The California Water Quality Monitoring Council
Increasing Efficiency and Effectiveness through Collaboration

First Triennial Audit of Implementing
A Comprehensive Monitoring Council Strategy for California

The Water Quality Information Problem

Many local, state, and federal agencies, regulated dischargers, and hundreds of water bond grant recipients spend millions of dollars each year collecting water quality data in California. These data must be turned into useable information to help decision makers and stakeholders understand the status of our waters and aquatic ecosystems, the public health and welfare issues related to water quality, and the effectiveness of agency programs to manage our water resources. To satisfy these needs, California's system for water quality and aquatic ecosystem information ~~system~~ must be improved. There are inconsistent monitoring objectives and methods to collect and assess these data. Often it is not possible to integrate data from different studies and there was no single user-friendly place to access these data.

Legislative Response

In response, California State Senate Bill 1070 was signed into law in 2006, requiring the California Environmental Protection Agency and the California Natural Resources Agency to enter into a Memorandum of Understanding establishing the California Water Quality Monitoring Council. The legislation and MOU required that by December 2008 the Monitoring Council report its recommendations for maximizing the efficiency and effectiveness of existing water quality and associated ecosystem health data collection and dissemination, and for ensuring that collected data are available for use by decision makers and the public. SB 1070 required that these recommendations lead to the development of a recommended *Comprehensive Monitoring Program Strategy for California*, which was submitted to the Agency Secretaries in December 2010.

Members of the Monitoring Council represent a diversity of interests, including: state regulatory, resource management, and public health agencies; regulated storm water, wastewater and agricultural interests; water suppliers; citizen monitoring groups; the scientific community; and the public. When viewed from a national perspective, the breadth of representation on this council is unique among state and regional monitoring councils.

The Monitoring Council's Solution

Rather than focusing on technical details, such as methods consistency and standard data formats, our Council's recommendations presented a new solution. The Monitoring Council believes that the best way to coordinate and enhance California's monitoring, assessment and reporting efforts is to focus first on providing a platform for intuitive, streamlined access to water quality and aquatic ecosystem information that directly addresses users' questions. Theme-specific workgroups, under the overarching guidance of the Monitoring Council, evaluate existing monitoring, assessment and reporting efforts and work to enhance those efforts so as to improve the delivery of water quality and associated ecosystem health information to the user in the form of theme-based internet portals.

Each portal is developed and maintained by a collaborative theme-specific workgroup. The workgroups are comprised of issue-experts representing key stakeholders, from both inside and outside state government, that develop a web portal devoted to their specific theme. Each workgroup works to coordinate existing monitoring programs within their theme, developing monitoring and assessment methods and data management

procedures according to performance measures defined by the Monitoring Council. The goal is to achieve only that degree of standardization necessary to meet users' needs. This provides the context needed to effectively evaluate and then resolve monitoring design, coordination, and data access problems.

Triennial Audit

The Council's enabling legislation requires that the Secretaries of California's Environmental Protection and Natural Resources Agencies conduct a triennial audit of the effectiveness of the *Comprehensive Monitoring Program Strategy*. With the *Strategy* being published in December 2010, the time for that audit is now. As a first step, the Secretary of Cal/EPA has asked that the Monitoring Council conduct a self-audit. Because they are on the front lines of implementing the Council's *Strategy*, each of the Monitoring Council's workgroups was asked to review their progress toward improving monitoring, assessment and reporting, evaluating their achievements against six performance measures stated in the *Strategy*:

- Program strategy, objectives, and designs
- Indicators and methods
- Data management
- Consistency of assessment endpoints
- Reporting
- Program sustainability

Workgroups were also asked to use the rating benchmarks contained within the *Strategy*. The workgroup progress reports are presented in Appendix 1 I to this report. The results can be summarized in four areas: our goals, achievements toward reaching those goals, the challenges we face, and where we go from here.

What Are Our Goals?
What Have We Achieved Toward Each Goal?

Based on the mandates of SB 1070 and the MOU, the Monitoring Council's *Strategy* includes three overarching goals:

- Collaboration
- Access to Information
- Projects Track Effectiveness

Collaboration

Our first goal is to make California's monitoring system more efficient and effective through improved coordination among governmental agencies and non-governmental organizations. This includes identifying and filling data gaps, minimizing redundancies in monitoring efforts, ensuring that quality control measures are in place so that data are useable (i.e. of known and documented quality), and enabling multiple data sources to be combined for broader assessments.

California's Monitoring Council has made great strides in coordination, forming six interagency workgroups to address water quality and associated ecosystem monitoring, assessment and reporting. In addition, an ocean and coastal ecosystem health workgroup is in the process of being formed. Program staff members from numerous agencies and non-governmental organizations are involve in these workgroups. Details regarding the workgroups and their themes are presented in Table 1.

Table 1: The Monitoring Council's Theme-Specific Workgroups

Theme	Workgroup
Is our water safe to drink?	Safe Drinking Water Workgroup
Is it safe to swim in our waters?	Safe-to-Swim Workgroup
Is it safe to eat fish and shellfish from our waters?	Bioaccumulation Oversight Group
Are our aquatic ecosystems healthy?	
• *Wetlands*	California Wetland Monitoring Workgroup
• *Streams, rivers and lakes*	Healthy Streams Partnership
• *Estuaries*	California Estuary Monitoring Workgroup
• *Ocean and coastal*	[workgroup forming]

Two additional groups were formed to provide further coordination and support. California's Water Quality Monitoring Collaboration Network, which conducts regular web-based seminars for agency personnel, citizen monitors and others, fosters information exchange and encourages broader use of sound methods and tools for monitoring, assessment, reporting and data management. California's Collaboration Network webinars are often coordinated with the National Water Quality Monitoring Council webinar series. A Data Management Workgroup has been formed to provide recommended best practices for data management, increased data access, geographic information systems, and web development.

The Monitoring Council and each of its workgroups maintain email subscription services, through which collaborators and other interested parties can sign up to receive periodic meeting notices and other information. Table 2 summarizes the number of persons who have voluntarily signed up for these email notifications. Subscription figures demonstrate strong interest in the Monitoring Council and workgroup efforts.

Table 2: The Monitoring Council's Theme-Specific Workgroups

Email Subscription List	Number of Subscribers as of May 1, 2014
Water Quality Monitoring Council	1,136
Safe Drinking Water Workgroup	209
Safe to Swim Workgroup	431
Bioaccumulation Oversight Group	525
Wetland Monitoring Workgroup	3,040
Healthy Streams Partnership	388
Estuary Monitoring Workgroup	568
Data Management Workgroup	584
Monitoring Collaboration Network	1,555

Through increased coordination, our workgroups have developed consistent monitoring, assessment, and reporting methods and data management tools designed both to improve the efficiency and effectiveness of system California's monitoring and assessment and to enhance the delivery of data and information to the user.

As a state and federal partnership, the California Wetland Monitoring Workgroup has developed a state Wetland and Riparian Area Monitoring Plan, based on the Level 1-2-3 framework of U.S. EPA. This plan includes the California Rapid Assessment Method (CRAM) a cost-effective and scientifically defensible rapid assessment method for monitoring the conditions of wetlands throughout California. Enhanced data management and visualization tools include: the California Environmental Data Exchange Network (CEDEN) a water quality database linked to the Water Quality Exchange of the U.S. EPA and the U.S. Geological Survey; tools used by our Estuary Monitoring Workgroup to bring reports, data, maps, and graphics together to tell stories about California's San Francisco Bay-Delta Estuary; and EcoAtlas, a tool that provides landscape context to aquatic resource extent, condition, and project information by integrating stream and wetland maps, restoration information, and monitoring results with land use, water quality, and other information. The Landscape Profile Tool of EcoAtlas generates dynamic summaries of aquatic resource information within a user-defined area or watershed. The base map for EcoAtlas is the California Aquatic Resources Inventory (CARI), including standardized wetland definition, mapping and classification protocols. California's Surface Water Ambient Monitoring Program (SWAMP) has developed and is broadening the use of scientifically validated monitoring and assessment protocols, quality assurance practices, and data quality documentation procedures.

Access to Information

Our second goal is to improve access by decision makers and the public to meaningful quality-assured monitoring data and assessment information. This goal includes designing monitoring and assessment efforts to address specific management questions, turning monitoring data into meaningful assessment information, and making the resulting monitoring data and assessment information readily accessible.

Toward this goal of making water quality and related ecosystem information readily available, the Monitoring Council's workgroups have publicly released six question-based, easy-to-use web portals. Each portal provides streamlined access to monitoring data and assessment information for decision-makers and the public that directly address users' questions. The published portals cover swimming safety, the safety of eating fish from our waters, and the health of wetlands, streams and rivers, estuaries and rocky intertidal habitats (also known as "tide pools"). The mockup for a seventh portal "Is our water safe to drink?" has been approved by the Monitoring Council and is in the process of being built. The My Water Quality website (www.MyWaterQuality.ca.gov), shown in Figure 1 below, provides a single point of entry to all of these portals. The My Water Quality button access link is found on numerous governmental and non-governmental websites.

Appendix 3 III to this report presents detailed information on how and by whom the My Water Quality website and the existing portals are being accessed.

As part of their efforts to address the safety of eating fish from California's waters, the Bioaccumulation Oversight Group has conducted the first comprehensive statewide survey of contaminants in sport fish from our

lakes, streams and coastal waters and developed the data which led to our first statewide advisory on eating fish from California's lakes and reservoirs.

The California Wetland Monitoring Workgroup is generating data and developing standardized procedures being used by the California State Water Resources Control Board to develop a new wetland and riparian area protection policy for the state. Supported by U.S. EPA's Healthy Watersheds Initiative, the Monitoring Council's Healthy Streams Partnership workgroup guided the development of the first statewide multi-metric assessment of watershed health. The results of that assessment will be incorporated into the workgroup's Healthy Streams Portal.

Projects Track Effectiveness

A third key goal of the legislation is to ensure that those water quality improvement projects financed by the state provide specific information necessary to track project effectiveness with regard to achieving clean water and healthy ecosystems. Though it has reviewed monitoring requirements for project grants managed by the State Water Resources Control Board and the Department of Water Resources, the Monitoring Council has yet to develop specific recommendations. We hope to begin addressing this goal in the near future.

Figure 1: The My Water Quality Website Home Page

What Are Our Challenges?

Implementing the Monitoring Council's *Comprehensive Monitoring Program Strategy for California* involves substantial challenges. A key challenge has been that the legislation requiring formation of the Monitoring Council did not include dedicated funding to support the Monitoring Council or the implementation of its ~~s~~*Strategy*, including its workgroups and web portals. A combination of redirected U.S. EPA grant monies, permit fees, and water contract funds currently pays for one Coordinator position at Cal/EPA, plus one half-time Coordinator from the Natural Resources Agency. Additional resources are needed now and into the future to both initiate and sustain collaboration, including staff time to attend workgroup meetings and to coordinate monitoring efforts. Resources are also needed to break down the data silos within existing agencies and programs and to develop and maintain the My Water Quality web portals. As an outgrowth of this triennial audit, each workgroup will be developing business plans to get a precise handle on resource needs to meet current goals and to ensure sustainability into the future.

While the enabling legislation required that the Monitoring Council develop the *Comprehensive Monitoring Program Strategy* and to send those recommendations to the Secretaries of Cal/EPA and the Natural Resources Agency, neither of the Secretaries has formally endorsed the *Strategy*, even after numerous requests from the Monitoring Council. As a result, implementation has been largely from the bottom up. Without direction from upper management, the Council's collaborative workgroups have had inconsistent leadership and uneven participation. Many of the tools developed by these workgroups currently have no agency home, making their long-term maintenance uncertain. By relying on largely voluntary participation and outreach efforts, many agency personnel are still unaware of the workgroups and the tools they have developed to improve their performance.

The sustainability of current efforts to implement the *Strategy* is further explored in Appendix II to this report.

Where Do We Go From Here?

Even with these substantial challenges, California's Monitoring Council is determined to keep moving forward. We will continue to work to build support through increased outreach to agency and program managers. Each workgroup will also identify mandates of governmental agencies that can be addressed more effectively through the collaborative processes, tools and web portals available through participation in the workgroups. Outreach efforts to agency managers can use this information to help build support needed for the program.

As mentioned earlier, business plans will be developed to identify key workgroup actions, necessary resources, and potential funding sources that would ensure workgroup sustainability. The Monitoring Council's Data Management Workgroup is also working with the theme-specific workgroups to develop recommendations for more effectively sharing of water resources information between agencies and with other data providers and users. Standardized data formats and transfer protocols need to be developed and implemented.

