Appendices-Municipal Water Quality Investigations Program 2014-15 Work Plan

6/17/14
Final

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Appendix 1. Program Element Costs FY14-15(MWQI and MWQI SPC funds)

Table 1 Program Element Costs for FY14-15 Work Plan Projects

Workplan Element		Program Element	2014/15 IO#	Labor Hours	Labor Cost	Contract costs	OE&E[c]	Total Cost	MWQI SPC Fund	Total Budget
5		**Water Quality Assessment**								
	5.1	Routine Monitoring Program	VWQASSMENT13	752	$72,944		$5,000	$77,944		$77,944
	5.2	Short-term Monitoring	VWQASSMENT13	1824	$176,928		$54,000	$230,928		$230,928
6		**RTDF-Comprehensive Program**								
	6.1	RTDF-CP Real Time Monitoring								
		6.1.1[a] MWQI Real Time Stations	VRTMONITOR13	2336	$226,592	$21,400	$55,000	$302,992	$25,000	$327,992
		6.1.2 Gianelli WQ Station	VGIANNELLI13	1064	$103,208	$4,600	$8,000	$115,808		$115,808
	6.2	RTDF-CP Water Quality Forecasting								
		6.2.1 BDO- Bay Delta Office Modeling	VRTBDOMODL13	1768	$224,536			$224,536		$224,536
		6.2.2 OCO- Operations Control Office Modeling	VRTOCOMODL13	1768	$224,536			$224,536		$224,536
		6.2.3 Model Support - Trends Analysis, modeling, rpt	VTRENDSAMR13	104	$10,088			$10,088		$10,088
	6.3	RTDF-CP Information Management and Data Dissemination								
		6.3.1 RTDF Data Dissemination & Reporting	VRTDDISRPT13	1264	$122,608			$122,608	$13,000	$135,608
		6.3.2 Administration and Database Activities[b]						$0	$62,400	$62,400
7		**Science Support (Special Studies)**								
	7.1	7.1 Limnology of the SWP	VLIMNOLOGY13	1944	$188,568			$188,568	$65,000	$253,568
		7.1.1 Nutrient Budget Study	VNTDYNSTDY13	1144	$110,968			$110,968		$110,968
		7.1.2 Nutrient Limitation Study	VLIMNUTLIM14	360	$34,920			$34,920		$34,920
		7.1.3 Nutrient and Nutrient Ratio Influence on Community Species Composition	VLIMNRATIO14	144	$13,968			$13,968		$13,968
		7.1.4 Light Limitation in the SWP	VLIMLIGHTL14	688	$66,736			$66,736		$66,736
		7.1.5 Algal and Macrophyte Growth Study	VLIMAMGROW14	120	$11,640			$11,640		$11,640
		7.1.6 Spatial-temporal Distribution of Melosira in the SBA	VLIMMELOSI14	696	$67,512			$67,512		$67,512
		7.1.7 Distribution of Macrophytes in the SWP	VLIMMACROP14	600	$58,200			$58,200		$58,200
		7.1.8 Wide Swings in Canal pH Study	VLIMPHSTUD14	528	$51,216			$51,216		$51,216
		7.1.9 San Luis Reservoir Study	VLIMSLRSRV14	0	$0			$0		$0
		7.1.10 Dyer Reservoir Study	VLIMDYRSRV14	0	$0			$0		$0
		7.1.11 Del Valle Reservoir Study	VLIMDLRSRV14	0	$0			$0		$0
	7.2	7.2.1 Cattle Impacts to SWP Water Quality	VSANSURVEY14	480	$46,560			$46,560		$46,560
	7.3	7.3 FDOM Phase II	VFDOMPOCS013	800	$77,600		$2,000	$79,600		$79,600
	7.4	7.4 Urban Sources and Loads Investigation	VURBANSL0013	80	$7,760			$7,760		$7,760
	7.5	7.5 O'Neill Forebay Mixing Study	VONEILFRBY13	80	$7,760			$7,760		$7,760
	7.6	7.6 Spectrofluorometer Study	VSPCTROFLU13	160	$15,520			$15,520	$2,000	$17,520
	7.7	7.7 Tidal Marsh Restoration Literature Review	VTIDALMRSH13	160	$15,520			$15,520		$15,520
	7.8	7.8 Feasibility Study for MWQI Portable Monitoring Sta.	VPORTBLSTN13	80	$7,760			$7,760		$7,760
	7.9	7.9 Prepare MWQI Fact Sheet								

Table 1 Program Element Costs for FY14-15 Work Plan Projects (continued)

Workplan Element		Program Element	2014/15 IO#	Labor Hours	Labor Cost	Contract costs	OE&E[c]	Total Cost	MWQI SPC Fund	Total Budget
8		**Other MWQI Funded Program Activities**								
	8.1	Administration Work	VDWRRQDDPC13	1640	$159,080		$10,000	$169,080		$169,080
	8.2	Field Unit Office Duties	VFUOFCWORK13	1200	$116,400		$5,000	$121,400		$121,400
	8.3	O & M WQ other duties	VOMWQHQ00013				$500	$500		$500
	8.4	MWQI Annual Workplan	VWORKPLAN013	528	$51,216			$51,216		$51,216
	8.5	DWR Bulletin 132	VBULL132WQ13	120	$11,640			$11,640		$11,640
	8.7	Workplace Safety	VSAFTYDOCS13	136	$13,192		$500	$13,692		$13,692
	8.8	Emergency Response	V911RESPNS13	40	$3,880			$3,880		$3,880
	8.9	Miscellaneous meetings attended by staff	VOTHERWQPA13	400	$38,800			$38,800		$38,800
9		**Program Management-Status Reporting**	VPROGMMGMT13	1792	$173,824			$173,824	$89,100	$262,924
10		**Non-MWQI Funded Program Management**			$0			$0		$0
11		**Other Required Program Costs**				$3,000		$3,000	$30,000	$33,000
	11.1	**MEO Insurance & Fuel**	G1111290005I				$1,000	$1,000		$1,000
		Total		24800	$2,511,680	$29,000	$141,000	$2,681,680	$286,500	$2,968,180

[a] 6.1.1 Includes contracts with San Luis & Delta Mendota Water Authority, Area Restroom and maintenance contracts for WQ Station analyzers.

[b] Includes Dennis' time(funded by the MWQI SPC). [c] Operating Equipment & Expenses

*** DWR assessments are equally charged to programs to cover costs of Departmental overhead expenses. For example, administration, legal, and executive offices.**

**** The MWQI Program includes 11 PY for staff and 3 PY for program partners in OCO, BDO, and O&M. ES Staff time has been calculated at $97 per hour, and Engineer Staff time at $127 per hour.**

Table 2 MWQI Program Staff Workload Assessments for FY14-15 Work Plan Projects

MWQP Branch Staff Hours allocated to the FY14-15 MWQI Work Plan-- Labor Breakdown, Not Cost!			Routine Monitoring Program (VWQASSMENT13)	Short-term, Special Study Monitoring (VWQASSMENT13)	MWQI Real Time Stations (VRTMONITOR13)	Gianelli WQ Station (VGIANNELLI13)	BDO- Bay Delta Office Modeling (VRTBDOMODL13)	OCO- Operations Control Office Modeling (VRTOCOMODL13)	Model Support (VTRENDSAMR13)	RTDF Data Dissemination and Reporting (VRTDDISRPT13)	Administration and Database Activities (Dennis)	Limnology of SWP Conveyance (VLIMNOLOGY13)	Nutrient Dynamics Study (VNTDYNSTDY13)	Nutrient Limitation Study (VLIMNUTLIM14)	Nutrient and Nutrient Ratio Influence on Community Species Composition (VLIMNRATIO14)	Light Limitation in the SWP (VLIMNRATIO14)	Algal and Macrophyte Growth Study (VLIMAMGROW14)	Spatial-temporal Distribution of Melosira in the SBA (VLIMMELOSI14)	Distribution of Macrophytes in the SWP (VLIMMACROP14)	Wide Swings in Canal pH Study (VLIMPHSTUD14)	San Luis Reservoir Study (VLIMSLRSRV14)	Dyer Reservoir Study (VLIMDYRSRV14)	Del Valle Reservoir Study (VLIMDLRSRV14)
Work Plan Element			5.1	5.2	6.1.1	6.1.2	6.2.1	6.2.2	6.2.3	6.3.1	6.3.2	7.1	7.1.1	7.1.2	7.1.3	7.1.4	7.1.5	7.1.6	7.1.7	7.1.8	7.1.9	7.1.10	7.1.11
MWQI Field Section																						
	Arin Conner		136	320	672	0	0	0	0	0	0	0	0	0	0	0	0	80	24	72	0	0	0
	Travis Brown		216	496	672	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Jeremy Del Cid		240	520	576	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Steven San Julian		56	96	96	0	0	0	0	0	0	184	0	0	0	0	0	0	0	0	0	0	0
MWQI (Industrial)																						
	Sonia Miller		16	48	0	0	0	0	0	160	0	256	0	0	0	48	0	240	0	176	0	0	0
	Jason Moore		0	40	0	0	0	0	0	0	0	752	0	0	0	0	0	208	160	160	0	0	0
	Marcia Tansey-Scavone		0	0	0	0	0	0	104	0	0	136	1144	40	40	0	0	0	0	0	0	0	0
	Rachel Pisor		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Shaun Rohrer		8	88	0	0	0	0	0	0	0	224	0	0	0	0	0	0	304	0	0	0	0
	Otome Lindsey		56	136	0	0	0	0	0	0	0	240	0	0	0	0	0	0	0	0	0	0	0
Water Quality Special Studies																						
	Ted Swift		0	0	0	0	0	0	0	64	0	120	0	320	104	640	104	0	0	56	0	0	0
	Mark Bettencourt		24	80	320	0	0	0	0	1040	0	0	0	0	0	0	0	120	32	16	0	0	0
Non-MWQP Staff																						
	Daniel Wisheropp		0	0	0	1064	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OCO		0	0	0	0	0	1768	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BDO		0	0	0	0	1768	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	O&M Field Support		0	0	0	0	0	0	0	0	0	48	0	0	0	0	0	48	80	48	0	0	0
	Total Hours		752	1824	2336	1064	1768	1768	104	1264	0	1944	1144	360	144	688	120	696	600	528	0	0	0

Table 2 MWQI Program Staff Workload Assessments for FY14-15 Work Plan Projects (continued)

MWQP Branch Staff Hours allocated to the FY14-15 MWQI Work Plan-- Labor Breakdown,			Cattle Impacts Sanitary Survey (VSANSURVEY14)	FDOM Proof of Concept Phase I & II (VFDOMPOCS013)	Urban Source & Loads (VURBANSL0013)	O'Neill Forebay Mixing Study (VONEILFRBY13)	Spectrofluorometer Study (VSPCTROFLU13)	Tidal Marsh Restoration Literature Review (VTIDALMRSH13)	Mobile Stations Project- (Portable Station) (VPORTBLSTN13)	Program Accomplishments (new IO#)	Administration work/training/TAC/MWQI meetings (VDWRRQDDPC13)	Field Unit Office Duties (VFUOFCWORK13)	O&M WQ other duties (O&M will be paying for this for FY 14-15) (VOMWQHQ00013)	Work Plan efforts (VWORKPLAN013)	Bulletin 132 efforts (VBULL132WQ13)	Safety efforts (VSAFTYDOCS13)	Emergency Response (V911RESPNS13)	Misc. Meetings (VOTHERWQPA13)	Program Management/Status Report (VPROGMMGMT13)	Non-MWQI Funded Dept Support, QA/QC, suppor for other DES branches (BDCP & Water PIE)	Funds not Assigned	Staff Days Committed	Staff Days Available	percent allocated
Work Plan Element			7.2.1	7.3	7.4	7.5	7.6	7.7	7.8	7.9	8.1	8.2	8.3	8.4	8.5	8.7	8.8	8.9	9	10	11	Total	Total	
MWQI Field Section																								
	Arin Conner		0	0	0	0	0	0	80	0	96	288	0	0	0	0	0	0	0	0	0	1768	0	85%
	Travis Brown		0	0	0	0	0	0	0	0	96	288	0	0	0	0	0	0	0	0	0	1768	0	85%
	Jeremy Del Cid		0	0	0	0	0	0	0	0	96	288	0	0	0	48	0	0	0	0	0	1768	0	85%
	Steven San Julian		0	0	0	0	0	0	0	0	96	288	0	80	16	48	0	40	768	0	0	1768	0	85%
MWQI (Industrial)																								
	Sonia Miller		400	0	0	0	0	160	0	0	200	0	0	16	8	0	0	40	0	0	0	1768	0	85%
	Jason Moore		0	0	0	80	0	0	0	0	200	0	0	40	8	40	40	40	0	0	0	1768	0	85%
	Marcia Tansey-Scavone		0	0	0	0	0	0	0	0	200	0	0	16	8	0	0	80	0	0	0	1768	0	85%
	Rachel Pisor		0	0	80	0	0	0	0	0	240	0	0	328	16	0	0	80	1024	0	0	1768	0	85%
	Shaun Rohrer		80	800	0	0	0	0	0	0	200	0	0	16	8	0	0	40	0	0	0	1768	0	85%
	Otome Lindsey		0	0	0	0	0	0	0	0	0	48	0	0	8	0	0	40	0	0	0	528	0	25%
Water Quality Special Studies																								
	Ted Swift		0	0	0	0	160	0	0	0	120	0	0	16	24	0	0	40	0	0	0	1768	0	85%
	Mark Bettencourt		0	0	0	0	0	0	0	0	96	0	0	16	24	0	0	0	0	0	0	1768	0	85%
Non-MWQP Staff																								
	Daniel Wisheropp		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1064	0	51%
	OCO		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1768	0	85%
	BDO		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1768	0	85%
	O&M Field Support		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	224	0	
Total Hours			480	800	80	80	160	160	80	0	1640	1200	0	528	120	136	40	400	1792	0	0	0	24800	0

Explanation of Table 1 Program Element Costs for FY14-15 Work Plan Projects

Specific Tasks to be Implemented using MWQI SPC Funds

The MWQI SPC will provide funding to provide technical support on program tasks associated with the MWQI Program:

Program Element 6.1.1 MWQI Real Time Stations

- **$25,000** allocated, if needed, for real time station and special study equipment and/or rental needs

Program Element 6.3.1 RTDF Data Dissemination & Reporting

- Consultant to provide technical expertise on the RTDF-CP Program up to **$13,000**.

Program Element 6.3.2 Administration and Database Activities

- Consultant to provide technical and managerial expertise with RTDF-CP administration, database activities, and data management support up to **$62,400**.

Program Element 7.1 Limnology of SWP

- Consultant will act as the Project Manager to provide technical and managerial expertise for the Limnology of SWP Study up to **$40,000**.
- Operating expense and equipment **$25,000.**

Program Element 7.6 Spectrofluorometry Study

- Consultant to provide technical expertise on the MWQI Spectrofluorometry Study up to **$2,000**.

Program Element 9 Program Management/Status Reporting

- Consultant to administer MWQI SPC managed fund and serve as a liaison between MWQI and the MWQI SPC up to **$80,000**. The MWQI SPC Consultant will provide technical and managerial expertise on program tasks associated with the MWQI Program. The consultant serves as a member of the MWQI TAC, administers the MWQI SPC fund, and serves as a liaison between MWQI SPC and the MWQI Program. The SWPCA General Manager will charge time to this budget when working on MWQI activities or attending meetings.
- Program Management expenses including SWC staff services, legal, administration expenses, and Annual Meeting costs up to **$9,100**.

Program Element 11 Unassigned Funds

- Consultant to continue work on artificial neural network model, up to **$30,000**.

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MWQI contracts required for FY14-15 Work Plan Elements

The MWQI Program maintains a planned budget of **$29,000** to cover the total expenses of the following contracts:

1. The contract has been extended with the San Luis & Delta Mendota Water Authority that covers the cost of phone service at the Jones Pumping Plant where MWQI maintains a RTDF water quality station. The service is necessary for safety reasons since staff may be working for extended periods of time in the lower level of this working plan where their cell phones may not have service, and in case of emergency staff would need access to a working landline phone. ($2,000)
2. The MWQI Program maintains the contract with All Cal Services that provides a portable toilet at the Hood RTDF WQ Station. This service is necessary since staff may be on-site for extended periods of time while calibrating the instruments and there are no other similar facilities in the local vicinity. ($1,000)
3. GE/Sievers service contract for repair to the organic carbon instruments. ($26,000)

MWQI Operating Equipment and Expenses using the MWQI Program's Planned Budgeted Funds

Program Element 5.1 Routine Monitoring Program

- **$5,000,** allocated for equipment and supplies related to the discrete monitoring program.

Program Element 5.2 Short Term Monitoring

- **$54,000,** allocated for contract lab analysis costs, equipment, and supplies.

Program Element 6.1.1: MWQI Real Time Stations

- **$55,000** allocated for the purchase of replacement filters, miscellaneous station supplies, and analyzer specific components and service agreements.

Program Element 6.1.2: Gianelli WQ station

- **$8,000** allocated for the purchase of replacement filters, miscellaneous station supplies, and analyzer specific components and service agreements.

Program Element 7.3: FDOM Proof of Concept Study

- **$2000** allocated for any needed repairs and the purchase of quantitative standards for instrument calibrations.

Program Element 8.1: Administration Work

- **$10,000** allocated for training classes, registration fees, travel related expense, and the cost for the annual or offsite meetings. The Annual Meeting costs may include rental fees for a facility, AV equipment and technical assistance, deposit for reserving dates and other miscellaneous meeting package elements. This budget covers the additional training expenses for new staff and promoted staff in the MWQI Program.

Program Element 8.2: Field Unit Office Duties

- **$5,000** allocated for field office maintenance activities.

Program Element 8.3: O&M WQ Other Duties

- **$500** allocated for training costs for MWQI funded staff working within O&M.

Program Element 8.7: Workplace Safety

- **$500** allocated for the purchase of miscellaneous safety equipment for example, vehicle fire extinguishers and first aid kits, personal flotation devices, earplugs, safety glasses, etc.

Program Element 11. Other Required Program Costs

- **$3,000** allocated for the expenses incurred if the DWR Project Services Office staff review any MWQI project reports prior to publication. Recall that as of July 1, 2013 the Project Services Office will no longer be covered by overhead expenses and will begin charging their document review services.
- **$1,000** allocated for the expenses associated with insurance and fuel for the MWQI Program's field support sampling vehicles. Currently the Field Support Section has four vehicles in its service fleet, two vans and two trucks that are necessary to maintain the MWQI Program's continuous monitoring and support to various special studies.

Further explanation of the table 2 MWQI Program Staff Workload Assessments for FY14-15 Work Plan Projects:

The MWQI Program's staff workload assessments are conducted to gain an understanding of how much time staff members were spending on their current assignments and special study projects and how much time staff have for any new assignments or special study projects. The workload assessment is included as Table 2 of this FY14-15 MWQI Work Plan. The Table 2 staff workload assessment includes all 15 staff members that make up the MWQI Program including its program

partners in the Division of Operations and Maintenance, Operations Control Office, and the Bay Delta Office.

Table 2 includes labor hours per project as listed in this work plan cycle including totals and percentages, and coincides with Table 1.

Appendix 2. Project Management Documentation

Background

The purpose of this appendix is to provide additional information on new studies that are described in the work plan. To keep the work plan clear and concise, only short summary descriptions and tables of deliverables and due dates are provided in the 2014-2015 work plan. This appendix contains the full project charters for the studies that appear in the work plan. Additionally, this work plan marks the beginning of using the Project Management body of Knowledge (PMBOK) standard of developing projects for all new projects.

The PMBOK standard of designing and implementing projects is the method that DWR is now using, and MWQI lead staff will be adapting for new studies. PMBOK includes processes for initiating, planning, executing, monitoring and controlling, and closing out a project. Each stage of project development incorporates the elements of project integration, management, scope, time, cost, quality, resources, communication, risk, procurement, and stakeholder management. Utilizing the PMBOK standard will enable staff to effectively manage projects while efficiently producing deliverables within scope, schedule, and budget.

Previously, ideas for new studies were submitted by MWQI staff and SWPCA members. These proposals were a general outline of the study idea, how the study met the needs of the MWQI mission, what resources and timeline the study would require, and the outcome or data gap that the study would fill. After these study ideas were approved by the MWQI Technical Advisory committee (TAC), the details of the study would be investigated and the study would be incorporated into the MWQI Work plan. Although the approval process for studies being incorporated into the Work plan remains the same, the format in which studies are proposed, developed, implemented and completed will change.

The process for developing studies begins with a concept proposal. These proposals are shared and discussed with the TAC Special Studies Committee for review and approval. Project initiation forms and charters of approved studies appear in the new Work Plan. A project initiation form is a document that outlines the basic scope and resources of a new project. The project charter is a more detailed document that clarifies the reason for the project, the project's background, its scope, risks, assumptions and constraints, milestones, core team members, and budget. A project initiation form may be included if a project has not been developed enough to complete a project charter. Studies that are ongoing from prior Work Plan cycles will not include project initiation forms or project charters.

For continuity between this appendix and the Work Plan, the sections of this appendix are broken down by Work Plan section. The project management documents for this Work Plan fall into “Program Elements Water Quality Assessment” and “Science Support (Special Studies)”. The initiation forms and charters are in the same order as those studies appear in the Work Plan. When an available study plan for a project is available it is included in this appendix.

Program Elements Water Quality Assessment – Short Term Monitoring Projects

IO# VWQASSMENT13 – hours 1824 – budget $230,928

This section consists of three monitoring projects;

- DSM2 Nutrient Monitoring
- Cache Slough Complex Pre-Restoration Baseline Monitoring
- Delta RMP Pathogen Monitoring

DSM2 Nutrient Monitoring

State of California DEPARTMENT OF WATER RESOURCES California Natural Resources Agency

DSM2 Nutrient Study-Initiation Form

Date: 4/5/2013

Project Details

Existing Problem/Need/Opportunity: *Does something need to be fixed? Updated? Created? Expanded? Helped?*

The DSM2 model is a computer simulation of water movement and quality in the Sacramento/San Joaquin Delta. There is a nutrient modelling component to DSM2 that requires continued development. Insufficient data are available for the DSM2 Nutrient Model to be properly calibrated and produce representative results. Further model development cannot occur if high quality, node specific data are not available for use by the modelers.

Solution: *How will this project fulfill the above?*

In order to meet the data need and improve model calibration, MWQI will sample the DSM2 nodes (or similar, to be determined) monthly during the same week as our existing, routine monitoring program. At these sites, samples will be collected based on which analytes are required by the DSM2 Nutrient model.

Project Objective Statement: *What will the project do? What does it look like?*

Collect monthly water quality data from key DSM2 nodes to increase the quantity and quality of data available to improve the calibration of the DSM2 nutrient model.

Target Start Date:	7/1/13	**Target End Date:**	Reassess continued need prior to 14/15 workplan
Proposed Project Manager(s):	Steve San Julian		
Proposed Project Sponsor(s):	Cindy Garcia		

Authorization: *Specify if there is a mandated reason for project (e.g. Legislative; executive; water code, other).*

Partners

Within DWR:	OCO, BDO, MWQI
Other Agencies:	State Drinking Water Contractors
Federal Agencies:	
Local Organizations:	

Benefits and Consequences

Project is completed:	Data will be available to improve DSM2 Nutrient model calibration.
Project is not completed:	No additional monitoring will take place and DSM2 model development will have to rely on existing data.

Environmental Stewardship and Sustainability Considerations

Considerations: *Describe the process that will be used to ensure compliance with the Environmental Stewardship Policy*

There would be no negative impacts to the environment from this study, and would provide useful monitoring data in accordance with the Environmental Stewardship Policy.

Signatures

Prepared By: _____ **Date:** _____

Reviewer: _____ **Date:** _____

Project Recommended ☐ **Project Not Recommended** ☐

Reason(s):

NOTE: Once The Project Initiation document is completed and approved, please send a copy to your Division Chief and digital version sent to the Project Services Office for filing. (Even if the Initiation is not approved, please send a copy to PSO.)

