



# **Wasatch Front Water Quality Council**

## **2022 Preliminary Budget**

**Wasatch Front Water Quality Council**  
**Jordan River Farmington Bay**  
**2021 Forecast to Complete and 2022 Preliminary Budget**

ACCT NO.	ITEM	ACTUAL 2020	Unexpended Contracts 2020	BUDGET 2021	YTD 10/29/21	Forecasted to Go	(Over)/Under Forecast	PROPOSED BUDGET 2022	EXPENDED %
<b>REVENUE</b>									
343044	Contributions	\$ 575,700		\$ 575,700	\$ 575,700	\$ -	\$ -	\$ 575,700	100.00%
343043	Reserves	\$ 25,000		\$ 100,000	\$ 25,000	\$ -	\$ -		25.00%
<b>TOTAL REVENUE</b>		<b>\$ 600,700</b>		<b>\$ 675,700</b>	<b>\$ 600,700</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ 575,700</b>	
<b>EXPENSE</b>									
110	Salaries	\$ 254,833		\$ 245,000	\$ 242,129	\$ 55,690	\$ (52,819)	\$ 245,000	98.83%
130	Employee Benefits	\$ 60,612		\$ 65,000	\$ 60,096	\$ 13,822	\$ (8,918)	\$ 67,000	92.46%
200	Operating Expenses	\$ 36,403		\$ 30,000	\$ 18,579	\$ 4,273	\$ 7,148	\$ 25,000	61.93%
210	Office Expense	\$ -		\$ 1,000	\$ -	\$ 1,000	\$ -	\$ 1,000	0.00%
220	Computer Expense	\$ 446		\$ 4,000	\$ -	\$ 2,500	\$ 1,500	\$ 2,000	0.00%
230	Telecommunications	\$ 659		\$ 2,000	\$ 292	\$ 67	\$ 1,641	\$ 1,000	14.60%
310	Transportation	\$ 5,911		\$ 6,000	\$ 5,200	\$ 1,196	\$ (396)	\$ 5,000	86.67%
350	Outside Services (Research Contracts)	\$ 313,079	\$ 94,762	\$ 314,000	\$ 178,328	\$ 132,279	\$ 3,393	\$ 180,000	56.79%
360	Laboratory	\$ 2,872		\$ 10,000	\$ 17,523	\$ 4,030	\$ (11,553)	\$ 15,000	175.23%
390	Education/Memberships/Pub./Incentives/Legal Contingency	\$ 2,676		\$ 5,000	\$ 1,645	\$ 1,378	\$ 1,977	\$ 4,000	32.90%
<b>TOTAL OPERATING EXPENSE</b>		<b>\$ 677,492</b>	<b>\$ 94,762</b>	<b>\$ 682,000</b>	<b>\$ 523,792</b>	<b>\$ 216,236</b>	<b>\$ (58,028)</b>	<b>\$ 545,000</b>	<b>76.80%</b>

**Contributors - 2021**

South Davis Sewer District	\$ 50,000	Expended	\$ 523,792	\$ 30,700
Central Davis Sewer District	\$ 50,000	Committed	\$ 216,236	
North Davis Sewer District	\$ 100,000			
Central Valley Water Reclamation Facility	\$ 150,000			
South Valley Water Reclamation Facility	\$ 75,000	Year End Total	\$ 740,028	
South Valley Sewer District	\$ 50,700			
Salt Lake City	\$ 100,000			
	<b>\$ 575,700</b>			