The California Water Quality Monitoring Council is increasing its involvement in the activities of the National Water Quality Monitoring Council, which also fosters coordination but on a national level. Jon Marshack, one of two Coordinators of California's Monitoring Council, was recently appointed to the National Water Quality Monitoring Council representing the Pacific Southwestern States of Arizona, California, Hawaii, and Nevada. Created in 1997, the National Water Quality Monitoring Council is a national forum for coordination of comparable and scientifically defensible methods and strategies to improve water quality monitoring, assessment and reporting. The National Council brings together scientists, managers, and citizens to ensure that information about the quality of our water resources is

accurate, reliable, and comparable. The National Council is chartered as a subgroup of the Advisory Committee on Water Information (ACWI) under the Federal Advisory Committee Act.

Recommendations

Looking back over the last seven years of its existence, the California's Water Quality Monitoring Council has made amazing progress, with no dedicated funding and largely through voluntary efforts. However, most of the workgroups predict that without support from agency and departmental management and dedicated funding, the current levels of collaboration and portal development and maintenance is not sustainable.

To be truly successful, the Monitoring Council's collaborative workgroup and portal development efforts must be blended into the normal way of doing business of numerous governmental organizations. Based on the analysis outlined above, the California Water Quality Monitoring Council makes the following recommendations both to meet the mandates of SB 1070 and the Memorandum of Understanding between Cal/EPA and the California Natural Resources Agency and to fully implement the Council's *Comprehensive Monitoring Program Strategy for California*:

1) The Monitoring Council's workgroups should develop business plans that identify key workgroup actions, necessary funding and potential funding sources to ensure sustainability.

    a) A key component will be to identify those monitoring, assessment and reporting mandates of existing and potential governmental agency and non-governmental partners that can be better satisfied through the Monitoring Council's collaborative workgroup process, tools, and the My Water Quality portals.

2) The Data Management Workgroup should develop recommended data formats and data transfer protocols to ensure that water resource data can be effectively shared (machine to machine) between agencies and with other data providers and users.

3) The Monitoring Council and its workgroups should increase outreach to departmental and program managers within those governmental organizations specifically listed in SB 1070 as well as those whose are involved in California's system of water quality and associated ecosystem monitoring, assessment, and reporting. Using the departmental mandates identified in Recommendation 1a, above, such outreach would encourage them to:

    a) Allow their staff to participate in the Monitoring Council's collaborative workgroups;

    b) Utilize the tools developed by these workgroups to improve the efficiency and effectiveness their department's/program's monitoring, assessment, data management, and reporting efforts;

    c) Use the My Water Quality portals to provide access to their department's/program's data and assessment information; and

    d) Add web services and other mechanisms to make their water quality and ecosystem health data and assessment information more accessible to other agencies and organizations.

4) The Monitoring Council should revisit the MOU with agency secretaries to achieve agreement on rolls and responsibilities of all parties.

5) The Monitoring Council should develop a proposal for legislation needed to advance implementation of the Monitoring Council's *Strategy*.

Appendices

Appendix I: Monitoring Council Workgroup Self-Evaluations

To begin the triennial audit required by SB 1070 (Statutes of 2006), the Secretary of the California Environmental Protection Agency asked that the California Water Quality Monitoring Council conduct a self-evaluation. Because the Monitoring Council's workgroups are on the front lines of implementing the *Comprehensive Monitoring Program Strategy for California*, each workgroup was asked to evaluate their progress over the last three years. As outlined in the *Strategy*, the Monitoring Council's performance measures and rating benchmarks were used for the workgroup self-evaluation.

Performance Measures and Rating Benchmarks – summarized from the Monitoring Council's *Initial Recommendations Report* (2008) and *A Comprehensive Monitoring Program Strategy for California* (2010)

The Monitoring Council's vision is that each theme or sub-theme would have its own web-based portal providing a single, coordinated access point for data, assessment results, and supporting information. In order for such theme-based web portals to provide simple and straightforward access to water quality monitoring and assessment information, both the portals and the coordinated monitoring programs on which they are based require certain attributes which can be defined with performance measures. The Monitoring Council adopted a set of monitoring program performance measures and benchmarks based on the U.S. Environmental Protection Agency report *Elements of a State Water Monitoring and Assessment Program* (USEPA 2003), but condensed U.S. EPA's list of ten elements to six. As part of the 2008 *Initial Recommendations Report*, the Monitoring Council used these performance measures for a preliminary assessment of existing web portals and planned to use them to gauge the success of the workgroup efforts.   As a key part of such evaluations, workgroups must ensure that monitoring designs and assessment approaches target core management questions.

- *Program strategy, objectives, and designs*
  The portal must describe monitoring strategies, objectives, and designs in enough detail that users can make informed decisions about how and for what purposes the data can be used. Assessment questions must reflect the concerns of key audiences and the way data will be used to make decisions. Objectives must be specific enough to connect assessment questions to the operational details of monitoring designs. Program objectives and designs must be evaluated to ensure that monitoring data effectively answer the underlying strategic questions.

  Low: No core questions; no or many undifferentiated target audiences; poorly articulated or conflicting objectives; uncoordinated monitoring efforts not focused on questions or objectives

  Medium: Core questions and target audiences implicit in program design; objectives implicit but only partly coordinated and not directly used to structure design effort

  High: Core questions coordinated, clearly stated, and focused on specific audience(s); clearly stated and common objectives address coordinated core questions and inform all aspects of design

- *Indicators and methods*
  The portal must describe indicators and methods in detail sufficient to inform users about the extent of standardization and any constraints on combining data from different programs. Indicators, sampling and analysis methods, and quality assurance benchmarks must be standardized and maintained at a scale (at least regional and preferably statewide) that is extensive enough to allow data from multiple studies to be combined to produce meaningful broader-based assessments.

  Low: Indicators and methods uncoordinated, not validated; no QA procedures or plan

  Medium: Indicators and methods validated but not coordinated statewide; QA procedures exist but are poorly matched to objectives and not coordinated statewide

High: Coordinated, scientifically validated, and clearly documented indicators, methods, and QA procedures that match monitoring objectives

- *Data management*
  The portal must be based on distributed database systems that support extensive data integration and access, and all data must be processed according to clearly specified and broadly applied data management procedures. National and/or statewide data formatting standards should take clear precedence over new/developing, regional or local standards. Coordination with water supply and use information, as envisioned in the Water Data Institute, should occur as practical.

  Low: No data management procedures or documentation

  Medium: Data management procedures exist but are not coordinated statewide and only poorly support access to data

  High: Coordinated and clearly documented data management procedures are coordinated statewide and fully support access to data at multiple levels

- *Consistency of assessment endpoints*
  The portal must describe the assessment methods used to convert raw monitoring data into information on the condition of California's water resources and their beneficial uses. Assessment methods must be standardized to the greatest extent possible in order to support consistent statewide assessments. Where multiple assessment approaches are called for, the portal should explain the need for multiple methods and provide a means of integrating the separate results to create broader assessments.

  Low: No data analysis or assessment procedures used or documented

  Medium: Data analyzed but methods not coordinated; assessment tools exist but not fully validated or coordinated

  High: Data analysis methods and assessment tools fully validated, clearly documented, and coordinated statewide, while providing a variety of valid perspectives on the data

- *Reporting*
  The portal must support timely and consistent reporting of monitoring data and assessment results, along with the metadata needed to demonstrate adherence to standards and to ensure data are used wisely. Reports must be produced at a range of time scales appropriate to the concerns of managers, the public, and other audiences. In addition to formal reports prepared by monitoring and assessment programs, users have also come to expect the ability to prepare customized, or ad hoc, reports using interactive tools to query online databases.

  Low: No reporting process or products

  Medium: Intermittent static reports, available with some effort

  High: Readily available regular static and dynamic reports focused on core questions and objectives; ability to create user-defined reports at multiple scales and from multiple perspectives

- *Program sustainability*
  Portals, and the programs they serve, must have the resources to actively participate in efforts such as methods development workgroups, laboratory intercalibration studies, and research and development into improved assessment methods. In addition, effective portals require investment in information technology infrastructure that improves users' capabilities to access, obtain, subset and/or combine, and work with a variety of monitoring data. This in turn depends on the allocation of staff and funding on a more permanent

basis than is typical for many monitoring and assessment programs and the agencies and organizations that manage them.

> *Low*: No systematic program evaluation, planning, or long-term funding devoted to infrastructure needs related to coordination and data integration

> *Medium*: Intermittent internal program review and planning that may or may not include infrastructure needs; limited funding for infrastructure

> *High*: Regular external program evaluations and planning for all program needs and for statewide integration

Self-Evaluation Results

Each workgroup submitted a self-evaluation report that evaluated the six performance measures against the relevant rating benchmarks. In addition, the workgroups were asked to:

- List specific needs that must be met for their efforts to succeed; and

- Identify organizations and programs that are currently not participating but whose participation would fit the workgroup's mission.

These responses are summarized in a table that is color coded based on the rating benchmarks. The summary table and the individual workgroup reports appear on the following pages. Common themes are presented in the main body of the Triennial Audit report above.

SUMMARY OF THE TRIENNIAL AUDIT OF THE CALIFORNIA WATER QUALITY MONITORING COUNCIL WORKGROUPS

MONITORING COUNCIL WORKGROUPS	PERFORMANCE MEASURES						Explicit Workgroup Needs	Who else should participate?
	Program Strategy, Objectives, Design	Indicators and Methods	Data Management	Consistency of Assessment Endpoints	Reporting	Program Sustainability		
Safe to Drink	**Low** - General public audience, local data and compliance with drinking water standards perspective. Little or no regional or statewide focus.	**Low to Medium** - Monitoring of public water systems clearly dictated by CDPH drinking water regulations. Difficult to provide clear picture of water quality as delivered to customer. Raw source water monitoring not currently coordinated among agencies.	**Medium** - DRINC Data management system for CDPH data being developed at UC Davis. Planned integration of DRINC with Water Quality Exchange will provide connectivity with CEDEN data. Migration of drinking water program to Water Boards creates perceived uncertainty. Current integration with GeoTracker GAMA not automated at present. No connectivity with DWR data systems.	**Medium** - Evaluation of CDPH data governed by drinking water MCLs and PHGs. Differences between MCL and PHG assessment endpoints not clearly explained. CDPH use of term "safe" could confuse interpretations. No consistent endpoints for raw source water assessment statewide.	**Low** - Data reporting in portal not fully vetted by workgroup. Dynamic reporting by public water system is envisioned. No integration of surface water data at present. Interactive groundwater data reporting on a well-by-well basis plus summary queries by area through GeoTracker GAMA.	**Low** - Migration of drinking water program to Water Boards adds funding and data management uncertainty. No current funding or program for surface water data integration. Groundwater data integration through GeoTracker GAMA has stable funding, but is not automated.	● Integration of water data systems between agencies. ● Expanded number of workgroup members. ● Secure funding for data management and integration and for portal development. ● Commitment of drinking water program to data and information transparency.	● American Water Works Association (AWWA) ● Dept. of Pesticide Regulation ● Surface water staff from SWRCB ● Additional staff from CDPH Drinking Water Program & Dept. of Water Resources
Safe to Swim	**Medium** - Portal focus on ocean beaches. Freshwater swimming information missing. Data management problems cause information to be out of date.	**Medium** - Indicators adopted in state water quality standards. But inconsistent use of indicators from region to region and even within regions. Plan exists to create statewide indicators through new water quality standards based on EPA criteria. QA consistency addressed through SWAMP and AB 411. Rapid indicator methods in development.	**Low to Medium** - Uneven data quality in BeachWatch with some data duplication and mis-labeling of data. Connectivity poor between BeachWatch and CEDEN. Portal data limited to coastal waters due to data feed from BeachWatch. Recent data currently unavailable in portal. Contract in place to correct the above and move portal feed from CEDEN, enabling freshwater data display. Developing mechanism to obtain coastal data in a more timely manner. General lack of access to data generated by citizen monitoring groups.	**Low to Medium** - Some inappropriate use of endpoints in SwimGuide. Inconsistent bacterial indicator objectives between regions and within regions. Plan to correct problem with statewide indicator standards through new rulemaking. Score card approaches in Heal the Bay's Ocean Beach Report Card and SwimGuide need to be extended to freshwater data.	**Medium** - Portal has not been updated since it was launched in 2009. Delay in receiving lab results due to methods; new rapid methods may improve timing. Delay in getting data into data structure and portals; improvements in data structure will help to correct this. Inability to obtain freshwater data in a timely manner. Delays cause NGOs to request data separately from county health officers, increasing inefficiency. Portal links to coastal county websites present most timely data.	**Medium** - Inconsistent workgroup leadership and commitment from member organizations. Coastal monitoring more sustainable due to continued funding. Freshwater monitoring relies on individual regional water board priorities and citizen monitoring efforts, for which there is no statewide coordination nor consistent funding.	● Funding for workgroup efforts and portal development. ● Continued funding for monitoring, especially for freshwaters. ● Consistent and sustained workgroup leadership and commitment of effort from Water Boards and others. ● Coordinated statewide freshwater swimming safety monitoring program. ● Improved data management system that includes timely data entry from multiple sources and transfer of data to portal. ● Development of smartphone apps to reach public more effectively.	● Citizen monitoring organizations ● Department of Public Health
Safe to Eat Fish and Shellfish	**Medium** - Survey level sampling permits determination of statewide and regional patterns of contamination, but does not allow definitive answers regarding fish eating safety in many locations. Intensive sampling allowed development of safe eating guidelines for a much smaller number of waterbodies. Developed strategy document generally guides program, but does not guide future sampling and assessment efforts.	**High** - SWAMP methods for sampling and analysis, well-documented QA program. Extending these tools to non-SWAMP monitoring programs still needed.	**Medium to High** - Data management in CEDEN. Safe-to-Eat portal presents data with multiple perspectives. Little coordination of non-SWAMP data.	**High** - OEHHA statewide data analysis and assessment process consists of multiple thresholds used to develop variable consumption advisories, all well developed and documented. Different thresholds used for determining fishing beneficial use impairment by Water Boards. Disagreement exists on use of OEHHA thresholds for evaluating survey-level data, as used in the portal.	**High** - Static reports and fact sheets developed yearly to reflect monitoring and assessment. Simultaneous publication of data through CEDEN and portal. Cross referencing of reports, fact sheets, and portal content. Successful media outreach on multiple occasions. Report card style reporting would improve understanding by general public.	**Low** - SWAMP budget allocation continuing to be reduced while costs continue to rise. No additional funding added for collaboration functions. BOG strategic plan outlines goals and priorities, but does not identify resources.	● Consistent reliable funding for monitoring, assessment, reporting, data management, communication, and fostering collaboration. ● Development of report card scoring of data to improve utility to general public. ● Integration of shellfish safety and biotoxin evaluation into program.	● Department of Public Health, Shellfish Protection and Marine Biotoxin Programs ● Non-SWAMP bioaccumulation projects and programs