DWR 9704 (New 6/11)

- Project Initiation

Date: 4/5/2013

Project Details

Existing Problem/Need/Opportunity: *Does something need to be fixed? Updated? Created? Expanded? Helped?*

The DSM2 model is a computer simulation of water movement and quality in the Sacramento/San Joaquin Delta. There is a nutrient modelling component to DSM2 that requires continued development. Insufficient data are available for the DSM2 Nutrient Model to be properly calibrated and produce representative results. Further model development cannot occur if high quality, node specific data are not available for use by the modelers.

Solution: *How will this project fulfill the above?*

In order to meet the data need and improve model calibration, MWQI will sample the DSM2 nodes (or similar, to be determined) monthly during the same week as our existing, routine monitoring program. At these sites, samples will be collected based on which analytes are required by the DSM2 Nutrient model.

Project Objective Statement: *What will the project do? What does it look like?*

Collect monthly water quality data from key DSM2 nodes to increase the quantity and quality of data available to improve the calibration of the DSM2 nutrient model.

1.1. Target Start Date:	7/1/13	Target End Date:	Reassess continued need prior to 14/15 workplan
1.2. Proposed Project Manager(s):	Steve San Julian		
Proposed Project Sponsor(s):	Cindy Garcia		

Authorization: *Specify if there is a mandated reason for project (e.g. Legislative; executive; water code, other).*

Partners

Within DWR:	OCO, BDO, MWQI
Other Agencies:	State Drinking Water Contractors
Federal Agencies:	
Local Organizations:	

Benefits and Consequences

Project is completed:	Data will be available to improve DSM2 Nutrient model calibration.
Project is not completed:	No additional monitoring will take place and DSM2 model development will have to rely on existing data.

Environmental Stewardship and Sustainability Considerations

Considerations: *Describe the process that will be used to ensure compliance with the Environmental Stewardship Policy*

There would be no negative impacts to the environment from this study, and would provide useful monitoring data in accordance with the Environmental Stewardship Policy.

Signatures

Prepared By: _____ Date: _____

Reviewer: _____ Date: _____

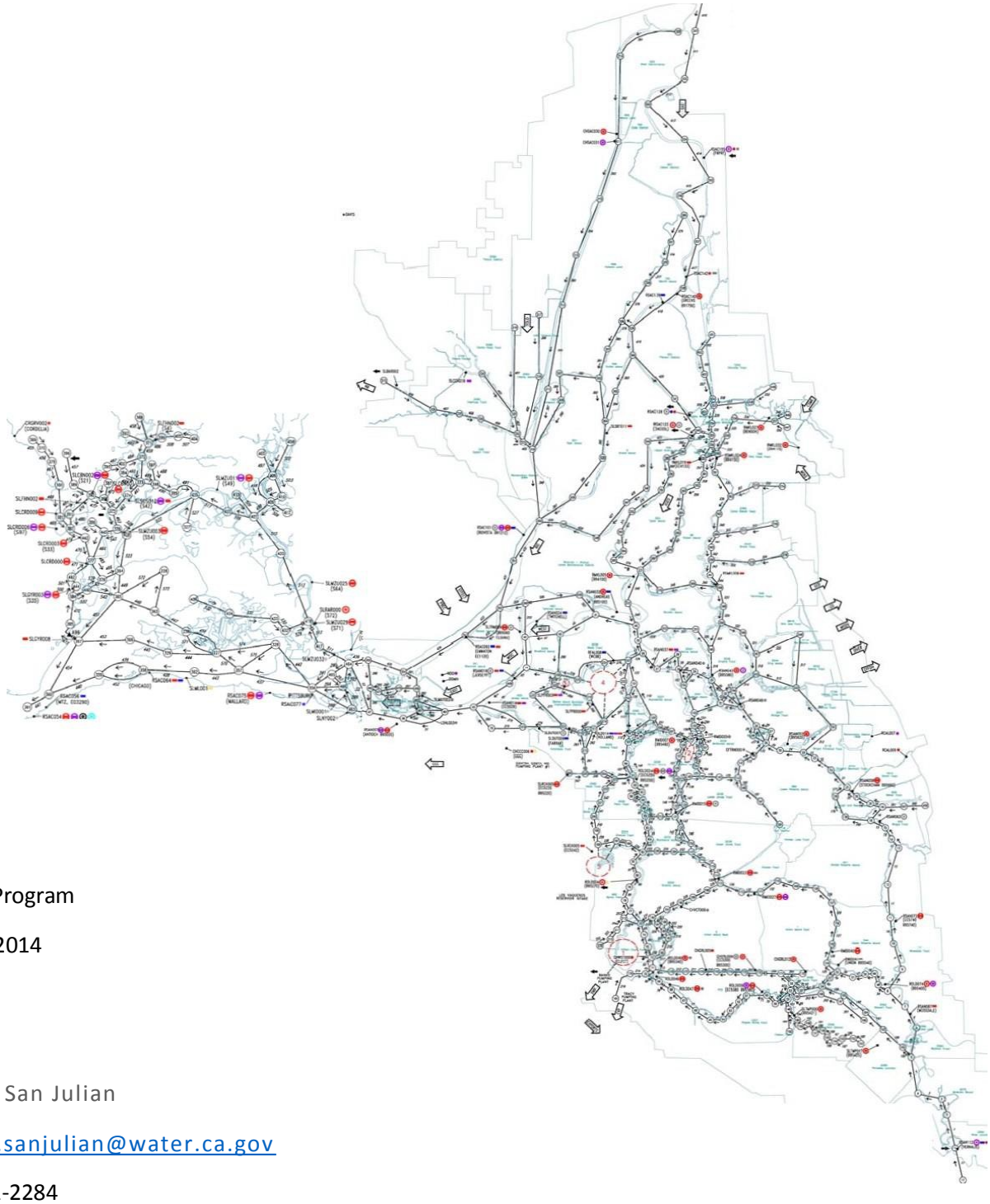
Project Recommended ☐ Project Not Recommended ☐

Reason(s):

MONITORING TO IMPROVE THE DSM2 NUTRIENT MODEL

DSM2 Nutrient Monitoring Plan and Quality Assurance Document

For project described in the MWQI 13/14FY work plan



MWQI Program

May 8, 2014

Steven San Julian

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916-371-2284

Contents

Section 1. Purpose of Monitoring

The Delta Simulation Model 2 (DSM2) is a Department of Water Resources (DWR) computer model used to model conditions and water quality in the Sacramento/San Joaquin River Delta. Currently, the output from the model is very good for measurements such as stage and flow, and water quality constituents such as electrical conductivity (EC) and dissolved organic carbon (DOC). That said, some constituents are improperly calibrated in the model. To be specific, modeled nutrient concentrations and flux are inaccurate. Inaccuracies in the data input to the model have been determined to be the shortcoming. To improve the DSM2 model response for nutrients additional field monitoring at key locations will be instituted for the 13/14 fiscal year.

Section 2. Sample Design and Rational

In this plan, various DSM2 nodes will be monitored to improve the model nutrient calibration. Certain nodes have been defined as locations where insufficient data exists. These nodes, from north to south, are the Sacramento River at I Street Bridge, Cosumnes River, Mokelumne River, Sacramento River near Mallard Island, Calaveras River, and the San Joaquin River near Vernalis. See Section 3.4 for specific monitoring location information.

These monitoring sites have been selected based on the assumption that collected data will help improve the DSM2 nutrient model. To ensure that the collected data meets this end MWQI, DWR Bay Delta Office (BDO), and the MWQI Technical Advisory Committee (TAC) will assess the results and make adjustments to the monitoring design as necessary. Adjustments made will result in edits to this monitoring plan, and each successive *accepted* edit will be given a version number as in *V.1*. Completed revisions will be distributed to those listed in Table 1.

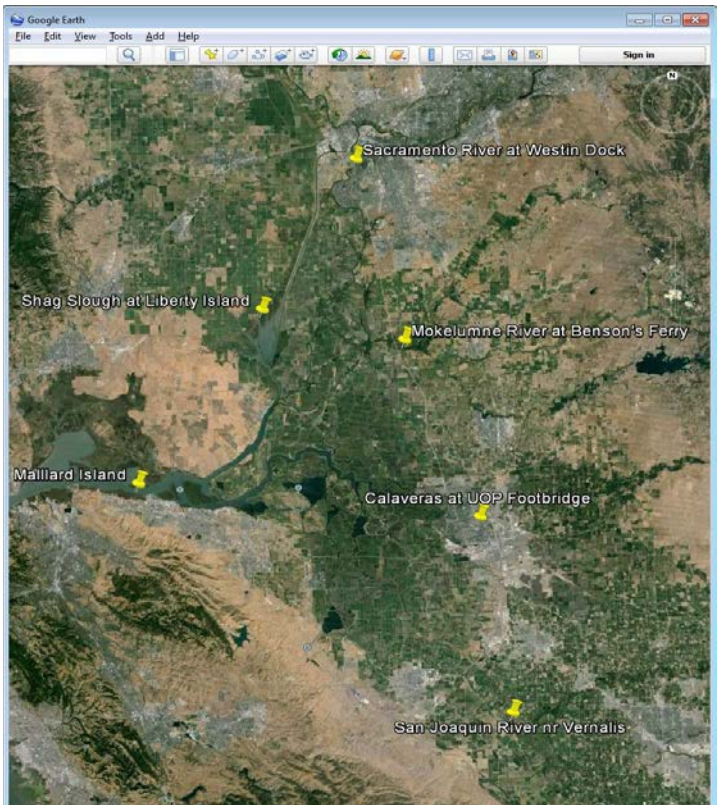


Figure 1. Map of monitoring locations for DSM2 nutrient model improvements.

2.1 Sampling Timeframe

As described in the MWQI FY13/14 work plan, monitoring activities were planned to last 1 year starting Aug 1, 2013, but the actual first sampling event did not occur until September 2013. After an initial year of monitoring, if it is decided that continued monitoring is needed, we will reassess the year 1 stations. One station that may be dropped is the Sacramento River at Westin Hotel Dock site which is representative of the I Street node. MWQI currently monitors the Sacramento River at the West Sacramento treatment facility, NEMDC, and the American River at Fairbairn. Monitoring at these 3 sites (flow weighted) should give results that are comparable to the I Street node. The first year of data will be compared to the calculated I street node data (by using the WSAC, NEMDC, and American River data). If no significant difference is found between the calculated and the I street node, the Westin site may be dropped. At that time the decision may be complicated by the fact that the three routine monitoring sites are collected monthly, and not twice a month. This will also factor in to the decision to drop or keep the Westin dock site.

Monitoring may continue beyond the 13/14 fiscal year, so the need for continued monitoring will be reassessed prior to the 14/15 fiscal year. At this point, the decision to end monitoring will be based on when enough quality information has been collected to adequately describe the DSM2 node locations. Communication with need to be maintained with the DSM2 developers so that 1) monitoring activities can be fine-tuned to meet DSM2 data needs, 2) when enough data is present to successfully calibrate the DSM2 model, monitoring will stop, and 3) DSM2 developers can communicate corrections made to the model calibration that result in additional data being unnecessary. That is, modelers need to let

us know if the additional monitoring is no longer needed. At the least, during the MWQI work plan development phase, MWQI and SWC need to meet with modelers to determine the need for continued monitoring in the following year work plan.

2.2 Funding Considerations

All of the constituents are to be analyzed at DWR's Bryte Laboratory with the exception of 2 analyses. These analyses will need to be sent to a contract lab for analysis. Bryte Lab analyses will be charged *on overhead* so there is no direct charge for these samples, but the contract lab samples need to be paid directly out of MWQI funds. The contract lab analyses and costs are listed below:

CBOD- $55
BOD- $35

24 sample events per year x 7 sites per event x $90 lab cost = $15,120

Nitrite monitoring was requested, but will not be monitored because in surface water, nitrite quickly converts to nitrate. For this reason it is assumed that, at all monitoring sites listed, analysis of nitrite would result in non-detects.

Shipping cost to transport these samples to the contract lab are covered in the above analysis cost.

Therefore, outside of labor costs, the estimated cost of conducting the contract lab part of this study is $15,120 which will be charged to the MWQI program under the VWQASSMENT13 internal order code.

Estimated labor expenses are 4 full staff days, 2 times per month. Using the average hourly rate of $100, the annualized labor cost for this study will be $10,000 per year. This brings the total study cost up to an estimated $27,000.

Staff resources will need to be used preparing these samples for shipment, coordination with contract lab, and inputting contract lab results into DWR's WDL database.

Section 3. Field Sampling Plan

3.1 Project Organization and Responsibilities

Table 1. DSM2 Nutrient Responsibilities Matrix

Staff Member	Position	Responsibilities
Steven San Julian, MWQI Field	Study Lead/Project Manager	General coordination and management, field run scheduling, and field run staff
Arin Conner, MWQI Field	Field Staff	field run staff
Travis Brown, MWQI Field	Field Staff	Field run staff, contract lab shipping coordinator
Jeremy Del Cid, MWQI Field	Field Staff	Field run staff, THMFP/HAAFP Chem module data entry and coordination
Sid Fong, DWR, Bryte Lab	Bryte Lab Director	Receive/Analyze/Report lab samples
Brandon Gee, Weck Lab	Weck Lab Contact	Send specialized sampling and shipping containers, analysis of THMFP/HAAFP samples, and deliver analytical results to Sid Fong and Jeremy Del Cid
Bryant Georgi, OCO	DSM2 Model support	Assess value of monitoring data for DSM2 Nutrient Model
Siqing Liu, BDO	DSM2 Model support	Assess value of monitoring data for DSM2 Nutrient Model
Hari Rajbhandari, BDO	DSM2 Model support	Assess value of monitoring data for DSM2 Nutrient Model
Cindy Garcia, MWQI	Program Manager	Study funding and approval
Elaine Archibald, SWPCA Rep.	Project Sponsor	Study funding and design support

3.2 Field Activities Safety Considerations

Employee safety is a chief concern during all field work. Conditions in the field can change rapidly and it is important for field staff to be adequately prepared for such changes. Prior to every field run, a safety tailgate meeting will be conducted by run lead with all run staff present. Topics discussed should related to the hazards described in the Job Hazard Analysis.

Based on initial field reconnaissance and staff experience, a job hazard analysis was completed that describes all of the tasks and possible hazards associated with the field component of this study. The complete JHA is in Appendix H. Aside from the hazards and procedures described here and in the JHA, field run staff need to read and understand the MWQI Field Safety Plan (Appendix B). The Safety Plan contains additional safety related information of which all field employees need to be aware.

3.3 Field Monitoring Schedule

Sampling at these proposed locations will be bi-weekly (twice a month) at all boundary locations. Sampling will occur during the first week of the month at the same time as routine monthly monitoring and Cache Slough Complex monitoring, and generally 2 weeks after the first monthly sampling event.

3.4 General Field Monitoring Locations

Table 2 contains the *DSM2 node* Lat/Longs and the selected MWQI monitoring location Lat/Longs. Monitoring locations may be different than the DSM2 nodes, but this difference has been assessed and the selected monitoring locations will provide the needed information. Google Earth was used to plot the locations and in some cases, the DSM2 nodes appear to be on land rather than in the water bodies where monitoring is actually intended.

Table 2. Latitude and Longitude of DSM2 Boundary Locations and MWQI Monitoring Locations

Boundary Location	DSM2 Node	DSM2 Node Latitude	DSM2 Longitude	MWQI Station Name	MWQI Station Latitude	MWQI Station Longitude
Sacramento	330	38.58638563	-121.5064805	Sacramento River @ Westin Hotel Dock	38°32'6.07"N	121°31'7.85"W
Vernalis	17	37.65849617	-121.2553017	San Joaquin River nr Vernalis	37.6761	-121.26417
Yolo	316	38.23181508	-121.6722735	Shag Slough at Liberty Island Bridge	38°18'23.47"N	121°41'34.60"W
Mokelumne	447	38.24838561	-121.4203701	Benson's Ferry	38°14'20.35"N	121°25'22.26"W
Cosumnes	446	38.2579398	-121.4198196	(See Benson's Ferry)		
Calaveras	21	37.96729204	-121.370151	Calaveras @ UOP Footbridge	37°58'52.59"N	121°18'50.54"W
Martinez	361	38.0339363	-122.1370264	Sacramento River at Mallard Island	38° 2'33.70"N	121°55'11.92"W

3.5 Field Monitoring and Sampling Methods

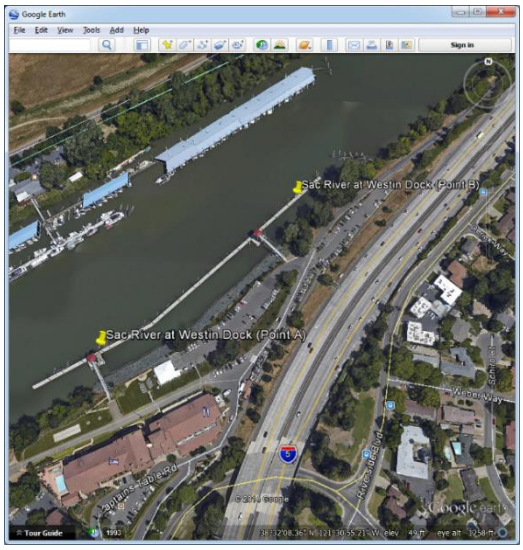
3.5.1 Sampling Vehicle

MWQI Field section mobile water quality vans and trucks will be used for DSM2 Nutrient monitoring field runs. These vehicles have been specially outfitted to conduct the monitoring activities.

3.5.2 Station Positions

Below are the specific locations of all 6 sites. All sites are monitoring on the I5 Corridor run with the exception of Shag Slough which is collected on the Cache Slough Boat run. At each site the location of sample collection should be as far out into the main flow of the waterway as possible, and approximately 3 feet below the surface. If depth is less than 5 feet, sample from the middle of the water column. Sample within 50 feet of the positions listed, and closer if possible.

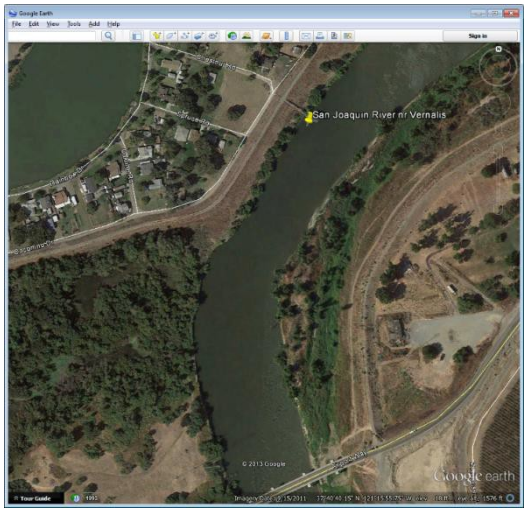
Sacramento River I Street Node:
Sacramento River @ Westin Hotel Dock



Representativeness: This site is supposed to represent the "I Street Bridge" node. Due to insufficient mixing at I Street Bridge, this downstream site was selected for monitoring. The original intent was to sample the upstream portion of the boat dock, but that part of the dock was locked and inaccessible. Therefore, sampling occurred at "Point A", visible in the image at right, from September 2013 until March 2014. In April 2014, MWQI acquired access to the upstream location, "Point B". Point B will be sampled starting April 2014 through the end of monitoring.

Access: We have the approval to access the dock to collect our water quality samples. Prior to arrival, call (916) 443-8400, and ask for Leo Chandler, Tommy Mims, or Mark Starache, and inform them that we are about to commence sampling. The hotel staff are accustom to kicking people off the dock, so we need to inform one of the three listed above so that doesn't happen. On arrival, park in the free parking area on the levee crown to the north end of the facility. They ask that we don't park in the "valet" area which is the lower levee area. Make sure you are doing everything by the book at this location (wear PFD, be clean). Due to some permit issues, we might be photographed so we want to look legit. On 7/29/13, John Williamson (DWR, levee inspections), said that we should be okay to access the dock if we have permission because the directive not to use the dock was specific to using the dock as a marina.

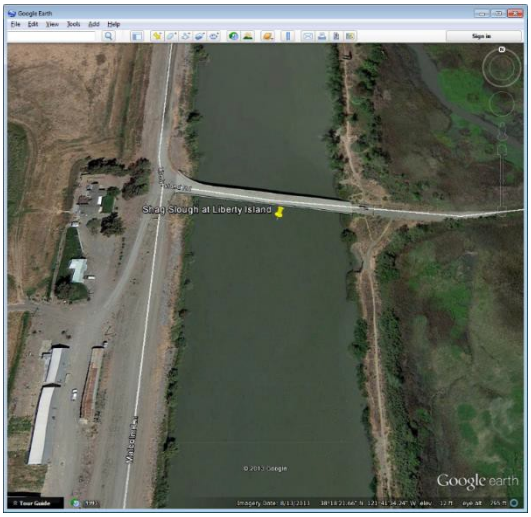
San Joaquin Node: San Joaquin River near Vernalis



Representativeness: Sample from monitoring station which is located near the outside bend in the river. During low water sample from the deck past the pump stand pipes. This will limit interference from the station drain line.

Access: Private access to the San Joaquin River Club SJRC. We have an entry permit that is specific to DWR. Other groups need to gain clear entry with the SJRC. Bring gate keycard for access. Our access permit is only for Chestnut Road so enter and exit via that route.

Yolo Bypass Node:
Shag Slough at Liberty Island (West Yolo Bypass Toe-drain)



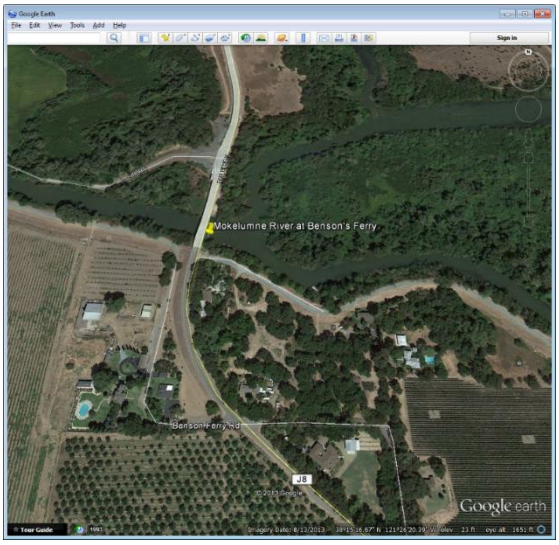
Representativeness: This site has been monitored for a few years now. The bridge site is a good, mid-channel monitoring location for the west Yolo toe drain.

Access: Site is publicly accessible. We access via boat as this is part of the Cache Slough Boat run.

Mokelumne and Cosumnes Nodes:
Mokelumne River at Benson's Ferry

Representativeness: Because sampling the lower Cosumnes is problematic we are monitoring the combined flow of the Cosumnes and Mokelumne just below the confluence of these two rivers. The original site, downstream at Wimpy's Marina, had too much tidal influence and so has been moved the site up to Benson's Ferry for this study.

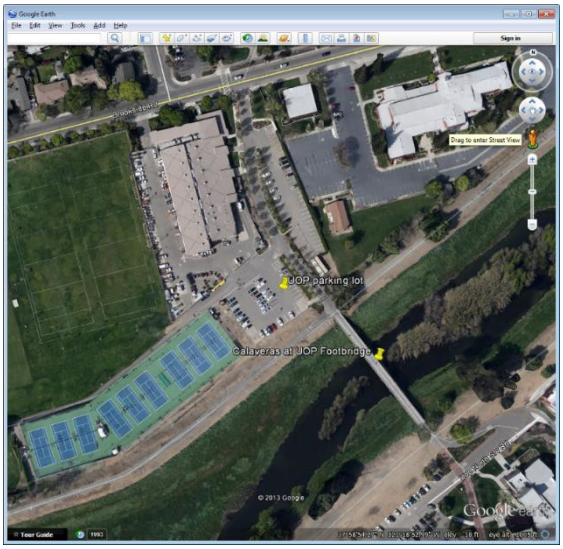
Access: Park at the south, upstream levee turnout. There is a no parking sign, but we should be okay according to NCRO. Just be prepared to move the vehicle if a land owner needs access. Use a spotter to pull out of the parking location due to poor visibility.