**Wasatch Front Water Quality Council  
Utah Lake  
2021 Forecast to Complete and 2022 Preliminary Budget**

ACCT NO.	ITEM	ACTUAL 2020	BUDGET 2021	YTD 10/29/21	Forecasted to Go	(Over)/Under Forecast	PROPOSED BUDGET 2022	EXPENDED %
<b>REVENUE</b>								
343044	Contributions	\$ 240,000	\$ 225,000	\$ 225,000	\$ -	\$ -	\$ 225,000	100.00%
343043	Reserves	\$ -	\$ -	\$ -	\$ -	\$ -		
<b>TOTAL REVENUE</b>		<b>\$ 240,000</b>	<b>\$ 225,000</b>	<b>\$ 225,000</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ 225,000</b>	
<b>EXPENSE</b>								
110	Salaries	\$ 72,430	\$ 75,000	\$ 60,845	\$ 15,211	\$ (1,056)	\$ 65,000	81.13%
130	Employee Benefits	\$ 24,128	\$ 26,000	\$ 14,262	\$ 3,566	\$ 8,173	\$ 23,000	54.85%
200	Operating Expenses	\$ 25,461	\$ 20,000	\$ 7,468	\$ 1,867	\$ 10,665	\$ 15,000	37.34%
210	Office Expense	\$ -	\$ 1,000	\$ -	\$ 1,000	\$ -	\$ 1,000	0.00%
220	Computer Expense	\$ 446	\$ 2,000	\$ -	\$ 1,000	\$ 1,000	\$ 1,000	0.00%
230	Telecommunications	\$ 659	\$ 2,000	\$ 153	\$ 38	\$ 1,809	\$ 2,000	7.65%
310	Transportation	\$ 4,120	\$ 5,000	\$ 4,290	\$ 1,073	\$ (363)	\$ 3,000	85.80%
350	Outside Services (Research Contracts)	\$ 129,264	\$ 131,000	\$ 64,703	\$ 32,297	\$ 34,000	\$ 97,000	49.39%
360	Laboratory	\$ 2,902	\$ 3,000	\$ 2,207	\$ 552	\$ 241	\$ 4,000	73.57%
390	Education/Memberships/Pub./Incentives/Legal	\$ 676	\$ 2,000	\$ 645	\$ 161	\$ 1,194	\$ 1,000	32.25%
	Contingency	\$ -	\$ -	\$ -	\$ -	\$ -		
<b>TOTAL OPERATING EXPENSE</b>		<b>\$ 260,086</b>	<b>\$ 267,000</b>	<b>\$ 154,573</b>	<b>\$ 56,765</b>	<b>\$ 55,663</b>	<b>\$ 212,000</b>	<b>57.89%</b>

**Contributors - 2021**

Orem City	\$ 50,000
Timpanogos SSD	\$ 100,000
Provo City	\$ 50,000
Spanish Fork City	\$ 25,000

Expended	\$ 154,573	\$ 13,000
Committed	\$ 56,765	
Year End Total	\$ 211,338	

**\$ 225,000**

# Wasatch Front Water Quality Council

## 2021 Outside Services Contracts and 2022 Outside Services Proposal

	2020 Remaining Contract Value Carried FWD	JRFB 2021 Contracts	UL 2021 Contracts	JRFB 2022 Contracts- Proposed	UL 2022 Contracts - Proposed
<b>2020 Projects with Unexpended Values</b>					
Farmington Bay Nutrient Mass Balance	\$ 19,288				
Farmington Bay Nutrient Mass Balance Burian	\$ 3,542				
BYU Sediment Core Study - Nelson	\$ 51,932				
Sediment Transformation - Sediment White Paper	\$ 11,000				
Air Deposition Expert	\$ 5,000				
<b>2021 Projects/Contracts</b>					
VSS Source Identification UofU		\$ 21,165			
VSS Source Identification Goel		\$ 9,500			
Corbicula Oxygen Demand - Oreohelix		\$ 20,000			
Jordan River Mussel Study Followup - Oreohelix		\$ 20,000			
Fate and Ecological Effects of North Davis SD Effluent - Oreohelix		\$ 60,000			
Food Web Assessment and Modeling - Oreohelix		\$ 15,000			
Oreohelix Reports - Per Memo - Farmington Bay and Jordan River				\$ 100,000	
Oreohelix Reports - Per Memo - Utah Lake					\$ 40,000
Farmington Bay Atmospheric Deposition - Wood Miller		\$ 25,000		\$ 25,000	
Atmospheric Sampling Analysis - BYU		\$ 5,000		\$ 5,000	
Sediment Cycling of P & N - Dr. Johnson		\$ 10,000		\$ 10,000	
Sediment Cycling of P & N - Student Support		\$ 10,000		\$ 30,000	
Support for Permits Development Jordan River 7Q10 - HAL		\$ 46,942			
Reuse Potential Study - GSL Science		\$ 9,000			
Permit Support - Jordan River Wasteload Review - Hansen Allen and Luce		\$ 20,000			
Atmospheric Bulk Deposition - Wood Miller			\$ 20,000		\$ 20,000
Utah Lake Food Web Nutrient Based Model - Oreohelix			\$ 25,000		
Sediment Transformation - Sediment White Paper			\$ 11,000		
River Continuum Concepts		\$ 15,000	\$ 12,000		
Rushforth Phycology		\$ 15,000	\$ 12,000		
Model Update - Wood Miller			\$ 10,000		
GSL Science		\$ 7,000	\$ 5,000	\$ 7,000	\$ 5,000
Tom Holstrom		\$ 2,000	\$ 2,000	\$ 3,000	\$ 3,000
<b>Totals</b>	<b>\$ 90,762</b>	<b>\$ 310,607</b>	<b>\$ 97,000</b>	<b>\$ 180,000</b>	<b>\$ 68,000</b>

# Reports and Continued Studies 2021 through 2022

## Wasatch Front Water Quality Council

David C. Richards, Ph.D.