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	Program Strategy, Objectives, Design	Indicators and Methods	Data Management	Consistency of Assessment Endpoints	Reporting	Program Sustainability		
Aquatic Ecosystem Health:								
Wetlands	**Medium** - Wetland and Riparian Area Monitoring Plan (WRAMP) monitoring and assessment framework developed and endorsed by Monitoring Council. Developed standardized tool set for monitoring, assessment, data management, visualization, and analysis. Need greater emphasis on implementation through existing agency programs.	**High** - Monitoring Council endorsed WRAMP framework includes a number of standardized tools to improve consistency of mapping, monitoring, assessment, and reporting, which help coordination and collaboration between wetland-, stream-, and riparian area-related programs. California Rapid Assessment Method (CRAM) includes a set of standardized indicators. Regular training on CRAM increases consistent usage. CRAM endorsement obtained from SWAMP.	**High** - CARI, eCRAM, and EcoAtlas managed at SF Bay Area CEDEN Regional Data Center. EcoAtlas uses web services to share information with other systems and to deliver data to the Wetlands Portal. All data delivered to CEDEN and readily available online. EcoAtlas currently wetlands-centric and needs to expand content to serve additional agency programs.	**Medium** - Consistent endpoints included in WRAMP framework (e.g., no-net-loss of wetlands). Further refinement needed, including scoring of CRAM results.	**Medium** - Monitoring results regularly reported in scientific and other forums including the *State of the State's Wetlands Report* published by CNRA. Data displayed interactively to the public through the Wetland Portal and EcoAtlas. Landscape Profile Tool in EcoAtlas permits user-defined reporting. However, consistent funding for both is a challenge. Status & Trends Project will improve future reporting.	**Medium** - Funding obtained from multiple federal sources. Diligent outreach efforts by workgroup members has created several partnerships with responsible agencies, generally moving toward broader use of WRAMP tools and increased public access to data and information. Proposed Water Board monitoring surcharge could help support some elements of WRAMP implementation.	● Foster partnerships with additional agencies to integrate WRAMP framework, methods, and tools into existing programs. ● Continued funding for development of WRAMP toolset, implementation by responsible agencies, and outreach functions of workgroup. ● Coordination with other Monitoring Council workgroups, especially estuaries and streams. ● Workgroup "Level 1" committee to coordinate water resource mapping. ● Metrics of workgroup performance. ● Expand EcoAtlas to incorporate wildlife habitat information to support NCCP planning and compliance monitoring. ● Better maintenance of workgroup web page.	● Dept. of Fish & Wildlife - Lake and Streambed Alteration Program, Aquatic Bioassessment Laboratory, Resource Assessment Program, and Biogeographic Data Branch ● Department of Water Resources ● State Water Board, Division of Water Rights ● California Coastal Commission ● State Coastal Conservancy
Estuaries	**Medium** - Current portal focus on SF Estuary as a template, with intention to expand statewide. Core questions identified and organized by five key estuary attributes. Multiple levels of detail to satisfy variety of audiences. Much documentation still lacking.	**Low** - Indicators and methods vetted by contributing organizations. Lack participation from other estuaries.	**Medium** - Using data from existing systems. Much data is not web-enabled, offering static figures in the portal. Focus on SF Estuary, not other estuaries. Data can be downloaded from portal for offline use. Differing reporting requirements and data formats pose a challenge.	**Low to Medium** - Portal currently presenting trends with little analysis. Little coordination between widely varying data types.	**Medium** - Not all data fully automated in portal. Many data graphs are live presentations with automatic updating from data sources via web services. Data can be downloaded for use offline. Original sources cited.	**Low** - Relatively young workgroup. Developing first internal review toward a strategic workplan. No reliable funding base for portal development and IT support. Coordination with the Interagency Ecological Program and Delta Science Program.	● Bring in new partners from other estuaries. ● Access to data from a wide variety of agencies and organizations. ● Improved communication and accountability of participants. ● Guidelines for assessments and conflict resolution. ● Better preparation and vetting of content and data issues prior to developing portal pages. ● Agency management recognition that workgroup activities are a priority to ensure staff availability and time.	● Partners from other estuaries

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MONITORING COUNCIL WORKGROUPS	PERFORMANCE MEASURES						Explicit Workgroup Needs	Who else should participate?
	Program Strategy, Objectives, Design	Indicators and Methods	Data Management	Consistency of Assessment Endpoints	Reporting	Program Sustainability		
Streams, Rivers & Lakes	**Medium** - Based on established SWAMP programs under the SWAMP Monitoring and Assessment Strategy, updated in 2010. But not all components included and those are only partially integrated to address core ecosystem health question. Not all stream and river types addressed. Lakes not yet addressed.	**Medium to High** - Indicators, methods, and QA scientifically validated through SWAMP for data displayed in portal. Multimetric indices of ecological condition not addressed. Healthy Watersheds Integrated Assessment could form basis for integration. Causality not yet addressed.	**Medium** - CEDEN forms basis of data displayed in portal and is updated automatically. Additional data sources needed to increase comprehensiveness. Consistent base map needed. Healthy Watersheds Integrated Assessment and component data sets to be made available through portal.	**Medium** - Assessment endpoints for BMI bioassessment and toxicity vetted through SWAMP. Portal displays raw data and bins data into logical categories (e.g., good, degraded, very degraded) to add meaning for public audience. No current integration of metrics.	**Medium** - Data are presented in regular SWAMP reports and interactively in the portal. Toxicity data automatically updated from CEDEN as new data generated. BMI bioassessment data are static at present.	**Low** - Current level of activity based on voluntary efforts of participants. No dedicated funding for workgroup and portal development. SWAMP funding being reduced as costs for monitoring and assessment rise.	● Improved integration and analysis of additional datasets from other programs. ● Commitment of resources. ● Improved base map for water resources (e.g., CARI). ● Build on Healthy Watersheds Integrated Assessment to present multi-metric assessments.	● Department of Fish and Wildlife, Lake and Streambed Alteration Program ● Department of Water Resources
Ocean & Coastal	Workgroup in formative stage. Portal plans not yet developed. Questions yet to be decided upon. Monitoring, assessment, reporting, and data management processes not yet evaluated. Funding for workgroup and portal planning effort secured.						To be determined	To be determined
Data Management	Workgroup charter developed. Two subcommittees address tools for portal development and data standards.		**Low** - Most relevant data currently housed in silos within individual departments. Lack of commitment to data sharing and data quality documentation. A few data systems are made available through web services or exchange networks.		**Low** - No current mechanism for publicizing workgroup recommendations.	**Low** - Lack of agency management support for workgroup participation and inconsistent workgroup leadership hamper progress. Need for better coordination with theme-specific workgroups.	● Document recommendations for data formats and data transfer protocols to the theme-specific workgroups. ● Greater coordination with theme-specific workgroups. ● Develop shared common GIS layer of aquatic resources. ● Commitment of departmental managers to importance of workgroup participation and value of workgroup recommendations. ● Increased commitment to sharing of data between agencies and organizations. ● Consistent and engaged workgroup leadership. ● Workgroup members willing and able to make recommendations on needed departmental actions. ● Method(s) to publicize workgroup recommendations. ● Improved ability to bridge gap between scientists and IT professionals.	● All departments listed in SB1070.

SUMMARY OF THE TRIENNIAL AUDIT OF THE CALIFORNIA WATER QUALITY MONITORING COUNCIL WORKGROUPS

MONITORING COUNCIL WORKGROUPS	PERFORMANCE MEASURES						Explicit Workgroup Needs	Who else should participate?
	Program Strategy, Objectives, Design	Indicators and Methods	Data Management	Consistency of Assessment Endpoints	Reporting	Program Sustainability		
Collaboration Network	**High** - Planning for improvement and future webinar topics provided via regular post-webinar participant surveys. Feedback from surveys and other comments suggest the CWQMCN is meeting its goals. Outreach to increase participation through conferences and social media (Linked In).	**High** - Webinars have been providing current information regarding Indicators and Methods, including QA, with the goal of improving monitoring performance statewide.	**High** - Webinars are continually being offered regarding data management, and sharing, with the goal of improving monitoring performance statewide.	**Medium** - Although webinars have not been presented directly on assessment endpoints, they have been presented and discussed within many webinars.	**High** - The webinar series has provided reporting guidance and has been a forum for water quality monitoring programs and projects to share their reports. Recorded webinars and presentation materials made available for later viewing via the Collaboration Network web page and YouTube.	**High** - At present the CWQMCN webinar series is sustainable. Improvements could be made by adding an additional facilitator(s) and seeing greater coordination with other Work Groups. Currently WebEx cannot support all of the CWQMCN's video conversion needs and additional software is needed.	● Additional webinar facilitator(s). ● Greater coordination with other workgroups. ● Additional software for video conversion of recorded webinars. ● Methods to gauge whether webinars result in improvements to monitoring, assessment, and reporting programs.	

Safe Drinking Water Workgroup - Triennial Audit
December 2013

This document presents internal audit results of an evaluation performed on the Safe-To-Drink Portal development effort using the six monitoring program performance measure criteria adopted by the Council. The evaluation was done by the Safe Drinking Water Workgroup facilitator with review and comment from the group.

Our Workgroup

The Safe Drinking Water Workgroup first met November 2011 in a plenary session wherein a "vision" of a "Safe to Drink" portal was presented by the California Department of Public Health (CDPH) Drinking Water Program. Our group's mission was and is to design, construct, and launch an easy-to-follow **My Water Quality** web site showing water users and other audiences the quality of their specific drinking water, and the role, responsibilities, and accountabilities of agencies and regulators to assure water of acceptable quality is delivered to the California populace.

We are a relatively new workgroup composed of organizations and a public representative passionate about water quality, each bringing specific knowledge and foresight to the table:

- CDPH Drinking Water Program – designated the "primacy" agency in regulating over 2500 California public water systems and having information on drinking water quality, production, the cost of water, and improvement projects
- The Department of Water Resources (DWR) – having information on surface water source assessment
- Association of California Water Agencies (ACWA) - a trade association representing water systems throughout the state
- State Water Resources Control Board (SWRCB) – providing analytical information on well water assessment through its GeoTracker GAMA Information System and categorization of impaired surface waters
- Water Education Foundation (WEF) – an organization dedicated to providing educational information on all stages of the water cycle
- Southern Coastal Commission Water Research Project (SCCWRP) – facilitating the funding for initial development of this web site
- Carmichael Water District (CWD) – providing a public water system perspective on design of the web site and possessing expertise in water treatment and delivery
- A public member affiliated with Environment Now - providing a consumer's perspective on what water quality information should be disclosed on the site

To round-out the group, it may be of benefit to invite a representative of the American Water Works Association (AWWA) having extensive technical expertise in the treatment and delivery of drinking water.

