Wasatch Front Water Quality Council

2018 Final Budget

Wasatch Front Water Quality Council - JR/FB
2017 Proposed Amended Budget - Jordan River Farmington Bay
2018 Budget

ACCT NO.	ITEM	ACTUAL 2016	BUDGET 2017	YTD 2017	REMAINING TO EXPEND (AMENDED)	OCTOBER AMENDED 2017	PROPOSED BUDGET 2018	CHG %
	REVENUE							
343044	Contributions	$ 600,000	$ 600,000	$ 550,000	$ -	$ 550,000	$ 550,000	0.00%
343046	Legal Services		$ 170,000	$ 8,000	$ -	$ 8,000	$ -	-100.00%
343043	Reserves		$ -	$ -	$ -	$ -	$ 50,000	0.00%
	TOTAL REVENUE		**$ 770,000**	**$ 558,000**	**$ 212,000**	**$ 558,000**	**$ 600,000**	7.53%
	EXPENSE							
110	Salaries	$ 188,901	$ 163,000	$ 151,897	$ 18,103	$ 170,000	$ 170,000	0.00%
130	Employee Benefits	$ 49,669	$ 56,000	$ 48,629	$ 6,371	$ 55,000	$ 55,000	0.00%
200	Operating Expenses	$ 44,930	$ 25,000	$ 10,322	$ 9,678	$ 20,000	$ 20,000	0.00%
210	Office Expense	$ 404	$ 2,000	$ 67	$ 933	$ 1,000	$ 1,000	0.00%
220	Computer Expense	$ 1,245	$ 3,000	$ 149	$ 1,851	$ 2,000	$ 2,000	0.00%
230	Telecommunications	$ 3,948	$ 2,000	$ 466	$ 1,534	$ 2,000	$ 2,000	0.00%
310	Transportation	$ 2,456	$ 4,000	$ 3,315	$ 685	$ 4,000	$ 4,000	0.00%
350	Outside Services (Research Contracts)	$ 196,273	$ 506,000	$ 173,918	$ 106,082	$ 280,000	$ 301,000	7.50%
360	Laboratory	$ -	$ 5,000	$ 20,144	$ (144)	$ 20,000	$ 15,000	-25.00%
390	Education/Memberships/Pub./Incentives/Legal	$ 71,105	$ 4,000	$ 18,973	$ (14,973)	$ 4,000	$ 4,000	0.00%
	Contingency	$ -	$ -	$ -	$ -	$ -	$ 26,000	
	TOTAL OPERATING EXPENSE	**$ 558,931**	**$ 770,000**	**$ 427,879**	**$ 130,121**	**$ 558,000**	**$ 600,000**	**7.53%**

Contributors - 2017	
South Davis Sewer District	$ 50,000
Central Davis Sewer District	$ 50,000
North Davis Sewer District	$ 100,000
Central Valley Water Reclaimation Facility	$ 150,000
South Valley Water Reclaimation Facitlty	$ 75,000
South Valley Sewer District	$ 75,000
*Salt Lake City	$ 50,000
	$ 550,000

Wasatch Front Water Quality Council - Utah Lake
2017 Proposed Amended Budget
2018 Budget

ACCT NO.	ITEM	ACTUAL 2016	BUDGET 2017	YTD 2017	REMAINING TO EXPEND (AMENDED)	OCTOBER AMENDED 2017	PROPOSED BUDGET 2018	Chg %
	REVENUE							
343044	Contributions	$ 200,000	$ 200,000	$ 267,000	$ 15,000	$ 282,000	$ 280,000	-0.71%
	TOTAL REVENUE	**$ 200,000**	**$ 200,000**	**$ 267,000**	**$ 15,000**	**$ 282,000**	**$ 280,000**	-0.71%
	EXPENSE							
110	Salaries	$ 45,991	$ 35,000	$ 49,073	$ 5,927	$ 55,000	$ 65,000	18.18%
130	Employee Benefits	$ 20,404	$ 12,000	$ 18,136	$ 1,864	$ 20,000	$ 25,000	25.00%
200	Operating Expenses	$ 9,799	$ 10,000	$ 4,650	$ 5,350	$ 10,000	$ 7,000	-30.00%
210	Office Expense	$ 313	$ 1,000	$ -	$ 1,000	$ 1,000	$ 1,000	0.00%
220	Computer Expense	$ 1,166	$ 1,000	$ 149	$ 851	$ 1,000	$ 1,000	0.00%
230	Telecommunications	$ 938	$ 1,000	$ 466	$ 3,534	$ 4,000	$ 1,000	-75.00%
310	Transportation	$ 1,491	$ 2,000	$ 3,416	$ 584	$ 4,000	$ 4,000	0.00%
350	Outside Services (Research Contracts)	$ 154,038	$ 136,000	$ 147,032	$ 35,968	$ 183,000	$ 162,000	-11.48%
360	Laboratory	$ -	$ 1,000	$ 2,544	$ 456	$ 3,000	$ 10,000	233.33%
390	Education/Memberships/Pub./Incentives/Legal	$ 11,896	$ 1,000	$ 651	$ 349	$ 1,000	$ 1,000	0.00%
	TOTAL OPERATING EXPENSE	**$ 246,036**	**$ 200,000**	**$ 226,116**	**$ 55,884**	**$ 282,000**	**$ 277,000**	-1.77%

