Delta Regional Monitoring Program
Stakeholder Meeting: 12 May 2010
Meeting Notes

In accordance with the Strategic Workplan for Activities in the San Francisco Bay/Sacramento-San Joaquin Delta Estuary, the State and Regional Water Boards (collectively Water Boards) have initiated an effort to develop and implement a comprehensive regional monitoring program (RMP) for the Delta. The purpose of this meeting was to reinstate stakeholder involvement, begin implementation of the Regional Monitoring Program through a pilot project phase, and initiate technical work to address limitations with current monitoring and data management systems.

SESSION I – This session was intended to review and update stakeholders on the RMP planning process. Presentations focused on the proposed strategy and the work and products to date in order to set the stage for future workgroup activities.

Opening Remarks
Dorothy Rice and Pamela Creedon provided opening remarks that touched on a number of topics including the State and Regional Water Boards continuing commitment to developing a regional monitoring program for the Delta as well as the importance of stakeholder involvement and coordination with key programs and efforts such as the Water Quality Monitoring Council, SWAMP, IEP, the San Francisco Bay RMP, and the Federal Workplan for the Bay-Delta.

Overview of Draft RMP Plan and Overall Strategy
Presenter: Meghan Sullivan, Central Valley Regional Water Board

How did we get hear?
With the crash of several species in the Delta in 2000-2002, intense focus was placed on the Delta by several agencies in many different efforts. Several of these efforts prioritized the need for a comprehensive monitoring program in the Delta. In 2008, the Water Boards kicked off an effort to develop a Delta Regional Monitoring Program with a large meeting to introduce everyone to the plan, garner some excitement and commitment, lay out a general roadmap, and elicit stakeholder input. The meeting developed a general consensus that in order to succeed the Delta RMP needed to start small and focused with consecutive phasing and strive for cost neutrality. Topics of concern were generally centered on 5 topics – governance, monitoring questions, coordination with other programs, data integration, and funding. Loose workgroups were formed based on people's interests. The original workgroup lists were provided for stakeholders to review and/or update as needed. The workgroups are intended to further develop the structure and plan for the RMP.

What's happened since?
Strawman proposals have been posted for comment. Some individual stakeholders have been interviewed to gauge interests about important aspects of the RMP. The POD Synthesis Report was completed and posted for review. A Monitoring Directory for the Central Valley has been developed. All these activities provide specific starting points to guide our discussions and planning and helped to develop a draft program plan.

The Draft Program Plan

The plan (posted on the RMP website) is a starting point expected to evolve and adapt. The plan was developed based on strategies and elements from the National Research Council, the U.S. Environmental Protection Agency (USEPA), the Monitoring Council and SWAMP's Comprehensive Monitoring and Assessment Strategy. By keeping these elements in mind, we develop a solid base on which to found the RMP and on which to integrate with other regional and statewide efforts (like the portals being developed by the Monitoring Council). The program plan is a reflection of the need to start small and focused with the Central Valley Water Board fulfilling infrastructure requirements. **The RMP Planning Team will be accepting comments on the draft plan until June 30, 2010.**

- Infrastructure (Governance, Funding, Coordination) - Currently, as dictated by stakeholders at the kick-off meeting, these roles are being fulfilled by the Water Boards with the Central Valley Water Board in the lead. The structure of these aspects will become clearer and develop with the stakeholder involvement in the pilot phase.
- Monitoring Objectives Framework – However the program develops, this is a crucial aspect that will guide the program as it evolves and grows. For now, with the Regional Water Board is leading the governance of the RMP by contributing staff and funding, the monitoring questions will be focused on issues of concern to the Water Boards. Right now, those topics are ammonia, pyrethroids, and chemicals of emerging concerns, particularly endocrine disrupters.
- Data Access and Integration – Conceptually, it's been clear that the lack of clear access and integration of data has prevented various programs from broadly learning about the Delta system. Practically, Mike Johnson's report proves this.