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And

Theron Miller Ph.D.

Wasatch Front Water Quality Council, Salt Lake City, UT

September 14, 2021

### Farmington Bay

1. Project Report Title: "Ecology and Food Web Dynamics of an Effluent Dominated Sheetflow Wetland, Great Salt Lake, UT". Mid-Year Progress Report. 2021.  
Synopsis: Mid-term evaluation of environmental and ecological dynamics of NDSD effluent dominated wetlands based on the objectives outlined in the DWQ approved NDSD 2020 Field Sampling Plan (Jacobs and WFWQC 2020).  
Anticipated Delivery Date: *September 2021*
2. Project Report Title: "Ecology and Food Web Dynamics of an Effluent Dominated Sheetflow Wetland, Great Salt Lake, UT". End-of-Year Progress Report. 2021.  
Synopsis: Annual evaluation of environmental and ecological dynamics of NDSD effluent dominated wetlands based on the objectives outlined in the DWQ approved NDSD 2020 Field Sampling Plan (Jacobs and WFWQC 2020).  
Anticipated Delivery Date: *February 2022*
3. Project Report Title: "Ecology and Food Web Dynamics of an Effluent Dominated Sheetflow Wetland, Great Salt Lake, UT". End-of-Year Progress Report.  
Synopsis: Final evaluation of environmental and ecological dynamics of NDSD effluent dominated wetlands based on the objectives outlined in the DWQ approved NDSD 2020 Field Sampling Plan (Jacobs and WFWQC 2020).  
Anticipated Delivery Date: *December 2022*

4. Project Report Title: “Development of Farmington Bay Effluent Dominated Sheetflow Wetland Food Web Model Using Ecopath with Ecosim”  
Synopsis: The report will summarize food web model components and justifications for the Ecopath with Ecosim food web models we are developing. The working model will be a static, mass-balanced snapshot of the system which will then be used in a time dynamic simulation module and a spatial and temporal dynamic module designed for exploring impacts from various preplanned scenarios.  
Anticipated Delivery Date: *Preliminary Findings, June 2022, Final, December 2022*
5. Project Report Title: Recent History of Cyanobacterial Blooms in Relation to Lake level, nutrient sources and residence time.  
Synopsis: This report will summarize weekly and biweekly data of cyanobacterial blooms in Farmington Bay in relation to declining lake levels, residence time and changing ecological characteristics.  
Anticipated Delivery Date: *October, 2022*
6. Project Report Title: Diel Patterns of Sonde Measurements and Nutrient Concentrations in Impounded Wetlands of Farmington Bay.  
Synopsis: Diel measurements of pH, Temperature, DO and EC have been performed and nutrients and H<sub>2</sub>S concentrations were measured monthly each summer in 3-4 impoundments in Farmington Bay over several years in order to characterize nutrient concentrations and cycling from river and sediment sources. This allowed evaluation of Farmington Bay wetlands in comparison to the general paradigm that healthy wetlands sequester suspended sediment and nutrients to improve habitat and water quality.  
Anticipated Delivery Date: *December, 2021*
7. Project Report Title: Atmospheric Deposition on Farmington Bay and its Significance to the Nutrient Budget of the Bay  
Synopsis: Three Council atmospheric deposition samplers, one NADP sampler and 5 of Dr. Wood Miller’s bulk samplers have been situated around Farmington Bay for two years. These data will be summarized and compared among sampling methods as well as with data from Utah Lake samplers and provide an accurate estimate of the AD contribution to the the FB budget.  
Anticipated delivery date: *November 2022*

## Utah Lake

1. Project Report Title: “Development of Utah Lake Food Web Model Using Ecopath with Ecosim”  
Synopsis: The report will summarize food web model components and justifications for the Ecopath with Ecosim food web models we are developing. The working model will be a static, mass-balanced snapshot of the system which will then be used in a time

dynamic simulation module and a spatial and temporal dynamic module designed for exploring impacts from various preplanned scenarios.

