End of Season Limnocorral Damage Report:
Utah Lake Nutrient Cycling Studies

Developed By:
Gustavious Williams, Ph.D.
Rachel Valek
Department of Civil and Environmental Engineering
Brigham Young University
Developed for:
Jeff DenBleyker
Manager
Jacobs Engineering
November 26th, 2022

Executive Summary

Following the 2022 summer sampling season, the corrals were removed from Utah Lake and placed on the TSSD shoreline by TSSD employees. Once the corrals were on shore, BYU students evaluated the conditions of the 9 skirts on shore. Their findings are detailed in this report.

Based on visual observations, measurements, and manual inspections, we identified several issues and have some general observations.

Initial observations:

- Two corral skirts have significant rips (3ft + long)
- Gradation of algal growth on the skirts is very apparent on the skirts clearly showing the impact of light penetration
- Lots of mud on the skirts (1 ft deep in some cases)

Next Steps

- Decide what to do with the plastic tubing in the skirts (makes it difficult to clean and store skirts)
- Move the three remaining cut skirts
- Decide which skirts can be repaired and which skirts need to be disposed of
- Clean and store skirts for 2023 sampling season
- Purchase the necessary skirts for the 2023 sampling season

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Utah Nutrient Cycling Studies: End of 2022 Season Corral Damage Report

2. Background

On November 12th, 2022, BYU students manually inspected the remaining 9 corral skirts on shore. Students specifically looked for holes in the corral skirts to better inform the decision of how many new skirts need to be purchased for the 2023 sampling season.

Each skirt was labeled 1-9 with orange construction tape and sharpie (Figure 2). This same method was used to identify locations with the holes and rips around the corral. Overall, 3 skirts

Figure 1 Limnocorrals on Shore showing the skirts

Figure 2 Corral Skirt and Rip Labeling System

are recommended to be replaced while the others are recommended to be power washed and repaired. Skirts with smaller holes could be used for ecological studies in which full isolation is not needed such as the macrophyte limnocorrals.

Once we inspected the skirts, we cut 6 of the skirts from the limnocorral floats. We left the remaining 3 corral skirts rolled up on the corral floats on shore as this seemed the best way to protect them through the winter. We were able to place 2 of the skirts in the TSSD trailer and 1 corral skirt next to the trailer.

After the BYU truck got stuck in the mud multiple times (finally being rescued by the TSSD tractor), we decided to leave the remaining 3 skirts where they were on shore and not move them near the trailer. We weighted these 3 skirts with poles and chains. We assume that TSSD can use the tractor or Marsh Master to pull them over to the trailer.

We were only able to pile two limnocorral skirts onto the TSSD trailer because of the plastic tubing still attached to skirt. In order to more nicely fold and clean the skirt this tubing would have to be removed. The BYU students felt that some discussion was required on the tubing before they could remove it. This is because removing the tubing would damage it and require more tubing to be purchased.

3. Corral Report

3.0. Corral Skirt Summary

Table 1 provides a summary of our skirt inspection. In the following sub-sections, we present detailed explanations for each skirt.

Corral Number	Number of Holes in Skirt	Size of Holes	Location (Measured from top)	Recommendation	Current Location
1	0	N/A	N/A	Power Wash	Clipped on Shore
2	5	2in 6ft 1in 1.5in 1.5x1in	4in 4in 4in 9in 11in	Replace	Tied up on Shore
3	6	2in 1in .5x.5in 0.5in 2x0.5in 1in	4in 4in 4in 2in 3in 1ft	Power Wash and Repair or Use This Skirt for Macrophyte Corral	Tied up on Shore
4	0 (hard to tell was still rolled up)	N/A	N/A	Reevaluate	Up by TSSD Trailer
5	2	7in 4ft +	1ft 9in 4.5ft	Replace	Clipped on Shore
6	11	5in 3.5in 1.5in 4in 3.5in 1in 1x1.5in 0.5in 5in 1ft 1in 4.5in	2ft 2ft 2.5ft 3.25ft 2in 1ft 2ft 2ft 1ft 7in 1ft 2in	Replace	On TSSD Trailer
7	1	4in	2in	Power Wash and Repair	On TSSD Trailer
8 (Special Bottom)	0	1in The bottom was ripped and the	0in	Power Wash	Clipped on Shore