Implementation of the Program

We still envision a phased approach to implement the program. We are currently transitioning from a development phase to implementation of the pilot phase. This phased approach will allow us to validate underlying assumptions and increase support, while developing capabilities and producing a long-term plan. The basic plan is meant to be an iterative process that can be refined as the RMP is further defined. There is room for stakeholder involvement and input throughout the process and those opportunities will be further refined as the governance structure is more formalized.

The scope of the pilot phase is based on three elements: a communication product developed for a broader audience and scheduled for release in November 2010, technical workgroups initially targeted specifically at addressing the monitoring system shortcomings identified in the Johnson et al report, and an initial program management infrastructure to coordinate elements (.e.g. data integration and access, sampling and analysis, reporting) that cut across multiple management questions.

A truly important component of the pilot phase, and the RMP in general, is stakeholder outreach. The RMP Planning Team plans to continue to provide status updates via the distribution lists and the website. We also plan to solicit lots of feedback throughout the production of the communication product. Feedback will also be necessary to establish stakeholder priorities for future syntheses (which are also proposed as part of the pilot phase).

We've established a template, essentially a repeatable, iterative process, to begin implementing the Delta RMP, in the short-term. The long-term implementation can be very similar or very different. The important things to remember are the basic elements – infrastructure, scope, monitoring objectives, and data access and integration. We need to move beyond conceptualizing possibilities and begin implementing a program that can and will evolve over time. Who gets what type of say? And what are we looking for? These are just a few of the questions that we will answer moving forward.

Summary of Existing Monitoring in the Delta,
Overview of the Central Valley Watershed Monitoring Directory
Presenter: Thomas Jabusch, Aquatic Science Center

Thomas Jabusch provided an overview of the current water quality monitoring and data management system and how this information will be used to inform the Delta RMP development. At the stakeholder kick-off meeting held in September 2008, participants identified several needs for an understanding of current monitoring information. The information will be used to:

- Build on existing efforts to the extent possible;
- Identify opportunities for cost-sharing and other efficiencies;
- Determine important data gaps to be filled.

To provide this important background material, the planning team prepared a report summarizing existing monitoring as a first step in organizing available information and used the Central Valley watershed monitoring directory as a tool for conducting the inventory and organizing metadata.

Summary of Existing Monitoring
The Final Report is available at the Delta RMP website. It organizes available information on monitoring programs in the Delta into a starting point for examining program designs and looking for potential efficiencies and synergies. To do this and not be endless, the planning team had to make decisions for what and what not to include. The inventory was restricted to include only programs monitoring surface water quality, only long-term programs (>3years, e.g. no grants), and only ongoing, continuing monitoring programs.

The report is intended as a background and baseline for planning. The report includes a summary section and summary tables devoted to data availability and uses. There is currently no single online access point for Delta surface water data. Main online data access points for Delta surface water information are the Bay-Delta and Tributaries project database (BDAT), the SWAMP databases/California Environmental Data Exchange Network (CEDEN), California Data Exchange Center (CDEC), the DWR Water Data Library (WDL), and the National Water Information System (NWIS).

The report includes appendices with details for each program including general program information, contact information, monitoring objectives, stations, parameters, and data availability. Additional appendices feature detailed, color-coded maps of monitoring, organized by program categories and parameters. The report divided the existing long-term programs (17) into four distinct categories that loosely reflect main approaches to monitoring in the Delta: continuous monitoring, receiving water monitoring, water supply monitoring and regional or watershed monitoring.

Continuous Monitoring: The Delta contains over 100 high-frequency continuous monitoring sites. These sites are maintained and funded by the Department of Water Resources (DWR), U.S. Geological Survey (USGS), and the U.S. Bureau of Reclamation (Reclamation). The focus of these continuous monitoring networks is mainly on flow and general water quality characteristics such as salinity, temperature, and turbidity. There is also limited coverage of a few other parameters such as chlorophyll florescence, organic carbon, and nutrients. The Interagency Ecological program (IEP) Environmental Monitoring Program (EMP) and Municipal Water Quality Investigations (MWQI) augment the continuous network monitoring with monthly grab samples.