Anticipated Delivery Date:

Initial setup and first run of model, *December 2021*.

Final Report and final model scenario runs, *December 2022*.

2. Project Report Title: “Reevaluating Nutrient Atmospheric Deposition on Utah Lake and Great Salt Lake Locations 2020, including Effects of Sampler Type. Statistical Analyses and Results.”

Synopsis: A statistical reanalysis of Utah Lake atmospheric deposition data collected by BYU grad student.

Anticipated Delivery Date: *October 2021*

3. Project Report Title: “Continued Development of a Utah Lake Multimetric Index of Ecological Integrity”

Synopsis: The Utah Lake Science Panel Subcommittee on Aquatic Life Use Criteria has recommended continued development of our provisional index of ecological integrity (Richards and Miller 2019).

Anticipated Delivery Date: *December 2022*

4. Project Report Title: “Chronic Misuse of Bioassessment Models and Potential for Their Misapplication to Utah Lake Monitoring”.

Synopsis: UDWQ relies on a single measure of biological integrity for the States rivers and streams. This measure has major flaws and is an example of what may be in store for Utah Lake monitoring. Several river and stream case examples will be used to guide the Utah Lake Science Panel away from accepting single metric assessment development.

Anticipated Delivery Date: *July 2022*

5. Project Report Title: A Critical Evaluation of Data Presented to the Utah Lake Science Panel and its Use.

Synopsis: Several projects have been commissioned by the ULSP to assist in understanding myriad nutrient-chemical interactions, nutrient bioavailability, sediment nutrient flux and atmospheric nutrient deposition. While this information will inform the Panel’s recommendation for nutrient criteria, there will likely not be an integrated report that describes this process, including the “weight” or confidence or assumptions in applying the underlying data.

Anticipated Delivery Date: *March, 2023*

## Jordan River

1. Project Report Title: “Contribution of Asian Clam, *Corbicula fluminea* to Sediment Oxygen Demand in the Jordan River”



Synopsis: Lower Jordan River occasionally has high SOD concentrations, which may be exacerbated by Asian Clam feeding, metabolism, and ecological interactions with sediments. The importance of the clam's effect on SOD will be evaluated quantitatively.  
Anticipated Delivery Date: *March 2022*

2. Project Report Title: Summary of Water quality, Sediment Nutrient Fluxes and Flow Measurements, Including an Update of the QUAL2Kw Model

Synopsis: Monthly water quality sampling for nutrients and common ions has been performed for more than 12 years. While periodic progress reports have been provided (e.g. Miller, 2018), a final synopsis, including an updated version of the QUAL2Kw will provide an essential record of this significant data record.

Anticipated Delivery Date: *September, 2022*

## Literature Cited

Jacobs and WFWQC. 2020. Richards, D.C. and T. Miller 2020. Monitoring the Ecological Health of Farmington Bay and Ogden Spur of Great Salt Lake as Related to North Davis Sewer District Discharge with a Focus on Water Chemistry, Biological Diversity, Primary, Secondary, And Tertiary Production, and Avian Food Resource Use. Sampling Analysis Plan 2020. Submitted to North Davis Sewer District.

Miller, T.G. 2018. A Physical, Chemical and Biological Assessment of the Jordan River: 2013-2018. Report to Wasatch Front Water Quality Council.

Richards, D. C., and T. G. Miller. 2019. A Provisional Multi-Metric Index of Biological Integrity (MIBI) to Assess Water Quality in Utah Lake centered on Regulatory Directives. Technical Report.



## Sediment Flux Studies - 2022

Bill Johnson

### Objective:

The objective of the research to be performed is to determine the fluxes of dissolved and particulate phosphorous in shallow sediment down-gradient of Central and North Davis POTW effluents. Bill Johnson will co-advise with Theron Miller two students (Hannah Finley and Ivan Gaichuk) for whom this research will comprise their M.S. theses in Geoscience.

### Approach:

Hydraulic gradients and phosphorous speciation (particulate and nominally dissolved) will be determined along two east-west transects extending westward from effluent discharges. Each transect will have three sites along its length, with each site having piezometers at three depths to monitor vertical hydraulic gradient and

### Budget for Project - 2022:

Dr Bill Johnson Consulting Fee	\$10,000
Student Fees -	\$19,000
Laboratory Supplies	\$10,000
	<hr/>
Total Project	\$39,000

Farmington Bay Wetlands Phosphorus Study  
Wasatch Front Water Quality Council  
University of Utah-Geology and Geophysics  
Hannah Finley and Ivan Giachuk  
Theron Miller, Ph.D. and William P. Johnson, Ph.D.