9	3	7in 0.5in 0.5in	2in 4in 4in	Power Wash and Repair	Tied up on shore
10	No Skirt	N/A	N/A	N/A	No Skirt
11	Was removed by TSSD	N/A	N/A	N/A	Next to Maintenance Building

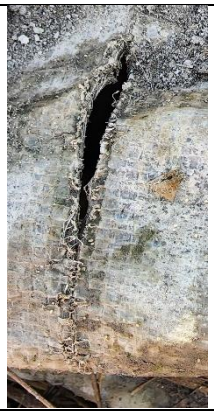
3.1. Corral #1 Detailed Report

Corral #1 had no visible rips or holes in it, just normal wear and tear (Figure 3). The corral was covered in algae and mud and could use a power wash. Overall, this skirt is in good condition and could be reused for the 2023 sampling season.

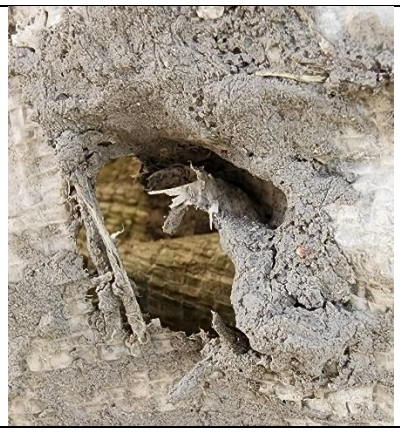
Figure 3 Corral #1 Wear and Tear

3.2. Corral #2 Detailed Report

Corral #2 had 5 holes. We recommend that this corral skirt be replaced. One of the holes spanned the length of the corral skirt. We are unsure when this rip happened but believe that it may have occurred in the process of moving the corral to shore. The significant rip is no along a seam and as such would be difficult to repair.

Rip Size	Picture
2in	

6ft	
1in	
1.5in	

1.5x1in	

3.3. Corral #3 Detailed Report

Corral #3 was tied up and as such was hard to thoroughly inspect for rips. We were still able to identify 6 rips in the skirt. This was one of the skirts that was left rolled up on shore for winter storage.

Rip Size	Picture
2in	
1in	

0.5x0.5in	
2x0.5in	
1in	

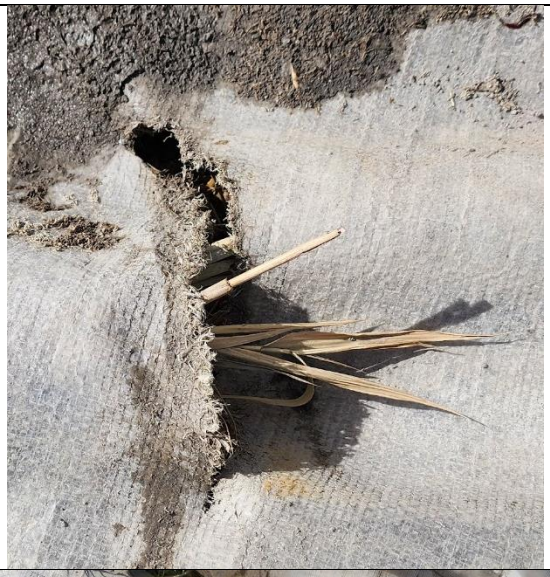
3.4. Corral #4 Detailed Report

Corral #4 seemed as though a truck was used to pull it out. It was pulled across the grass and as such was difficult to thoroughly inspect. No rips were easily spotted. It seemed as though this skirt had some wear and tear and would only need to be power washed for next year's sampling schedule.

3.5. Corral #5 Detailed Report

Corral #5 inspected found 2 significantly sized holes in the skirt and many smaller holes from wear and tear. The biggest rip (4ft +) is along a seam and has potential to be repaired.