Contributors - 2017	
Orem	$ 50,000
Payson	$ 30,000
Spanish Fork	$ 50,000
Provo	$ 50,000
Timpanogus	$ 102,000
	$ 282,000

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	2016 Contracts - Expended/Acc.	2017 Contracts - To Date	2017 Contracts - Total	2018 Contracts - Proposed
Hoven-MMI/sheetflow wetlands assessment	$ 45,095	$ 3,749	$ 11,000	$ -
Kettinring Sheetflow and manure	$ 16,702	$ 22,402	$ 43,000	$ -
David Richards - MMI, Ammonia criteria review, Mussel Survey, FB Ecology	$ 46,830	$ 57,265	$ 70,000	$ 65,000
River Continuum (Midge Taxonomy)/consulting	$ 29,351	$ 3,680	$ 10,000	$ 10,000
Farmington Bay Cyanobacteria (Marden)	$ 11,431	$ 26,132	$ 25,000	$ 10,000
Cavitt - Nodularin bioaccumulation	$ -			$ 25,000
University of Utah - Shah - Nitrogen Dynamics	$ 45,742		$ 23,258	$ -
University of Utah - Goel Nitrogen Transformation in Jordan River and Wetlands		$ 35,410		
University of Utah - Goel Sediment N transformations & P flux	$ -		$ 26,000	$ 25,000
University of Utah - Burian				$ 20,000
W Miller - Atmospheric N and P deposition	$ -			$ 15,000
Misc.	$ 1,113	$ 455	$ 2,000	$ 500
Rushforth/Nelson/Levitt	$ -		$ -	$ 70,000
Rushforth - Algal taxonomy	$ -		$ -	$ 10,000
Jordan River VSS Study				$ 25,000
Causeway Sediment Study				$ 25,000
Wilkinson Ferrari	$ -	$ 9,654	$ 30,000	
Totals	$ 196,264	$ 158,747	$ 240,258	$ 300,500

Wasatch Front Water Quality Council - Utah Lake
2017 Proposed Amended Budget - Utah Lake
2018 Budget

	2016 Contracts - Expended	2017 Contracts - To Date	2017 Contracts - Total	2018 Contracts - Proposed
Oreo Ecosystem/foodchain analysis	$ 50,820	$ 26,830	$ 40,000	$ 35,000
BYU Sediment P Flux	$ 32,601	$ 21,689	$ 24,037	$ 20,000
USU	$ 4,227	$ -	$ -	$ -
River Continuum (Midge Taxonomy)	$ 4,956	$ -	$ -	$ 5,000
Gray/Other (DNA Analysis)	$ 36,200	$ 11,200	$ 11,000	$ 10,000
Merritt-Miller Modelling	$ 25,000			$ 20,000
Wood Miller Atmospheric Deposition		$ 26,400	$ 26,400	$ 15,000
Misc. (Chemtech Ford; cyanotoxins. Chl a)	$ 235	$ 455	$ 500	$ -
Wilkinson Ferrari		$ 13,960	$ 13,960	$ -
Phycology Evaluation		$ 43,025	$ 50,000	$ 7,000
Rushforth/Nelson/Levitt Paleolimnology				$ 50,000
Totals	$ 154,039	$ 143,559	$ 165,897	$ 162,000

Summary of Proposed Studies to be Continued and Initiated in 2018 by the Wasatch Front Water Quality Council

Studies focused on the Jordan River and Farmington Bay include:

Goel or Shah: Organic Matter Sources and Fate

Objective: To what extent is the VSS from POTWs settling and contributing to the SOD?

The Shah - Weintraub project has thus far demonstrated that dissolved organic matter is the most labile/reactive/oxygen consuming form of carbon in the water column of the Jordan River. While this suggests that the VSS discharged from our POTWs plays only a minimal role in oxygen consumption, this research has not yet addressed two remaining questions: 1) because the Phase I TMDL clearly identified elevated SOD as the primary cause of oxygen loss, this implies that the organic matter in the water column is settling. Hence, the propensity of POTW-derived OM to settle remains a critical question; 2) DOM is the dominant form of carbon transport in all streams, and particularly urban streams such as the Jordan River. Although the Shah-Weintraub report can suggest that P may be limited in the metabolism of DOM in the water column – potentially linked to oxygen depletion in the water column, this has already been accounted for with our BOD and CBOD measurements. We need to further investigate the magnitude and connection of anaerobic metabolism of C in the sediments (i.e. leading to small chain fatty acids and methane production) – thus further explaining the source of SOD. This question must also identify whether the organic matter in the sediment is anthropogenic (POTW) or terrestrial (leaves, twigs, grass, seeds, etc.).