## Objective 1

1. Placement and maintenance of piezometer transects to understand phosphorus mobilization through hydraulic head measurements and sediment core collection for phosphorus sequential extraction.

## Frequency of Measurement

- Bi-weekly hydraulic head measurements.
- One-time collection of duplicate sediment cores located equidistant in north-south trend from the piezometer for phosphorus sequential extraction.

## Locations

### North Transect

The north transect is made up of three sites located west of North Davis Sewer District (NDSD) (Figure 1) running approximately parallel to Antelope Island Rd to the north and the edge of the phragmites patch to the south. Each site has shallow (~1.5 m) and deep (~2 m) piezometers adding up to six piezometers total.

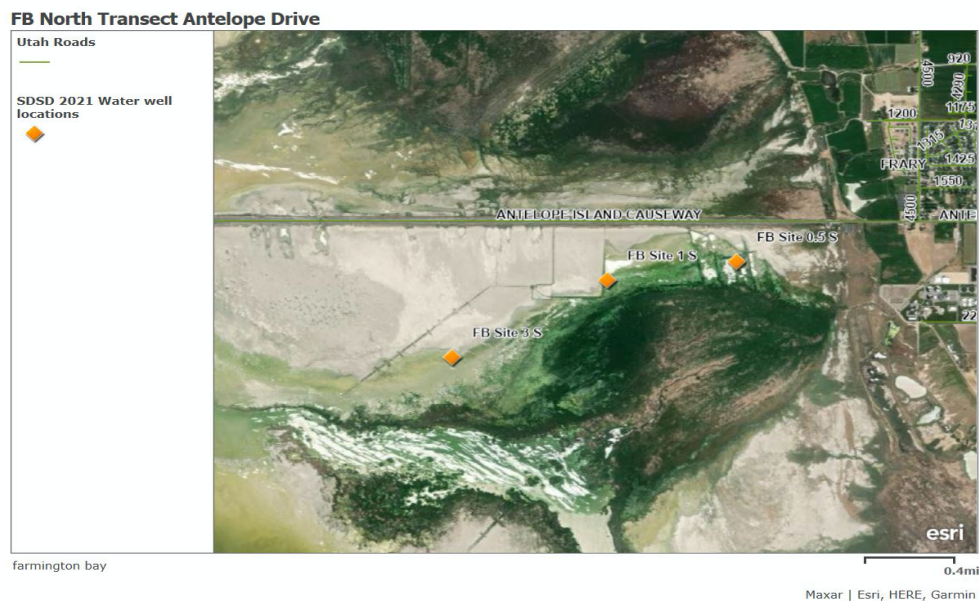


Figure 1. North transect with Antelope Drive to the north and phragmites patch to the south.

## South Transect

The proposed south transect will be made up of three sites to the southwest of Central Davis Sewer District (CDSD) (Figure 2) running parallel to CDSD discharge creek. Each site has shallow (~1.5 m) and deep (~2 m) piezometers adding up to six piezometers total.



Figure 2. South transect located southwest of CDSD, parallel to effluent discharge.

## Objective 2

2. Streamflow discharge measurements at Farmington Bay (FB) to understand the contribution of groundwater inflow.

## Frequency of Measurement

- One time each late-summer early-fall season measurement of discharge at two locations north and south of the main lateral groundwater flow from FB east shore.

### FB Site Locations



farmington bay

Earthstar Geographics | Esri, HERE, Garmin

Figure 3. The north(blue) and south(red) streamflow transects located in the main channel of FB to the east of Antelope Island.

### Summary

In summary we need weekly access to the transects (alternating between north and south) and seasonal access to FB flow with an expected duration of a half day.