Initial Design

The group decided to develop initial content based on the strategy to answer eight assessment questions with the public as the primary audience and "drinking water" being assessed specific to that selected by the site visitor. These questions met with Council approval at its Spring 2012 meeting: (Several other questions relating to the cost of water, water quality improvement projects, and water production will be addressed in the future.)

1. Is my tap water safe to drink?
2. What is the source of my water?
3. How is my drinking water treated?
4. How is my drinking water made safe?
    a. What are the government standards?
    b. What agencies are involved with water quality protection?
5. What is in my drinking water?
6. How safe is groundwater? Surface Water?
7. Drinking water FAQ (include taste/smell and other general questions)
8. Who do I contact about my water?

Work began in earnest July 2012 with the identification of end-of-the-year seed money, allowing for the contracting with the WEF, through the SCCWRP, to research and to develop site content. Relevant datasets available from group members were surveyed and evaluated for relevance in supporting proposed content. The first site mock-up was constructed by SCCWRP early 2013. As of this audit date, the group has met frequently for the iterative process of finalizing a mock-up of the proposed site to be presented for Council approval at its December 12th meeting.

Audit Evaluation

We are a relatively new workgroup, and as such our disparate water quality methods and systems have not been integrated let alone comprehensively identified or characterized. We are confident, however, that our site will provide sufficient information about water quality relating to a specific water system.

The work of this project has transformed from a contractor-based content development and workgroup review model to one where the development and review is being done

by the workgroup, the monies available to our sub-contractor, WEF, having been exhausted. It appears, however, that this latter method is more effective and efficient in reaching our milestone of finalizing a mock-up of the site for Council consideration. At this phase of the project, there does not appear to be any explicit needs that would increase the quality of our work effort.

1.   **Strategy, objectives, and design**: Core questions have been focused at providing drinking water quality information to the general public specific to a particular locale. Other audiences such as state agencies, environmental groups, legislative decision-makers, and academicians should be surveyed to determine drinking water quality issues and necessary water quality datasets to which the portal could provide answers with supporting data and analyses. No regard has been placed on the manner and context of presenting regional or statewide drinking water quality information.
Score: Low

2.   **Indicators and methods**: The business processes within the CDPH for the collection and evaluation of public water system operational information are robust; however, these systems are being re-engineered to take advantage of current reporting technologies.

The site will provide a link to the SWRCB GeoTracker GAMA Information System. This system consumes well water quality data supplied by CDPH as well as by other reporting systems. The group has identified a lack of supporting data in characterizing the quality of post-treated (finished) water delivered to the consumer as differentiated from pre-treated (raw) water for both well and surface waters. Water quality analysis is not done routinely after treatment with the exception of lead and copper testing.
Score: Low to Medium

3.   **Data management**: With the hosting of the proposed site at UC Davis and with the construction of an integrated Exchange Node compatible with CEDEN on the CDPH DRINC Portal, there is the assurance that needed datasets can be reliably accessed, analyzed, and presented. Procedures, however, must be tested and documented to assure sustainability of operations. While the CDPH is hopeful for the development of a drinking water semantic ontology that will facilitate the understanding of tagged drinking water datasets, the effort has been hampered given restrictions on funding authorization.

This portal will be based upon a content management system (CMS) technology. Increased coordination is necessary for a CMS-type of site management integrated with the existing **My Water Quality** portals. For example, this portal is capable of using the

new Governor's web site standards identified at webtools.ca.gov in favor of the legacy templates currently used by other sites. Coordination is also required for:
- Integration of iFrames (GeoTracker GAMA) (SWRCB and CDPH)
- Sustained availability of non-CDPH datasets contemplated for use (other members and CDPH)
- Second-level menu navigation links compatible with existing sites (CDPH and My Water Quality site host)

Score: Medium

4.   **Consistency of assessment endpoints**: Given that there are a wide range of issues related to water quality by the various state and industry organizations, there is no single statewide assessment approach for drinking water other than what is legally defined as "safe" from a health standpoint, that being the compliance with the maximum contaminant level standards. The workgroup is struggling to conclude the context in which the level of drinking water contamination is presented to the site visitor. One perception is that two million Californians do not have access to "good" drinking water, a view not necessarily supported by acceptable drinking water quality standards. There is a difference between a Public Health Goal (PHG), a Maximum Contamination Level (MCL), and a violative condition requiring an enforcement action, all which must be easily understood by the site visitor. It is hoped that users of this portal will be able to understand the difference between these objectives, and compare and contrast their water quality against these differing standards. Of significance is the fact that there are only a few chemicals that have a PCG or MCL whereas there are hundreds of chemical contaminants that do not have any acceptable contamination level.

Score: Medium

5.   **Reporting**: No reporting guidelines have been as yet defined by this project. There is the potential, however, of creating dynamic datasets based upon information requests of key fields in what is termed a JSON Restful web service. This would allow any user to consume information available on the portal for their particular use and presentation. It would be helpful if there would be a coordinated effort by the Council's Data Management Committee to facilitate a standard method for responding to this type of data request.

Score: Low

6.   **Program sustainability**: The majority of information supplied to this portal is gathered through normal and sustained on-going CDPH business operations. The portal is based upon a CMS technology allowing for workgroup members easily to add and modify portal content as necessary. Because there is no history associated with

evaluation of this project and related programs, and because this project is in a design phase, a valued sustainability assessment cannot be made at this time.
Score: Low

Author: M. Emmerson
Draft #1   November 22, 2013
Final   December 2, 2013

SDWW Audit

Background

The California Water Quality Monitoring Council has requested the first Triennial Audit of implementing the Monitoring Council's comprehensive monitoring program strategy, as required by SB 1070 [Water Code §13181(h)]. Since the workgroups are the main instruments to implement the strategy, the Monitoring Council asked that each workgroup provide their portion of the Triennial Audit, reviewing their workgroup's progress implementing the Monitoring Council's strategy.   The audit period began with the delivery of the Monitoring Council's strategy to the Agency secretaries at the end of December 2010.

To guide this audit, the Monitoring Council's strategy contains a set of six "performance measures."

1. Strategy, objectives, design
2. Indicators and methods
3. Data management
4. Consistency of assessment endpoints
5. Reporting
6. Program sustainability

This report is response to the Monitoring Council's request to review the Safe to Swim web portal's activities and progress since 2010.

Key Points

- The Workgroup is re-evaluating objectives and goals for safe to swim portal. For example, reporting on inland fresh waters is a relatively new priority

- The State Water Board process to develop statewide recreational objectives based on EPA criteria will improve consistency, and will impact the Workgroup and Portal approaches.

- There are no dedicated staff and resources to move the portal forward. These is a need for funding to ensure long-term viability and success for both staff who plan, create and update the portal and to support inland fresh water monitoring programs which are being subject to 20% cuts in the next Fiscal Year.

Background

There have been 15-30 members attending in person/online meetings of the workgroup. Members come from the county health agencies, the State and Regional Water Boards, NGOs, California data center experts and US EPA.   There are 380 people receiving updates to Safe to Swim workgroup meetings through signing up at a State Water Board Lyris list.

Three Year Safe to Swim Web Portal Audit Review

Evaluation criteria

1. Strategy, objectives, design
    a. The purpose of the group is to coordinate the monitoring and assessment of water quality issues affecting swimming safety and also to report that information

to decision makers and the public through the Safe to Swim Water Quality web portal.

b. To ensure that the [Safe to Swim "My Water Quality"](#) web portal will best serve California, the workgroup addresses two primary questions:

  i. What do agency decision makers and the public really want to know about swimming safety on a local, regional and statewide basis?

  ii. How can we best inform decision making?

c. To assist the "Safe to Swim" Workgroup the "Data Management" Workgroup identified several specific questions which will help address how the primary two questions are answered

  i. What are the problems in data management?

  ii. What data sets should be a priority for access?

  iii. Where are the data gaps?

  iv. What data restrictions currently exist?

d. In addition, the workgroup has produced a priority list of information and tasks which will help address public desires. This priority list identified 13 items of interest amongst 3 separate "Safe to Swim" Categories: "What are the current threats to my beach water quality?", "Is it safe to swim at fresh water beaches?", "What water quality data is available?" To date, only two of the priorities have been completed and those were by outside groups which created phone Aps to access beach data and created the ability for locals to upload beach conditions to the Aps websites. These Aps have not yet been incorporated into the Safe to Swim Portal architecture.

2. Evaluation

a. Medium. The portal has created web pages to answer many of the questions, but there are some gaps and discrepancies. Examples:

  i. Question of can I stream in lakes and streams? The portal is not currently addressing freshwater lakes and streams.

  ii. Regional Board inland recreational data doesn't show up on the portal, plans are underway to address this.

  iii. Some water quality monitoring programs may not be question driven.

  iv. Workgroup is still evaluating whether the portal questions are addressing underlying issues of interest?

b. Current Data available only based on Ocean water quality monitoring

c. Highest current priority is to add fresh water bacteria data to portal.

3. Indicators and methods

a. Medium. We have indicators (Bacterial standards measure performance), but there is an issue of statewide consistency. Regional Boards have varying indicators and some standards are water body based. This is some movement towards consistent EPA standards which will help with the freshwater standards in particular.

b. Currently there are three different bacterial indicators (Enterococcus, Total and Fecal Coliform) referenced in the portal and these are currently in swim guide and beach watch guide, but there is an issue of statewide consistency.

c. Some of the regional boards have different bacterial indicators. There is some commonality, but there is a movement to move to the indicators that the state water board is using, which could be discussed (see e below).

d. Inland waters weren't initially a priority, but that we have reevaluated and are moving inland, and need to make sure we are consistent in our methods.

e. The State Water Resources Control Board (State Water Board) is proposing statewide water quality bacterial objectives and a control program to protect recreational users from the effects of pathogens in California water bodies. The program would be adopted as amendments to both the Inland Surface Water, Enclosed Bays and Estuaries Plan and the Ocean Plan. Significant proposed program elements include: new water quality objectives for both fresh and marine waters based on United States Environmental Protection Agency (U.S. EPA) Recreational Water Quality Criteria released in November 2012 (*E.coli* for fresh water and Enterococcus for marine). The project would also attempt to create a statewide reference beach/natural source exclusion process and address a consistent high flow exemption for certain stormwater channels.

4. Data management

a. Low-medium. Issues past few years with Beach Watch (connectivity with Beach Watch and CEDEN has been poor). Contract in place to address Beach Watch data quality issues.

b. Difficulty of integrating data from outside organizations such as the Council for Watershed Health. Problems with this process and efforts are being made to coordinate monitoring among regional coastal agencies on a local level, this is not being done on a statewide basis.

c. Data Management Issues

   i. Uneven data quality within BeachWatch.

   ii. The current system was developed collaboratively between SWRCB, the Southern California Beach Water Quality Work Group, and SCCWRP. Structures used in the data system are the result of the cooperative agreements made in the past with a goal of retaining compatibility with the legacy database system originally developed by the SWRCB. The data structures and implementation designed to maintain compatibility with the legacy system present several challenges in light of developments the occurred in the intervening years. For example, the structure does not provide for efficient flow of data to the central database and subsequently to the EPA WQX and PRAWN systems. As originally implemented the data structures are awkward to use and can be easily misunderstood by data users unfamiliar with the database.

   iii. The second problem is the result of normalizing the data structures to establish a relationship between an advisory and the indicator(s) that triggered the advisory. Structurally this is implemented as a one-to-many relationship between the advisory table and the advisory indicators table.

Each county is required to report their data to the central database by the 15th of each month. An existing advisory or closure that bridges the 15th of any given month without an associated open date opened is reported with each data submission. This one-to-many relationship generates duplicate records for that advisory in proportion to the number of times it is submitted by the county without resolution (a reported opening date). An individual record is created for each advisory for each indicator. So, if all five indicators triggered the advisory five records would be generated in the central database. To resolve these issues, the approach taken for many years has been to manually clean-up data prior to delivery of the final database to the SWRCB and EPA.

iv. The laboratory data is less problematic, but not fully clean. As part of the historical analysis requirements, E. Coli was labeled as Fecal Coliforms to expedite the AB411 analysis. This was the result of the cooperative agreement and is understood by all of the health officers in the state. In practice, this only affects the data from two of the 16 counties reporting to Beachwatch. These data are easily distinguishable by the analysis method associated with the bacteria name, but for clarity, the labeling is cleaned up in the central database before the data is released.

v. The State Board is looking at a solution that would be for data collected by the counties to be submitted immediately, along with any management actions regarding beach advisory, closure or opening. Direct data submission to the CEDEN Regional Data Center (RDC) would eliminate several data processing steps to facilitate immediate transfer and availability via CEDEN and data marts serving the Monitoring Council's "Safe to Swim" Portal and the participating counties. Annual submissions of results to EPA would be handled through existing WQX transfer from CEDEN. Submission of notifications to the EPA PRAWN system could either be added to CEDEN or handled by the RDC following the conclusion of the annual cycle

vi. Bringing in indicator data from various orgs

1. Are these inputted effectively? – Fresh water is not yet available on the portal. We are looking to the Regional Board data already collected and transmitted to SWAMP to be our next set of data added to the web portal.

vii. Are there problems in this process – Yes, part identification, part creating organizational training for using CEDEN.