Calaveras Node: Calaveras River at UOP Footbridge

Representativeness: This site has been monitored for a few years now. The bridge site is a good, mid-channel monitoring location for the west Yolo toe drain although it can be shallow with submerged vegetation. Adjusting site across the channel is okay in order to find a clear path to representative water.

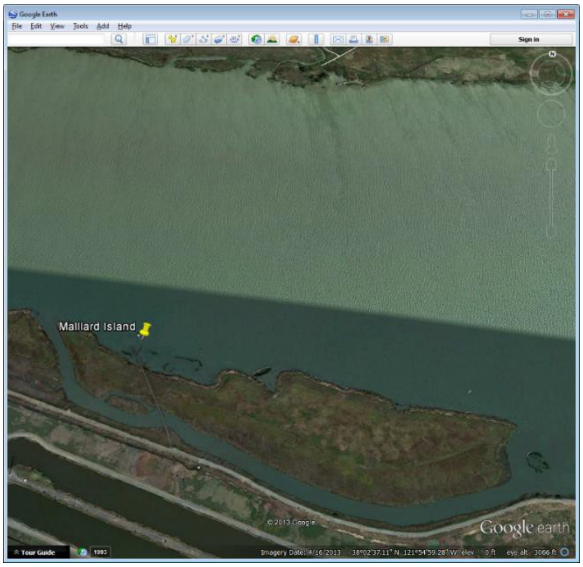
Access: Prior to arriving, call the UOP Police at 209-946-2537 to inform that we will be onsite. Park in employee lot off of Brookside Road which is also noted in the image at right.



Martinez Node: Sacramento River at Mallard Island

Representativeness: Martinez site was requested but since we are already sampling at Mallard and since continuous EC data is available at Martinez, Mallard will be used for discrete monitoring.

Access: Access through the company entrance for the old PG&E power plant. You will need to supply the guard your California driver's license and your DWR ID. Inform guard why you are there and that you will be accessing the water quality station via the western evacuation route.



3.5.3 Field Supplies and Equipment

All reagents and consumables will be inspected to ensure they are not expired prior to use.

See MWQI Field Manual (Appendix A) for required equipment and supplies. Processes not covered in the MWQI Field Manual are described in section 3.5.5, below.

3.5.4 Equipment Decontamination

See Appendix A for general instructions.

3.5.5 Collection of Water Samples

Collection of water samples will follow general procedures outline in the MWQI Field Manual (Appendix A), but some methods will be used in this study that are not covered in the MWQI Field Manual. These new methods are described in this section.

Chlorophyll Sampling

For Chlorophyll collection the following items are required:

1. Plastic filter funnel
2. Vacuum system (3-4 psi)
3. GF/F filters, (47 mm)
4. Plastic wash bottle, 500 mL, for MgCO3
5. Filter forceps
6. 500ml graduated cylinder
7. Plastic wash bottle, 500 mL
8. Opaque sample envelopes

Saturated Magnesium Carbonate Solution: Add 10 grams magnesium carbonate to 1000mL of DI water. The solution is settled for a minimum of 48 hours. Decant the clear solution in a new container for subsequent use. Only the clear "powder free" solution is used during subsequent steps.

Carry out the sampling and processing in subdued light, if possible. On board the boat, put the *Bimini* top up to shield out some light. Samples should be stored in dark conditions, on ice. Place filters, using forceps, textured side up. Assemble the filtration apparatus just prior to filtration. Spray a small amount of MgCO3 solution into the plastic filter funnel to wet the filter. Fill a graduated cylinder to 500ml, exactly. Actuate hand vacuum pump, not exceeding 3 psi. Pour sample from the graduated cylinder into the filter funnel. Only put as much sample on the filter as will pass through the filter. A 500ml samples is optimal, but less is okay if the filter is loading. If possible, use only a single filter. Two filters may be used if you believe the filter clogging is due to non-chlorophyll laden material. When all sample water has passed through the filter, allow vacuum to be maintained an extra 5-10 seconds to help remove moisture from filter. Using the forceps, fold and remove the filter and carefully place it into the bottom portion of the pre-labeled seal envelop. Make sure the 'green' side of the filter is folded in on itself. Record the volume of sample on the sample envelop. Place envelope in sealed plastic travel bag firmly between two well chilled blue ice packets. Make sure enveloped do not come in contact with additional moisture. Rinse processing apparatus with DI water to remove residual sample and stow.

CBOD/BOD Sampling

Collected CBOD/BOD samples will be <u>unfiltered</u> and collected directly into the sample container using the specially designed sampling apparatus. See figure 2 for photo of the sampling devices. Fill 1 quart poly bottle at 3 feet below surface and fill completely so that there is no head space (no air present) in sample. If you cannot fill completely, squeeze container until all air is removed and then install cap so that no air is present.

Figure 2. CBOD and BOD sampling devices

3.6 Monitoring Analyses and Measurements

Table 3, below, contains all of the analytes being collected specifically for this study. Table 4 shows the breakdown of *all* samples being collected at the DSM2 Nutrient study sites. These lists are not the same because some analyses are requested at these DSM2 project sites for other studies.

Table 3. Constituents to be monitored specifically for the DSM2 Nutrient Model:

Laboratory Analytes	Field Measurements
Nitrate	Dissolved Oxygen
~~Nitrite~~	Turbidity Specific
Ammonia	Conductance pH
Organic Nitrogen (TKN – NH3)	Temperature
Carbonaceous biochemical oxygen demand	
Biochemical oxygen demand	
Chlorophyll a & Pheophytin	
Organic Phosphorus (Total P-Ortho P)	
Orthophosphate	

Table 4. Sample Sites and Analytes to be collected associated with the DSM2 Nutrient Model

Site	Analysis	Containers
Johnson Sl. @ Robinson B9D75732454 (DUP)	whichever site is duplicated	whichever site is duplicated
Shag Sl. @ LibertyIslBr (west toe drain) B9S81841416	Standard Mineral(1), Bromide(36) Standard Nutrients(2) TOC(66) DOC(66D) UVA Turbidity (59) Suspended Solids (55) Chlorophyll CBOD & BOD (to contract lab) THMFP/HAAFP (to contract lab)	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 pint unfiltered 1 quart unfiltered 1 glass fiber filter in envelope 1 quart poly unfiltered 1 liter, amber glass filtered
Calaveras River @ UOP footbridge B9D75851188	Standard Mineral(1), Bromide(36) Standard Nutrients(2) TOC(66) wet oxidation DOC(66D) wet oxidation UVA Suspended Solids (55) Chlorophyll CBOD & BOD (to contract lab)	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 quart unfiltered 1 glass fiber filter in envelope 1 quart poly unfiltered
Mokelumne River @ Benson's Ferry B9D81531264	Standard Mineral(1), Bromide(36) Standard Nutrients(2) TOC(66) DOC(66D) UVA Suspended Solids (55) Chlorophyll CBOD & BOD (to contract lab)	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 quart unfiltered 1 glass fiber filter in envelope 1 quart poly unfiltered

San Joaquin River @ Vernalis B0702000	Standard Mineral(1), Bromide(36) Standard Nutrients(2) TOC(66) DOC(66D) UVA Turbidity (59) Chlorophyll Dissolved--As(11),Cu(16)Fe(17)Al(18)Mn(20) Total--As(11),Cu(16)Fe(17)Al(18)Mn(20) CBOD & BOD (to contract lab)	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 pint unfiltered 1 glass fiber filter in envelope 1 pint filtered (acid washed) 1 pint (acid washed) 1 quart poly unfiltered

Sacramento River @ Westin Hotel Boat Dock B9D832213010	Standard Mineral(1) Standard Nutrients(2) Chlorophyll CBOD & BOD (to contract lab)	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 1 glass fiber filter in envelope 1 quart poly unfiltered
Sacramento R.@ Mallard Is E0B80261551	Standard Mineral(1), Bromide(36) Standard Nutrients(2) TOC(66) wet oxidation DOC(66D) wet oxidation UVA Turbidity (59) Chlorophyll CBOD & BOD (to contract lab)	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 pint unfiltered 1 glass fiber filter in envelope 1 quart poly unfiltered

3.7 Chain of Custody Procedures

3.7.1 Bryte Lab

Follow standard Bryte Lab COC procedures (described in Bryte Lab QA Manual, Appendix G).

3.7.2 Contract Lab (Weck)

Follow procedures described in Appendix C (SOP: Sample Handling, Documentation, and Analysis), and Appendix D (Golden State Overnight Shipping Instructions).

3.8 Sample Handling and Transport

Field data sheets, COC's and sample container labels will be created using DWR Bryte Lab's FLIMS system. All requested analyses, including those submitted to contract labs, will be entered into FLIMS. Samples will be dropped off at Bryte Lab the same day as collection. If circumstance do not allow for same day delivery, samples will be stored under refrigeration until being delivered to Bryte, first thing the following morning. CBOD and BOD samples are not analyzed at Bryte lab and therefore must be sent to DWR's contract laboratory.

CBOD and BOD have short hold times and therefore will be shipped the same day to the contract lab. Ship under WECK's shipping contract number (see GSO shipping procedures). Once results are received, Field Section staff will record CBOD and BOD results in Bryte Lab's Chem Module software which will allow for these results to be accessible on the WDL.

3.9 Field Run Documentation and Forms

As with all FLIMS based field runs, documentation for this study will consist of:

1. FLIMS COC & Analysis request form
2. FLIMS Field Sheets (Record all times in Pacific Standard Time (PST))
3. FLIMS derived container labels

For the sub-contract laboratory (WECK) we will also print and fill:

1. WECK Chain of Custody
2. Golden State Overnight shipping form

See Sample Handling and Transport for sub-contract shipping

instructions. See Appendix F for examples of these forms.

3.10 Investigation-Derived Waste

There will be no special waste derived from field sampling operations.

3.11 Special Training Requirements and Certifications

For this one site on this study, MWQI staff will be required to sample from department vessels. For this reason, staff will take the DWR boat class, or receive California Department of Boating and Waterways certification prior to working on boats. In order to act as the vessel operator, staff must complete the USFWS Motorboat Operators Certification Course
(MOCC) and show sufficient aptitude on board the vessels to be granted operator status.

Field run staff must also read, understand and agree to follow this document, the MWQI General Sampling Plan and the
MWQI Field Safety Plan.

3.12 Field Quality Control Samples

Field run staff will following Bryte Lab and Weck Lab requirements for quality control samples, including the collection of one replicate sample for each analysis on each field run. This is commonly referred to as the duplicate site and is describe on the FLIMS field run paperwork. Additionally, *field blank* samples will be collected once per run for DOC, dissolved metals, and dissolved nutrients.

3.13 Laboratory Analysis

CBOD and BOD samples will need to be sent to a contract lab for analysis. The current sub-contract lab is:

Weck Laboratory
Laboratory Facilities
14859 East Clark Avenue
City of Industry, CA 91745
Phone: (626) 336-2139
Fax: (626) 336-2634
Contact: Brandon Gee

All other samples will be submitted to DWR's Bryte Lab for analysis. See Appendix G for *Bryte Lab QA Manual*.

Section 4. Data Management

4.1 DWR's Bryte Lab Data Management

DWR' Bryte Laboratory has its own data management system. See the Bryte Laboratory Manual for specifics.

All lab data analyzed by Bryte will be available on the Water Data Library within a 2 month time frame. This amount of time is required so that the lab chemists can analyze the samples and conduct QC activities, the lab manger can QC checked and released the results, and be uploaded to the DWR WDL website.

4.2 Contract Lab (Weck) Data Management

All lab data collected will be available on the Water Data Library within a 2 month time frame. This amount of time is required because contract lab data needs to be manually entered by MWQI staff. Depending on staff availability, there could be some delay in the data entry to DWR's Bryte Laboratory *Chem Module* database. Until the contract lab data is entered, all contract lab field run results will be unavailable. The two month time frame should give ample time for the data to be made available on the WDL.

The contract lab sample submittal process is outlined in

Appendix C. The Chem Module data entry process is

described in Appendix E.

4.3 Data Assessments and Response Actions

Analytical results for all monitoring locations will be available on DWR's Water Data Library (WDL) for analysis. Study lead will conduct spot checks of data to ensure that 1) data is available on the WDL, 2) replicate samples are within acceptance limits for replicates, and 3) no contamination is present based on the blank results.

The study lead will be responsible for these activities. If data is determined to be missing, the study lead will work with the appropriate parties to make sure the data gets to the WDL. If either the replicate samples or the blanks show problems, the study lead will take the appropriate steps to flag or remove the data from the WDL. No flagged or removed data will be deleted, only hidden from view on the public WDL website.

4.4 Reports to Management

Project status updates will be a routine part of MWQI Technical Advisor Committee (TAC) meetings. Part of the TAC meeting is completing written updates in the MWQI Program Status Report. A specific heading is listed in that report to give updates about this project. This will occur monthly.

Appendix A—MWQI's Field Sampling Plan

Appendix B—MWQI Field Safety Plan

Appendix C—SOP: Sample Handling, Documentation, and

Analysis Appendix D—Golden State Overnight Shipping

Cache Slough Complex Pre-Restoration Baseline Monitoring

Version#: 1.0 **Date : 8/6/13**

Project Name: Write out the entire, specific name.

Cache Slough Complex Pre-Restoration Baseline Monitoring

Sponsor/Program Manager	Cindy Garcia
Project Manager	Steven San Julia

Project Objective Statement: What must the project do? By When? Keep this statement to 25 words or less. Make it SMART (Specific, Measurable, Achievable, Relevant, and Time-based).

By September 1, 2013, develop monitoring plan and commence monitoring of analytes of concern to municipal water agencies at sites upstream and downstream from proposed Cache/Yolo Complex restoration in a manner that will allow for restoration drinking water quality impacts to be measured.

Triple Constraint Trade-off:

Resources	S	Select a different flexibility letter for each constraint N= Not Flexible S= Somewhat Flexible M= Most Flexible
Schedule	N	
Scope	M	

Estimated Start Date:	9/1/13	**Estimated End Date:**	At finish of restoration

Project Deliverables: What is the project going to produce? Create a list of tangible products that will result from project.

Monitoring Plan, Data available on WDL

Strategic Fit: What is the Strategic Initiative Identifier for this project?

Agreed to part of the MWQI 13/14 Workplan

Customer: Who are you doing the project for?

MWQI Contractors, and other Cache Slough Monitoring interests (FRPA, Aquatic Ecology, Methyl-Mercury Group)

Customer Benefits: What customer requirements does this project address? Relate these to: increase revenue, avoid costs, improve service, and/ or comply with a mandate? Create a short list of customer benefits.

Water Quality data for Cache Slough Complex pre-restoration. Make data available.

Success Determination Factors: How will the success of the project be determined from the customer's perspective? Make criteria measurable so there is no doubt as to the project's success. Create a short list.

Data will be available and when analyzed will accurately describe the pre-restoration water quality of the cache slough complex.

Assumptions and Constraints: What assumptions were made in defining project? Are there constraints to the execution of project? List assumptions and constraints.

Water Quality will be affected by changes in the land use in the Cache Slough Complex. Data can be collected that will accurately reflect the water quality in the Cache Slough Complex. Restoration projects will be complete. FRPA monitoring will not occur fast enough for MWQI's funding contractors.

Project Background: What is the primary motivation for this project? Include a brief high level description of the business area, the current situation, the desired situation, and the gaps that exist. This summary builds on your description in the Project Initiation form.

Planned habitat restoration activities in the Cache/Yolo Complex will have unknown impacts to in-stream water quality and therefore, restoration efforts may result in additional costs to drinking water municipalities treating thru-Delta water. The development of a planned FRPA monitoring program, which was addressed in Phase 1 (Cache/Yolo Complex Baseline WQ Monitoring Project-Phase 1, dated 2/26/13), has either not developed quickly enough or has neglected to meet drinking water quality concerns brought forward by the MWQI program. The MWQI program will develop its own monitoring program to answer questions and concerns of drinking water contractors funding the MWQI program. Based on the selected monitoring program, MWQI will collect baseline drinking WQ data near the proposed restoration sites with the goal of creating a data set that will define pre-restoration water quality in the Cache Slough Complex. Once restoration efforts are complete a comparison between pre and post restoration water quality will be possible allowing drinking water contractors to see how restoration efforts have affected the water quality at municipal intakes.

Project Scope:

In Scope: List areas and functionality included in project.	**Out of Scope:** List areas and functionality not included in project.
Collect WQ samples in and below the Cache Slough Complex. Collect samples that will benefit WQ questions in the complex. Make data available on WDL.	Not WQ related. Not related to the 8000 acre restoration requirement.

Dependent Projects: What projects must be underway or completed before this project can be successful?

This project cannot reach it natural endpoint until the complete 8000 acre restoration requirement has been met.

Risks: What characteristics or situations could cause this project to fail? Identify those items which are outside the jurisdiction of project and could result in a "show-stopper" to the project success. Create a short list.

Contractors cut funding to this monitoring program. Access issues arise. Monitoring boats become unavailable. Contract lab changes. Bryte can't handle the increase in samples. Change in ability for collaborating groups to collect samples.

Environmental Stewardship and Sustainability Considerations: What is the process that will be used to ensure compliance with the Environmental Stewardship Policy? Include the Environmental Stewardship Coordinator and team members (this can be roles instead of specific names)

No impact to the environment from this activity, so no environmental coordinator necessary. No waste material will be thrown overboard during monitoring other than unused sample water and small amounts of deionized (clean) water. All solid waste will be disposed of in the proper receptacles. This monitoring project will provide data that can be used determining environmental effects of restoration.

Environmental Stewardship Coordinator:	n/a

Major High-Level Milestone Targets: What events measure progress? E.g. Initiation Approved, Analysis Comple

Milestone	Target
Create Draft Monitoring Plan	7/13
Complete Final Monitoring Plan	9/13
Begin Monitoring Activities	9/13
Make Data Available on the WDL	10/13
End of Monitoring	n/a

Project Core Team Members:

Team Member	Phone/E-mail	Role
Steven San Julian	916-371-2284	Project lead
Alex Rabidoux	707-455-1106	Study design
Elaine Archibald	916-736-3713	Study design
Gina Benigno	916-376-9767	Study design/monitoring
Jared Frantzich	916-376-9823	Study design/monitoring
Carol Digiorgio	916-376-9743	Study design/monitoring
MWQI Field Staff	916-322-5786	monitoring

Charter Version Number: 1	
Updated By:	**Date:**
Approved By:	**Date:**

Funding Information:

Project Budget:	**$ 105,000 /year**
Fund Center Title	Water Quality Assessment
Fund Center Number	VWQASSMENT13
Organization	DWR-Municipal Water Quality Investigations
Contact Person	Steven San Julian
Phone/E-mail	916-371-2284; sjulian@water.ca.gov

This Project Should Have: Check all that apply

Project Management Plan ☐	Environmental Stewardship Plan[1] ☐	Work Breakdown Structure ☐	Communications Plan ☐	Procurement Plan ☐	Human Resources Plan ☐
Quality Management Plan ☐	Stakeholder Register ☐	Risk Register ☐	Project Budget ☐	Project Schedule ☐	DWR Form 1498 ☐
Project Safety Plan[2] ☐					

[1] See WREM 58b for more information about creating an Environmental Stewardship Plan.

[2] All project Managers must take into account safety policies and procedures for projects. A safety plan should be created if needed. For more information visit the Workplace Safety Project web site.

Project Initiation--Cache/Yolo Complex Baseline WQ Monitoring, Phase 1

Date: 02/26/2013

Project Details

Existing Problem/Need/Opportunity: *Does something need to be fixed? Updated? Created? Expanded? Helped?*

Planned habitat restoration activities in the Cache/Yolo Complex will have unknown impacts to in-stream water quality and therefore, may result in additional costs to drinking water municipalities treating thru-Delta water. Currently, other DWR groups and sister agencies are looking to initiate baseline monitoring efforts as required by the FRPA agreement. The proposed FRPA monitoring program is still in the initial phase of development. It is unclear if drinking water quality concerns will be covered by the FRPA monitoring plan and when such monitoring might commence. Additionally, it is unclear what monitoring activities might already be active in the area and how tidal and watershed events may impact monitoring site selection.

Solution: *How will this project fulfill the above?*

During Phase 1, MWQI will work to ensure drinking water quality concerns are addressed in FRPA monitoring. MWQI will provide staff resources to research and define existing monitoring activities and hydrodynamic modeling in the Cache/Yolo Complex. With MWQI resources in play, the goal is to implement an appropriately scaled and designed monitoring program through existing FRPA monitoring requirements while limiting MWQI involvement in on-the-ground monitoring activities.

Project Objective Statement: *What will the project do? What does it look like?*

Work with and give momentum to FRPA to implement a water quality monitoring program that takes drinking water quality concerns into account, and that accurately defines baseline WQ conditions in the Cache/Yolo Complex prior to planned FRPA restoration efforts.

1.3. Target Start Date:	3/1/13	Target End Date:	At "build out" of Cache/Yolo Complex restoration (~5yrs?)
1.4. Proposed Project Manager(s):	Steve San Julian		
Proposed Project Sponsor(s):			

Authorization: *Specify if there is a mandated reason for project (e.g. Legislative; executive; water code, other).*

Partners

Within DWR:	Mitigation and Restoration Branch, other DWR monitoring groups
Other Agencies:	Cal. Fish & Wildlife (DFG), State Drinking Water Contractors
Federal Agencies:	
Local Organizations:	

Benefits and Consequences

Project is completed:	There is a higher likelihood that drinking water quality concerns will be addressed in FRPA monitoring program and that the chosen monitoring plan will more quickly be implemented. Pre restoration water quality monitoring results will be available. With additional, post restoration monitoring the impacts of will be measurable.
Project is not completed:	The FRPA baseline monitoring program would develop without the input of MWQI and drinking water quality interests. On-the-ground monitoring activities may take longer to commence.

Environmental Stewardship and Sustainability Considerations

Considerations: *Describe the process that will be used to ensure compliance with the Environmental Stewardship Policy*

There would be no negative impacts to the environment from this study, and would provide useful monitoring data in accordance with the Environmental Stewardship Policy.

Signatures

Prepared By: _____ Date: _____

Reviewer: _____ Date: _____

Project Recommended ☐ Project Not Recommended ☐

Reason(s):	

Project Initiation--Cache/Yolo Complex Baseline WQ Monitoring, Phase 2

Date: 2/26/13

Project Details

Existing Problem/Need/Opportunity: *Does something need to be fixed? Updated? Created? Expanded? Helped?*

Planned habitat restoration activities in the Cache/Yolo Complex will have unknown impacts to in-stream water quality and therefore, restoration efforts may result in additional costs to drinking water municipalities treating thru-Delta water. The development of a planned FRPA monitoring program, which was addressed in Phase 1 (Cache/Yolo Complex Baseline WQ Monitoring Project-Phase 1, dated 2/26/13), has either not developed quickly enough or has neglected to meet drinking water quality concerns brought forward by the MWQI program.

Solution: *How will this project fulfill the above?*

The MWQI program will refine FRPA monitoring or develop its own monitoring program to answer questions and concerns of drinking water contractors funding the MWQI program. Based on the selected monitoring program, MWQI will collect baseline drinking WQ data near the proposed restoration sites with the goal of creating a data set that will define pre-restoration water quality in the Cache/Yolo Complex. Once restoration efforts are complete a comparison between pre and post restoration water quality will be possible allowing drinking water contractors to see how restoration efforts have affected the water quality at municipal intakes.

Project Objective Statement: *What will the project do? What does it look like?*

Develop monitoring plan and conduct monitoring of analytes of concern to municipal water agencies at sites upstream and downstream from proposed Cache/Yolo Complex restoration in a manner that will allow for restoration drinking water quality impacts to be measured.

