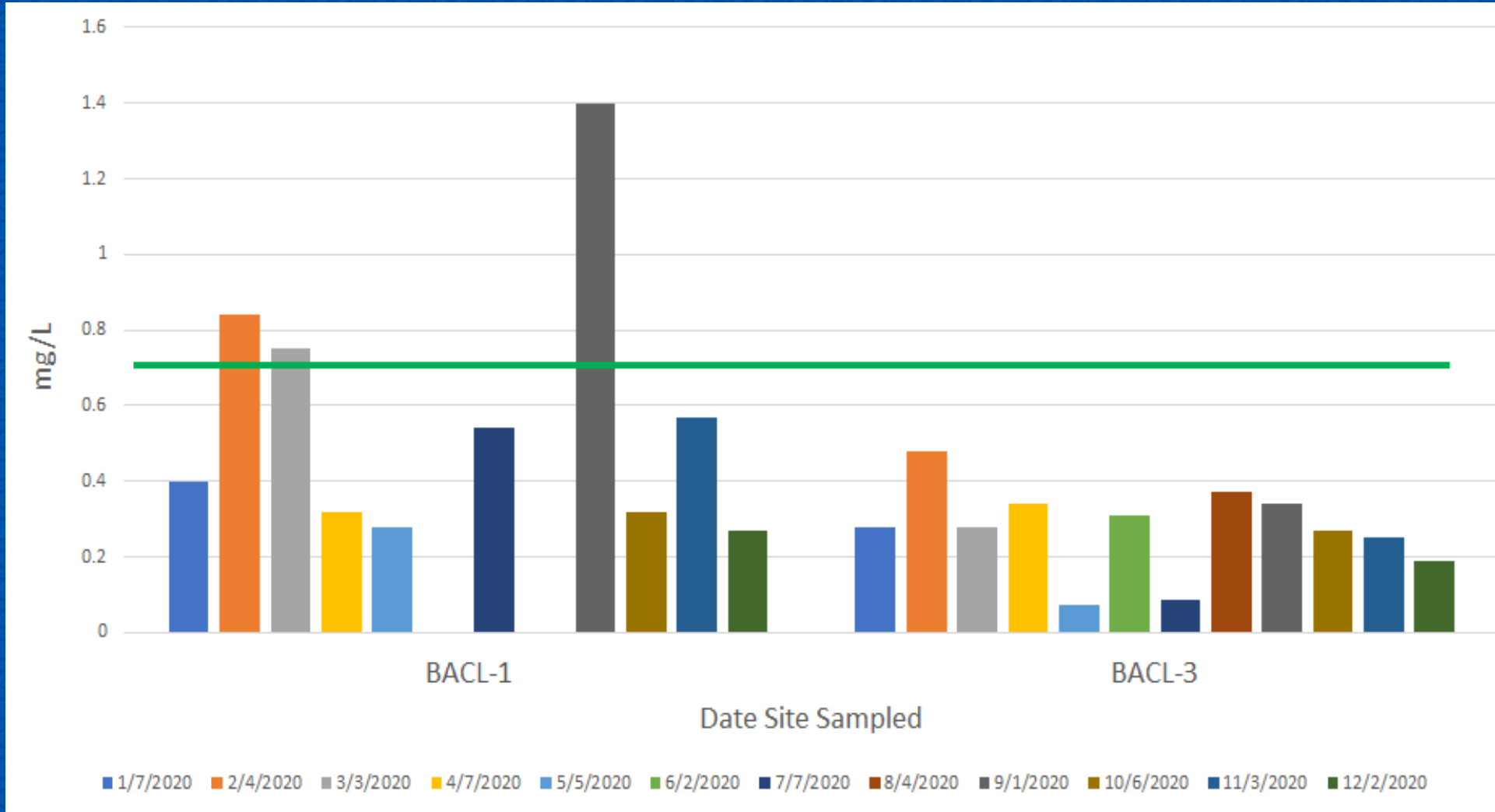
# MONTHLY PHOSPHORUS RESULTS



Collection Date	BACL-1	BACL-3
1/7/2020	0.074	ND
2/4/2020	0.084	0.062
3/3/2020	0.055	0.057
4/7/2020	0.15	0.072
5/5/2020	0.089	0.13
6/2/2020	0.11	0.092
7/7/2020	0.09	0.12
8/4/2020	0.056	0.11
9/1/2020	0.084	0.15
10/6/2020	0.062	0.078
11/3/2020	0.056	0.081
12/2/2020	0.077	0.12



# Monthly Nitrogen Results



Collection Date	BACL-1	BACL-3
1/7/2020	0.4	0.28
2/4/2020	0.84	0.48
3/3/2020	0.75	0.28
4/7/2020	0.32	0.34
5/5/2020	0.28	0.071
6/2/2020	ND	0.31
7/7/2020	0.54	0.088
8/4/2020	ND	0.37
9/1/2020	1.4	0.34
10/6/2020	0.32	0.27
11/3/2020	0.57	0.25
12/2/2020	0.27	0.19

# Statistical Analysis:

Site ID		E. coli MPN/100 ml	DO m g/L	PH s. u.	Specific Conductivity uS/cm	Sample Temp C	TSS mg /L	Turbidity FAU	Hardness mg/L	Nitrogen mg/L	Ammonia mg/L	Total Phosphorus mg/L
TSWQS Acceptable Values		<399 126	<	6.5 - 9	<1500		<50	<50		<1.68	<1.7	<1.25
BACL-1	MIN	17.3	3.9	6.76	331	9.8	13	17	116	0.27	0.2	0.055
	Mean	135	6.92	7.61	601.08	20.43	26.83	28.08	225.25	0.57	0.20	0.08
	MAX	866.4	11	8.57	792	29	44	45	347	1.4	0.2	0.15
BACL-3	MIN	29.2	2.79	7.09	236	11	6	8	91	0.071	0.13	0.054
	Mean	76	7.77	7.74	423.93	19.20	20.07	22.36	166.57	0.27	0.20	0.09
	MAX	275.5	10.6	8.39	539	29.6	39	34	197	0.48	0.37	0.15



# BACHMAN LAKE WATER SAMPLING

- The statistical analyses of the data determined the water quality of Bachman Lake was compliant with the Texas Surface Water Quality Standards set by the TCEQ.

# REFERENCES

- TCEQ - Texas Surface Water Quality Standards, Chapter 307, Rule Project No. 2012-001-307-OW
- EPA Standard Method 21st Edition
- EPA-SW-846 Online, Series 3000
- EPA-SW-846 Online, Chapter Three (Inorganic Analytes)



# BACHMAN LAKE STORMWATER INLET CLEANING

- The Neighborhood Drainage Service group is responsible for the removal of blockages on City-owned inlets, creeks/channels (except creeks and channels located in Parks), storm sewers, and responds to inclement weather emergencies such as snow/ice, windstorms and street flooding.



# BACHMAN LAKE INLETS AREA MAP





# BACHMAN LAKE CLEANED INLETS





# STORMWATER INLET CLEANING SCHEDULE

Maintenance and Inspection of 25 inlets around Bachman Lake were performed the following dates:

April 2, 2020

August 5, 2020

January 20, 2021

No other deficiencies were found during our investigation.



# QUESTIONS?