Receiving Water Monitoring: The receiving water monitoring is largely a result of monitoring requirements incorporated into National Pollution Discharge Elimination System (NPDES) permits or the Irrigated Lands Conditional Waivers. Depending on the type of facility and associated discharge, the scope of receiving water monitoring can range from a few basic water quality characteristics to a whole suite of contaminants that may include disinfection byproducts, metals, mercury, nutrients, pathogens, pesticides, organic contaminants, and toxicity. There are approximately 90 sites within the Delta used to assess specific impacts of point source, agricultural, and storm water-derived discharges. Wastewater dischargers are located peripherally around the inner Delta and their local monitoring sites are more or less aligned along the major waterways of the Delta, the Sacramento, San Joaquin, and Old Rivers. The agricultural water quality coalitions have selected ten sites representative of agricultural-derived discharges from Delta islands for a targeted monitoring approach. The stormwater-related indicator sites are located in the urban reach of the Sacramento River, in the San Joaquin River, the Stockton Deep Water Ship Channel, and other urban waterways in the Stockton area.

Water Supply Monitoring: There are four current efforts assessing the quality of source water from a drinking supply perspective in the Delta: the Department of Water Resources' Municipal Water Quality Investigations (MWQI), the State Water Project (SWP) Water Quality Monitoring Program, the Contra Costa Water District (CCWD) and the Delta-Mendota-Canal (DMC) Water Quality Monitoring Program. The MWQI maintains a monitoring network representing the main in- and outflows of the Delta, and the major water intakes to the State Water Project (SWP) and Central Valley Project (CVP). The State Water Project and Contra Costa Water District monitor for water supply purposes at sites near the intakes or inside their conveyance systems in the Delta. The MWQI, the SWP, and the CCWD monitor general water quality parameters and a wide range of drinking water constituents of concern (including nutrients, OC, pathogens, and pesticides). The Delta-Mendota-Canal (DMC) Water Quality Monitoring Program monitors salinity and selenium in Delta water exports to the San Joaquin Westside.

Regional or Watershed Monitoring: Several programs conduct monitoring on a regional or watershed basis to gain an understanding of the ambient system and a variety of other parameters. Included in this category of monitoring are the Interagency Ecological Program (IEP) and other related efforts based on water-rights permits. Other regional programs that monitor overlapping regions (San Francisco Bay Regional Monitoring Program, Sacramento Coordinated Monitoring Program [CMP]), as well as basin-wide, statewide (Surface Water Ambient Monitoring Program [SWAMP]), and national efforts (National Water Quality Assessment Program [NAWQA]) are included in this category.

The IEP Environmental Monitoring Program (EMP) monitors 12 sites in the Delta representing the main inflows and outflows. The other programs each visit one or more selected integrator or indicator sites near the end of major watersheds or legal boundaries. The IEP EMP conducts discrete monitoring of general water quality, nutrients, phytoplankton, zooplankton, and benthos at 12 sites representing main in- and outflows of the Delta. USGS monitors general water quality, mercury, nutrients, and pesticides at integrator sites at the bottom of the Sacramento and San Joaquin watersheds and in the Yolo Bypass. The SWAMP Statewide Stream Contaminant Trend Monitoring program takes sediment samples annually at Hood and Vernalis for contaminant analysis and toxicity testing. A Central Valley Water Board Seasonal Trend study is linked to the statewide program and analyzes water quality and water column toxicity four times per year. The San Francisco Bay RMP measures water and sediment chemistry and toxicity at two stations near the confluence of the San Joaquin and Sacramento rivers and collects bivalves as biosentinels for tissue analyses of mercury and other metals. The Sacramento CMP tests for general water quality, nutrients, and toxic contaminants at two receiving water sites in the Sacramento River.