1.5. Target Start Date:	7/1/13	Target End Date:	At "build out" of Cache/Yolo Complex restoration (~5yrs?)
1.6. Proposed Project Manager(s):	Steve San Julian		

Proposed Project Sponsor(s):

Authorization: *Specify if there is a mandated reason for project (e.g. Legislative; executive; water code, other).*

Partners

Within DWR:	Mitigation and Restoration Branch, other DWR monitoring groups
Other Agencies:	Cal. Fish & Wildlife (DFG), State Drinking Water Contractors
Federal Agencies:	
Local Organizations:	

Benefits and Consequences

Project is completed:	Pre restoration water quality monitoring results will be available. With additional, post restoration monitoring the impacts will be measurable.
Project is not completed:	FRPA would eventually institute a baseline monitoring program, but it may not occur on MWQI's timeline and/or may not include pertinent drinking water quality monitoring. Based on this there may not be timely pre-restoration drinking water quality data available to compare against post restoration drinking water quality.

Environmental Stewardship and Sustainability Considerations

Considerations: *Describe the process that will be used to ensure compliance with the Environmental Stewardship Policy*

There would be no negative impacts to the environment from this study, and would provide useful monitoring data in accordance with the Environmental Stewardship Policy.

Signatures

Prepared By: _____ Date: _____

Reviewer: _____ Date: _____

Project Recommended ☐ Project Not Recommended ☐

Reason(s):

Cache Slough Complex Pre-Restoration Baseline Monitoring Quality Assurance & Monitoring Plan V.1

Cache Slough Complex Pre-Restoration Baseline Monitoring Quality Assurance & Monitoring Plan V.1

For *Phase 2* project described in the MWQI 13/14FY Workplan

MWQI Program

November 4, 2013

Steven San Julian

steven.sanjulian@water.ca.gov

916-371-2284

Contents

Section 1. Purpose of Monitoring

In the coming years, numerous ecologically driven restoration projects are planned for construction in the Cache Slough Complex. The Cache Slough Complex includes the Yolo Bypass, North Bay tributaries draining into the Delta, and in-Delta, Sacramento River connected sloughs. Tied to the Delta Smelt Biological Opinions, numerous restoration projects of various sizes are planned, and a total of over 8000 acres could eventually be restored. These planned habitat restoration activities will have unknown impacts to in-stream water quality and therefore, may result in additional costs to drinking water municipalities treating thru-Delta water. Currently, other DWR groups and sister agencies are looking to initiate baseline monitoring efforts as required by the FRPA agreement. The proposed FRPA monitoring program is still in the initial phase of development. It is unclear if drinking water quality concerns will be covered by the FRPA monitoring plan and when such monitoring might commence. For this reason, MWQI will commence its own monitoring program to ensure pre-restoration water quality data is available to compare against post restoration water quality. Phase 1 part of this project, which is not covered in this monitoring plan, is for MWQI to work with FRPA to get drinking water quality concerns addressed in the FRPA monitoring plan. Both phases will run concurrently.

Section 2. Sample Design and Rational

In this plan, all major inputs and outflows, from the area commonly referred to as the Cache Slough Complex, will be monitored. Samples sites were initially selected to be monitored from shore, but due to issues related to access and representativeness, monitoring will be conducted by boat. When possible, station locations were positioned near existing flow gaging stations. See Section 3.4 for specific monitoring location overview.

Since the goal of this study is to describe pre-restoration water quality conditions, sites have been selected in each of the main tributaries to the lower Cache Slough. Sampling will occur in Lindsey Slough at Hastings Bridge, upper Cache Slough (below Ulatis Creek), Shag Slough (west Yolo bypass toe-drain), south tip of Liberty Island, Lisbon Weir (east Yolo bypass toe-drain), Sacramento Deep Water Channel (about mid-Prospect Island), Miner Slough above Prospect Island, Miner slough near the bottom of Prospect island, and finally, downstream, where all of these waters combine, in the lower Cache Slough above Elkhorn Slough.

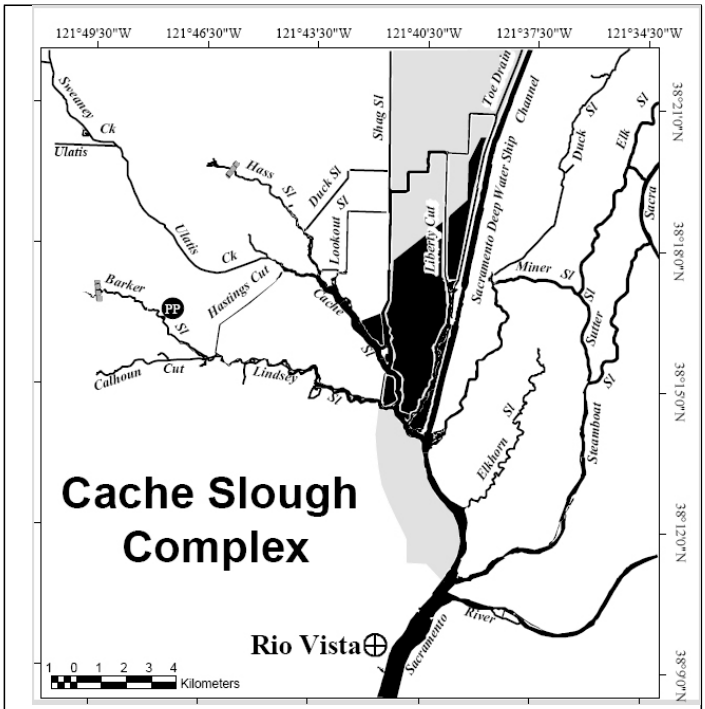


Figure 1. Map of Cache Slough Complex

Monitoring on a tidally consistent basis has benefit, but due to logistical concerns will not take place. The amount of time required to collect samples from all sites cannot occur at the same phase of the tidal cycle (sampling all sites takes about 3.5 hours), and using multiple boats and crews is not feasible at this point. Additionally, short hold time analyses, such as BOD and CBOD, need to be shipped immediately and tidally based sampling might result in key shipping times with our preferred shipper, Golden State Overnight (GSO), being missed. Therefore, monitoring runs will start at relatively consistent times (6-7am), and will occur roughly every two weeks with all samples being collected on the same day but not necessarily at the same time in the tidal cycle. In-situ instruments, such as YSI sondes, are planned to be installed in the near future and may aid in analysis of the non-tidally driven monitoring data.

The monitoring sites have been selected based on the assumption that the data will describe pre-restoration water quality in the Cache Slough Complex. To ensure that the data meeting this end, MWQI, the MWQI Technical Advisory Committee (TAC), FRPA staff, and other DES interests will continually assess the results and make adjustments to the monitoring design as necessary. Adjustments made will result in edits to this monitoring plan, and each successive *accepted* edit will be given a version number as in *V.1*. Completed revisions will be distributed to those listed in Table 1.

2.1 Sampling Timeframe

As described in the MWQI FY13/14 Workplan, monitoring activities are planned to last 1 year starting Aug 1, 2013 (actual first sampling event occurred September 2013). During the development of the FY14/15 workplan, the timeframe for this study may be extended, and changes may be made to the sampling locations and constituents. During initial discussions, project sponsors showed interest in this study continuing until all restoration projects were complete. This project may go on that long, but continued monitoring will be decided each year during MWQI workplan development.

2.2 Funding Considerations

THMFP/HAAFP samples need to be sent to a contract lab for analysis. Bryte Lab analyses are charged on overhead so there is no direct charge for these samples to the MWQI program, but the contract lab samples need to be paid directly out of MWQI funds. For informational purposes, the value of Bryte Lab analytical support for this study would cost roughly $60,000/year if the MWQI program was charged directly. The contract lab charges, per sample, $330 for HAAFP and $75 for THMFP. Therefore, outside of labor costs, the estimated cost of conducting the contract lab part of this study is $90,000 for the 13/14 fiscal year. All of these charges will be paid for by the MWQI program under the VWQASSMENT13 internal order code. Staff resources will be used preparing these samples for shipment, coordination with contract lab, and inputting contract lab results into DWR's WDL database. These costs are accounted for in MWQI's FY13/14 budget.

For this study, MWQI will be borrowing a boat from the DWR's Environmental Water Quality and Estuarine Studies Branch (EWQES). A resource agreement has been developed to supply EWQES reimbursement for MWQI's use of their equipment. This additional cost is unknown at this time, so has not been added onto the studies total cost.

It is estimated that 6 full staff days (including overtime) will be needed each week that monitoring is conducted. This is equal to 12 staff days per month. The average hourly rate for employees is assumed to be $100. Therefore the annualized labor cost will be approximately $15,000.

Total estimated costs for this study including contract lab costs (not including Bryte Lab), and labor is $105,000.

Section 3. Field Sampling Plan

3.1 Project Organization and Responsibilities

The MWQI Field Section is taking the lead on this study, but many parties will be involved in various aspects of this study. See Table 1 for the listed responsibilities.

Table 1. Cache Slough Complex Study Responsibilities Matrix

Staff Member	Position	Responsibilities
Steven San Julian, MWQI Field	Study Lead/Project Manager	General coordination and management, field run scheduling, boat scheduling, boat operator, and field run staff
Arin Conner, MWQI Field	Field Staff	Boat operator, field run staff
Travis Brown, MWQI Field	Field Staff	Field run staff, contract lab shipping coordinator
Jeremy Del Cid, MWQI Field	Field Staff	Field run staff, THMFP/HAAFP Chem module data entry and coordination
Mark Bettencourt, MWQI	Field Staff	Boat operator, field run staff
Jared Frantzich, DWR, Aquatic Ecology	Aquatic Ecology Coordinator	Monitoring design support and calibration, and Lisbon Weir sample collection/coordinator.
Sid Fong, DWR, Bryte Lab	Bryte Lab Director	Receive/Analyze/Report lab samples associated with this study with the exception of THMFP/HAAFP samples
Brandon Gee, Weck Lab	Weck Lab Contact	Send specialized sampling and shipping containers, analysis of THMFP/HAAFP samples, and deliver analytical results to Sid Fong and Jeremy Del Cid
Carol DiGiorgio, DWR	Methyl Mercury Coordinator	Monitoring design support and calibration
Gina Benigno, DWR, FRP	FRPA Coordinator	Monitoring design support and calibration
Alex Rabidoux, SWCA	SWC Study Partner and SWCA Coordinator	Monitoring design support and calibration
Cindy Garcia, MWQI	Program Manager	Study funding and approval
Elaine Archibald, SWPCA Rep.	Project Sponsor	Study funding and design support

3.2 Field Activities Safety Considerations

Employee safety is a chief concern during all field work. Conditions in the field can change rapidly and it is important for field staff to be adequately prepared for such changes. For this study in particular, additional hazards will be present related to boat work. Prior to every field run, a safety tailgate meeting will be conducted by the boat operator with all run staff present. Topics discussed should related to the hazards described in the Job Hazard Analysis. Also, prior to departing the office for this field run, the boat operator needs to complete a boat pre-operation checklist and a float plan. The float plan describes information such as which boat is being used, who is on the boat, where the boat will be, and contact information for run staff. The float plan is to be entrusted to a responsible party at the office (not on the field run) who is in charge of ensuring that the run staff return to the office by the planned time.

The boat operator and field run staff must follow all boating and waterway rules. Field run staff need to do as directed by the boat operator as the boat operator has the ultimate responsibility for staff safety. Weather and water conditions may be hazardous. Prior to leaving the office in the morning, the boat operator needs to check weather and water conditions. If the conditions are deemed unsafe, the run will be cancelled. Again, once the crew arrives on site at the boat ramp conditions need to be assessed. If the operator or field run staff are uncomfortable with the conditions, they have the authority to cancel the run.

When onboard any vessel, staff are required to wear a personal floatation device (PFD).

On boat-based monitoring runs, MWQI staff need to bring the Boat Safety Bag on the vessel. The boat safety bag contains:

1. Field Safety Plan Binder
2. Type IV throw-able floatation device
3. Collapsible paddle
4. Beacon light
5. Signal horn
6. Eye wash
7. Flashlight
8. First aid kit
9. Throw rope
10. Paper towels
11. CPR mask
12. Emergency blankets
13. Waterproof chart book, bay/delta
14. gloves

Based on initial field reconnaissance and staff experience, a job hazard analysis was completed that describes all of the tasks and possible hazards associated with the field component of this study. The complete JHA is in Appendix H. Aside from the hazards and procedures described here and in the JHA, field run staff need to read and understand the MWQI Field Safety Plan (Appendix B). The Safety Plan contains additional safety related information of which all field employees need to be aware.

3.3 Field Sampling Schedule

Sampling at the sites will be bi-weekly (twice a month) at all sites. Sampling will occur during the first full week of the month at the same time as MWQI's routine monthly monitoring and current special study monitoring. Sampling will occur roughly every two weeks. Because sampling will occur from a boat, conditions may result in field runs being cancelled. Such occurrences will be noted. An attempt will be made to reschedule on another day during the early part of the same week, but if this is not feasible, the run will be cancelled. Because MWQI is borrowing a boat from another DWR group, MWQI is responsible for scheduling field runs as far in advance as possible. Because of the consistent schedule for this study, MWQI will try to schedule the boat for 6 months into the future.

3.4 General Field Sampling Locations

Figure 2. Map of all sampling sites

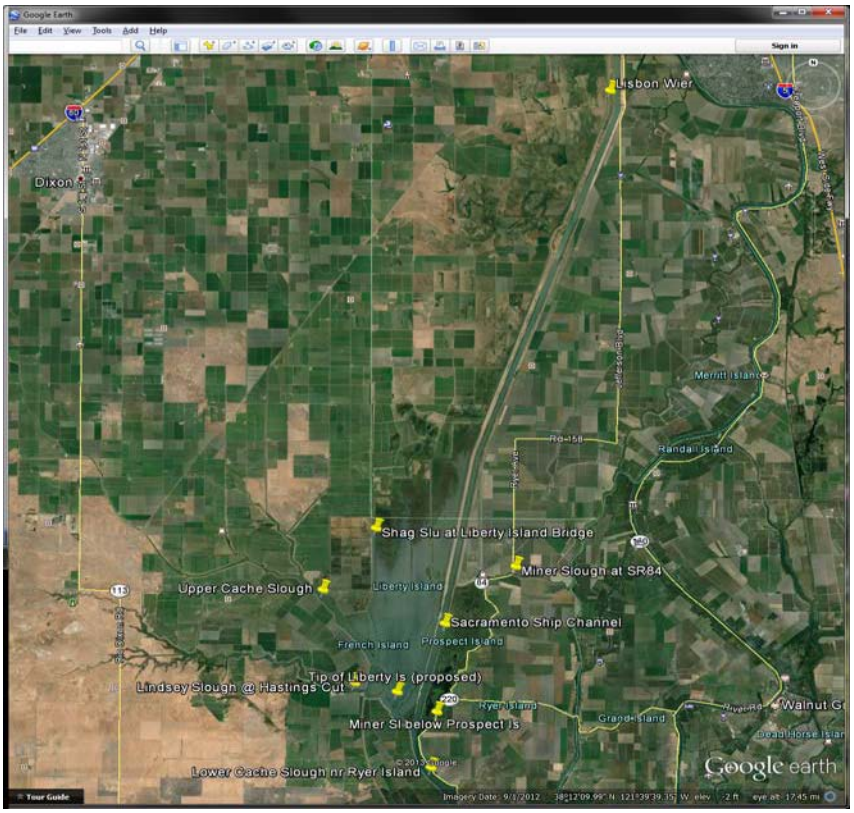


Table 3. Cache Slough Monitoring Locations

Station Name	Station ID#	Latitude	Longitude
Lindsey Slough at Hastings Bridge (Barker/Lindsey Slough)	B9D81481421	38°14'46.84"N	121°42'8.83"W
Upper Cache Slough	B9D81701460	38°16.954'N	121°42.992'W
Lisbon Weir (East Yolo Bypass Toe-drain)	B9D82851352	38°28'36.07"N	121°35'19.30"W
Shag Slough at Liberty Island (West Yolo Bypass Toe-drain)	B9S81841416	38°18'23.47"N	121°41'34.60"W
Miner Slough above Prospect Island (highway 84 bridge)	B9D81751379	38°17'29.89"N	121°37'51.06"W
Miner slough below Prospect Island	B9D814103910	38°14'6.18"N	121°39'57.55"W
Cache Slough nr. Ryer Island gaging station	B9D81281401	38°12.799'N	121°40.115'W
Sacramento Deep Water Channel	B9D81621397	38°18.436'N	121°39.231'W
Southern Tip of Liberty Island	B9D81461410	38°14'34.16"N	121°41'0.99"W
Little Slough @ French Cut (Duplicate Site)	B9D42136142	n/a	n/a

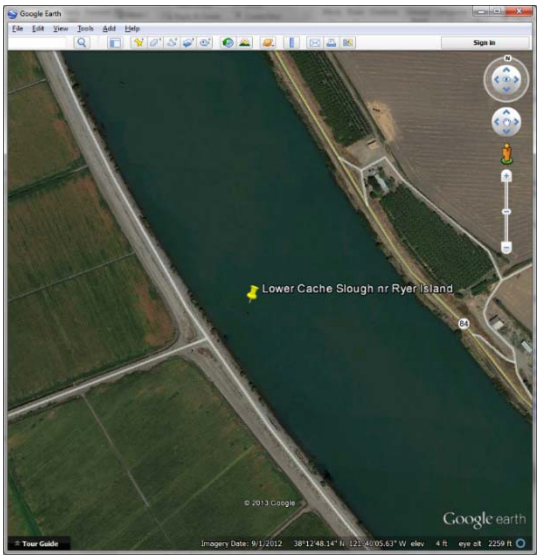
3.5 Field Monitoring and Sampling Methods

3.5.1 Sampling Vessels

Monitoring activities will take place aboard Department of Water Resources' vessels. We currently have the approval to use the EWQES Branch vessel commonly referred to as the *Stryker*. The boat will be trailered from West Sacramento and deployed at the Rio Vista Boat Ramp. Launch at this location is free to state agencies. The Stryker is appropriately sized for the monitoring task at hand, has sounding equipment for GPS location and depth measurements, and has mounting brackets for sampling equipment. Additionally, the Stryker has a Bimini Top to help protect run staff and collected samples from the elements. An additional vessel, commonly referred to as the *Whaler*, may be used at times. The Whaler will handle rough conditions better, but does not have a Bimini top to protect staff and samples from the elements.

3.5.2 Station Positions

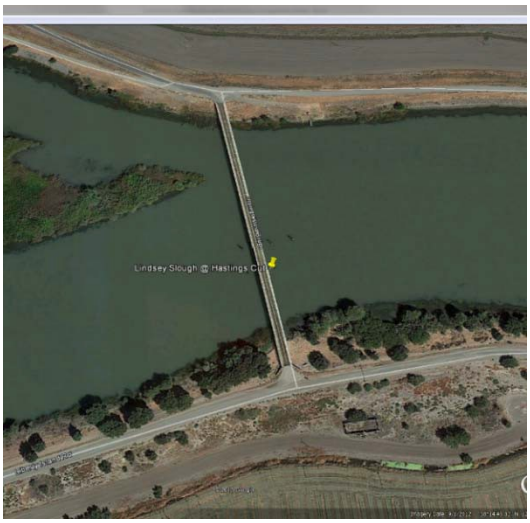
Below are the specific locations of all 9 sites. All sites are monitoring on the boat run with the exception of the Lisbon Weir site which is collected by the Aquatic Ecology section. At each site the location of sample collection should be mid-channel and approximately 3 feet below the surface of the water. If depth is less than 5 feet, sample form the middle of the water column. Sample within 50 feet of the positions listed, and closer if possible. On water travel time from Rio Vista to the 8 sites and back takes approximately 3 hours. Adding in time for processing, on water time will be roughly 6 hours. NOTE: The sites should be sampled in the following order!



Lower Cache Slough nr. Ryer Island @ 38°12.799'N 121°40.115'W

Representativeness: Mid-channel location near the USGS gaging station. At this location it is possible that the water body might not be adequately mixed. Such instances will be noted.

Access: No access issues by boat.

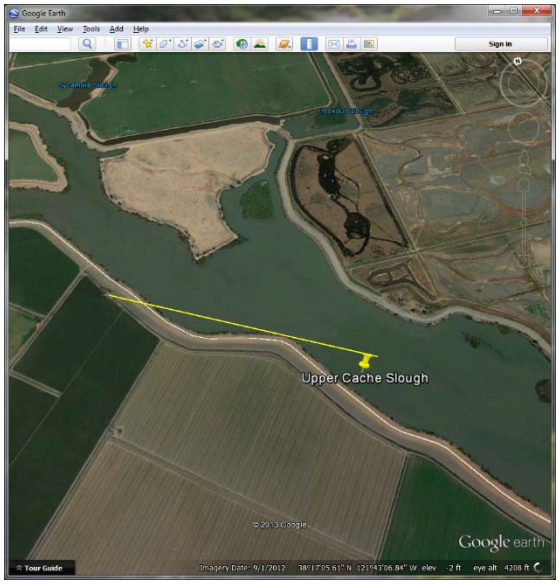


Lindsey Slough at Hastings Bridge@ 38°14'46.84"N 121°42'8.83"W

Representativeness: Good, mid-channel monitoring location (from bridge) that is intended to describe water quality in the Lindsey Slough drainage to Cache Slough.

Access: Private Bridge and levees. Selected because other groups (SCWA) already monitor at this location (add what is being monitored). Alex recommends monitoring from the SCWA monitoring shed on the northeast side of the bridge. If sampling by land, will use the SCWA's entry permit as we are sampling for SCWA. When boat sampling access is not an issue. Location of station is about 10 minutes off of highway 12.

Upper Cache Slough @ 38°16.954'N 121°42.992'W



Representativeness: Representative of the upper Cache Slough above Shag Slough connection**.** Might move this site to be near existing USBR station (CCS), but CCS is farther upstream and will add travel time, so to start, will monitoring at this location.

Access: Not accessible by land without accessing private levees (RD 2060). Will need temporary entry permit (TEP) or similar to access by land, but since we are boat sampling this is not an issue.

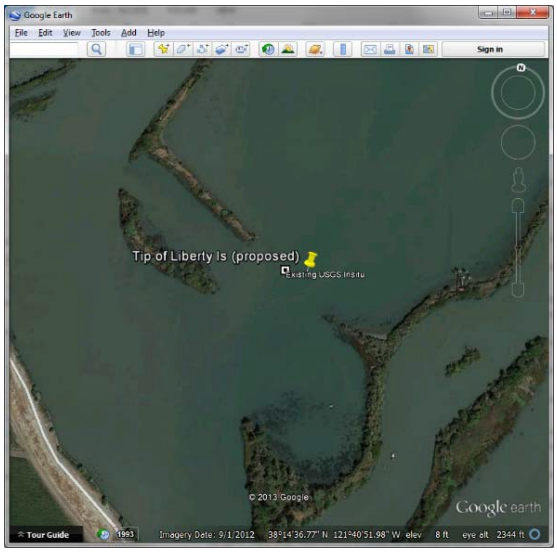
Line of sight: Positioned mid-channel, line up the bend in the river with the power poll for correct sampling position.

Shag Slough at Liberty Island (West Yolo Bypass Toe-drain) @ 38°18'23.47"N 121°41'34.60"W

Representativeness: This site has been monitored for a few years now. The bridge site is a good, mid-channel monitoring location for the west Yolo toe drain.

Access: Site is publicly accessible but is a long drive. Site will be sampled by boat for this study.

South Tip of Liberty Island @ (38°14'34.16"N 121°41'0.99"W)



Representativeness: Located at the southern tip of the flooded Liberty Island and near the existing USGS station. Site intended to describe water quality exiting and entering onto Liberty Island.

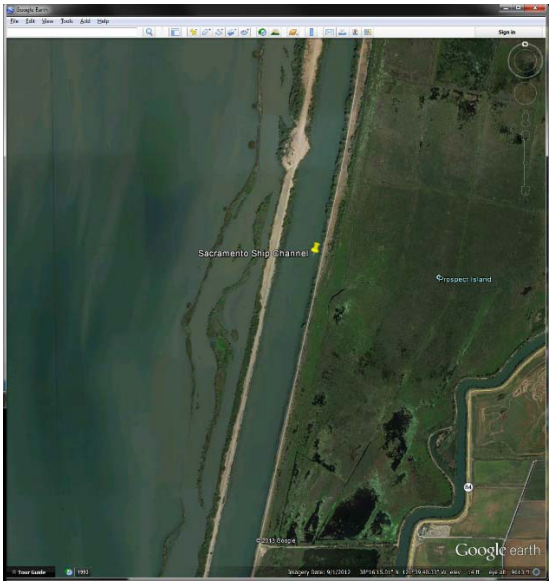
Access: No access issues by boat.