Estimated Budget: $25,000

Nelson/Rushforth/Levitt: Paleo studies

Objective: More fully characterize the paleolimnological record of Farmington Bay by elucidating the phytoplankton/cyanobacterial community structure at specific historical events.

Despite a detailed and comprehensive paleolimnological study performed by Levitt et al., doubt remains by DWQ of the timeline of certain hydrologic and contaminant shifts related to anthropogenic influences on Farmington Bay. Critical questions remain concerning 1) the degree of eutrophication that existed prior to European settlement of the Wasatch front; and 2) more importantly, limnological conditions at 1975 – the point in time and conditions at which beneficial uses were established and the conditions to which mitigation efforts of impaired waters are to be restored. Recent developments in paleolimnological research has vastly improved our ability to understand the

phytoplankton community that existed during these critical time marks. We will basically duplicate the project conducted by Levitt et al. during 2013 at at least two additional sites in Farmington Bay to resolve dating questions relative to the timing of causeway construction, wastewater consolidation and changes in phytoplankton community as described by diatom valves and cyanobacterial pigments and akinetes (spores) and particularly in relation to the 1975 condition.

Estimated Budget: $70,000

Carling/BYU: Nutrient concentrations in Core samples of N Farmington Bay and South Gilbert Bay

Objective: Evaluate sediment nutrient concentrations in the NE corner of Farmington Bay and the SE corner of Gilbert Bay in relation to the NDSD proposal to move its discharge point to the N side of the Antelope Island Causeway

Estimated Budget: $25,000

Carling/Wood Miller: Atmospheric deposition of N and P

Objective: Quantify wet and dry deposition loading to Farmington Bay and eventually GSL at large to incorporate into and improve the Farmington Bay and GSL mass balance model

Previous measurements of Hg deposition on GSL by USGS and preliminary measurements of N and P in the lower elevations along the Wasatch front by Leland Meyers discovered that significant quantities of these and other elements are deposited in our watersheds and on Utah's lake surfaces. These contributions likely provide a significant contribution to the overall nutrient budget of Utah Lake, Farmington Bay and GSL at large. This study quantifies (weekly sample retrieval) both wet and dry (dust) deposition at numerous locations surrounding Utah Lake and Farmington Bay using remote, solar powered, solenoid-equipped, moisture-triggered devises to capture nutrient and metal samples during both rain events and the intermediate dry periods.

Estimated Budget: $15,000

Carling/Goel: Sediment recycling of N and P

Objective: Determine the potential of P flux to and from the sediments as it relates to nutrient loading to Farmington Bay

Recent studies by Levitt et al. and USGS have documented very high concentrations of P in Farmington Bay sediments. While Drs. Goel and Hogsett have documented large

fluxes of P in Jordan River sediments (some sites represent sinks while the majority of sites represent P sources), there has been little work documenting the potential of Farmington Bay sediments to act as a source of P and N to the water column. This could represent a significant uncontrollable source of P.

Estimated Budget: $25,000

Burian - Hydrologic/ nutrient budget Model

Objective: Develop an accurate nutrient and hydrologic budget for Farmington Bay

It is essential to understand the nutrient budget in order to determine primary sources of nutrients, prioritize and design mitigation measures and even to determine whether mitigation measures of controllable sources of nutrients will achieve desired results. We have determined loadings of major sources to Farmington Bay for more than two years. Recently we have determined that atmospheric deposition and sediment reflux are additional significant sources of N and P and have collected atmospheric deposition samples for nearly 1 year. We have measured sediment efflux of N and P in the Jordan River and need to complete similar measurements in Farmington Bay. We will submit these date to Dr. Steve Burian for incorporation into his current and accurate hydrologic model during 2018 for incorporation into his model to complete this important task.