Figure 4 Corral #4 Skirt When the BYU Students Arrived

Rip Size	Picture
7in	
4ft +	

3.6. Corral #6 Detailed Report

The inspection of Corral #6 resulted in the identification of 11 rips in the skirt. The size of these skirt rips range from 1 in to 1 ft long. We recommend to replace this skirt.

Rip Size	Picture
Three holes spanning 5in	
Two Holes Spanning 3.5in (a third hole beginning to wear)	
1.5in	

Three holes spanning 4in	
3.5in	
1in	
1x1.5in	
0.5in	Missing Picture

5in	
1ft 1in	
4.5in	Missing Picture

General Wear and Tear	

3.7. Corral #7 Detailed Report

Corral #7 only had one visible rip in the top yellow part of the limnocorral. This corral would benefit from being washed. It can be used next season.

Rip Size	Picture
4in	

General Wear and Tear	

3.8. Corral #8 Detailed Report

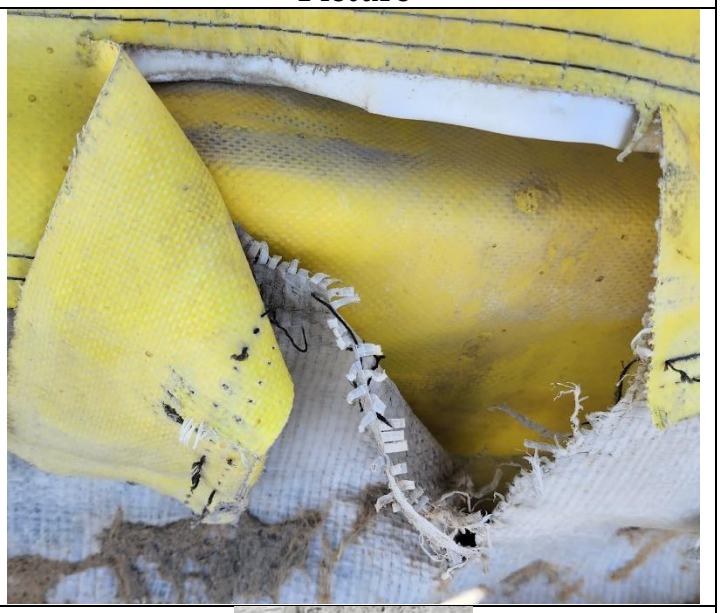
Corral #8 was the skirt with the special bottom to reduce the sediment mixing within the corral. The bottom part of the skirt was ripped off and there was plenty of missing fill for the skirt. The skirt was replaced in the middle of the sampling seasoning and has no rips in the skirt. The bottom of the skirt has a lot of mud in it, making it extremely heavy and hard to work with.

Rip Size	Picture
Missing Filling from the Special Bottom	

Rips in Special Bottom	

3.9. Corral #9 Detailed Report

Corral #9 was hard to fully inspect because it was tied up. We were still able to find four holes in the skirt. The algae on this skirt have fully dried off and could be easily brushed or ripped off. In addition to the holes in the skirt in this limnocorral the reinforcement bars on the floats have been damaged.

Rip Size	Picture
7in	
0.5in	

0.5in	
2 holes 1.5in each	
Limnocorral Damage	

3.10. Corral #10 Detailed Report

Corral #10 had no skirt on it when the BYU crew arrived. This was the 11th corral that was put together in the summer of 2022 but was never deployed. This corral looks great. In just one area the reinforcing brackets are bent but still work.

Description	Picture
Corral #10 with no Skirt	
Bending Brackets	

3.11. Corral #11 Detailed Report

Corral #11 was not on shore. This was the corral that BYU students noticed previously was severely damaged. The floats and all reinforcing elements were bent. This likely happened when the corral was brought onto shore. We believe that this corral was taken by TSSD into maintenance building.

Contact Information

Gustavious Williams, Ph.D.
gus.williams@byu.edu
801 422-7810 (office)
801 400-0004 (cell)

Department of Civil and Construction Engineering
Brigham Young University
Provo, UT 84602