Monitoring Directory
Thomas Jabusch also gave a brief overview of the Central Valley Monitoring Directory. The monitoring directory is an online tool that can be used to maintain and update the metadata over time. A map-based interface serves as a directory to find information on who is sampling what, when, and where and whether and where monitoring data and information are made available. Program managers will be able to use password-protected data entry screens to update monitoring program information. The beta-version is at www.centralvalleymonitoring.org

Next steps: Participants at the kick-off meeting felt that there is currently a lack of coordination potentially resulting in inefficiencies and duplication of effort. A better understanding of the existing programs is a starting point. The planning team suggests that improving coordination and identifying efficiencies should go hand in hand. In guiding these efforts participants should consider this central question: “If we took the funds currently being spent on WQ monitoring and prioritized information needs on which to spend it, would monitoring look the same as it does today?” Focused analyses based upon the shared monitoring/assessment objectives identified in the current system can help explore potential efficiencies by identifying a) patterns (potential redundancies, gaps, opportunities for coordination) and b) opportunities for the exchange of requirements for participation (Reduce frequency, parameters, or stations? Periodic shifts of effort?). The Monitoring Summary is a starting point for additional progress.

Lessons Learned from the POD Synthesis Analysis
Presenter: Michael Johnson, University of California, Davis

Michael Johnson presented an overview of the lessons learned while conducting the analysis for the report entitled “Evaluation of Chemical, Toxicological, and Histopathologic Data to Determine their Role in the Pelagic Organism Decline.” The goal of the report was to determine if sufficient data are available to conclude that contaminants are partially or wholly responsible for the Pelagic Organism Decline (POD). The review examined chemical, toxicity, and histopathology data from monitoring programs and studies conducted on organisms in the Delta. During the course of the

review, several constraints and common issues within the existing monitoring systems became evident.

The review was conducted by examining publicly available data from databases developed by current or past monitoring programs (including the UC Davis Regional Data Center, the Bay-Delta and Tributaries project database, NPDES and SWAMP data) and then expanded to include both published and non-published reports. The geographic scope of the analysis included the legal Delta +30 miles. Initially, the analysis was focused on a specific list of contaminants (chlorpyrifos, diazinon, diuron, bifenthrin, esfenvalerate/fenvalerate, lambda lambda-cyhalothrin, permethrin, s s-metolachlor, propanil propanil, and copper). However, due to limited spatial and temporal availability of data on the specific contaminants, the analysis was expanded to include any chemical of concern.

The review assembled over a million data records. However, many of these records were filtered from the analysis for various data quality issues. Data were removed from the analysis if they did not include detection or reporting limits, lacked an identifiable analyte name, were not associated with an identifiable sample site location, and/or units of measure were recorded incorrectly (e.g. chlorpyrifos measured in seconds or nitrate measured in m^3). Because this removed a lot of data, the analysis reserved data without complete quality assurance information (e.g. information about duplicates, blanks, and matrix spikes are rarely reported.

The review was not meant to make a definitive determination of the role of contaminants, but rather to determine if sufficient data are available to determine if contaminants could be implicated in the decline. In the course of the review, several common issues were identified that make most of the data unusable for a comprehensive analysis. With nonexistent and/or non-reported quality assurance and quality control information, most data is difficult to interpret. The spatial and temporal consistency of monitoring programs is patchy at best and not conducive to understanding long-term trends within the Delta. Similarly, the differences across the different programs make the integration of data types difficult. Other common issues discovered in the course of the analysis include a lack of ancillary data and inappropriate methodologies for sample preservation and/or analysis.

Overall, as a result of the concerns noted above, there were few chemicals with sufficient data available to draw conclusions about the role of contaminants in the POD. Current monitoring programs are conducted with a specific purpose and can not be expected to provide information to address issues such as the POD. The report illustrates the need for a comprehensive long-term monitoring program (that includes chemical analysis, toxicity testing, and some histopathology analyses) to be able to compile and synthesize data with common quality control and quality assurance information.