Estimated Budget: $20,000

Marden and Richards - Ecosystem Monitoring/Nutrient/ecosystem Model

Objective: Further elucidate important ecosystem structural and functional characteristics and health in relation to environmental drivers, including cyanobacteria and cyanotoxins

Brad Marden and David Richards have been monitoring the phytoplankton and zooplankton and benthic components of the aquatic ecosystem of Farmington Bay for five successive years and have conducted several acute and subacute tests evaluating the toxicity of nodularin to brine shrimp nauplii. Results of these tests indicate that current peak summer nodularin concentrations in Farmington Bay remain at 10 to 25% of toxicity test endpoints. Similarly, comparison of ecological conditions and the presence/absence of major zooplankton community and benthic community members indicate that the seasonal succession of zooplankton changes are not correlated to onset of Nodularia blooms or the presence or peak values of nodularin concentrations. Rather, major shifts are associated with salinity regimes and the onset of the egg hatching and growth of the predator, Corixidae. Nevertheless, as lake/bay elevations continue to fluctuate, resulting in different hydrologic, salinity and temperature regimes, we believe it is important to document phytoplankton community changes, including Nodularia blooms and potential linkages in responses in the zooplankton/benthic communities and predation. The 2018 project will include testing the efficacy of eDNA to determine presence and population sizes of phytoplankton and zooplankton

communities. Where proven useful, we will perform whole-body DNA techniques to begin understanding foodchain relationship and selectivity/utility of various phytoplankton species, including Nodularia by various zooplankton species, including Artemia.

Estimated Budget: $75,000

John Cavitt – Bioaccumulation of Nodularin in the Farmington Bay Foodchain

Objective: With the assistance of DNA-determined linkages in the foodchain, determine the potential for bioaccumulation/biomagnification from Nodularia to zooplankton to target shorebirds.

Estimated Budget: $25,000

Summary of Contractors and Projects for Utah Lake

Notably, similar questions exist between Utah Lake and Farmington Bay. Accurate nutrient budgets and necessary for both water bodies to quantify major nutrient sources and define which sources and loads represent “controllable” sources via regulatory measures or watershed BMPs vs other sources such as atmospheric deposition, sediment recycling and stormwater. As with Farmington Bay, WFWQC technicians collect monthly samples and measure flows within all flowing tributaries and include values at the end of pipe as well as at the terminus of sloughs and throughout Provo Bay.

These important data will also be supplemented with studies by:

Wood Miller/Carling: Atmospheric wet and dry deposition measurements

Objective: Quantify wet and dry deposition loading to Utah Lake to incorporate into and improve the Utah Lake mass balance model

Sampling stations have been established at five locations surrounding Utah Lake and three locations across the Wasatch front foothills. This is also a critical component of the Utah Lake nutrient budget as it may represent a significant and uncontrollable source of nutrients to Utah Lake.

Estimated Budget: $15,000

Carling: Sediment recycling of N and P

Objective: Determine the potential and magnitude for N and P to enter the water column and contribute to the Utah Lake nutrient budget.

The nature of terminal waterbodies includes advanced stages of eutrophy that includes accumulation of significant quantities of nutrients in the sediments. Despite the more geologically recent decline of Lake Bonneville, resulting in low rates of flushing, Utah Lake has accumulated significant quantities of P and early sampling by Carling suggests that large quantities of sediment P may actually exist in soluble forms within the pore water (in addition to being incorporated in more permanent minerals such as hydroxy-apatite). Therefore, it is critical to document the magnitude of sediment nutrient influx and efflux throughout Utah Lake and Provo Bay. This will test hypotheses by Dr. Merritt that sediments represent a large sink for P as well as the potential for Utah Lake sediments to contribute a significant uncontrollable source of P.

Estimated Budget: $20,000

Merritt/Wood Miller: Updated nutrient mass balance model

Objective: Update the original Larsen-Mercier mass balance and trophic state model

Large deviations between the end-of-pipe and “street crossing” measurements obtained during the 2009 to 2013 CUWCD/DWQ study and measurements of actual nutrient loading values obtained at the terminus of effluent and tributary flows that actually reach the lake have been discovered by WFWQC sampling. These adjustments have the potential to significantly modify actual nutrient loadings, particularly from POTWs, to the lake. These values need to be incorporated in the L-M model. In addition, nutrient flux measurements of N and P at several locations to obtain representative values of P and N flux throughout the lake will be performed in addition to atmospheric wet and dry deposition sampling. Incorporating these data will result in developing the most accurate mass balance model to date and will serve to validate future modeling efforts for Utah Lake.

Estimated Budget: $20,000

Rushforth/Nelsen/Levitt Paleo - Cyanobacteria History and potential for Lake restoration

Objective: Accurately characterize the historical limnological conditions of Utah Lake in relation to specific historic events

This study will basically emulate studies planned for Farmington Bay to develop a similar timeline associated with Utah Valley settlement and the onset of massive water diversions from major Utah Lake tributaries and also the conditions that existed at the 1975 mark.

Estimated Budget: $50,000 (Not fully funded)

Richards/Theron Miller: Lake ecosystem/nutrient monitoring/model development

Objective: Understand foodchain linkages including influence of top-down control imposed by carp removal and the role that the benthic community plays in nutrient cycling

This study is intended to elucidate important ecological characteristics and health particularly associated with the question of whether Utah Lake is actually impaired due to excess P and the presence of cyanobacteria.

Estimated Budget (Oreohelix): $35,000