Caution: Wind and current can quickly move boat onto/off of Liberty or into remnant levees! Lots of underwater hazards on Liberty, so don't go much north of the USGS buoy.

Sacramento Deep Water Channel (SDWC) @ 38°18.436'N 121°39.231'W

Representativeness: Location is at channel marker 54? which is located about half way up Prospect Island. A USGS gaging station is located on this channel marker.

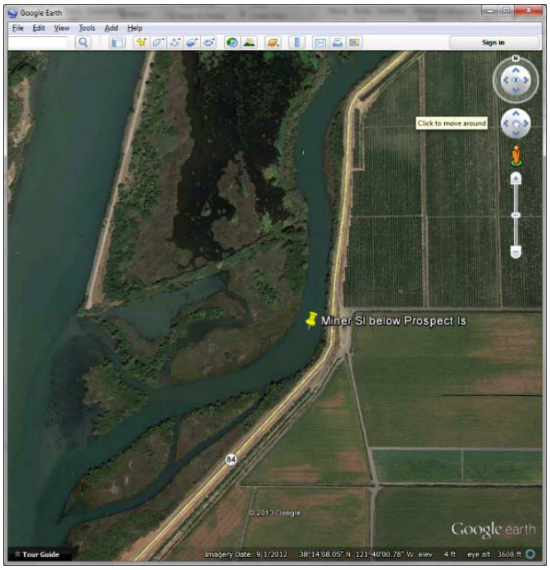
Access to both: Land access would be through Port of West Sacramento gate. Have access permission and do not need to check in. Access through 'FedEx gate' with port key, or through I80 adjacent gate with PG&E key. Port Phone Number: 916-373-5800. Since we are sampling from boat, access is not an issue.



Miner slough below Prospect Island @ 38°14'6.18"N 121°39'57.55"W

Representativeness: Mid-channel location. Site is selected because it is below any proposed breach in Prospect Island. May move this site nearer to planned gaging/insitu monitoring site, but site location not certain yet.

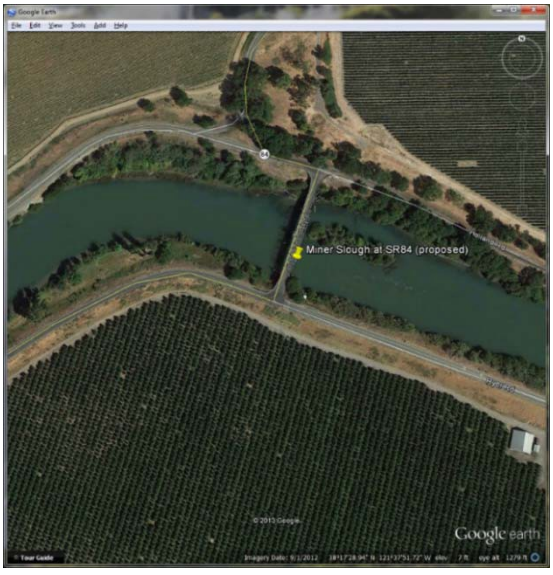
Access: No access issues by boat. Take main, middle channel. It doesn't look this obvious from the water.



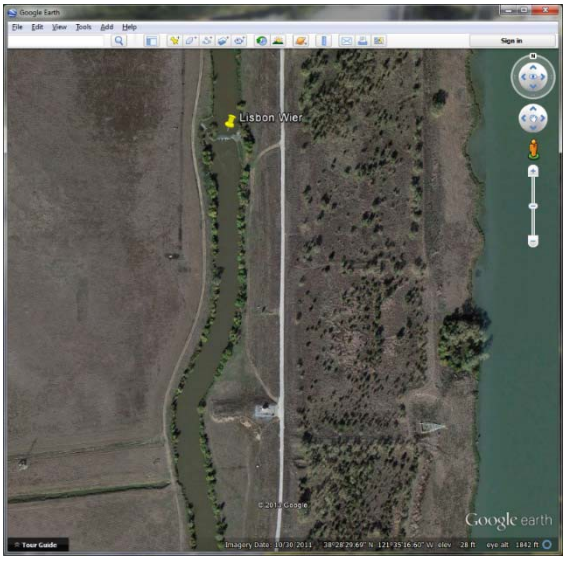
Miner Slough above Prospect Island (highway 84 bridge) @ 38°17'29.89"N 121°37'51.06"W

Representativeness: This is a good, mid-channel sampling location that will be very representative of upper Miner Slough above any levee breach on Prospect Island.

Access: When approaching the Arrowhead Marina at the top of Prospect, no wake until you are safely past the moored houseboats. Also, be cautious of shallow conditions at the bend near these houseboats.



Lisbon Weir (East Yolo Bypass Toe-drain) @ 38°28'36.07"N 121°35'19.30"W



DWR's Aquatic Ecology Section will collect this sample and attempt to do so on the same day as the rest of the collection.

Representativeness: Representative of the east Yolo toe drain. Gaging station and continuous sonde present on site. Upstream of tidal restoration projects and downstream of Putah Creek mouth. Proposed re-routing of Putah creek mouth may make adjustment to this site necessary as we would want to stay downstream of Putah to keep general flow conditions of site consistent (need to check on this). Sample from shore. Pin shows sample site upstream of weir, but Jared may be sampling downstream, near gaging station.

Access: Clear to enter port gates and access Lisbon. No contact necessary. Access through 'FedEx gate' with port key, or through I80 adjacent gate with PG&E key.

3.5.3 Field Supplies and Equipment

All reagents and consumables will be inspected to ensure they are not expired prior to use.

See MWQI Field Manual (Appendix A) for required equipment and supplies. Processes not covered in the MWQI Field Manual are described in section 3.5.5, below.

3.5.4 Equipment Decontamination

See Appendix A for general instructions.

3.5.5 Collection of Water Samples

Collection of water samples will follow general procedures outline in the MWQI Field Manual (Appendix A), but some methods will be used in this study that are not covered in the MWQI Field Manual. These new methods are described in this section.

3.5.5.1 Boat Sampling

With boat sampling, some variations in sampling technique will be required. The sampling equipment and methodology is described below. When collecting samples on this study, the following setup will required:

1. 12 volt DC, peristaltic pump with *cigarette lighter or* battery clamp power connection
2. Power source (12 volt battery or *cigarette lighter* auxiliary connection)
3. Peristaltic pump tubing
4. 0.45 micron capsule filters
5. Capsule to peristaltic tube connection fittings
6. Stainless steel bucket
7. churnsplitter
8. short sampling cable
9. PVC conduit to house YSI probe
10. Sample preservative
11. CBOD/BOD sampling pole

Once at sampling site, ensure the vessel is located at the correct position in the channel. Look for appropriate shore based markers, channel markers, etc. Boat should be positioned so that the sample intake is upstream of the boat motor. Prior to sampling, flush 2 quarts of DI water through capsule filter and collect blanks, if appropriate. One run staff (*the filter staff*) will be responsible for sample collection from water body, and *dissolved* sample processing. The other run staff (*the field staff*) will be responsible for taking YSI and turbidity field measurements, chlorophyll sample processing, and total sample collection. Sample collection and YSI probe should be located 3 feet below the surface (or ½ the distance to the substrate, if less than 6 feet).

Filter Staff: First, collect sample with bucket. After container rinsing, fill bucket and churnsplitter approximately half full of sample water. Set aside, and prepare sample bottles for both total and dissolved constituents. Next, place peristaltic tubing in sample bucket and turn on peristaltic pump. Allow ½ quart of sample water to pass through the capsule filter prior to collecting "dissolved" samples. Rinse plastic containers 1 time with sample water unless preservative is already in container. Once this is complete, pump sample water from tube, and then begin flush with DI water. Flush peristaltic pump tubing with 2 quarts DI water. Pump DI water out of tubing (some residual water in line is okay). Stow filter apparatus.

Field Staff: First, take YSI measurement directly from the water body. YSI measurements will be read to the boat operator so that he can record results on field sheet. Next, process chlorophyll sample (see section below). Collect all 'total' samples and fill turbidity cell from churnsplitter. Rinse plastic sample containers 1 time with sample water unless preservative is already in container. Read turbidity measurement result off to boat operator. Rinse YSI probe with DI water and put into storage container. Rinse and add storage DI water to turbidity cell. Stow all items.

Depending on the speed at which staff are moving some of these activities can move from one staff to another.

3.5.5.2 Chlorophyll Sampling

For Chlorophyll collection the following items are required:

1. Plastic filter funnel
2. Vacuum system (3-4 psi)
3. GF/F filters, (47 mm)
4. Plastic wash bottle, 500 mL, for MgCO3
5. Filter forceps
6. 500ml graduated cylinder
7. Plastic wash bottle, 500 mL
8. Opaque sample envelopes

Saturated Magnesium Carbonate Solution: Add 10 grams magnesium carbonate to 1000mL of DI water. The solution is settled for a minimum of 48 hours. Decant the clear solution in a new container for subsequent use. Only the clear "powder free" solution is used during subsequent steps.

Carry out the sampling and processing in subdued light, if possible. On board the boat, put the *Bimini* top up to shield out some light. Samples should be stored in dark conditions, on ice. Place filters, using forceps, textured side up. Assemble the filtration apparatus just prior to filtration. Spray a small amount of MgCO3 solution into the plastic filter funnel to wet the filter. Fill a graduated cylinder to 500ml, exactly. Actuate hand vacuum pump, not exceeding 3 psi. Pour sample from the graduated cylinder into the filter funnel. Only put as much sample on the filter as will pass through the filter. A 500ml samples is optimal, but less is okay if the filter is loading. If possible, use only a single filter. Two filters may be used if you believe the filter clogging is due to non-chlorophyll laden material. When all sample water has passed through the filter, allow vacuum to be maintained an extra 5-10 seconds to help remove moisture from filter. Using the forceps, fold and remove the filter and carefully place it into the bottom portion of the pre-labeled

seal envelop. Make sure the 'green' side of the filter is folded in on itself. Record the volume of sample on the sample envelop. Place envelope in sealed plastic travel bag firmly between two well chilled blue ice packets. Make sure enveloped do not come in contact with additional moisture. Rinse processing apparatus with DI water to remove residual sample and stow.

3.5.5.3 THMFP/HAAFP Sampling

Collected THMFP/HAAFP samples will be filtered to 0.45 micron as has been done in the past on other MWQI studies. *Standard Methods* does not clarify if the analysis requires filtered or unfiltered water. All previous THMFP/HAAFP samples collected by MWQI have been filtered, and therefore, samples will be filtered for this study. Follow the collection procedure outlined in the DWR Field Manual. Fill 1 liter amber bottle so that there is no head space (no air present) in sample.

3.6 Monitoring Analyses and Measurements

In Table 5, some analyses listed are not specific to the Cache Slough Complex study. The discrepancy is the result of other ongoing studies where monitoring has been requested. The Table 5 constituent list represents the combined sample request for multiple studies. Table 4 lists the Cache Slough Complex Study specific constituents.

Table 4. Constituents at the sites being specifically collect for the Cache Slough Pre-Restoration Monitoring Project

Laboratory Analytes	Field Measurements
Standard Minerals Standard Nutrients (DWR 28-day method) TOC/DOC THMFP/HAAFP Bromide UVA Total Suspended Solids Chlorophyll	Dissolved Oxygen Turbidity Specific Conductance pH Temperature

Table 5. Cache Slough Complex Sample Sites and Constituents, FY 13/14.

Site	Analysis	Containers
Little Slough @ French Cut-- B9D42136142 (DUP)	whichever site is duplicated	whichever site is duplicated
Shag Sl. @ LibertyIslBr (west toe drain) B9S81841416	Standard Mineral, Bromide Standard Nutrients TOC DOC UVA Suspended Solids Chlorophyll CBOD & BOD THMFP/HAAFP	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 quart unfiltered 1 glass fiber filter in envelope 2 liter, unfiltered 1 liter, glass amber
Lindsey Slough at Hastings Bridge B9D81481421	Standard Mineral, Bromide Standard Nutrients (28d DWR Method) TOC DOC UVA THMFP/HAAFP Suspended Solids Chlorophyll	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 liter glass, amber 1 quart unfiltered 1 glass fiber filter in envelope
Upper Cache Slough B9D81701460	Standard Mineral, Bromide Standard Nutrients (28d DWR Method) TOC DOC UVA THMFP/HAAFP Suspended Solids Chlorophyll	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 liter glass, amber 1 quart unfiltered 1 glass fiber filter in envelope
Sacramento Deep Water Channel (SDWC) B9D81621397	Standard Mineral, Bromide Standard Nutrients (28d DWR Method) TOC DOC UVA THMFP/HAAFP Suspended Solids Chlorophyll	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 liter glass, amber 1 quart unfiltered 1 glass fiber filter in envelope
Miner Slough at Highway 84 bridge B9D81751379	Standard Mineral, Bromide Standard Nutrients (28d DWR) TOC DOC UVA THMFP/HAAFP Suspended Solids Chlorophyll	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 liter glass, amber 1 quart unfiltered 1 glass fiber filter in envelope
Miner Slough below Prospect Island B9D814103910	Standard Mineral, Bromide Standard Nutrients (28d DWR) TOC DOC UVA THMFP/HAAFP Suspended Solids Chlorophyll	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 liter glass, amber 1 quart unfiltered 1 glass fiber filter in envelope
Cache Slough nr. Ryer Island gaging station B9D81281401	Standard Mineral, Bromide Standard Nutrients (28d DWR) TOC DOC UVA THMFP/HAAFP Suspended Solids Chlorophyll	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 liter glass, amber 1 quart unfiltered 1 glass fiber filter in envelope
South Tip of Liberty Island B9D81461410	Standard Mineral, Bromide Standard Nutrients (28d DWR) TOC DOC UVA THMFP/HAAFP Suspended Solids Chlorophyll	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 liter glass, amber 1 quart unfiltered 1 glass fiber filter in envelope
Lisbon Weir (East Yolo Bypass toe-drain) B9D82851352	Standard Mineral, Bromide Standard Nutrients (28d DWR) TOC DOC UVA THMFP/HAAFP Suspended Solids Chlorophyll	1 quart filtered; ½ pint, filtered/fix ½ pint filtered, ½ pint unfiltered 40ml clear w/acid 40ml clear w/acid filtered 1/2 pint filtered 1 liter glass, amber 1 quart unfiltered 1 glass fiber filter in envelope
Filtered Blank	DOC oxidation	40ml clear w/acid filtered
Nutrient Blank - Filtered	Standard Nutrients	½ pint filtered

Physical Parameters collected at all sites: Temperature, pH, Turbidity, Dissolved Oxygen, and Specific Conductance
Code 1 – Standard Mineral analysis includes: Ca, Mg, Na, K, S, Cl, B, Alkalinity, Nitrate, Dissolved Solids, and Specific Conductance
Code 2 – Standard Nutrient analysis includes: Nitrate + Nitrite, Kjeldahl Nitrogen, Organic Nitrogen and Ammonia, Total Phosphorus (unfiltered), and Ortho-Phosphate
Chlorophyll – Chlorophyll a and Pheophytin a

3.7 Chain-of-Custody Procedures

3.7.1 Bryte Lab

Follow standard Bryte Lab COC procedures (described in Bryte Lab QA Manual, Appendix G).

3.7.2 Contract Lab (WECK)

Follow procedures described in Appendix C (SOP: Sample Handling, Documentation, and Analysis), and Appendix D (Golden State Overnight Shipping Instructions).

3.8 Sample Handling and Transport

THMFP/HAAFP analysis has an undefined hold time according to Standard Methods. In place of a firm hold time *Standard Methods* says that "samples should be processed immediately, but if that is not possible, store at 4^{0}C and analyze as soon as possible." The contract laboratory, WECK Labs, says that formation potential hold times are 14 days *after the samples are preserved and the process begins*. We will handle the THMFP/HAAFP samples similar to previous samples sent to the contract lab. Samples will all be collected over two days and stored in a refrigerator at <4^{0}C. One shipment for all samples will be scheduled to occur on day 2 or, on the morning of day 3. This will allow for analysis to commence within 5 days at the contract lab.

CBOD and BOD samples collected at Shag Slough have a short hold time of 48 hours and need to be shipped to Weck Lab *the same day they are collected*.
See Appendix C for SOP of sample handling and documentation, and Appendix D for Golden State Overnight shipping instructions.

3.9 Field Run Documentation and Forms

As with all FLIMS based field runs, documentation for this study will consist of:

1. FLIMS COC & Analysis request form
2. FLIMS Field Sheets (Record all times in Pacific Standard Time (PST))
3. FLIMS derived container labels

For the sub-contract laboratory (WECK) we will also print and fill:

1. WECK Chain of Custody
2. Golden State Overnight shipping form

See Sample Handling and Transport for sub-contract shipping instructions.

3.10 Investigation-Derived Waste

There will be no special waste derived from field sampling operations.

3.11 Special Training Requirements and Certifications

For this study, MWQI staff will be required to sample from department vessels. For this reason, staff will take the DWR boat class, or receive California Department of Boating and Waterways certification prior to working on boats. In order to act as the vessel operator, staff must complete the USFWS Motorboat Operators Certification Course (MOCC) and show sufficient aptitude on board the vessels to be granted operator status.

Field run staff must also read, understand and agree to follow this document, the MWQI General Sampling Plan and the MWQI Field Safety Plan.

3.12 Field Quality Control Samples

Field run staff will following Bryte Lab and Weck Lab requirements for quality control samples, including the collection of one replicate sample for each analysis on each field run. This is commonly referred to as the duplicate site and is

describe on the FLIMS field run paperwork. Additionally, *field blank* samples will be collected once per run for DOC, dissolved metals, and dissolved nutrients.

3.13 Laboratory Analysis

THMFP/HAAFP will need to be sent to a contract lab for analysis. The current contract is with Weck Labs.

Weck Laboratory
Laboratory Facilities
14859 East Clark Avenue
City of Industry, CA 91745
Phone: (626) 336-2139
Fax: (626) 336-2634
Contact: Brandon Gee

All other samples will be submitted to DWR's Bryte Lab for analysis. See Appendix G for *Bryte Lab QA Manual*.

4.0 Data Management

4.1 DWR's Bryte Lab Data Management

DWR' Bryte Laboratory has its own data management system. See the Bryte Laboratory Manual for specifics.

All lab data collected will be available on the Water Data Library within a 2 month time frame. This amount of time is required because contract lab data needs to be manually entered by MWQI staff. Depending on staff availability, there could be some delay in the data entry to DWR's Bryte Laboratory *Chem Module* database. Until the contract lab data is entered, all field run results, including those analyzed by Bryte Lab, will be unavailable. The two month time frame should give ample time for the data to be made available on the WDL.

4.2 Contract Lab (WECK Labs) Data Management

All lab data collected will be available on the Water Data Library within a 2 month time frame. This amount of time is required because contract lab data needs to be manually entered by MWQI staff. Depending on staff availability, there could be some delay in the data entry to DWR's Bryte Laboratory *Chem Module* database. Until the contract lab data is entered, all field run results, including those analyzed by Bryte Lab, will be unavailable. The two month time frame should give ample time for the data to be made available on the WDL.

The contract lab sample submittal process is outlined in Appendix C.

The Chem Module data entry process is described in Appendix E.

4.3 Data Assessments and Response Actions

Analytical results for all monitoring locations will be available on DWR's Water Data Library (WDL) for analysis. Study lead will conduct spot checks of data to ensure that 1) data is available on the WDL, 2) replicate samples are within acceptance limits for replicates, and 3) no contamination is present based on the blank results.

The study lead will be responsible for these activities. If data is determined to be missing, the study lead will work with the appropriate parties to make sure the data gets to the WDL. If either the replicate samples or the blanks show problems, the study lead will take the appropriate steps to flag or remove the data from the WDL. No flagged or removed data will be deleted, only hidden from view on the public WDL website.

4.4 Reports to Management

Project status updates will be a routine part of MWQI Technical Advisor Committee (TAC) meetings. Part of the TAC meeting is completing written updates in the MWQI Program Status Report. A specific heading is listed in that report to give updates about this project. This will occur monthly.

Information to be discussed:

1. Monitoring updates
2. Results of performance evaluations & audits
3. Results of periodic data quality assessments
4. Any significant QA problems
5. Monitoring design re-evaluation

Aside from updates to the TAC, additional communication will occur with other groups monitoring within the *Cache Slough Complex*. MWQI monitoring updates will be provided to FRPA on an as needed basis.

Appendix A—MWQI's Field Sampling Plan

Appendix B—MWQI Field Safety Plan

Appendix C—SOP: Sample Handling, Documentation, and

Analysis Appendix D—Golden State Overnight Shipping

Instructions Appendix E—*Chem Module* Contract Lab Data Entry

Appendix F—Required Study Forms

Appendix G—Bryte Lab QA Manual

Delta RMP Pathogen Monitoring

PROJECT INITIATION

Date: 06/12/2014

Project Details

Existing Problem/Need/Opportunity: *Does something need to be fixed? Updated? Created? Expanded? Helped?*

Pathogen monitoring is needed in the San Joaquin Delta to comply with the Long Term 2 Enhanced Surface Water Treatment Rule (LT2).

Solution: *How will this project fulfill the above?*

MWQI will collaborate with the Drinking Water Policy Group and the Delta Regional Monitoring Program (RMP) to advise in the development or, and conduct the monitoring of pathogens and indicator organisms in the Sacramento-San Joaquin Delta.

Project Objective Statement: *What will the project do? What does it look like?*

Starting in July 2014, MWQI will advise the Drinking Water Policy Work Group and Delta RMP in their development of a Delta pathogen monitoring plan, and starting in April 2015 and ending in March 2017, MWQI will conduct a coordinated, short-term monitoring effort with the Drinking Water Policy Work Group and Delta RMP to monitor pathogens and indicator organisms at key locations in the Sacramento-San Joaquin River Delta.

1.7. Target Start Date:	July 1, 2014	Target End Date:	March 31, 2017

1.8. Proposed Project Manager(s):	Steven San Julian

Proposed Project Sponsor(s):	Cindy Garcia/Elaine Archibald

Authorization: *Specify if there is a mandated reason for project (e.g. Legislative; executive; water code, other).*

Monitoring is mandated by LT2, but MWQI has not been mandated to monitor. MWQI's funding agencies are mandated to monitor and so are interested in having MWQI conducting the mandated monitoring.

Partners

Within DWR:	n/a
Other State Agencies:	
Federal Agencies:	
Local Organizations:	Drinking Water Policy Working Group, Delta RMP, SWPCA, treatment entities

Benefits and Consequences

Project is completed:	MWQI has advised the development of the Delta Pathogen Monitoring plan, and all MWQI monitoring activities have been completed and reported.
Project is not completed:	MWQI has not advised the development of the Delta Pathogen Monitoring plan, and has not completed monitoring activities or ensured that the results have been reported.

Environmental Stewardship

Policy Applicable: ☐ Policy Not Applicable: ☐

Reason(s):	Monitoring of water quality does not have any environmental impact that would need to be addressed through the Environmental Stewardship Policy.

Signatures

Prepared By: _____ Date: _____

Reviewer: _____ Date: _____

Project Recommended ☐ Project Not Recommended ☐

Reason(s):	

Science Support (Special Studies)

7.1.1 Nutrient Budget Study

IO# VNTDYNSTDY13 – hours 1144 – budget $110,968

State of California | DEPARTMENT OF WATER RESOURCES | California Natural Resources Agency

Nutrient Budget Study- Initiation Form

Date: 06/03/13

Project Details

Existing Problem/Need/Opportunity: *Does something need to be fixed? Updated? Created? Expanded? Helped?*

A number of adverse impacts occur when nutrients are present in drinking water supplies at concentrations that exceed natural background levels. Therefore, there is a need to know how nutrients are changing overtime in the Delta.