5. Consistency of assessment endpoints

a. Low-medium. Freshwater standards are being applied to marine waters in SF in Swim Guide. This is also being addressed by State Water Board Bacteria Objectives project noted above in Item 3.

b. Working on reviewing and presenting Regional Board Basin Plan and water body standards. This is a major project to determine location based fresh water standards. There is a major GIS project through Cal State Northridge University to map all these individual water body standards.

6. Reporting- how well we are getting the assessment out to people in a real time manner?

   a. Medium.

      i. Delay in receiving lab results. Conventional procedures have an embedded 2-day delay period. Problems getting data from labs into data systems. Local county beach programs are required to submit their data into BeachWatch only by the 15th of the following month it is collected.

      ii. BeachWatch plans to improve timeliness and data quality via an online database replacement

      iii. How well data is freshwater getting into CEDEN and then to the portals? Is it available in a dynamic manner so that people can get information? No freshwater is available at all. Again, beach date when available is often at least a month old before being made available.

      iv. Most useful data come from the Heal the Bay Beach Report Card (BRC) and SwimGuide in providing access to useful interpretation of ocean beach data.

         1. The BRC is an online public health tool based on routine beach water monitoring conducted by local health agencies and dischargers. The BRC assigns a weekly letter grade (A-F) based on the risk of adverse health effects to the beachgoers. Grades are based on fecal indicator bacteria concentrations which indicate pollution from numerous sources, including fecal waste. The better the grade a beach receives, the lower the risk of illness to ocean users. The BRC should be used like the SPF ratings in sunblock—beachgoers should determine what they are comfortable with in terms of relative risk, and then make the necessary decisions to protect their health.

         2. Weekly grades are calculated on a point-based system which takes into consideration the magnitude and frequency of bacteria exceedances (based on state standards) from the most recent 30 days. Grades are updated and available online every Friday at www.beachreportcard.org

      v. Safe to Swim website provides links to coastal county websites and this provides the most timely reporting of beach conditions possible, on the day the lab results are complete.

7. Program sustainability

   a. Medium.

      i. Workgroup has suffered from transitional membership over the past few years, but there is good interest currently.

      ii. Coastal beach monitoring is more sustainable because of long-term funding through State Water Board Waste Discharge Permit fee program and water quality monitoring grant agreements with local county programs. Funding is $1.8 million per year for Beach Safety Program.

      iii. Inland monitoring (SWAMP and NGO successes)

b. Web portal survives on uncompensated support from the State Water Board's GIS and web units (in addition to OIMA and DWQ Ocean Unit, State Board Citizen monitoring coordinator). Continued support without funding cannot be guaranteed.

c. Regional Board inland freshwater recreational monitoring.

    i. All nine regions were informed 11/19 that they will suffer approximately 20% cuts to their SWAMP regional monitoring budgets for FY13-14. This will directly impact each Region's freshwater bacteria monitoring program (which is funded mostly by SWAMP) and therefore should not be considered "sustainable."

    ii. Central Valley Regional Board – Freshwater bacterial monitoring Program

        1. Scope: They have a Safe to Swim monitoring style effort that targets swimming holes on river and streams during the summer swimming season (typically they monitor mid-May through September). This past summer they also added some recreational lake sites. The primary sites are sampled twice per month, and they have additional sites sampled by citizen monitoring groups on a monthly basis. Most of the sites are in the Sierra foothills, although they do have some sites in the valley, particularly along the lower American River. They use E. coli as the indicator and for the last two years they've had a contract with UC Davis for pathogen analysis at the problem sites with high results. Because they do the E. coli analyses in-house, they include it in all their studies and have accumulated a lot of results over the years, even if the primary purpose of the study wasn't safe to swim.

        2. Funding status: The management has agreed to continue the Safe to Swim efforts through next summer. The analysis costs are low, so it's mainly their ability to maintain the staffing for the field runs, lab work, data management, coordination with the partners. Being able to show how the data is being used on a statewide portal would really help make their case to continue committing so many resources to this effort.

        3. Issues: Their study design was developed using the old USEPA single sample maximum for E. coli. They are anxious to see how the Water Boards decide to implement the new USEPA guidelines as they may need to revise the sampling design (more frequent sampling at fewer sites). This work group could potentially be a great resource to discuss how ambient monitoring can be used on the portal.

    iii. North Coast Regional Water Quality Control Board

        1. Region 1's Freshwater Beaches Bacteria Monitoring Program.

        2. The Regional SWAMP program funded the development and operation of an ELAP certified Bacteria Lab at the Regional Board office for the past 3 years.

3. The focus of the monitoring effort was two-fold, development of a Pathogen TMDL for the Russian River and monitoring for public health considerations at several heavily recreated freshwater beaches in the Russian River.

4. They expanded the sampling effort to include several freshwater beaches in the South Fork Eel River watershed during the past 2 years.

5. All of the lab activities occurred here at the Regional Board office utilizing the IDEXX system for Coliforms and Enterococcus.

6. RB 1 management is currently considering persuading the County Health Department to conduct this effort into the future. If management is unsuccessful, They will most assuredly continue our collection and analysis efforts.

iv. Lahontan Regional Water Quality Control Board

1. The SWAMP program at Region 6 coordinates the efforts of multiple programs (i.e., SWAMP, NPS, Planning, TMDLs, etc.) to conduct monitoring of fecal indicator bacteria (FIB) at fresh water streams and lakes throughout the Region. Where FIB screening indicates potential problems, the Region follows up with more frequent and multi-indicator diagnostic sampling to characterize bacteria loads and to identify sources. (A summary report for 2011 can be viewed at the Region's SWAMP webpage.)

2. One of the Lahontan Regional Board's highest Triennial Review priorities is to update & modernize its bacteria objectives. The Region also has many water bodies that are 303(d)-listed for bacteria & pathogens, for which it needs to know the source(s) of bacteria before effective remedial strategies can be determined.

3. The Region's monitoring questions are:

   a. Do targeted water bodies meet water quality objectives for bacteria? and

   b. Where water bodies are known or suspected to be impaired by bacteria and pathogens, what are the magnitude & extent of the impairments, and what are the sources?

4. The Region relies on staff from multiple programs to collect samples which are then processed at its in-house laboratory, and it utilizes contract funding from SWAMP, TMDLs, and "discretionary" contract pools to conduct microbial source tracking (MST) studies at impaired water bodies.

5. All of the Region's FIB data are entered into CEDEN, and could therefore be automatically captured and displayed at the Council's Safe-to-Swim web portal.

v. Santa Ana Regional Water Quality Control Board freshwater bacteria monitoring programs:

1. The Basin Plan Amendment R8-2012-0001 "Recreation Standards for Inland Fresh Surface Waters in the Santa Ana Region" requires a monitoring plan – monitoring has not started-

   a. As part of the Stormwater Quality Standards Task Force efforts that led to the adoption of the E. coli objectives for inland fresh surface waters, the three principal funding members, i.e., the Orange, Riverside and San Bernardino county stormwater agencies, committed to participate in the development and implementation of a comprehensive, watershed-wide bacteria quality monitoring program.

   b. To begin the development of a comprehensive bacteria quality monitoring program, the Stormwater Quality Standards Task Force considered the waterbodies that should be considered high priority for monitoring and identified a tentative list.

   c. This program is in the nascent stages, so there is no information on who will fund what. The Regional Board will work with the dischargers to develop a monitoring plan so that monitoring required in the stormwater permits and MSAR TMDL could be incorporated into this monitoring plan (to the extent possible). The RB work with them in setting up the data so it can be uploaded into CEDEN. The RB will also inform them of the Safe to Swim Portal and try to get them to participate in the workgroup (if they are not already).

2. Stormwater permits for Orange, San Bernardino and Riverside counties require monitoring (not sure where the data are submitted except in the annual report)

3. Middle Santa Ana River TMDL requires bacteria monitoring at several locations. The data are sent to the Santa Ana Watershed Project Authority but we are trying to get them to upload to CEDEN

   vi. Citizen monitoring funding more readily available in Southern California than in Northern California. Funding and leadership (staff) is an issue.

Current Workgroup Goals

➢ Integrate Safe to Swim website with existing smartphone applications and websites (Beach Report Card and The Swim Guide) and reduce redundancies.

➢ Evaluate the informational survey conducted during 2013 of monitoring entities to determine "what agency decision makers want to know about swimming safety on a local, regional and statewide basis and how to best inform decision making."

➢ Develop priority list for addressing problems in data management and restrictions; review Beach Watch/CEDEN database for gaps, barriers to use, etc.

➢ Expand the coverage of Safe to Swim by adding inland waters to Safe to Swim Portal website.

➢ Develop recommendations for long-term agency involvement and financial support of Safe to Swim portal and workgroup.

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Triennial Audit of the Bioaccumulation Oversight Group - Fish and Shellfish Consumption Safety

December 2013

Fish and shellfish consumption safety is a concern in streams, rivers, lakes, coastal waters, and bays and estuaries where sport and commercial fishing, and shellfish harvesting, have been designated as beneficial uses. Both federal and state agencies have jurisdiction over this issue, but only the federal Food and Drug Administration (FDA) sets specific action levels and these only for commercial fish. California's Office of Environmental Health Hazard Assessment (OEHHA) sets risk-based thresholds for certain chemicals in sport fish as the basis for establishing site- and species-specific consumption advisories. Neither federal nor state agencies conduct systematic tissue monitoring for assessing seafood safety. OEHHA, however, has used monitoring data collected for other purposes for its advisory-related assessments, and has used the results of site-specific monitoring efforts tailored to development of consumption advisories. For example, OEHHA has used data from SWAMP's statewide assessments of sport fish tissue contamination to develop and update advisories. These SWAMP studies were designed to give a statewide screening of fish tissue contamination. Elevated levels have been found to be widespread, suggesting that more advisories are needed. However, the monitoring needed to develop these advisories is largely unfunded. A second program, coordinated by the Department of Public Health in cooperation with a number of academic and other institutions, conducts statewide monitoring of shellfish and marine biotoxins in coastal waters and bays and estuaries.

Sport Fish

Website: http://www.mywaterquality.ca.gov/safe_to_eat/
Sponsor: Bioaccumulation Oversight Group (BOG) of the Surface Water Ambient Monitoring Program (SWAMP) of the State Water Resources Control Board (SWRCB)
Description: SWAMP's sport fish tissue assessments have answered key questions about patterns of contamination in sport fish tissue in three major habitat types statewide – lakes and reservoirs, coastal environment, and rivers and streams. The focus of the first statewide surveys in lakes and reservoirs was on Clean Water Act Sections 303(d) impaired waters listing and 305(b) water quality assessment, not specifically human health risk assessment. In the subsequent surveys of the coast and rivers and streams, the focus shifted to addressing the prevalence of fishing locations where fish can be safely consumed. Coordination of smaller local and regional sport fish sampling efforts is an area for improvement.

Evaluation

Overall Summary: Substantial progress has been made in the past three years, especially in the areas of data management and reporting. A five-year effort assessing contaminants in sport fish throughout the state was completed in 2013, with an annual series of reports and fact sheets, establishment of CEDEN as a functional repository for these data, and establishment of the Safe to Eat Fish and Shellfish portal that displays the data from the statewide surveys. Limited funding remains an obstacle that has prevented definitively determining whether it is safe to eat the fish in may popular fishing locations, and the communication of the information that does exist to the fishing public.