SESSION II – The afternoon session focused on defining specific next steps for beginning to implement the Pilot Phase of the draft RMP strategy. The Pilot Phase includes two main components: addressing constraints in the monitoring and data management system highlighted by the Contaminants Synthesis Report and developing a second synthesis report focused on another topic of regional management interest. Participants agreed that this was an effective strategy for beginning to implement the Delta RMP.

Dr. Brock Bernstein began the session by reiterating the highlights of the morning session and having participants introduce themselves and provide a brief statement about how the Delta RMP is important in their particular capacity. The afternoon discussion quickly focused on three issues that, if resolved, would improve the ability to conduct future regional-scale analyses and assessments. The participants agreed that these issues formed a logical starting point for the Delta RMP; they include:

- The need to measure simultaneously the ancillary parameters (e.g., total organic carbon) necessary for interpreting measurements of potentially toxic compounds
- The value of data transfer formats that would streamline the transfer of key data types among program participants
- The value of a tiered, or hierarchical, system of quality assurance requirements suited to the different types of data being collected by monitoring programs and the different management questions they address

The following paragraphs discuss each of these issues in turn and identify the next steps needed to resolve them.

Ancillary data types

Mike Johnson's morning presentation described instances in which it was not possible to fully evaluate the potential effects of observed levels of contaminants because ancillary data necessary to accomplish this were not collected at the same time and place. Many such ancillary data types are general chemistry parameters such as salinity or total organic carbon which are relatively inexpensive to collect and for which sampling methods are well developed. Thus, resolving this issue would be relatively straightforward and would involve the following steps:

- Establish a technical workgroup of chemists, toxicologists, and monitoring specialists
- Define a core list of key contaminants of regional interest
- Define the ancillary data types needed for the complete evaluation and assessment of monitoring data on these contaminants
- Examine major current monitoring programs to determine whether needed ancillary data types are measured in concert with each key contaminant
- Identify the adjustments needed (if any) to current monitoring programs to ensure that needed ancillary data are collected
- Identify mechanisms for implementing these needed adjustments (e.g., permit modifications, decisions by program managers, revisions to programs' operating procedures)
- Implement program adjustments

Data transfer formats

Mike Johnson's morning presentation also noted the difficulty often encountered in obtaining data from a variety of sources and consolidating it into aggregated datasets for

analysis. Such data integration problems are common in assessments of this type, especially when they involve the use of historical data. Other regional monitoring and assessment programs have resolved this issue, at least for core data types, by developing standardized data transfer formats that facilitate the movement of data among different entities. Such transfer formats do not require participants to change their internal data formats or data management procedures. In such a system, each participating entity develops two software routines, one that converts its data formats into the standardized transfer format used by all participants and another that converts data received in the standardized format into its internal data formats. These software routines can be thought of as coding and decoding programs. Once they are developed, they enable the ready transfer and integration of core data types among participating programs.

While such transfer formats have been proved to be extremely useful, the recent implementation of the California Environmental Data Exchange Network (CEDEN) by the State Water Board may provide an analogous option that would accomplish much the same function. CEDEN is a distributed network of data centers intended to provide for the storage of and access to a wide variety of environmental data throughout the state. It is a central feature of the data management strategies for both the Surface Water Ambient Monitoring Program (SWAMP) and the California Water Quality Monitoring Council. Submitting data to CEDEN may accomplish much of what is intended by data transfer formats implemented at a regional level. SWAMP has offered to assist the Delta RMP in assessing data integration challenges within the region and determining whether and to what extent CEDEN could provide a solution for this issue.