Ambient    Extraction    Ambient    Extraction

Analyte	Method #	Test Reagent	Item Number	\$ per box	mL of pore water per test	# tests per box	\$ Per Test	\$ Per Test	# tests per year	\$ boxes per year	# boxes to order	Unit \$	Initial	Initial Cost
		PhosVer® 3 Phosphate Reagent												
Ortho Phosphorus	8048	Powder Pillows	2106069	\$ 42.09	25	100	\$ 0.42	\$ 0.42	72	288	3.6	4 \$	168.36	1 \$ 42.09
Total Phosphorus	8190	Phosphorus (Total) TNT Reagent Se	2742645	\$ 83.75	25	50	\$ 1.68	\$ 1.68	72	288	7.2	8 \$	670.00	2 \$ 167.50
Raw Phosphorus		Chemtech-Ford Laboratories					\$ 12.00		72	288			\$ 4,320.00	0 \$ -
Dissolved Phosphorus		Chemtech-Ford Laboratories					\$ 12.00		72	288			\$ 4,320.00	0 \$ -
Nitrate	8192	NitraVer 6 Nitrate, 10 mL	2107249	\$ 57.00	15	100	\$ 0.57	\$ 0.57	72		0.72	1 \$	57.00	1 \$ 57.00
Ammonia Nitrogen	8038	Ammonia Nitrogen Reagent Set	2458200	\$ 96.00	25	250	\$ 0.38	\$ 0.38	72		0.288	1 \$	96.00	1 \$ 96.00
Total Iron	8112	TPTZ Iron Reagent Powder Pillows,	2608799	\$ 42.55	10	100	\$ 0.43	\$ 0.43	72		0.72	1 \$	42.55	1 \$ 42.55
Sulfate	8051	SulfaVer® 4 Sulfate Reagent Powde	1206599	\$ 41.15	25	100	\$ 0.41	\$ 0.41	72		0.72	1 \$	41.15	1 \$ 41.15
Sulfide	8131	Sulfide Reagent Set, Methylene Blue	2244500	\$ 66.15	25	100	\$ 0.66	\$ 0.66	72		0.72	1 \$	66.15	1 \$ 66.15
Manganese	8034	Manganese Reagent Set, HR, 10 ml	2430000	\$ 81.69	10	100	\$ 0.82	\$ 0.82	72		0.72	1 \$	81.69	1 \$ 81.69
Aluminum	8012	AluVer® 3 Aluminum Reagent Powd	1429099	\$ 102.00	25	100	\$ 1.02	\$ 1.02	72		0.72	1 \$	102.00	1 \$ 102.00
extractions per port	4			mL per port:	185		\$ per port:	\$ 6.4	\$ 121.5					
ports per core	3			mL per core:	555		\$ per core:	\$ 19.2	\$ 364.6					
cores per transect	3						\$ per transect:	\$ 57.5	\$ 1,093.9					
# transects per field	2						\$ per field:	\$ 114.9	\$ 2,187.7					
efforts per year	4						\$ per year:	\$ 459.7	\$ 8,751.0					
										upfront \$ per year		\$ 9,126.5		
													Initial \$ Total	\$ 696.13

Part	Item						Ambient				
	Number	\$ per unit	# per port	# per unit	\$ Per port	# tests per year	\$ units per year	# boxes to order	Unit	\$	
50 mL syringe		\$ 60.85	1	50	\$ 1.22	72	1.44	2	\$	121.70	
5.0 um filter		\$ 71.50	1	50	\$ 1.43	72	1.44	2	\$	143.00	
porex rod 12"		\$ 50.00	2	12	\$ 8.33	72	6	6	\$	300.00	
luer lok port		\$ 0.44	1	1000	\$ 0.00	72	0.072	1	\$	0.44	
15 mL Centrifuge Tubes		\$ 121.82	1	500	\$ 0.44	72	0.144	1	\$	121.82	

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		\$ per port:	\$ 11.4								
ports per core		3	\$ per core:	\$ 34.3							
cores per transect		3	\$ per transect:	\$ 102.8							
# transects per field		2	\$ per field:	\$ 205.5							
efforts per year		4	\$ per year:	\$ 822.1	upfront \$ per year		\$	687.0			

<b>Test</b>	<b>\$ Per Test</b>
Particulate Phosphorus	\$ 12.00
Dissolved Phosphorus	\$ 12.00

Chemtech-Ford Laboratories

<b>extractions per port</b>	<b>4</b>	<b>\$ per port:</b>	<b>\$ 48.00</b>
<b>ports per core</b>	<b>3</b>	<b>\$ per core:</b>	<b>\$ 144.00</b>
<b>cores per transect</b>	<b>3</b>	<b>\$ per transect:</b>	<b>\$ 432.00</b>
<b># transects per field</b>	<b>2</b>	<b>\$ per field:</b>	<b>\$ 864.00</b>
<b>efforts per year</b>	<b>4</b>	<b>\$ per year:</b>	<b>\$ 3,456.00</b>