1. Strategy, objectives, design
    2010 - SWAMP's assessment asks and answers clear questions, with specific audiences (specifically 303(d) listing and 305(b) assessment) in mind; however, this strategy does not focus specifically on consumption safety, nor is it coordinated with those in the shellfish sub-theme. While the program began with an assessment of all readily available data that passed a quality assurance screening, the statewide long-term monitoring design is a combination of probabilistic sampling intended to characterize statewide conditions and targeted sampling that focuses on the most popular fishing sites. **Score: Medium**
    2013 - As described above, the more recent SWAMP sport fish assessments addressed questions with a sharper focus on identifying locations where it is safe to eat fish. Given budgetary limitations, however, the surveys provided an initial screening that was not extensive

enough to allow definitive characterization of the locations sampled. In some cases the statewide surveys prompted more thorough follow-up sampling by Regional Water Boards and evaluation of data by the Office of Environmental Health Hazard Assessment (OEHHA), which resulted in a few new consumption advisories. Although substantial progress has been made through SWAMP in recent years, monitoring that would allow definitive characterization of each popular fishing location and clearly answer the core "safe to eat" question remains a significant information gap. Monitoring of trends in condition related to this question is an even greater information gap. The BOG has developed a document ("A Strategy for Coordinated Monitoring, Assessment, and Communication of Information on Bioaccumulation in Aquatic Ecosystems in California**)** that provides an overarching set of goals and priority actions for improvement. However, the Strategy does not provide a roadmap to future sampling and assessment efforts. **Score: Medium**

2. Indicators and methods
  2010 - Indicators, i.e., tissue measurements, are standardized, with well-developed sampling and laboratory procedures. Quality assurance methods are well developed and described in the SWAMP QAPP. Data must meet SWAMP standards before entry into the SWAMP database. **Score: High**
  2013 - SWAMP, which is the largest source of data in the state, continues to use standardized, well-established methods for sampling and analysis, with a strong and well-documented QA program. Promoting the use of these indicators and methods by other smaller programs in the state is an area for improvement. **Score: High**

3. Data management
  2010 - Data management procedures are well established, but data have yet to be placed into a readily available format usable by OEHHA and the State and Regional Water Boards. Data are currently stored at SFEI and are not yet available online **Score: Medium**
  2013 - Well-established data management procedures are still followed, and now SWAMP data have been placed into a standard format and uploaded to CEDEN, where they are readily accessible to the Water Boards, OEHHA, and others. In addition, the "Safe to Eat" portal has been established and in use for the past three years, and draws data directly from CEDEN for display on the portal. The SWAMP studies provide a rich dataset to populate the portal. Inclusion of datasets from smaller regional or local programs, and from past studies, in CEDEN and the portal is an area where more work is needed. **Score: Medium to High**

4. Consistency of assessment methods
  2010 - OEHHA has developed a formal data analysis framework for the purpose of developing consumption advisories and is working closely with SWAMP to implement standardized assessment methods.   **Score: High**
  2013 - OEHHA's assessment thresholds continue to be used and provide a means of consistent assessment across California's water bodies. For mercury, a new statewide tissue objective is in development that will differ slightly from OEHHA's thresholds. Once adopted, the mercury objective will create a challenge for clearly communicating the status of each water body to the public. **Score: High**

5. Reporting
  2010 - Draft reports are being prepared for the initial phases of this program to meet SWAMP's 305(b) reporting responsibilities. OEHHA posts reports and consumption advisories on its website. The longer-term plan is to make all data available through an online interactive mapping tool being developed at SFEI for the Fish Mercury Project being funded primarily by CALFED. **Score: Medium**
  2013 - From 2009 to 2013, SWAMP produced reports each year summarizing the statewide sport fish monitoring as it progressed from lakes and reservoirs, to the coast, to rivers and streams. Each year's data were simultaneously published on the Safe to Eat portal and summarized in fact sheets. Each sampling round generated significant media coverage and public interest. The Safe to Eat portal is now a well-established source of information on contaminants in fish. Refining the presentation of data on the portal to make it more useful to

the fishing public is an area for further work. Developing a concise way of summarizing the condition of each water body, comparable to the Safe to Swim report card, is a potential area for improvement. **Score: High**

6. Program sustainability

2010 - There is no readily available description of a periodic program evaluation or planning process for either SWAMP or OEHHA, although SWAMP is currently developing a formal business plan. **Score: Low**

2013 - The SWAMP published an updated strategic plan in 2010 that will be updated every five years. The 2010 SWAMP Strategy estimated that SWAMP was funded at approximately 7 percent of the original estimate in the 2000 Needs Assessment. The SWAMP budget has experienced additional reductions in the subsequent three years while costs continue to increase. The BOG - originally a subcommittee of SWAMP - became a workgroup of the Monitoring Council but this new role was not accompanied by additional funding or strong coordination opportunities. In response to this issue and to plan for the future, the BOG has developed a document ("A Strategy for Coordinated Monitoring, Assessment, and Communication of Information on Bioaccumulation in Aquatic Ecosystems in California") that describes goals and priority actions for bioaccumulation monitoring in the state. Identifying resources for coordinating and conducting the monitoring, assessment, and communication that is needed to adaptively manage bioaccumulative contaminants in California remains a significant challenge. **Score: Low**

Shellfish

Website: Biotoxins and shellfish –
http://www.cdph.ca.gov/HealthInfo/environhealth/water/Pages/Shellfish.aspx
Sponsor: Department of Public Health
Description: The Department of Public Health's Pre-harvest Shellfish Protection and Marine Biotoxin Monitoring Program monitors commercial shellfish growing areas in conformance with the National Shellfish Sanitation Program. The Program also monitors numerous points along the California coastline for marine biotoxins in shellfish and toxigenic phytoplankton in marine waters. Warnings are issued or quarantines are established as needed for recreational and commercial shellfish harvesting. These programs are separate and not coordinated. No significant changes have occurred for this program over the past three years, so the performance measure scores are unchanged.

Evaluation:
1. Strategy, objectives, design: The program asks and answers clear questions, with specific audiences in mind. The objective has been clearly stated and is to describe broad trends over time, and CDPH's objective is to establish sanitary requirements for shellfish growing waters and to regulate commercial growing and harvesting to ensure shellfish are safe for human consumption. The monitoring design is based on national guidelines promulgated by the Food and Drug Administration, although these allow for a degree of local flexibility. Monitoring is conducted by a wide range of collaborating local partners and is more organized and consistent for shellfish growing sites than for phytoplankton and toxins in marine waters.
   Score: High (with a need for more coordination of phytoplankton and toxin sampling)
2. Indicators and methods: Taxonomic methods for phytoplankton identification and methods for the direct measurement of marine biotoxins are not standardized. However, NOAA is organizing a nationwide methods intercalibration study for 2009, with the goal of improving standardization of methods for species identification and estimating abundance, as well as for toxin identification and measurement. Laboratory quality assurance methods are defined in a national procedure manual, however, there is no readily available information on the degree to which these standards are met, or on data checking and validation methods further along the data path.
   Score: Medium
3. Data management: There is no readily available information on data management procedures. However, the program produces aggregated statewide reports, which requires that data be collected and housed in a statewide database. The program does not provide users a means to access and download data. However, it has recently implemented a statewide listserve to enable participants to more readily share data and results.
   Score: Medium
4. Consistency of assessment methods: Standardized data summarization approaches are used, with assessment thresholds applied to data on toxin levels in shellfish as a basis for regulatory decisions. However, there may be need to develop assessment thresholds for phytoplankton and toxins in marine waters.
   Score: High
5. Reporting: The program regularly produces monthly, quarterly, and annual reports, which are posted on the program's website. However, users cannot create reports based on individual criteria.
   Score: High
6. Program sustainability: There is no readily available description of a periodic program evaluation or planning process.
   Score: Low

To assist the Monitoring Council in its audit, the CWMW has organized its summaries, self-evaluations, and specific needs according to the Council's six performance measures.

1. Strategy, objectives, design

Overview
The **objectives** of the CWMW, found in the mission statement in the CWMW Charter, are to improve the monitoring and assessment of wetlands and riparian areas by developing a comprehensive wetland monitoring plan for California and by increasing coordination and cooperation among local, state, and federal agencies, tribes, and non-governmental organizations to implement the plan. The **strategy** is to build monitoring tools for collecting and delivering essential data and information to environmental planners, managers and regulators that will meet their common scientific and technological support needs, and to help implement those tools through existing programs at all levels of government. By **design**, the CWMW involves representatives from many of these programs including federal partners who have key responsibilities in terms of wetland management or regulation.

Self-evaluation
Rating: Medium

The CWMW has been well organized and focused on development of assessment tools with less emphasis on tool implementation.

Specific Needs
The CWMW needs to revisit its charter to ensure it supports the transition of the workgroup from its focus on the development of the WRAMP framework and technical tools to their implementation through existing programs. This will highlight the need for more implementation partners, including but not necessarily limited to the Lake and Streambed Alteration Program, and the major infrastructure planning and development projects of DWR and Caltrans.

2. Indicators and methods

Overview
The CWMW has developed a framework for comprehensive wetland and riparian monitoring and assessment called the Wetland and Riparian Area Monitoring Plan (WRAMP). This document lays out a framework for organizing relevant science and technology to efficiently inform public decisions and programs that most directly affect these resources. The CWMW helps to coordinate collaborative efforts among these programs and to build tools to meet these information needs. The Council has endorsed the tenets of WRAMP. The WRAMP toolset includes the following.

- *California Aquatic Resource Inventory* (CARI). This is a set of standard operating procedures developed by an inter-agency state-federal team for mapping and classifying state waters as needed to support local implementation of state and federal wetland policies and programs. CARI is designed to answer the basic question: Where are the wetlands and streams?

- *Wetland Status and Trends Assessment Plan* (Wetlands S&T). This is a statewide and regional cost-effective sampling plan to track net changes in wetland extent and diversity statewide using CARI. The S&T Plan is designed to answer the question: What are the relative effects of nature and people on the statewide distribution, abundance, and diversity of wetlands, streams, and riparian areas?

- *California Rapid Assessment Method* (CRAM) for wetlands, streams, and riparian areas. CRAM is a scientifically defensible method to evaluate the overall condition of wetlands and streams based on standardized visual indicators. CRAM is designed to answer the question: What is the general health of wetlands, and streams?

- *Online 401.* This is a web-based tool designed for the 401 Program of the State Water Board to enable online applications for 401 Certifications and for tracking their status. Online 401 could potentially be applied to other environmental regulatory programs affecting wetlands, streams, and riparian areas.

- *California EcoAtlas.* The EcoAtlas is a free online service for accessing, visualizing, and summarizing information about the distribution, abundance, diversity, location, and condition California wetlands, streams, and riparian areas. The Landscape Profile Tool of EcoAtlas enables users to summarize existing information into standardized reports for any user-defined area of the State.

Self-evaluation
Rating: High

The CWMW has done very well in developing fundamentally useful technical tools intended to meet the essential needs of many agencies for standardized and meaningful tracking and evaluation of projects and programs. Future work will focus on demonstrating the efficacy of those tools in meeting program needs.

Specific Needs
The CWMW will continue to need funding to further develop and refine the WRAMP toolset, based on the input of its user communities. As it moves forward with implementation, the CWMW will need to further focus on key implementing agencies and will need to develop metrics of its own performance.

3. Data management

Overview
CWMW remains focused on data management to support CARI, CRAM, and EcoAtlas. The databases for these tools are presently managed at the SF Bay Area Regional Data Center of the California Environmental Data Exchange Network (CEDEN). CRAM is supported by a dedicated database, "eCRAM," that enables qualified CRAM users to manage their CRAM data. EcoAtlas uses web services to share information with other systems, including eCRAM, and to deliver data to the Wetlands Portal. All data in these databases are delivered to CEDEN and are readily available to the public online.

Self-evaluation
Rating: High

The CWMW has done very well in developing databases to support the WRAMP Toolset and EcoAtlas as an information delivery system for these databases and others. These are fundamentally useful tools that can help meet the essential needs of many agencies for standardized and meaningful tracking and evaluation of projects and programs. However, EcoAtlas is wetlands-centric at this time and should strategically expand in content with other kinds of data needed to serve key agencies.

Specific Needs
The CWMW needs to foster stronger partnerships with WRAMP implementing agencies to encourage their use of EcoAtlas as a data and information delivery system that does not necessarily replace any existing databases but greatly increases their value. Regional environmental communities of the Delta and Tahoe Basin are focus areas for future use of EcoAtlas. In the near future, EcoAtlas should incorporate wildlife habitat information to support NCCP planning and compliance monitoring.

4. Consistency of assessment endpoints

Overview
The CWMW assesses its progress based on membership, attendance, degree of collaboration in WRAMP tool development, and breadth of use of WRAMP tools among agencies. The CWMW established clear goals and objectives that are articulated in its Charter. The CWMW is also refining its target endpoints and focusing itself on strategic opportunities as they emerge.

Self-evaluation
Rating: Medium

CWMW has made progress toward developing WRAMP, and will be actively working towards WRAMP implementation. See the list of CWMW accomplishments in part 6 below.

Specific Needs
As it moves forward with implementation, the CWMW will need to develop metrics of its own performance for reporting to the Council and to other interests.

5. Reporting

Overview
The CWMW posts the minutes of its quarterly meetings online, and continues to present its products to numerous scientific and other forums, including to the Council, as part of its outreach activities. The CWMW has collaboratively developed the Wetland Portal to enable anyone interested in wetlands, streams, and riparian areas to access current information about their distribution, abundance, specific locations, conditions, and supporting government programs and organizations. The newly launched Landscape Profile Tool of EcoAtlas will allow anyone to develop their own custom reports about these resources for any area of the state. CWMW also provided input on the State of the State's Wetlands Report produced by the Natural Resources Agency. The Status & Trends (S&T) Project under development could yield statewide information on wetland status that will help improve future reporting on the State's wetlands.