Next steps include:

- Establish a technical workgroup of data managers, programmers, and SWAMP representatives
- Define a set of core data types that are a high priority for regional data integration, based on expert judgment about the analyses and assessments likely to be performed at the regional or subregional scale
- Identify the current locations of these data
- Confirm the availability of technical support from SWAMP
- Assess CEDEN's ability to store and/or provide access to these data types
- Assess the relative difficulty, level of effort, reliability, and long-term effectiveness of the two alternatives represented by CEDEN and regional standardized data transfer formats
- Choose the preferred alternative
- If CEDEN, work with SWAMP and regional program staff to design and implement data submittal, access, and/or transfer mechanisms
- If not CEDEN, design and implement standardized regional data transfer formats
- For either option, establish oversight and support procedures to ensure that solutions remain viable over the long term

Tiered quality assurance structure

Another issue highlighted in Mike Johnson's presentation was the effect of missing or inadequate quality assurance information on the ability to use data in the synthesis analyses. Such gaps in quality assurance data make it impossible in certain circumstances to properly evaluate monitoring data and can result in their exclusion from the analysis. While a large percentage of these problems occurred with historical data,

there remain inconsistencies and gaps in the approaches used by current monitoring programs to verify and document data quality. Different programs have a variety of systems for documenting data quality and these vary depending on the size and sophistication of the program, the intended use of the data, and historical program practices. Thus, it is not feasible to consider implementing a single standardized approach for all programs in the region. In addition, a single approach, even if feasible, would not suit the varying needs of different programs.

On the other hand, it is necessary that efforts to integrate and analyze data from multiple sources have available some means to establish the relative quality of monitoring data and its suitability for different types of analyses. SWAMP has established data quality requirements for its own monitoring data and there are in addition broad requirements that permit mandated monitoring programs produce data that are SWAMP comparable. To help meet those requirements, SWAMP has begun establishing a tiered structure for data quality that enables programs to select data quality requirements and the level of quality assurance detail appropriate to their needs. One benefit of achieving SWAMP comparability is that it would enhance programs' ability to submit their data to CEDEN. SWAMP has offered to assist the Delta RMP in examining how the SWAMP tiered quality assurance approach could be best applied to key monitoring programs through the following steps:

- Establish a technical workgroup of data management, quality assurance, and monitoring specialists, and SWAMP representatives
- Define a set of core monitoring programs and data types that are a high priority for data integration
- Describe current data quality objectives and quality assurance requirements for each program and data type
- Assess the applicability of current SWAMP quality assurance tiers to the core programs and data types
- Identify and implement needed revisions to the SWAMP quality assurance tiers to improve their regional applicability
- Identify the adjustments needed (if any) to monitoring programs' current quality assurance procedures to ensure their comparability with the appropriate SWAMP quality assurance tier
- Identify mechanisms for implementing these needed adjustments (e.g., permit modifications, decisions by program managers, revisions to programs' operating procedures
- Implement program adjustments

Stakeholder concerns

While meeting participants agreed that the three starting points described above were likely to produce clear benefits, they were also concerned that these efforts not impose additional monitoring requirements or significantly increase program costs. In addition, they stressed the importance of ensuring that monitoring data be targeted at management information needs and that adjustments to monitoring requirements be considered in the context of necessary tradeoffs where cost, logistical, or other constraints exist. Finally, stakeholders agreed to participate on needed workgroups and to help move the Pilot Phase efforts forward.

Next synthesis report

Participants agreed that a new synthesis report, targeted at another issue of regional importance, would be an effective way to continue creating regional assessments and identifying specific potential improvements to the monitoring and data management system. The Regional Board proposed an analysis of spatial patterns, temporal trends, and current knowledge about the sources, fates, and effects of three types of contaminants: ammonia, pyrethroids, and endocrine disruptors. These represent contaminants that have been monitored for some time (ammonia), that are of increased concern currently because of improved understanding of their potential widespread toxicity (pyrethroids), and are an emerging concern for the future (endocrine disruptors).

Regional Board staff agreed with participants' comments that the analysis approach for each type of contaminant (i.e., historical, increased current, and emerging concerns) will probably differ, in large part because of significant differences in the amount of data available for each. Thus, the ammonia analysis would be retrospective while the endocrine disruptor analysis would be more prospective. Participants agreed that the next steps include:

- Participants submit additional suggestions to Regional Board staff if participants believe another topic would prove more useful
- Regional Board prepares draft project plan and distributes for review
- Regional Board finalizes project plan
- Delta RMP implements regional assessment