Solution: *How will this project fulfill the above?*

Study nutrients dynamics in the Delta.

Project Objective Statement: *What will the project do? What does it look like?*

Study nutrient dynamics in the Delta.

Target Start Date:	7/1/13	**Target End Date:**	
Proposed Project Manager(s):	Marcia Scavone-Tansey		
Proposed Project Sponsor(s):	Rachel Pisor		

Authorization: *Specify if there is a mandated reason for project (e.g. Legislative; executive; water code, other).*

Partners (organizations that will be benefited with this publication)

Within DWR:	Bay-Delta Office
Other State Agencies:	CalFED, CalTrans, California Department of Boating and Waterways. CDPH
Federal Agencies:	US Bureau of Reclamation, USEPA, USFWS
Local Organizations:	State Water Contractors, WARMF

Benefits and Consequences

Project is completed:	Information from nutrient trend analysis will help the DWR, the contractors, and other partners to manage nutrients in the Delta.
Project is not completed:	No information from nutrient trend analysis will be presented.

Environmental Stewardship

Policy Applicable: ☐ **Policy Not Applicable:** ☐

Reason(s):

Signatures

Prepared By: _____ **Date:** _____

Reviewer: _____ **Date:** _____

Project Recommended ☐ **Project Not Recommended** ☐

Reason(s):

NOTE: Once The Project Initiation document is completed and approved, please send a copy to your Division Chief and digital version sent to the Project Services Office for filing. (Even if the Initiation is not approved, please send a copy to PSO.)

DWR 9704 (New 6/11)

Nutrient Budget Study Timeline

Task Name	Start	Finish	Observation
Identify key components of the SWP to include in the study	June/13	June/13	
Phase 1:			
1. Obtain water quality and flow/pumping data for Phase 1 locations	July 7/13	Sept/13	
2. Develop time series graphs for Phase 1 locations	Oct/13	Dec/13	
3. Conduct additional data analysis for Phase 1 locations	Jan/14	Mar/14	
Phase 2a:			
4. Develop methodology for Phase 2a (Delta) locations	Apr/14	Apr/14	
5. Obtain water quality and flow/pumping data for Phase 2a locations	Apr/14	Apr/14	
6. Develop time series graphs for Phase 2a locations	May/14	May/14	
7. Analyze Phase 2a data	May/14	May/14	
8. Analyze Phase 1 data	July/14	July/14	
Phase 2b:			
9. Develop methodology for Phase 2b (San Luis Complex) locations	Aug/14	Aug/14	
10. Obtain water quality and flow/pumping data for Phase 2b locations	Aug/14	Aug/14	
11. Develop time series graphs for Phase 2b locations	Sept/14	Sept/14	
12. Analyze Phase 2b data	Sept/14	Sept/14	
13. Conduct additional data analysis for Phase 2b locations	Sept/14	Sept/14	
Phase 2c:			
14. Develop methodology for Phase 2c (Inflow) locations	Oct/14	Oct/14	
15. Obtain water quality and flow/pumping data for Phase 2c locations	Oct/14	Oct/14	
16. Develop time series graphs for Phase 2 c locations	Nov/14	Nov/14	
17. Analyze Phase 2c data	Nov/14	Nov/14	
18. Conduct additional data analysis for Phase 2c locations	Nov/14	Nov/14	
Phase 2d:			
19. Develop methodology for Phase 2d (Pyramid and Castaic Lake) locations	Dec/14	Dec/14	
20. Obtain water quality and flow/pumping data for Phase 2d locations	Dec/14	Dec/14	
21. Develop time series graphs for Phase 2d locations	Jan/15	Jan/15	
22. Analyze Phase 2d data	Jan/15	Jan/15	
23. Conduct additional data analysis for Phase 2d locations	Jan/15	Jan/15	
Phase 2e:			
29. Develop methodology for Phase 2f (Lake Silverwood) locations	Feb/15	Feb/15	
30. Obtain water quality and flow/pumping data for Phase 2f locations	Feb/15	Feb/15	
31. Develop time series graphs for Phase 2 f locations	Mar/15	Mar/15	
32. Analyze Phase 2f data	Mar/15	Mar/15	
33. Conduct additional data analysis for Phase 2f locations	Mar/15	Mar/15	
34. Submit Draft Report to DWR management and SWPCA for Review	Apr/15	May/15	
35. Incorporate edits	June/15	July/15	
36. Submit Draft Report to DWR Editors for formatting and editorial review	Aug/15	Sept/15	
37. Final report published	Oct/15	Nov/15	
PS: The Nutrient Budget Study is an on-going project that can change according to results. Therefore, it is the way that the project is being developed up to now according to the changes agreed- on 10/3/13.			

7.1.2 Nutrient Limitation Study

IO# VLIMNUTLIM14 – hours 360 – budget $34,920

Version: 1.1 Date: 12 June 2014

Project Name: *Write out the entire, specific name.*

7.1.2 SWP Limnology: Nutrient Limitation Study

Sponsor/Program Manager	Rich Losee/Cindy Garcia
Project Manager	Ted Swift

Project Objective Statement: *What must the project do? By When? Keep this statement to 25 words or less. Make it SMART (Specific, Measurable, Achievable, Relevant, and Time-based).*

This paper study will use the data assembled in Project 7.2.1 and literature information to investigate the theoretical nutrient limitation as it might occur over space and time in the SWP. to investigate potential for nutrient limitation for algae and macrophytes that occur in the Delta, aqueducts and lakes of the SWP in specific seasons.

Triple Constraint Trade-off

Resources	N	*Select a different flexibility letter for each constraint* *N= Not Flexible* *S= Somewhat Flexible* *M= Most Flexible*
Schedule	S	
Scope	M	

Estimated Start Date:	July 2014	Estimated End Date:	September 2014

Project Deliverables: *What is the project going to produce? Create a list of tangible products that will result from project.*

- Spreadsheet & other documents calculating nutrient ratios at locations known to be sources of problematic algal or macrophyte growth.
- Progress report summarizing results of data analysis.
- Pending decision on progress report, a final report as an official MWQI work product OR results to be combined with results from other Limnology Project studies.
- Evaluation reporting feasibility of developing a nutrient status index for selected SWP locations within MWQI data products (e.g., RTDF Water Quality Report).
-

Strategic Fit: *What is the Strategic Initiative Identifier for this project?*

This project supports MWQI's mission of providing knowledge based support for operational decision-making and conducting scientific studies of drinking water importance.

Customer: *Who are you doing the project for?*

This project is a component of the overall Limnology Project, for which the customer is the Municipal Drinking Water Contractors (MWQI SPC) and the DWR O&M Water Quality Branch.

Customer Benefits: *What customer requirements does this project address? Relate these to: increase revenue, avoid costs, improve service, and/ or comply with a mandate? Create a short list of customer benefits.*

The SWP Contractors have identified problems, issues, and concerns associated with drinking water quality of the SWP, caused by biological activity within the SWP. Improved management of these problems can be achieved by gaining applicable knowledge of the limnology and ecology of organisms that produce these problems, and use of this knowledge to develop optimal control and treatment strategies. Investigating the feasibility of a nutrient status index will provide the Contractors with decision support information to decide whether to implement a nutrient status index that would predict likelihood of algal blooms or changes in algal species. These will assist optimal control and treatment strategies will reduce treatment costs, improve reliability, and improve drinking water customer satisfaction.

Success Determination Factors *How will the success of the project be determined from the customer's perspective? Make criteria measurable so there is no doubt as to the project's success. Create a short list.*

This project will be a success if it determines if, and if so where and when, nutrient limitation (e.g., nitrogen and/or phosphorus ratios needed for algal and/or macrophyte growth fall outside those found in the literature) occurs at locations within the dataset assembled in Project 7.2.1; if it clearly and completely reports those findings; and if it clearly spells out the feasibility of developing a nutrient status index for selected locations in the SWP.

Project Background: *What is the primary motivation for this project? Include a brief high level description of the business area, the current situation, the desired situation, and the gaps that exist. This summary builds on your description in the Project Initiation form.*

Drinking water quality is important to the 25 million customers of the State Water Project, and the drinking water contractors must meet government health and safety requirements for drinking water. Biological activity in the SWP affects water quality by producing compounds that negatively affect taste and odor, disinfection byproduct precursors, and changing pH, which in turn affects treatment plant operations. These increase costs for the water purveyors and affect customer satisfaction for the ultimate consumers. The current situation is that the contractors have many examples of these biological effects, yet little is known about the precise sources of the problems and the feasibility of reducing and/or controlling them. The desire is to understand the limnology of the SWP well enough to produce recommendations for actions or operational changes that would improve water quality, reduce treatment costs, and improve regulatory compliance. One mechanism that affects biological activity is nutrient limitation, in which a vital nutrient (e.g., nitrogen, phosphorus) is in short supply and limits biological activity and/or shifts biological activity to an ecological community that can better tolerate the nutrient limitation.

Project Scope:

In Scope: *List areas and functionality included in project.*	Out of Scope: *List areas and functionality <u>not</u> included in project.*
* Lit. review of nutrient limitation for Melosira, T&O-producing algae, and submerged macrophytes found or likely to be found in the SWP. * Analyze the nutrient data from Project 7.1.1 for nutrient ratios, times and places within the data set. * Investigate feasibility of developing nutrient status index for selected locations in SWP.	* Literature search of all reports of nutrient limitation. A * Greatly extend the 7.1.1 data set, other than spot-checks. * Implement nutrient status index data flow (real-time or manual)

Dependent Projects: *What projects must be underway or completed before this project can be successful?*

This Project depends on Project 7.1.1 Phase 1 being substantially complete. Work can commence without 7.1.1 Phase 2 completion, but conclusions will only extend over time periods and locations for which data are available. Literature review relies on access to the electronic literature catalogs, which the State doesn't provide, but which Ted Swift presently has through an affiliate computer account at UC Davis. This is expected to be available through the duration of the project.

Risks: *What characteristics or situations could cause this project to fail? Identify those items which are outside the jurisdiction of project and could result in a "show-stopper" to the project success. Create a short list.*

* Available data may be of such unknown quality or insufficient quantity that conclusions are limited to fewer locations or time periods than expected. This is not a "show stopper" that would cause complete project failure, but would reduce the conclusions' scope of applicability. The project would still be an improvement on the present state of knowledge. Production of nutrient status index (this project will evaluate feasibility) may involve significant data-flow development to automate process.

Assumptions and Constraints: *What assumptions were made in defining project? Are there constraints to the execution of project? List assumptions and constraints.*

Assumptions: Sufficient data of sufficient quality will be available for analysis (very likely); sufficient knowledge exists (from literature) of nutrient limitation characteristics for species of interest (very likely); subject matter experts have sufficient knowledge to arrive at optimal conclusions.
Constraints: Funding ("resources" in triple constraints, above) and therefore time are co-constraints.

This Project Should Have: *Check all that apply*

Project Management Plan	Environmental Stewardship Plan	Work Breakdown Structure	Communications Plan	Procurement Plan	Human Resources Plan
☐	☐	■	☐	☐	☐
Quality Management Plan	**Stakeholder Register**	**Risk Register**	**Project Budget**	**Project Schedule**	**DWR Form 1498**
☐	■	☐	■	■	☐

Major High-Level Milestone Targets: *What events measure progress? E.g. Initiation Approved, Analysis Complete.*

Milestone	Target Date
Conduct literature review of nutrient limitation for Melosira, T&O producing algae and submersed macrophytes.	29 July 2014
Examine nutrient ratios	29 July 2014
Develop nutrient status index	15 Aug 2014
Submit Draft Progress Report to DWR management and MWQI SPC for review	29 Aug 2014
Receive comments and decision whether to produce stand-alone report or merge with other studies	15 Sept 2014
Respond to comments and finalize Progress Report	30 Sept 2014

Project Core Team Members

Team Member	Phone/E-mail	Role
Ted Swift	916-376-9718, Ted.Swift@water.ca.gov	Lead Scientific Investigator
Rich Losee	(909) 392-5124, rflosee@dslextreme.com	Project Partner, Subject matter expert
Cindy Garcia	916-376-9715, Cindy.A.Garcia@water.ca.gov	MWQI Branch Chief, Program Management

Project Core Team Members

Team Member	Phone/E-mail	Role
Ted Swift	916-376-9718, Ted.Swift@water.ca.gov	Lead Scientific Investigator
Elaine Archibald	916-736-3713, elaine.archibald@comcast.net	Consultant to MWQI SPC, Program Management
Jeffrey Janik	916-653-5688, jjanik@water.ca.gov	Stakeholder, Subject matter expert

Charter Version Number:	
Updated By: Ted Swift	Date: 5 June 2014
Approved By:	Date:

Funding Information

Project Budget:	$ 34,920 – 360 hours
Fund Center Title	7.1.2 Nutrient Limitation Study
Fund Center Number	VLIMNUTLIM14
Organization	DWR, Division of Environmental Services, Office of Water Quality
Contact Person	Ted Swift
Phone/E-mail	916-376-9718, Ted.Swift@water.ca.gov

7.1.3 Nutrient & Nutrient Ratio Influence on Community Species Composition

IO# VLIMNRATIO14 – hours 144 – budget $13,968

Version: 1.0 Date: 5 June 2014

Project Details

Project Name: 7.1.3 SWP Limnology: Nutrient & Nutrient Ratio Influence on Community Species Composition

Existing Problem/Need/Opportunity *Does something need to be fixed? Updated? Created? Expanded? Helped?*

The SWP Contractors have identified problems, issues, and concerns associated with drinking water quality of the SWP, caused by biological activity within the SWP. These effects cause costly problems in drinking water treatment plants ranging from taste & odor events that result widespread customer complaints to pH swings that complicate plant operations to filter-clogging algal production. Knowledge of the biological activity, the key drivers, and major biological players in the SWP is at a very rudimentary level. One facet of addressing these problems is developing a knowledge base on how nutrient concentrations and nutrient ratios (e.g., Nitrogen/Phosphorus) can affect benthic and planktonic algal community composition.

Solution *How will this project fulfill the above?*

Improved management of biologically-caused drinking water problems can be achieved by gaining applicable knowledge of the limnology and ecology of organisms that produce these problems, and use of this knowledge to develop optimal control and treatment strategies. This project will synthesize the work of Bay-Delta research that specifically pertains to effects of nutrients and nutrient ratios on benthic and planktonic algal community composition. The synthesis will guide further studies, potentially manipulating or at least predicting algal community. These in turn may provide optimal control and treatment strategies that will reduce treatment costs, improve reliability, and improve drinking water customer satisfaction.

Project Objective Statement *What will the project do? What does it look like?*

Review and follow the progress of Irwin van Nieuenhuyse's work and the Dick Dugdale group's work on nutrients and nutrient ratios as they affect benthic and planktonic algal community composition, respectively, in the Bay-Delta system. Following the literature review and reviewing the information developed in the Nutrient Budget Study (Project 7.1.1) and the Nutrient Limitation Study (Project 7.1.2), develop hypotheses of SWP community algal species composition. These hypotheses will guide and be tested in future studies of algal species composition. The work product from this study will be a progress report summarizing the key findings from the literature review and a list of hypotheses to be tested in the next phase of work.

1.9. Target Start Date	1 March 2015	Target End Date	30 April 2015
1.10. Proposed Project Manager(s)	Ted Swift		
Proposed Project Sponsor(s)	State Water Contractors MWQI SPC		

Authorization *Specify if there is a mandated reason for project (e.g. Legislative; executive; water code, other)*

Requested by State Water Project Contractors Authority MWQI Specific Project Committee

Partners

Within DWR	MWQI Branch, O&M Water Quality (information contact)
Other State Agencies	SFSU (R. Dugdale research group, information contact)
Federal Agencies	USBR (van Nieuenhuyse, information contact)
Local Organizations	Losee Limnology Consulting (subject matter expert)

Benefits and Consequences

Project is completed	Algal species in the SWP affect drinking water quality. Algal species composition is affected by nutrient concentrations and ratios, with deleterious or beneficial effects. Completion of this project will not in itself solve deleterious water quality effects, but will guide hypothesis-testing studies that may recommend biological manipulation strategies to control algal effects.
Project is not completed	The body of research in Bay-Delta algal community composition is an important clue to addressing the biological effects within the SWP. If this research synthesis is not included, further research is likely to waste financial and time resources in repeating previous research.

Environmental Stewardship

Policy Applicable ☐ Policy Not Applicable ■

Reason(s): This project is not expected to have any DWR policy implications.

Signatures

Prepared By: Ted Swift Date: 5 June 2014

Reviewer: _____ Date: _____

Project Recommended ☐ Project Not Recommended ☐

Reason(s): _____

7.1.4 Light Limitation in the SWP

IO# VLIMLIGHTL14 – hours 688 – budget $66,736

Version#: 1.1 Date: 12 June 2014

Project Name: *Write out the entire, specific name.*

7.1.4 SWP Limnology: Light Limitation in the SWP

Sponsor/Program Manager	Rich Losee/Cindy Garcia
Project Manager	Ted Swift

Project Objective Statement: *What must the project do? By When? Keep this statement to 25 words or less. Make it SMART (Specific, Measurable, Achievable, Relevant, and Time-based).*

This study will determine the amount of light reduction necessary to sufficiently reduce the growth of algae and submersed macrophytes to limit their growth in the SWP

Triple Constraint Trade-off

Resources	N	*Select a different flexibility letter for each constraint* *N= Not Flexible* *S= Somewhat Flexible* *M= Most Flexible*
Schedule	S	
Scope	M	

Estimated Start Date:	1 August 2014	Estimated End Date:	27 Mar 2015

Project Deliverables: *What is the project going to produce? Create a list of tangible products that will result from project.*

- Literature review of light limitation of filamentous diatoms (e.g., *Melosira*), benthic cyanobacteria (e.g., T&O producers, if available), and submerged macrophytes (macrophytes (particularly of problematic species in the SWP).
- Progress report summarizing results of the literature review and the data analysis of light attenuation and photic depth versus turbidity data in the IEP database. The progress report will address the practicality of using light reduction to control algal or macrophyte growth.
- Develop peer-reviewed protocol to measure light and light attenuation in the SWP aqueducts.
- Purchase and test light sensors for further studies.

Strategic Fit: *What is the Strategic Initiative Identifier for this project?*

This project supports MWQI's mission of providing knowledge based support for operational decision-making and conducting scientific studies of drinking water importance.

Customer: *Who are you doing the project for?*

This project is a component of the overall Limnology Project, for which the customer is the Municipal Drinking Water Contractors (MWQI SPC) and the DWR O&M Water Quality Branch.

Customer Benefits: *What customer requirements does this project address? Relate these to: increase revenue, avoid costs, improve service, and/ or comply with a mandate? Create a short list of customer benefits.*

The SWP Contractors have identified problems, issues, and concerns associated with drinking water quality of the SWP, caused by biological activity within the SWP. Improved management of these problems can be achieved by gaining applicable knowledge of the limnology and ecology of organisms that produce these problems, and use of this knowledge to develop optimal control and treatment strategies. Understanding the light available for photosynthesis is fundamental to evaluating practical strategies. These will assist optimal control and treatment strategies will reduce treatment costs, improve reliability, and improve drinking water customer satisfaction.

Success Determination Factors *How will the success of the project be determined from the customer's perspective? Make criteria measurable so there is no doubt as to the project's success. Create a short list.*

This project will be a success if it determines sufficiently precise estimates of light requirements for species of concern in the SWP, if it develops useful and predictive relationships between light attenuation versus turbidity in the SWP, if it clearly and completely reports those findings; and if it acquires and develops clear protocols for measuring light climates for selected locations in the SWP.

Project Background: *What is the primary motivation for this project? Include a brief high level description of the business area, the current situation, the desired situation, and the gaps that exist. This summary builds on your description in the Project Initiation form.*

Drinking water quality is important to the 25 million customers of the State Water Project, and the drinking water contractors must meet government health and safety requirements for drinking water. Biological activity in the SWP affects water quality by producing compounds that negatively affect taste and odor, disinfection byproduct precursors, and changing pH, which in turn affects treatment plant operations. These increase costs for the water purveyors and affect customer satisfaction for the ultimate consumers. The current situation is that the contractors have many examples of these biological effects, yet little is known about the precise sources of the problems and the feasibility of reducing and/or controlling them. The desire is to understand the limnology of the SWP well enough to produce recommendations for actions or operational changes that would improve water quality, reduce treatment costs, and improve regulatory compliance. One mechanism that strongly affects biological activity is light availability for photosynthesis. Light is known to limit algal and macrophyte growth in the Delta, but the light climate changes as light attenuation changes within the SWP. Also, different species can tolerate different ranges of light, and light may play an important role in determining which species dominates within different portions of the SWP. E.g., there are anecdotes of T&O species changes after a period of low aqueduct flow reducing turbidity and thus increasing light availability.

Project Scope:

In Scope: *List areas and functionality included in project.*	Out of Scope: *List areas and functionality <u>not</u> included in project.*
* Literature review of light limitation for Melosira, T&O-producing algae, and submerged macrophytes found or likely to be found in the SWP. * Analyze the light and suspended matter data within the IEP monitoring database to develop relationships between suspended matter concentration and light attenuation. * Develop robust protocol for light and light attenuation measurements in SWP channel and reservoir environments. * Acquire appropriate light measurement instruments in time for the 2015 "growing season"	* Literature search of all reports of light limitation. * Survey in-situ light limitation of attached algae or macrophytes in the SWP beyond initial testing phase.

Dependent Projects: *What projects must be underway or completed before this project can be successful?*

This Project has no vital dependencies on other Limnology projects. Instrument procurement will depend on funding availability and will probably be subject to DWR procurement paperwork, which may be time consuming. Literature review relies on access to the electronic literature catalogs, which the State doesn't provide, but which Ted Swift presently has through an affiliate computer account at UC Davis. This is expected to be available through the duration of the project.

Risks: *What characteristics or situations could cause this project to fail? Identify those items which are outside the jurisdiction of project and could result in a "show-stopper" to the project success. Create a short list.*

* Available IEP data may be of such unknown quality or insufficient quantity that conclusions are limited to fewer locations or time periods than expected. This is not a "show stopper" that would cause complete project failure, but would reduce the literature search conclusions' scope of applicability. The project would still be an improvement on the present state of knowledge.

Assumptions and Constraints: *What assumptions were made in defining project? Are there constraints to the execution of project? List assumptions and constraints.*

Assumptions: Sufficient IEP data of sufficient quality will be available for analysis (almost certain); sufficient knowledge exists (from literature) of light limitation characteristics for species of interest (very likely); subject matter experts have sufficient knowledge to arrive at optimal conclusions.
Constraints: Field testing of measurement protocols may involve intra-division coordination. Funding ("resources" in triple constraints, above) and therefore time are co-constraints. The best instruments for the job may

This Project Should Have: *Check all that apply*

Project Management Plan	Environmental Stewardship Plan	Work Breakdown Structure	Communications Plan	Procurement Plan	Human Resources Plan
☐	☐	■	■	■	☐
Quality Management Plan	**Stakeholder Register**	**Risk Register**	**Project Budget**	**Project Schedule**	**DWR Form 1498**
■	■	☐	■	■	☐

Major High-Level Milestone Targets: *What events measure progress? E.g. Initiation Approved, Analysis Complete.*

Milestone	Target Date
Conduct literature review and examine existing IEP light vs turbidity data	30 Sep 2014
Submit Draft Progress Report to DWR management and MWQI SPC for review	31 Oct 2014
Respond to comments and finalize Progress Report	28 Nov 2014
Develop light measuring protocol and submit to DWR management and MWQI SPC for review	30 Jan 2015
Respond to comments and finalize protocol	27 Feb 2015
Purchase & field-test sensors	27 Mar 2015

Project Core Team Members

Team Member	Phone/E-mail	Role
Ted Swift	916-376-9718, Ted.Swift@water.ca.gov	Lead Scientific Investigator
Rich Losee	(909) 392-5124, rflosee@dslextreme.com	Project Partner, Subject matter expert
Cindy Garcia	916-376-9715, Cindy.A.Garcia@water.ca.gov	MWQI Branch Chief, Program Management
Elaine Archibald	916-736-3713, elaine.archibald@comcast.net	Consultant to MWQI SPC, Program Management
Jeffrey Janik	916-653-5688, jjanik@water.ca.gov	Stakeholder, Subject matter expert
Margaret Spoo-Chupka, MWDSC		T&O Algae Subject matter expert

Charter Version Number:	
Updated By: Ted Swift	Date: 5 June 2014
Approved By:	Date:

Funding Information

Project Budget:	$ 66,736 – 688 hours
Fund Center Title	7.1.4 Light Limitation in the SWP
Fund Center Number	VLIMLIGHTL14
Organization	DWR, Division of Environmental Services, Office of Water Quality
Contact Person	Ted Swift
Phone/E-mail	916-376-9718, Ted.Swift@water.ca.gov

7.1.5 Algal and Macrophyte Growth Study

IO# VLIMAMGROW14 – hours 120 – budget $11,640

Version: 1.0 Date: 5 June 2014

Project Details

Project Name: 7.1.5 SWP Limnology: Algal and Macrophyte Growth Study

Existing Problem/Need/Opportunity *Does something need to be fixed? Updated? Created? Expanded? Helped?*

The SWP Contractors have identified problems, issues, and concerns associated with drinking water quality of the SWP, caused by biological activity within the SWP. These effects cause costly problems in drinking water treatment plants ranging from taste & odor events that result widespread customer complaints to pH swings that complicate plant operations to filter-clogging algal production. Knowledge of the biological activity, the key drivers, and major biological players in the SWP is at a very rudimentary level. One facet of addressing these problems is developing a knowledge base on algal and macrophyte growth rates in the laboratory and in the field (SWP) as functions of nutrient and light availability, and how this can affect benthic and planktonic algal community composition, for good or ill.