Self-evaluation
Rating: Medium

The CWMW has struggled to maintain its website. Minutes of meetings and the roster of members tend not to be up-to-date. There is a lack of understanding about the purpose and activities of the CWMW among the staff of participating agencies.

Specific Needs
The CWMW needs further resources for clerical support, and its members need to increase their efforts to brief the staff of their programs and related programs about CWMW activities.

6. Program sustainability

Overview
With continuing support by the Council, broad participation among responsible agencies, and by leveraging funds from mainly federal sources, the CWMW has enjoyed success during 2011-13. The trajectory is toward broader use of WRAMP tools to improve wetland protection statewide, with better public access to essential scientific data and information. The State Water Board is investigating a new 401 Water Quality Certification monitoring surcharge fee that would help support implementation of some elements of WRAMP.

2011-13 CWMW Highlights

The CWMW has focused on coordinating wetland assessment efforts statewide and transferring WRAMP tools to state and local agencies for use in their programs for wetland and stream planning, management, and regulation. CWMW accomplishments during the last three years include the following.

- Provided statewide coordination of wetland and riparian assessment

- Established the "L2 Committee" to guide CRAM development, implementation and training

- Served as the inter-agency clearinghouse for the Technical Advisory Team (TAT) of the State Water Board's Wetland Protection Policy

- Provided input on the Five Year Coordinated Work Plan for Wetland Conservation Program Development. The 2014 update will include two new agencies: Delta Conservancy and Coastal Conservancy along with State Water Board and DFW. The Plan allows for agency collaboration on wetland program development projects funded by EPA. It also provides CWMW an opportunity to help shape future strategies for the wetland conservation program. The CWMW reviews the Plan before submission to EPA.

- Established a statewide network of 95 wetland reference sites that anchor ongoing CRAM development and training

- Launched the "My Water Quality Portal" for Wetlands and other "Are our Ecosystems Healthy" Portals

- Published the SOP for CA Aquatic Resource Inventory (CARI)

- Published the Wetlands extent Status and Trends Assessment Plan (S&T Plan)

- Updated the CRAM Manual, eCRAM database, and Trainee curriculum

- Trained 740 new CRAM practitioners

- Calibrated three new CRAM modules, validated one, and initiated validation studies for the other two.

- Upgraded EcoAtlas with new "Landscape Profile Tool"

- Developed "401-Online" pilot, with state approval pending for this 401 certification application and certification tracking system

- Assisted with WRAMP-based watershed assessments for Coyote Creek and Guadalupe River (Santa Clara Valley Water District), Upper Truckee River (Lahontan Water Board, Tahoe Regional Planning Agency, Tahoe Conservancy), and Santa Rosa Plain (North Coast Water Board).

- Advised on the application of CRAM and other assessment tools to High Speed Rail EA (HSRA), Delta Conveyance EA (DWR), Willits Bypass Project (CalTrans), solar array projects (California Energy Commission), Perennial Stream Assessment Program (SWAMP)

- Obtained endorsement of CRAM by SWAMP

- Developed draft "Performance Curves" for predicting restoration project progress for streams and tidal wetlands

- Advised State Water Board on staffing needs for improving compliance monitoring

- Continued development of WRAMP tools. Projects funded in 2013:
  - Validate CRAM modules
  - Use EcoAtlas to track projects for Central Valley JV, Bay Area JV, and Delta Conservancy
  - Develop common compliance monitoring framework based on WRAMP for NCCP/HCP-401/404

Self-evaluation
Rating: Medium

CWMW has enjoyed participation from state and federal agencies, as well as JPA's and other scientific entities. As a result, the CWMW has been successful in improving interagency coordination of wetland monitoring and in developing new field and online tools for conducting wetland assessments. The CWMW continues to transition along its planned trajectory from WRAMP tool development to implementation of the toolset. Implementation will require different kinds of coordination and different sources of funding, which will present new challenges. The following are areas that the CWMW has identified as needing improvement.

Specific Needs
The CWMW has made very significant progress in developing the WRAMP toolset but implementation has been less successful due to incomplete coordination with state programs most responsible for wetland management.

- *Identify Implementation Funding.* While CWMW partners have been able secure funding from a variety of sources, technical tool development has largely been funded by Federal programs, chiefly the State and Tribal Wetland Program Development Grants of USEPA, with important contributions by SWAMP and past State bond measures. The expectation by federal partners is that the State will assume more responsibility for implementation. This will require a greater commitment by State programs to use, and not just help develop, WRAMP tools. These tools will be useful to line staff in multiple state and federal programs representing multiple agencies. While the consistent use of these tools among agencies is essential to coordinate and standardize the agencies' activities, as desired by the Council, the maintenance of these tools for multi-agency use and the training of staff in different programs are not within the mission of any one participating agency. As a result, dedicated staff support and funding through multiple partners will be necessary to ensure its long-term success. An overall inter-agency implementation "business model" should be developed. Staff from the State Water Resources Control Board has prepared a long-term implementation strategy and funding options that can serve as the foundation of this business model.

- *Coordination with other Workgroups.* Considerable overlap in data needs exists between CWMW and the stream and estuaries workgroups. If EcoAtlas is to be of most use to agency staff and the public, relevant data from other workgroups should be imported. The inclusion of CRAM into the SWAMP Perennial Stream Assessment (PSA) Program, and the recent agreement between the DFW's Natural Community Conservation Program (NCCP) and the State Water Board's 401 Program to coordinate compliance monitoring at the landscape scale are leading efforts in the right direction. It would be similarly very helpful for the DFW Lake and Streambed Alteration Program, (LSA) to adapt the "401 Online" tool and EcoAtlas for permit application and tracking, and to use CRAM for overall project assessment.

- *Level 1 Committee.* CWMW has yet to establish a "Level 1 Committee" to coordinate aquatic resource mapping, as has been done for CRAM with the "Level 2 Committee." With development of the Status and Trends Plan, CARI, and EcoAtlas, it is becoming increasingly important for the CWMW participating agencies to coordinate their mapping efforts.

- *Program Participation.* Improved coordination across programs is needed. Many participating agencies manage programs that will need to be involved in WRAMP tool implementation if it is to be successful. Agencies and Programs that should be targeted for increased participation in CWMW include: LSA, Aquatic Bioassessment Lab, Resource Assessment Program and Biogeographic Data Branch of DFW; California Coastal CommissionCCC; State Coastal ConservancySCC; DWR; and the State Board Division of Water Rights.

Attachment 1 - List of Agencies Participating in the CWMW

State Agencies

California Coastal Commission
California Department of Fish and Wildlife
California Department of Parks and Recreation
California Department of Water Resources
California Natural Resources Agency
California State Lands Commission
Delta Conservancy
Lahontan Regional Water Board
Central Coast Regional Water Board
Central Valley Regional Water Board
Los Angeles Regional Water Board
San Diego Regional Water Quality Control Board
San Francisco Bay Regional Water Board
Santa Ana Regional Water Quality Control Board
State Water Resources Control Board
California Department of Transportation

Federal Agencies

National Marine Fisheries Service
Natural Resources Conservation Service
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service

Other Agencies and Entities

Moss Landing Marine Laboratories
SF Estuary Institute and Aquatic Science Center
Southern California Coastal Water Research Project

NOTE: Many additional agencies, universities, and private consultants and non-governmental organizations – too numerous to list - provide input to CWMW through their participation in WRAMP tool development including demonstration projects.

CA Estuaries Workgroup Triennial Audit 2010-1013

Background

The California Estuaries Monitoring Workgroup (CEMW) was established in December 2010. The CEMW developed Roles and Responsibilities in December 2011 and established a Charter in June 2012. The main mission of the CEMW is to enhance existing estuarine resource monitoring, assessment and reporting efforts. The CEMW endeavors to improve the monitoring, assessment, and reporting of estuarine resources by increasing cooperation, coordination, and collaboration among local, state, and federal agencies, tribes, and non-governmental organizations involved in the monitoring of water quality and ecosystem health of California's estuaries. Two focal products of the CEMW are the Estuaries Workgroup Website that was started in 2011, a password-protected virtual world for scientists to analyze data and develop stories to be presented on the Estuaries Portal and elsewhere, and the Estuaries Portal that was launched in October, where information about the health of CA's estuaries is displayed for general consumption as well as access to the data used in those presentations.

Monitoring Program Elements

Strategy, Objectives, Design

The Estuaries Portal is currently focused on the San Francisco Estuary (SFE), populated as a pilot, with the intention to expand statewide. Because the SFE section was the pilot, it will act as a template and fraework for additional estuaries to follow as they are incorporated, recognizing the SFE "template" may not be the best or applicable in all cases for other estuaries. It follows core questions of, "What is it and why is it important, How and where is it monitored, What are the trends, and What's being done about it?" as applied to various topics that relay information about the health of an estuary (e.g., phytoplankton, benthics, zooplankton). Those core questions are organized by five key attributes (Water, Habitat, Living Resources, Ecological Processes, and Stewardship), and the amount of technical detail found in answering those questions increases as a person ventures into the site (public focus in the first couple levels, with increasing data and technical information for those more interested in specifics).

Rating: Medium The organization of the Portal and content to be developed have a pretty strong grounding, but we lack much of the documentation that would aid in consistency and broader understanding of the path as understood by the core group. Coordination with many groups has been established or identified, and different pieces are geared toward different audiences. The structure leaves placeholders and a framework for additional estuaries to be brought in. The objectives and design will continue to be refined and are likely to become more developed as there is more involvement from scientists working in other CA estuaries. The current challenge is bringing in new partners from other estuaries and ensuring their participation.

Indicators and Methods

We rely on the participation of fifteen, currently contributing organizations to vet indicators and methods used in our assessments. We call on the organizations that generated the data to participate in the use and assessment of their data, which helps us know the quality of the data as well as have deeper understanding of groupings for assessments. Some of the major data suppliers we are working with (e.g., CEDEN, CDEC, and WQS) are SFE-centric, but others are statewide and nationwide sources. There are current plans to incorporate additional datasets, but funding to accomplish this is not yet sustainable.

Rating: Low Although we have a fair amount of coordination within Sacramento-San Joaquin Delta participants, we lack participation from other estuaries at this point. An additional challenge is getting data from other groups to enable broader, more robust analyses. Even when partners are willing, the disparate state of data sets is a real IT challenge.

Data Management

Data used by the CEMW are either data that have web services with our website, provide data batch uploads, or are published information. We rely on the documentation of the entities collecting the data and the databases they use (e.g., CDEC and CEDEN), and prioritize the use of data that is well documented with metadata and quality assurance measures. We've chosen to start with large data sources that are well coordinated. Because of the very different types of data used to evaluate estuarine health (i.e., blending fish health and abundance estimates with zooplankton health, abundance, and species composition with phytoplankton abundance, location, and composition with water quality data and GIS information) understanding limitations, minimizing assumptions, and determining the most useful ways to present the data have been a challenge. Not only are the types of data a challenge to work with, but the frequency in which it's collected also poses challenges.

Rating: Medium Although we have access to some of the larger data sources, we do not have full web services established, resulting in static figures on the Portal. Currently, our greatest limiting factor is financial support for additional web services to be established. Specific datasets we are currently focusing on in the SFE are the Interagency Ecological Program (IEP) fish survey datasets. Data in live presentations on the Portal can be directly downloaded and imported into software for data analysis. Management of data from other regions will have to addressed as other groups with differing reporting requirements or formats present themselves.

Consistency and Assessment Endpoints

Currently, the Estuaries Portal is predominantly presenting trends that do not include much analysis, but in cases where averages or groupings are included in the trends, captions are included to let the reader know how they were derived. The captions act as documentation, but there has been little coordination between sections, primarily due to the wide variety of the types of data used. Future coordination with other estuaries will call for additional comparisons and possible adjustments to analyses performed. The Sacramento San Joaquin Water Quality Conditions Report is the first report the CEMW has incorporated into a fully functional and exploratory format. Plans to incorporate other reports in the area are under discussion, and we are mindful of assessments and endpoints that are commonly used across multiple groups. As other estuaries and groups are incorporated, consistency will be a focus where deemed appropriate.

Rating: Medium Validation of assessment tools has been internal to the group's participants at this point. Not only has the Portal been live since October 29th, but it's also been presented at four different scientific conferences as work has progressed.