Solution *How will this project fulfill the above?*

Improved management of biologically-caused drinking water problems can be achieved by gaining applicable knowledge of the limnology and ecology of organisms that produce these problems, and use of this knowledge to develop optimal control and treatment strategies. This project will synthesize the published research that specifically addresses lab and field measurement methods of growth rates of benthic and planktonic algal species. The synthesis will guide further studies that measure primary production (growth rates) in selected SWP facilities. These in turn may provide optimal control and treatment strategies that will reduce treatment costs, improve reliability, and improve drinking water customer satisfaction.

Project Objective Statement *What will the project do? What does it look like?*

Review and synthesize the state of the art in measuring primary production (growth rates) of benthic and planktonic algal species likely to be found in the SWP as functions of light and nutrient availability in the laboratory. Similarly summarize state of the art in field methods of estimating production for whole reaches of the CA Aqueduct, and field methods of measuring photosynthetic rates for small benthic areas of the aqueduct to compare variation in flow/turbulence and light level These methods will be used in future studies of algal species production in SWP facilities. The work product from this study will be a progress report summarizing the key findings from the literature reviews.

1.11. Target Start Date	2 Feb 2015	Target End Date	31 March 2015
1.12. Proposed Project Manager(s)	Ted Swift		
Proposed Project Sponsor(s)	Rich Losee/Cindy Garcia		

Authorization *Specify if there is a mandated reason for project (e.g. Legislative; executive; water code, other)*

Requested by State Water Project Contractors Authority MWQI Specific Project Committee

Partners

Within DWR	MWQI Branch, O&M Water Quality (information contact)
Other State Agencies	UC Davis Dept of Plant Biology (information contact)
Federal Agencies	
Local Organizations	Losee Limnology Consulting (subject matter expert)

Benefits and Consequences

Project is completed	Algal species in the SWP affect drinking water quality. Algal species concentrations are determined by growth rates, with deleterious or beneficial effects. Completion of this project will not in itself solve deleterious water quality effects, but will provide tools needed for hypothesis-testing studies that may recommend biological manipulation and/or water operations strategies to control algal effects.
Project is not completed	Determining growth rates will be fundamental to understanding the biological effects within the SWP. If this research synthesis is not included, further research is likely to waste financial and time resources in repeating previous research.

Environmental Stewardship

Policy Applicable ☐ Policy Not Applicable ■

Reason(s): This project is not expected to have any DWR policy implications.

Signatures

Prepared By: Ted Swift Date: 6 June 2014

Reviewer: Date:

Project Recommended ☐ Project Not Recommended ☐

Reason(s):

7.1.6 Spatial-temporal Distribution of *Melosira* in the SBA

IO# VLIMMELOSI14 – hours 696 – budget $67,512

Version#: 1.0 Date: 6/03/2014

Project Name: *Write out the entire, specific name.*

7.1.6 Spatial-temporal Distribution of *Melosira* in the SBA

Sponsor/Program Manager	Rich Losee/Cindy Garcia
Project Manager	Jason Moore

Project Objective Statement: *What must the project do? By When? Keep this statement to 25 words or less. Make it SMART (Specific, Measurable, Achievable, Relevant, and Time-based).*

This is an MWQI project to identify the spatial-temporal distribution of problematic algal species in the South Bay Aqueduct through a two-year monitoring program to assist customers in controlling drinking water treatment costs due to algal issues.

Triple Constraint Trade-off

Resources	M	*Select a different flexibility letter for each constraint* *N= Not Flexible* *S= Somewhat Flexible* *M= Most Flexible*
Schedule	S	
Scope	N	

Estimated Start Date:	May 2014	Estimated End Date:	November 2016

Project Deliverables: *What is the project going to produce? Create a list of tangible products that will result from project.*

- Progress report / literature review on sampling methods of common problem algal species.
- Monitoring plan for algal distribution in SBA.
- 1st year (2014) sampling progress report.
- Final report detailing findings and recommendations.

Eventually the findings of this study will be integrated into the limnology synthesis report.

Strategic Fit: *What is the Strategic Initiative Identifier for this project?*

This project fits with MWQI's mission of providing data & knowledge based support for operational decision-making and conducting scientific studies of drinking water importance.

Customer: *Who are you doing the project for?*

MWQI SPC, DWR O&M, SBA Water Contractors

Customer Benefits: *What customer requirements does this project address? Relate these to: increase revenue, avoid costs, improve service, and/ or comply with a mandate? Create a short list of customer benefits.*

Understanding the distribution of the algal species that have caused increased treatment costs for the water contractors using the South Bay Aqueduct will aid DWR O&M in developing more effective management of the system.

Success Determination Factors *How will the success of the project be determined from the customer's perspective? Make criteria measurable so there is no doubt as to the project's success. Create a short list.*

-Identify species of algae in SBA that are problematic. -Determine spatial-temporal distribution of those species. -Provide effective recommendations for management of the SBA to control problem algal species.

Project Background: *What is the primary motivation for this project? Include a brief high level description of the business area, the current situation, the desired situation, and the gaps that exist. This summary builds on your description in the Project Initiation form.*

The objective of this study is to assess the spatial and temporal distribution of filter clogging diatoms in the SBA. The first phase of this study is to conduct a literature review and develop a method for sampling *Melosira* in the SBA to determine its spatial and temporal distribution. The work product from this study will be a progress report summarizing the key findings from the literature review. After the method has been developed and reviewed, MWQI staff will coordinate with O&M Water Quality and with the Delta Field Division to determine the most efficient way to conduct the field work. A monitoring plan will be developed to assess the distribution of *Melosira* biomass in the SBA to help determine a method to more efficiently manage filter clogging by these algae. The monitoring will be conducted during the algal growth season of February to October.

Project Scope:

In Scope: *List areas and functionality included in project.*	Out of Scope: *List areas and functionality <u>not</u> included in project.*
Conditions associated with algal distribution shifts: Nutrients, pH, water depth, water temperature, dissolved oxygen changes, algal composition through pigments, sun exposure, canal orientation, water velocity	*Species found outside of the SBA* *Conditions outside of the SBA* *Any algal species not in periphyton*

Dependent Projects: *What projects must be underway or completed before this project can be successful?*

Nutrient Budget Study – Wide Swings in Canal pH Study—Light limitation in the SWP – Nutrient Limitation Study – Algal and Macrophyte Growth Study

Risks: *What characteristics or situations could cause this project to fail? Identify those items which are outside the jurisdiction of project and could result in a "show-stopper" to the project success. Create a short list.*

Inability to acquire equipment for measuring pH, conductance, depth, temperature, total algae pigments, dissolved oxygen. Sampling equipment fabricated for this study inadequate for sampling canal surfaces Data from associated studies are not readily available for final report.

Assumptions and Constraints: *What assumptions were made in defining project? Are there constraints to the execution of project? List assumptions and constraints.*

Assumptions: Site access availability. Species will be limited to a few ie.. *Melosira* and *Cladophera*. Collected data will highlight causes of pH shifts. Equipment will be available. Benthic algae are the main contributors to clogging. Constraints: Funding for equipment

This Project Should Have: *Check all that apply*

Project Management Plan ■	Environmental Stewardship Plan ■	Work Breakdown Structure ■	Communications Plan ☐	Procurement Plan ■	Human Resources Plan ☐
Quality Management Plan ■	Stakeholder Register ☐	Risk Register ☐	Project Budget ■	Project Schedule ■	DWR Form 1498 ■

Major High-Level Milestone Targets: *What events measure progress? E.g. Initiation Approved, Analysis Complete.*

Milestone	Target Date
Conduct literature review and develop sampling method	May 2014
Submit Draft Progress Report to DWR management and MWQI SPC for review	June 2014
Respond to comments and finalize Progress Report	June 2014
Develop monitoring plan and coordinate with O&M	June 2014
Conduct pilot monitoring	Oct 2014
Submit Draft Progress Report to DWR management and MWQI SPC for review	Dec 2014
Respond to comments	Jan 2015
Conduct Monitoring	Oct 2015
Prepare Draft Report	Feb 2016

Project Core Team Members

Team Member	Phone/E-mail	Role
Rich Losee	rflosee@dslextreme.com	Project Partner/ Sponsor
Jason Moore	jason.moore@water.ca.gov	Project Manager
Sonia Miller	sonia.miller@water.ca.gov	Researcher
Rachel Pisor	rachel.pisor@water.ca.gov	Supervisor
Cindy Garcia	cindy.a.garcia@water.ca.gov	Program Manager

Charter Version Number: 1.0	
Updated By: Jason Moore	Date: *06/04/2014*
Approved By:	Date:

Funding Information

Project Budget:	$ 67,512 – 696 hours
Fund Center Title	7.1.6 Spatial-temporal Distribution of Melosira in the SBA
Fund Center Number	VLIMMELOSI14
Organization	DWR DES MWQI
Contact Person	Jason Moore
Phone/E-mail	916-376-9713/ jason.moore@water.ca.gov

7.1.7 Distribution of Macrophytes in the SWP

IO# VLIMMACROP14 – hours 600 – budget $58,200

Version#: 1.0 Date: 6/04/2014

Project Name: *Write out the entire, specific name.*

7.1.7 Distribution of Macrophytes in the SWP

Sponsor/Program Manager	Rich Losee/Cindy Garcia
Project Manager	Jason Moore

Project Objective Statement: *What must the project do? By When? Keep this statement to 25 words or less. Make it SMART (Specific, Measurable, Achievable, Relevant, and Time-based).*

This is an MWQI project to identify the distribution and abundance of problematic macrophyte species in the coastal branch of the State Water Project to assist in the development of management practices to control macrophyte growth.

Triple Constraint Trade-off

Resources	M	*Select a different flexibility letter for each constraint* *N= Not Flexible* *S= Somewhat Flexible* *M= Most Flexible*
Schedule	S	
Scope	N	

Estimated Start Date:	August 2014	Estimated End Date:	June 2017

Project Deliverables: *What is the project going to produce? Create a list of tangible products that will result from project.*

- Progress report / literature review on sampling methods of likely problem macrophyte species.
- Monitoring plan for macrophyte distribution in Coastal branch of the SWP.
- 1st year (2015) pilot sampling progress report.
- Final report detailing findings and recommendations.

Eventually the findings of this study will be integrated into the limnology synthesis report.

Strategic Fit: *What is the Strategic Initiative Identifier for this project?*

This project fits with MWQI's mission of providing data & knowledge based support for operational decision-making and conducting scientific studies of drinking water importance.

Customer: *Who are you doing the project for?*

MWQI SPC, DWR O&M, SBA Water Contractors

Customer Benefits: *What customer requirements does this project address? Relate these to: increase revenue, avoid costs, improve service, and/ or comply with a mandate? Create a short list of customer benefits.*

Understanding the distribution of the macrophyte species that have caused increased costs due to macrophytes clogging intakes and filters. This will aid DWR O&M in developing more effective management of the system.

Success Determination Factors *How will the success of the project be determined from the customer's perspective? Make criteria measurable so there is no doubt as to the project's success. Create a short list.*

-Identify species of macrophytes in the coastal branch that are problematic.
-Determine distribution patterns of those species.
-Provide effective recommendations for management of macrophytes in the Coastal Branch and San Luis Canal of the SWP.

Project Background: *What is the primary motivation for this project? Include a brief high level description of the business area, the current situation, the desired situation, and the gaps that exist. This summary builds on your description in the Project Initiation form.*

The objective of this study is to assess the macrophyte distribution and abundance, especially in the Coastal Branch and the San Luis Canal reach of the California Aqueduct and to determine if it is feasible to control macrophyte growth in the SWP. The Coastal Branch may be the best location to control macrophytes because of its small size. The first phase of this study is to conduct a literature review of submersed macrophyte sampling methods. The work product from this study will be a progress report summarizing the key findings from the literature review. After the method has been selected, MWQI staff will coordinate with O&M Water Quality and with the San Joaquin Field Division to determine the most efficient way to conduct the field work. A monitoring plan will be developed prior to field work initiation.

Project Scope:

In Scope: *List areas and functionality included in project.*	Out of Scope: *List areas and functionality not included in project.*
Conditions associated with Macrophyte distribution: Nutrients, pH, water depth, water temperature, dissolved oxygen changes, algal composition through pigments, sun exposure, canal orientation, water velocity	*Species found outside of the Coastal Branch and San Luis Canal* *Conditions outside of the Coastal Branch and San Luis Canal* *Will not be looking at non-nuisance species.*

Dependent Projects: *What projects must be underway or completed before this project can be successful?*

Nutrient Budget Study —Light limitation in the SWP – Nutrient Limitation Study – Algal and Macrophyte Growth Study

Risks: *What characteristics or situations could cause this project to fail? Identify those items which are outside the jurisdiction of project and could result in a "show-stopper" to the project success. Create a short list.*

Inability to acquire equipment for measuring pH, conductance, depth, temperature, and dissolved oxygen.
Sampling equipment unavailable.
Data from associated studies are not readily available for final report.

Assumptions and Constraints: *What assumptions were made in defining project? Are there constraints to the execution of project? List assumptions and constraints.*

Assumptions: Site access availability. Species diversity will be limited to a reasonable amount. Equipment will be available. Species will be easily identified.
Constraints: Funding for equipment

This Project Should Have: *Check all that apply*

Project Management Plan ■	Environmental Stewardship Plan ■	Work Breakdown Structure ■	Communications Plan ☐	Procurement Plan ■	Human Resources Plan ☐
Quality Management Plan ■	Stakeholder Register ☐	Risk Register ☐	Project Budget ■	Project Schedule ■	DWR Form 1498 ■

Major High-Level Milestone Targets: *What events measure progress? E.g. Initiation Approved, Analysis Complete.*

Milestone	Target Date
Conduct literature review and develop sampling method	Sep 2014
Submit Draft Progress Report to DWR management and MWQI SPC for review	Oct 2014
Respond to comments and finalize Progress Report	Nov 2014
Develop monitoring plan and coordinate with O&M for field work in current and next work plan cycle	Feb 2015
Macrophyte sampling pilot study	July 2015
Submit Draft Progress Report to DWR management and MWQI SPC for review	Oct 2015
Respond to comments	Nov 2015

Project Core Team Members

Team Member	Phone/E-mail	Role
Rich Losee	rflosee@dslextreme.com	Project Partner/Sponsor
Jason Moore	jason.moore@water.ca.gov	Project Manager
Shaun Rohrer	shaun.rohrer@water.ca.gov	Researcher
Rachel Pisor	rachel.pisor@water.ca.gov	Supervisor
Cindy Garcia	cindy.a.garcia@water.ca.gov	Program Manager

Charter Version Number: 1.0	
Updated By: Jason Moore	Date: *06/04/2014*
Approved By:	Date:

Funding Information

Project Budget:	**$** 58,200 – 600 hours
Fund Center Title	7.1.7 Distribution of Macrophytes in the SWP
Fund Center Number	VLIMMACROP14
Organization	DWR DES MWQI
Contact Person	Jason Moore
Phone/E-mail	916-376-9713/ jason.moore@water.ca.gov

7.1.8 Wide Swings in Canal pH Study

IO# VLIMPHSTUD14 – hours 528 – budget $51,216

Version#: 1.0 Date: 5/30/2014

Project Name: *Write out the entire, specific name.*

7.1.8 Wide Swings in Canal pH Study

Sponsor/Program Manager	Rich Losee/Cindy Garcia
Project Manager	Jason Moore

Project Objective Statement: *What must the project do? By When? Keep this statement to 25 words or less. Make it SMART (Specific, Measurable, Achievable, Relevant, and Time-based).*

This is an MWQI project to identify causes of wide pH shifts in the South Bay Aqueduct through a two-year monitoring program to assist customers in controlling drinking water treatment costs due to pH issues.

Triple Constraint Trade-off

Resources	M	*Select a different flexibility letter for each constraint* *N= Not Flexible* *S= Somewhat Flexible* *M= Most Flexible*
Schedule	S	
Scope	N	

Estimated Start Date:	May 2014	Estimated End Date:	November 2016

Project Deliverables: *What is the project going to produce? Create a list of tangible products that will result from project.*

- Progress report on SBA pH data review.
- Monitoring plan for causes of pH change in SBA.
- 1st year (2014) sampling progress report.
- Final report detailing findings and recommendations.

Eventually the findings of this study will be integrated into the limnology synthesis report.

Strategic Fit: *What is the Strategic Initiative Identifier for this project?*

This project fits with MWQI's mission of providing data & knowledge based support for operational decision-making and conducting scientific studies of drinking water importance.

Customer: *Who are you doing the project for?*

MWQI SPC, DWR O&M, SBA Water Contractors

Customer Benefits: *What customer requirements does this project address? Relate these to: increase revenue, avoid costs, improve service, and/ or comply with a mandate? Create a short list of customer benefits.*

Understanding the causes of the observed wide shifts in pH that have caused increased treatment costs for the water contractors using the South Bay Aqueduct will aid DWR O&M in developing more effective management of the system.

Success Determination Factors *How will the success of the project be determined from the customer's perspective? Make criteria measurable so there is no doubt as to the project's success. Create a short list.*

-Determine factors that contribute to wide swings in pH.
-Provide effective recommendations for management of the SBA to minimize wide shifts in SBA pH.

Project Background: *What is the primary motivation for this project? Include a brief high level description of the business area, the current situation, the desired situation, and the gaps that exist. This summary builds on your description in the Project Initiation form.*

Wide shifts in pH of the water in the SBA have caused increased costs treating water drawn from the SBA for municipal uses. These shifts are associated with diurnal variations in algal activity. The specific conditions associated with these shifts in pH are important for developing effective management practices. This project will look at the water's pH, nutrient composition, depth, temperature, velocity, and algal composition. In addition certain canal characteristics such as shading, sun exposure, and orientation as contributors to pH changes.
The goal of this effort is to apply limnological principles to decrease the treatment plant difficulties resulting from photosynthetically driven pH excursions in the SBA. Note that a solution to this problem will likely also solve the *Melosira* filter clogging issue. The objectives of this study are to 1) understand the magnitude of the problematic pH excursion events and the inorganic carbon chemistry and buffering capacity of the SBA; and 2) to quantify the magnitude and diurnal dynamics of specific pH excursion events before, during, and after algaecide treatment. The first step will be to analyze the historical data to identify the magnitude and frequency and seasonality of pH excursion events, and to understand the inorganic carbon chemistry and buffering capacity during the events. The work product from this phase will be a progress report that discusses the key findings from the data review.

The next phase will be to conduct monitoring during pH excursion events. This will involve continuous measurement of pH and oxygen, upstream and downstream of the reach of interest on the SBA before, during and after treatments to control *Melosira*. Inorganic carbon and alkalinity of the water will be monitored to assess the buffering capacity. This phase of the study will require coordination with O&M Water Quality and the Delta Field Division. Ideally, the monitoring will be conducted during the algal growth season of June to October, 2014.

Project Scope:

In Scope: *List areas and functionality included in project.*	Out of Scope: *List areas and functionality not included in project.*
Conditions associated with pH shifts: *Nutrients, pH, water depth, water temperature, dissolved oxygen changes, algal composition through pigments, sun exposure, canal orientation, water velocity* *Effects of treatment in specific reaches of the SBA*	*Conditions outside of the SBA*

Dependent Projects: *What projects must be underway or completed before this project can be successful?*

Nutrient Budget Study – Spatial Temporal Distribution of Melosira in the SBA—Light limitation in the SWP – Nutrient Limitation Study – Algal and Macrophyte Growth Study

Risks: *What characteristics or situations could cause this project to fail? Identify those items which are outside the jurisdiction of project and could result in a "show-stopper" to the project success. Create a short list.*

Inability to acquire equipment for measuring pH, conductance, depth, temperature, total algae pigments, dissolved oxygen.

Data from associated studies are not readily available for final report.

Assumptions and Constraints: *What assumptions were made in defining project? Are there constraints to the execution of project? List assumptions and constraints.*

Assumptions: Site access availability. Collected data will highlight causes of pH shifts. Equipment will be available. Constraints: Funding for equipment

This Project Should Have: *Check all that apply*

Project Management Plan ■	Environmental Stewardship Plan ■	Work Breakdown Structure ■	Communications Plan ☐	Procurement Plan ■	Human Resources Plan ☐
Quality Management Plan ■	Stakeholder Register ☐	Risk Register ☐	Project Budget ■	Project Schedule ■	DWR Form 1498 ■

Major High-Level Milestone Targets: *What events measure progress? E.g. Initiation Approved, Analysis Complete.*

Milestone	Target Date
Analyze Historical Data	May 2014
Submit Draft Progress Report to DWR management and MWQI SPC for review	June 2014
Respond to comments and finalize Progress Report	July 2014
Develop monitoring plan and coordinate with O&M	July 2014
Conduct pilot monitoring	Oct 2014
Submit Draft Progress Report and Monitoring Plan to DWR management and MWQI SPC for review	Dec 2014
Respond to comments	Jan 2015
Conduct Monitoring	Oct 2015
Prepare Draft Report	Jan 2016

Project Core Team Members

Team Member	Phone/E-mail	Role
Rich Losee	rflosee@dslextreme.com	Sponsor/Project Partner
Jason Moore	jason.moore@water.ca.gov	Project Manager
Sonia Miller	sonia.miller@water.ca.gov	Researcher
Rachel Pisor	rachel.pisor@water.ca.gov	Supervisor
Cindy Garcia	cindy.a.garcia@water.ca.gov	Program Manager

Charter Version Number: 1.0	
Updated By: Jason Moore	Date: *06/04/2014*
Approved By:	Date:

Funding Information

Project Labor Budget:	$ 51,216 – 528 hours
Fund Center Title	7.1.8 Wide Swings in Canal pH Study
Fund Center Number	VLIMPHSTUD14
Organization	DWR DES MWQI
Contact Person	Jason Moore
Phone/E-mail	916-376-9713/ jason.moore@water.ca.gov

7.2.1 Status of Cattle Grazing in the State Water Project

IO# VSANSURVEY14 – hours 480 – budget $46,560

Version#: 1.1 Date: 6.13.2014

Project Name: *Write out the entire, specific name.*

Status of Cattle Grazing in the State Water Project (SWP)

Sponsor/Program Manager	Elaine Archibald/Cindy Garcia
Project Manager	Sonia Miller

Project Objective Statement: *What must the project do? By When? Keep this statement to 25 words or less. Make it SMART (Specific, Measurable, Achievable, Relevant, and Time-based).*

Conduct an update of Cattle Grazing in the watersheds of the State Water Project from previous sanitary surveys. To be completed by June 2015.

Triple Constraint Trade-off

Resources	N	*Select a different flexibility letter for each constraint* *N= Not Flexible* *S= Somewhat Flexible* *M= Most Flexible*
Schedule	M	
Scope	S	

Estimated Start Date:		Estimated End Date:	

Project Deliverables: *What is the project going to produce? Create a list of tangible products that will result from project.*

Prepare a short report that updates the status of cattle grazing in the watershed of the State Water Project.

Strategic Fit: *What is the Strategic Initiative Identifier for this project?*

The sanitary survey is a requirement by law.

Customer: *Who are you doing the project for?*

California Department of Public Health and State Water Project Contractors

Customer Benefits: *What customer requirements does this project address? Relate these to: increase revenue, avoid costs, improve service, and/ or comply with a mandate? Create a short list of customer benefits.*

Fulfills a legal requirement.

Success Determination Factors *How will the success of the project be determined from the customer's perspective? Make criteria measurable so there is no doubt as to the project's success. Create a short list.*

A report on cattle grazing completed by June 2015

Project Background: *What is the primary motivation for this project? Include a brief high level description of the business area, the current situation, the desired situation, and the gaps that exist. This summary builds on your description in the Project Initiation form.*

Take a large report and break it down into manageable sections, by conducting investigations on specific areas of concern within the watershed. This year's investigation is to be conducted on cattle grazing in the watershed of the State Water Project. Cattle grazing in the State Water Project watershed has not been updated since 2001.

Project Scope:

In Scope: *List areas and functionality included in project.*	Out of Scope: *List areas and functionality not included in project.*
Conduct research on past sanitary surveys, update relevant information on cattle grazing, produce a report by June 2015	*Conducting research on anything but cattle grazing in the watershed*

Dependent Projects: *What projects must be underway or completed before this project can be successful?*

None

Risks: *What characteristics or situations could cause this project to fail? Identify those items which are outside the jurisdiction of project and could result in a "show-stopper" to the project success. Create a short list.*

None

Assumptions and Constraints: *What assumptions were made in defining project? Are there constraints to the execution of project? List assumptions and constraints.*

It will take no more than 480 hours to complete this project.

This Project Should Have: *Check all that apply*

Project Management Plan X	Environmental Stewardship Plan ☐	Work Breakdown Structure ☐	Communications Plan ☐	Procurement Plan ☐	Human Resources Plan ☐
Quality Management Plan ☐	Stakeholder Register ☐	Risk Register ☐	Project Budget ☐	Project Schedule X	DWR Form 1498 ☐

Major High-Level Milestone Targets: *What events measure progress? E.g. Initiation Approved, Analysis Complete.*

Milestone	Target Date
Develop detailed scope of work	July 2014
Obtain data for analysis and prepare Draft Report	October 2014
Submit Draft Report to Sanitary Survey Subcommittee for initial review	November 2014
Respond to comments	December 2014
Submit Revised Draft Report to Sanitary Survey Subcommittee for review	January 2015
Respond to comments	January 2015

Project Core Team Members

Team Member	Phone/E-mail	Role
Sonia Miller	(916) 376-9712 Sonia.Miller@water.ca.gov	Lead Investigator
Elaine Archibald		Project Partner

Charter Version Number:	
Updated By:	Date:
Approved By:	Date:

Funding Information

Project Budget:	$ 46,560 – 480 hours
Fund Center Title	7.2.1 Cattle Impacts to SWP Water Quality
Fund Center Number	VSANSURVEY14
Organization	
Contact Person	
Phone/E-mail	

7.3 Fluorescence of Dissolved Organic Matter Phase II

IO# VFDOMPOCS013 – hours 800 – budget $77,600

Version#: 1.1 **Date: 6/12/14**

Project Name: Write out the entire, specific name.

Fluorescence of Dissolved Organic Matter Phase II

Sponsor/Program Manager	SWPCA
Project Manager	Shaun Rohrer

Project Objective Statement: What must the project do? By When? Keep this statement to 25 words or less. Make it SMART (Specific, Measurable, Achievable, Relevant, and Time-based).

To measure the correlation between FDOM and DBPs and DOC at Banks PP in the State Water Project for one year.

Triple Constraint Trade-off:

Resources	N	Select a different flexibility letter for each constraint N= Not Flexible S= Somewhat Flexible M= Most Flexible
Schedule	M	
Scope	S	

Estimated Start Date:	June 2014	**Estimated End Date:**	November 2015

Project Deliverables: What is the project going to produce? Create a list of tangible products that will result from project.

The project will produce daily data on fluorescence and grab samples will be collected and analyzed for DBP concentration from Banks PP. A final report will be produced on the correlation between FDOM, DBPs and DOC.

Strategic Fit: What is the Strategic Initiative Identifier for this project?

It may be possible to cut costs on sending samples to outside labs to analyze data for the SWP.

Customer: Who are you doing the project for?

SWP contractors and MWQI.

Customer Benefits: What customer requirements does this project address? Relate these to: increase revenue, avoid costs, improve service, and/ or comply with a mandate? Create a short list of customer benefits.

Avoid costs in the future for DBP analyzing

Success Determination Factors: How will the success of the project be determined from the customer's perspective? Make criteria measurable so there is no doubt as to the project's success. Create a short list.

At the end of the project, a correlation will be analyzed between FDOM and DBP concentration. A strong correlation would be a success, however a weak correlation will still provide important information.

Project Background: What is the primary motivation for this project? Include a brief high level description of the business area, the current situation, the desired situation, and the gaps that exist. This summary builds on your description in the Project Initiation form.

DOC is a particular concern to water treatment operators. During the water treatment process, disinfection agents such as chlorine and ozone, react with the DOC to form DBPs, which are suspected carcinogens. It is difficult to manage the balance between removing disease causing organisms while protecting the population from DBP's. DBP's are classified under two different categories; trihalomethanes (THM's) and haloacetic acids (HAA's). Due to the possible health effects of these DBP's, the Environmental Protection Agency (EPA) regulates the amounts in drinking water. To assist water treatment plant operators and the drinking water treatment process, DOC concentrations are monitored at select locations throughout the Delta. The sampling can be completed by taking grab samples at predetermined intervals or real time monitoring using equipment designed to read DOC/TOC samples at given intervals. The equipment can be costly to purchase upfront while also demanding continuous maintenance and repairs.

We propose to use an in-situ fluorometer installed at Banks to correlate FDOM values to those of DOC and DBP's. The fluorometer will be given unfiltered water while DOC values will be collected through a Sievers TOC analyzer with a Streamwalker set up to split a stream for DOC. DBP's will be analyzed through grab samples (the sampling of which will be determined later, possibly biweekly).

Project Scope:

In Scope: List areas and functionality included in project.	**Out of Scope:** List areas and functionality not included in project.
Basic sensor maintenance The use of certified standards (if they are available) Data management Final Report publication	Only DOC and DBPs will be correlated with FDOM during this study.

Dependent Projects: What projects must be underway or completed before this project can be successful?

none

Risks: What characteristics or situations could cause this project to fail? Identify those items which are outside the jurisdiction of project and could result in a "show-stopper" to the project success. Create a short list.

If the sensor is damaged in any way, or malfunctions during the course of the project, the necessary data will not be collected and the concentration of DBPs will not be correlated with FDOM.

Assumptions and Constraints: What assumptions were made in defining project? Are there constraints to the execution of project? List assumptions and constraints.

The assumption is that the data will be collected consistently for one year total, with no interruptions. The constraint is there may be outside factors that may cause in interruption in data collection including power outages at Banks PP or a malfunction in the FDOM sensor.

Environmental Stewardship and Sustainability Considerations: What is the process that will be used to ensure compliance with the Environmental Stewardship Policy? Include the Environmental Stewardship Coordinator and team members (this can be roles instead of specific names)

n/a

Environmental Stewardship Coordinator:	

Major High-Level Milestone Targets: What events measure progress? E.g. Initiation Approved, Analysis Comple

Milestone	Target
Installation complete	06/14
Data Collection	06/14
Mid Study Report	09/14
End Data Collection	06/15
Final Report	06/15
Final Draft Edits	08/15
Incorporate Final Draft Comments	10/15
Final Report Published	10/15

Project Core Team Members:

Team Member	Phone/E-mail	Role
Shaun Rohrer	916-376-6710	Project manager
Steve San Julian	916-371-2284	Field Unit Supervisor
Mark Bettencourt	916-376-9717	Team member

Charter Version Number:	
Updated By:	**Date:**
Approved By:	**Date:**

Funding Information:

Project Budget:	**$ 79,600**	**Project Hours:**	800
Fund Center Title	FDOM Phase II		
Fund Center Number	VFDOMPOCS013		
Organization	DWR		
Contact Person	Shaun Rohrer		
Phone/E-mail	916-376-9710/shaun.rohrer@water.ca.gov		

This Project Should Have: Check all that apply

Project Management Plan ■	Environmental Stewardship Plan[1] ■	Work Breakdown Structure ■	Communications Plan ■	Procurement Plan ■	Human Resources Plan ■
Quality Management Plan ■	Stakeholder Register ■	Risk Register ■	Project Budget ■	Project Schedule ■	DWR Form 1498 ■
Project Safety Plan[2] ■					

[1] See WREM 58b for more information about creating an Environmental Stewardship Plan.

[2] All project Managers must take into account safety policies and procedures for projects. A safety plan should be created if needed. For more information visit the Workplace Safety Project web site.

Communication Plan

Project Title: Fluorescence of Dissolved Organic Matter Phase II

Information Recipient	Recipient Requirements (format, delivery method)	Information to be Communicated (content, level of detail, reason)	Communication Constraints	Time F Frequ
Sponsor: SWPCA	Email; meetings Project Status Reports	Project progress, any issues and resolutions	Workload priorities	As needed Weekly-mo
Project Manager: Shaun Rohrer	Email; meetings Project Status Reports Phone conversations	Project progress on tasks and deliverables	Workload priorities	As needed Weekly-mo
Project Team Members	Email; meetings Phone conversations	Issues related to Banks PP and the installed equipment	Workload priorities	As needed

Ground Rules:

Any proposed changes will be circulated through all recipients
Emails/phone calls are responded to as quickly as possible

Fluorescence of Dissolved Organic Matter Phase II

Sponsor/Program Manager	SWPCA
Project Manager	Shaun Rohrer
Project Budget	$ 79,600/800 hours

Project Summary/Description (include Scope statement)

Dissolved organic carbon (DOC) is a particular concern to drinking water treatment operators due to its abilities to react with disinfection agents such as chlorine and ozone, to form disinfection by-products (DBPs). Many DBPs are suspected carcinogens and it is difficult to manage the balance between removing disease causing organisms while limiting the formations of DBPs. To assist drinking water treatment plant operators, DOC concentrations are monitored throughout the Delta. Sampling can be done with grab samples at predetermined intervals, or continuously using real time monitoring equipment. The equipment can be expensive to purchase upfront, demand countless repairs/maintenance, and require expensive reagents. Fluorescence has been proven to be a strong indicator of DOC concentrations including an ongoing project where DOC and fluorescence of dissolved organic matter (FDOM) will be correlated at Banks Pumping Plant. This project proposes to do a correlation between FDOM and DBPs. Sampling for DBPs will be conducted biweekly-monthly and analyzed by an outside lab. Samples will be collected for one year, as the in-situ fluorometer will continue to collect data continuously. A mid-study progress report will be developed to highlight the first six months of the project, with a final report concluding the results of the comparison.

Project-Specific Considerations (this can be legislative language or other guidelines that will drive project)

If it is found that FDOM and DBPs have a strong correlation, it can be argued that FDOM can be used to predict DBP concentrations in the State Water Project eliminating the need for costly lab analysis from outside labrotaries thus saving the Department of Water Resources and the State Water Project Contractors money and time.

Start Date:	June 2014	Estimated End Date:	November 2015

Project Life Cycle/ Major Milestones

Project Life Cycle/ Major Milestones

	Planned	Actual
Complete Installation	6/14	6/14
Collect Data	6/14	
Mid Study Report	11/14	
Final Report	6/15	
Final Draft Editing	8/15	
Incorporate Final Draft Comments	10/15	
Final Report Published	10/15	

Roles & Responsibilities

Project Manager: Shaun Rohrer. This role is responsible for the projects status updates as well as the deliverables. The project manager will need to remain in constant communication with the sponsor and other interested parties. It is the responsibility of the project manager to document any changes made within the scope of the project.

Project Team: MWQI Field Unit. The MWQI Field Unit will be responsible for updating the project manager any status changes in the equipment currently located at Banks PP. To save time and resources, it will also fall on the field staff to maintain a service schedule for the FDOM as they are routinely in the field to maintain their equipment. If any issue arises, it will be imperative to communicate this with the project manager.

Major Deliverables

This project will have the following major deliverables:

- 12 months of data collection
- A mid-study progress report at 6 months
- A final report correlating DOC data, DBP concentrations, and FDOM

Resources Needed

The FDOM has already been purchased and is currently collecting data for the conclusion of Phase I.

Standards can be used to test the "drift" of the sensor over the course of the year; meaning standard concentrations can be tested to test the accuracy of the sensor.

Quality Planning Considerations

If DBPs have a strong correlation to FDOM, it may be possible to use fluorescence as a proxy for DBP concentration. It may be possible to eliminate the need for expensive lab testing without eliminating the ability to measure DBP concentrations. Fluorometers can be installed at several key locations in the Delta provide water treatment operators useful information on DBP concentrations.

Risk-Response Considerations (list any potential positive or negative risks and planned responses)

1. Power outages do occur at Banks PP. When they occur data is lost for the duration of the outage. Hopefully they don't last longer than necessary to ensure quality data is still collected.

2. The sensor may require maintenance beyond the staff's abilities. There may not be enough room in the budget for this to occur in which case the project may be put on hold.

Change Management Considerations/Procedures

1. If anything needs to change from the original scope of the project, then it must go through the proper channels to see if it is accepted. This includes supervisors as well as the contractors. If it is in agreement, the changes can take place.

Baselines Attached	X
Work Breakdown Structure	x
Project Budget	x
Project Schedule	x

Other Attachments	X
Stakeholder Register	
Communications Management Plan	x
Human Resources Management Plan	
Risk Register	
Quality Management Plan	
Procurement Plan	
Environmental Stewardship Plan	x

7.7 Tidal Marsh Restoration Literature Review

IO# VTIDALMRSH13 – hours 160 – budget $15,520

Version#: 2.0 Date: 6.13.14

Project Name: *Write out the entire, specific name.*

Tidal Marsh Restoration Literature Review

Sponsor/Program Manager	Alex Rabidoux/Cindy Garcia
Project Manager	Sonia Miller

Project Objective Statement: *What must the project do? By When? Keep this statement to 25 words or less. Make it SMART (Specific, Measurable, Achievable, Relevant, and Time-based).*

Review, compile, and summarize existing research on the impact of tidal wetlands in the Delta

Triple Constraint Trade-off

Resources	N	*Select a different flexibility letter for each constraint* *N= Not Flexible* *S= Somewhat Flexible* *M= Most Flexible*
Schedule	M	
Scope	S	

Estimated Start Date:		Estimated End Date:	May 2015

Project Deliverables: *What is the project going to produce? Create a list of tangible products that will result from project.*

Produce a literature review of available studies.

Strategic Fit: *What is the Strategic Initiative Identifier for this project?*

Restoration of wetlands in the Delta and upstream of the Delta could affect drinking water quality.

Customer: *Who are you doing the project for?*

State Water Project Contractors

Customer Benefits: *What customer requirements does this project address? Relate these to: increase revenue, avoid costs, improve service, and/ or comply with a mandate? Create a short list of customer benefits.*

Summarize research on wetlands and drinking water quality

Success Determination Factors *How will the success of the project be determined from the customer's perspective? Make criteria measurable so there is no doubt as to the project's success. Create a short list.*

Project Background: *What is the primary motivation for this project? Include a brief high level description of the business area, the current situation, the desired situation, and the gaps that exist. This summary builds on your description in the Project Initiation form.*

State, federal, and local agencies will be adding thousands of acres of tidal marsh to the Delta. Several examples include the most recent draft of the Bay Delta Conservation Plan (BDCP) which proposes creation or restoration of 65,000 acres of tidal wetland in the Delta, including the Suisun Marsh.

One negative impact from wetland restoration is the production of dissolved organic carbon (DOC) which at high concentrations can cause disinfection by products (DBPs) during the chlorination process of water treatment. DBPs are carcinogenic, highly regulated, and can lead to increased scrutiny and regulation of water treatment plant operations.

Project Scope:

In Scope: *List areas and functionality included in project.*	Out of Scope: *List areas and functionality not included in project.*
Tidal wetlands	

Dependent Projects: *What projects must be underway or completed before this project can be successful?*

None

Risks: *What characteristics or situations could cause this project to fail? Identify those items which are outside the jurisdiction of project and could result in a "show-stopper" to the project success. Create a short list.*

None

Assumptions and Constraints: *What assumptions were made in defining project? Are there constraints to the execution of project? List assumptions and constraints.*

Project must be complete with 160 hours or less.

This Project Should Have: *Check all that apply*

Project Management Plan	Environmental Stewardship Plan	Work Breakdown Structure	Communications Plan	Procurement Plan	Human Resources Plan
X	☐	■	☐	☐	☐
Quality Management Plan	Stakeholder Register	Risk Register	Project Budget	Project Schedule	DWR Form 1498
☐	☐	☐	☐	☐	☐

Major High-Level Milestone Targets: *What events measure progress? E.g. Initiation Approved, Analysis Complete.*

Milestone	Target Date
Prepare Draft Report for MWQP management	Done
Respond to comments	Done
Submit Draft Report to MWQP management and MWQI SPC project partners for review	August 2014
Respond to comments	September 2014
Submit Revised Draft Report to MWQI SPC and OWQ Chief for review	October 2014
Respond to Comments	October 2014
Send Draft Final Report to DWR Editors for formatting and editorial review	November 2014
Incorporate Comments	November 2014
Send draft for final review by DES Chief and DWR Executive	March 2015
Incorporate Comments	March 2015
Publish Final Report	April 2015

Project Core Team Members

Team Member	Phone/E-mail	Role
Sonia Miller	916-376-9712 Sonia.Miller@water.ca.gov	Lead investigator
Alex Rabidoux		Project Partner

Charter Version Number:	
Updated By:	Date:
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Funding Information

Project Budget:	$ 15,520 – 160 hours
Fund Center Title	7.7 Tidal Marsh Restoration Literature Review
Fund Center Number	VTIDALMRSH13
Organization	
Contact Person	
Phone/E-mail	

Appendix 3.

1.1. Work Plan Development Process and Schedule

- Producing the annual MWQI work plan requires staff time and the following of a strict schedule to produce the final document by the deadline of June 15th. To improve efficiency, this section was added to define the process and schedule for work plan development. The following process dates may be modified as needed to accommodate staff workloads and schedules:

1. ~September – October => Work Plan Development.
    a. Conduct an initial meeting between MWQI management and SWPCA to discuss continuing current project status, any planned project phases, and develop and determine new projects for the coming fiscal year that may be included into the annual work plan.
    b. If enough work is already defined to fill staff time in the following FY, MWQI Management and SWPCA are responsible for creating a priority list for those projects.
    c. If insufficient work is defined to fill staff time in the following FY, MWQI Management and staff, the SWPCA, MWQI-SPC, and Urban Water Contractors may initiate new projects using concept proposals (see section 2.3).
    d. MWQI management will work with staff to determine the labor requirements, resource and equipment costs, and a rudimentary schedule for any new projects, and then will discuss these project aspects with the MWQI-SPC.
2. ~ November - December => Workload Assessment Development
    a. MWQI management will compare last year's workload assessment to actual charges and will use this comparison assessment to develop a new annual draft workload assessment.
    b. Draft workload assessment should include all activities that are currently being worked on that will carry forward into the new work plan cycle and un-allocated staff time should be left as such in this draft.
    c. MWQI Management will provide the draft workload assessment to the MWQI-SPC for review and discussion in the follow-up meeting in January. MWQI management and SWPCA are responsible for creating a priority list for the work plan projects.

3. ~ December – January => Continuing Project and Concept Proposal Developments Project leads working on continuing projects will refine their project schedules, if needed and this information will be included into the annual work plan.
    a. For new projects for the coming fiscal year MWQI Management will request peer reviewed concept proposals from MWQI staff, the SWPCA, MWQI SPC, and Urban Water Contractors.
    b. MWQI Management will discuss the assignment of project leads with MWQI-SPC. Project lead staff will be responsible for developing the appropriate project products (work plan write-up with deliverable and timeline table, project initiation, charter, etc.)
4. ~January – Further Work Plan Development
    a. Conduct a follow-up meeting between MWQI management and MWQI-SPC to discuss the work plan projects, draft workload assessment, and concept proposals. MWQI management and MWQI-SPC will define the acceptability of concept proposals and develop a priority list for the approved projects.
    b. MWQI Management will use a priority list to decide what projects fit into the final workload assessment and add new projects into workload assessment so that all staff reach a work time allocation of 85%. Using 85% takes into consideration when staff is out-of-the office on vacations, holidays, sick-time, etc.
    c. MWQI Management will assemble the information on each work plan project and prepare the draft work plan.
5. ~February – March => Draft Work Plan Development
    a. Complete the annual draft work plan and distribute it to the Urban Water Contractors by March 30th of each year.
6. ~April – May => Address Work Plan Comments
    a. Receive and incorporate comments then complete work plan revisions and prepare final-draft work plan.
7. June - => Final Work Plan Development
    a. Complete the annual final work plan and distribute it to the TAC by June 15th of each year.

1.2. Work Plan Project Development Process

- In an on-going effort to improve quality and efficiency, and provide additional transparency in the MWQI Program this section has been added to the work plan this year to further define the responsibilities of project leads in developing annual work plan projects. Also, new MWQI work plan projects will be accepted using this concept proposal process to meet the challenges set-forth in the Delta Science Plan objectives, develop consistency within the MWQI Program, and increase collaboration and transparency between MWQI, Interagency Ecological Program (IEP), and the Urban Water Contractors:

1. MWQI Management will ask MWQI staff and MWQI SPC members to develop their concept proposals once it has been determined that there is insufficient work defined for the new annual work plan.
2. Once it has been determined that there is room for additional projects in the work plan, prepare a *concept* proposal. A *concept* proposal should:
    - Include a title, contact person, succinct study concept, and study location, proposed budget, timeline, level of readiness, and collaboration with existing similar efforts.
    - Define the problem and study question that needs to be answered.
    - Describe the method planned to answer the question.
    - Describe the technique that will be used to analyze the data to answer the question.
    - Define the products that will be produced by this study.
    - Define the resources required to conduct the study (labor hours, equipment, etc.)
    - Define the schedule for the study including important milestones.
3. Present concept proposal during the January follow-up meeting between MWQI management and MWQI-SPC. This meeting provides the opportunity to discuss the work plan projects, draft workload assessment, and concept proposals.
4. If the concept proposal is approved, or if an existing or new study is delegated to a staff member, further develop the proposal into a work plan project by doing the following:
    - Work on refining and adding detail to the concept proposal

- Refine methods and analysis through research and by seeking support from the appropriate subject matter experts.
- Refine budget and schedule.
- Complete project initiation document
- Create project summary including deliverable timeline in the approved work plan style for inclusion in the following year's work plan.

5. Beyond the above steps, project work may proceed prior to the start of the fiscal year if the project proposal has been approved by MWQI Management and MWQI-SPC, and MWQI Management work with staff to determine their allotted time for such work. If these steps have been met, work may begin, but are not limited to work on the following study components:
    - Project Charter
    - Project Management Plan
    - Study Plan with information on the project budget, schedule, and work breakdown structure
    - Quality Assurance Project Plan
    - Study Safety Plan
    - Purchasing activities
    - Environmental Stewardship Plan
    - Communication, Risk, and Resources Plans
    - Data collection and analysis
    - Mid-study and Final reports