Reporting

The Estuaries Portal is a continual work in progress with the last date each page was updated stamped at the bottom of each page. Many of the graphs are live graphs that get updated automatically, as new data is loaded via web services and this also allowed the graphs to be dynamic, and augmented to the reader's interest. Readers can also download the data and use it in their own analyses. All static information (e.g., photos and tables) references the source, so the reader can contact the source for additional information. In addition, we have a staff person dedicated to overall look and feel issues and publically friendly language across the entire Portal. It is the intent of the CEMW to ensure that all data and analyses presented are done so in plain language without jargon, sources are credit, and metadata is included to enable users to have confidence in what was used and how. Transparency is paramount.

Rating: Medium Not all of our data is fully automated, but we are striving to make it so.

Program Sustainability

We are in the process of formalizing many of our group's roles and interactions, coordination and tools for implementation. We are in the middle of developing a Strategic Workplan to guide both short-term and long-term goals of the workgroup. We continually reach out to others to financially support IT services as well as provide staff time to develop Portal pages. Currently, there is coordination with IEP and the Delta Science Program to explore avenues of cost-sharing and enhancement of collaboration for sustained participation. We use scientific conferences and press releases to promote our efforts, and we have plans to pursue local partners and possible grant funding to enable more balanced and sustainable participation.

Rating: Low We are a relatively young workgroup, and are in the middle of our first internal review as part of developing our Strategic Plan. We don't have reliable funding yet, but have been pursuing multiple options and continue to brainstorm needs and planning based on recent lessons learned.

Recommended Actions

- Additional documentation to improve communication and accountability of participants, also enabling people to pre-determine time and resource needs before committing.
- Carefully lay out guidelines for assessments and conflict resolution.
- Fully vet content as well as presentation before Portal pages are mocked up and IT funds are spent.
- Carefully plan and prioritize IT projects rather than implement as ideas come.
- Work closely with potential data sharers to better understand potential roadblocks before initiating data acquisition.
- Engage management earlier to ensure staff availability and commitment of time and participation. If not recognized as a priority, these efforts will fail.

Healthy Streams Partnership (HSP)

2010-2013 Triennial Audit

Background

The mission of the Healthy Streams Partnership (HSP) is to promote the protection of California's healthy streams and the restoration of threatened and impaired streams by informing resource management perspectives, decisions and actions. The HSP maintains the Healthy Streams, Rivers and Lakes Portal (Portal) on the MyWaterQuality website. The Portal, which was launched in 2012, currently displays data from water quality monitoring programs funded by the Surface Water Ambient Monitoring Program (SWAMP).   In 2012 and 2013, the HSP collaborated with the USEPA's Healthy Watershed Initiative to develop the California Integrated Assessment of Watershed Health (Integrated Assessment) project which was completed in November 2013.

Audit Summary

HSP efforts were evaluated based on the six Performance Measures in the Monitoring Council Strategy. Individual performance measure evaluations and ratings are presented below. Overall, the HSP scored well in the majority of the performance measure categories. Improved integration and analysis of multiple datasets would enhance the work group's ability to identify healthy aquatic ecosystems. The lack of available resources to conduct this effort is a major obstacle.

Individual Performance Measure Analysis

1. Strategy, objectives, design

    The core question addressed by the HSP is the ecological condition, or health, of California's streams, rivers and lakes. This assessment question is addressed for perennial, wadeable streams through by the Perennial Stream Assessment (PSA) monitoring program. Benthic macroinvertebrate (BMI) from the PSA are displayed on the Healthy Streams Portal. Along with BMI data, the Portal also displays toxicity results from samples taken in streams and rivers. Sediment and water column toxicity results are displayed on the Portal in separate maps. Data from other elements of the PSA are currently not well integrated into the site (e.g. algae, physical habitat data, CRAM).   More importantly, current assessments only cover a portion of California's streams (approximately 24% statewide). Non-perennial and ephemeral streams, and large rivers are not well represented, partly because assessment tools are lacking for these resource types.   As new tools are developed (e.g. ephemeral stream assessment methods) they should be incorporated into the portal.   Also, novel approaches to large river assessment could be explored. Examples include fish or bird data from programs such as MAPS or USGS or emerging remote sensing assessment tools for large rivers. No data from lakes are currently displayed on the Portal.

    The Integrated Assessment project addresses the ecological condition question from a watershed perspective. The HSP intends to display Integrated Assessments on the Portal, and to incorporate additional datasets where appropriate to assess watershed health.

    Rating: **Medium.** Component programs rate high, but efforts only partially coordinated to address core assessment question.

2. Indicators and methods

The indicators utilized by the HSP and displayed on the Portal – BMIs and toxicity - are scientifically validated and include robust QA procedures in relation to the individual monitoring projects they support. The indicators have not been combined in an assessment of ecological condition. However, the Integrated Assessments could potentially provide a framework for this type of coordinated analysis. In particular more work could be done to better connect stressor and condition data to begin understanding causes of less than desirable condition (where they occur)

If additional datasets are incorporated in the future that use similar indicators (e.g. BMIs or algae) collected under different sampling procedures, it will be necessary to ensure that the datasets are comparable in order to conduct an integrated analysis.

Rating: **High**

3. Data management

The BMI and toxicity data displayed on the portal is housed in the California Environmental Data Exchange Network (CEDEN). The Portal does not link to any other databases or display data from other sources. For example, stronger connections to the CRAM database and the USGS Multi-taxa database would provide additional information.   In addition, improved basemaps from programs such as the Central Valley Flood Protection Program and the California Aquatic Resources Inventory would provide context for some of the condition data currently displayed by the portal. The HSP intends to make geospatial datasets developed for the Integrated Assessments publically available via the Portal or other appropriate website.

Rating: **Medium**.   Connections with CEDEN are good, but connections with other priority databases would allow for a more comprehensive presentation of relevant information

4. Consistency of assessment endpoints

The Portal displays three assessment endpoints – BMIs, water column toxicity and sediment toxicity. Each assessment endpoint is displayed on a separate map and the three measures are not integrated into a broader assessment.

The Integrated Assessments are not currently displayed on the Portal, but potentially could be used as a framework for a broader, coordinated assessment. The assessments could be further refined by adding additional indicators, incorporating thresholds, weighting, or other procedures.

Rating: **Medium**

5. Reporting

The Portal maps are representations of monitoring data from the various monitoring programs. The maps are interactive; they allow the user to zoom into an area of interest and to identify additional information about the sites. The toxicity data are linked to CEDEN and updated regularly; the BMI data are shown on static maps.

Rating: **Medium**

6. <u>Program Sustainability</u>

There are no funds available for the work group to conduct its efforts. The Portal was funded by a contract with the State Water Board that has been fully expended. The Integrated Assessment project was a USEPA funded effort that directed funds to an environmental consultant (Cadmus). HSP members participated in the effort on a voluntary basis and were not compensated for their time.

Rating: **Low**

Recommended Actions

- Enhance the Healthy Streams Portal with the following additional items:
    - Display CA Integrated Assessment results using an interactive, map-based interface
    - Add an interactive map to display algae data
    - Incorporate data from other monitoring programs that assess aquatic ecosystem condition
    - Pursue relationships to improve availability of information on non-perennial and ephemeral streams, and large rivers
    - Improve base mapping through partnership with other mapping efforts in the State
    - Add data to assess aquatic ecosystem condition in lakes
- Build on framework established by the California Integrated Assessment of Watershed Health:
    - Integrate with other multimetric assessments of aquatic ecosystem health (e.g. DWR Water Plan, regional watershed report cards, etc.)
    - Refine the assessments by adding additional indicators, incorporating thresholds, weighting, or other methods
- Pursue new partnerships and participation with programs not currently well represented on the HSP
    - Department of Fish and Wildlife Lake and Streambed Alteration Program or others

Purpose of the DMWG:

The DMWG provides expertise to establish the overall approach to make use of and integrate existing data management systems into a distributed system of databases, catalogs, and assessment and mapping tools to enable users to access data, metadata, and assessment products from a single entry point, or web portal. In support of the Council's Comprehensive Strategy, key responsibilities of the DMWG include.

- Assist Monitoring Council workgroups identifying methodologies for assessing data management and quality needs.

- Assess and recommend best practices for development of structured data formats and data management strategies complying with appropriate national and state guidelines.

- Identify methods to increase accessibility of water quality and related ecosystem data and opportunities to coordinate and share these data among workgroups, governmental agencies, and non-governmental organizations.

- Assess and recommend IT tools and standards facilitating development of portals meeting Monitoring Council web development guidelines.

- Serve as a resource to assist other workgroups to evaluate technologies in the areas of data management, web applications and geospatial information management.

- Serve as a resource to workgroups for communicating, and where necessary, translating into clear, non-technical language recommendations regarding data management in support of individual workgroup's efforts.

Overall Assessment of Success of the DMWG:

Since its establishment, the DMWG has focused on developing a charter, assessing the state of data, technologies and needs of the existing theme specific workgroups and developing summary documents and recommendations for best practices regarding recommend infrastructure and data standards for Monitoring Council and Portals.

While several work products resulted, the DMWG has found it exceptionally challenging to build and maintain momentum to move these items forward in a timely and effective manner. In large part this is due to a lack of resources and direction from management. As is the case with all of the workgroups, members of the DMWG serve in a volunteer capacity, and as such, it has been extremely difficult to maintain the necessary attention and effort necessary to accomplish key tasks. Furthermore, because the DMWG was not established before several of the theme specific workgroups, significant effort has been required to develop an understanding of the many and varied data and technological solutions that had already been implemented by those groups in developing their portals prior to the DMWG's inception.

The workgroup has been successful in summarizing many of the existing portals and data utilized within them, though the process has not been particularly efficient or effective. In particular, we have found it very difficult to interact with the other workgroups and to obtain the information requested. Additionally, while the DMWG is able to provide advice for implementing particular methods, standards and software, there are typically not the

resources, and in some cases the expertise, available to implement them. Data availability for some workgroups is improving as data become more accessible through systems such as the California Environmental Data Exchange Network (CEDEN). But given data come from a variety of agencies and sources, the degree of availability for integration with the web applications driving the portals is inconsistent. In most cases, the ability to improve upon this situation relies on the availability of resources and management priority to make these data available via web services which can be easily ingested by the portals.

During the summer of 2011 a list of potential workgroup members was developed, representing data management experts from agencies, industry, academic and non-profit sectors. Invitations were initially sent to 29 individuals representing 15 organizations. The initial meeting of the DMWG was held in August 2011. In the last two plus years the membership focused on several key objectives including: Developing a common understanding of current and developing data management systems; establishing workgroup structure and schedule; and establishing subcommittees for: (1) Portals/Tools and (2) Data Standards.

The first three meetings of the workgroup included a series of presentations to provide the membership with an overview of various data management systems and approaches. Meetings throughout focused on developing the workgroup charter and collection of baseline information about the data and technology behind each of the existing and/or developing Monitoring Council Portals. Additionally a joint meeting between the DMWG and the three Ecosystem Health workgroups (Wetlands, Estuaries, and Streams Rivers and Lakes) was held in November 2012 to explore the value of developing a common GIS layer for aquatic resources to be shared by each of the workgroups and to establish effective channels of communication between workgroups. Meetings in 2013 continued to flesh out information about the needs of the existing workgroups as well as to develop recommendations/best practices relating to commonly needed data sources across workgroups and mapping technologies for portals.

Meetings:

Since its inception in the fall of 2011, the DMWG has met 12 times (approximately every other month) with some exceptions when meetings were cancelled due to a lack of progress or agenda. One additional, joint meeting in November 2012 with the three Ecosystem Health workgroups (Wetlands, Estuaries, and Streams Rivers and Lakes) was organized to assess value of a common GIS layer for aquatic resources.

- August 2011
- September 2011
- November 2011
- January 2012
- April 2012
- June 2012
- August 2012
- November 2012: joint meeting with Ecosystem Health workgroups.
- December 2012
- February 2013
- April 2013
- June 2013
- October 2013

Key accomplishments:

- Developed and adopted a workgroup charter;

- Established two subcommittees: (1) Portals/Tools and (2) Data Standards; (subcommittees met as needed via phone/web).

- Through the subcommittees, inventoried and assessed data and technologies in use by existing and forthcoming theme specific workgroups and developed recommendations regarding mapping technologies for portals.

- Held a joint meeting between the DMWG and the three Ecosystem Health workgroups to assess opportunities to develop a common/shared water data layer, such as the California Aquatic Resources Inventory, (CARI) for use by the Monitoring Council Workgroups.

- Developed issue paper for which web mapping framework to utilize as a replacement for the Google Maps API v.2 framework used on a number of My Water Quality portal pages.

- Developed an outline for a data management best practices guide for theme specific workgroup portals which was vetted with several of the workgroups.

Recommendations:

- In our 2012 report, we suggested that all existing and future theme specific workgroups should maintain a designated data liaison who also participates in meetings of the DMWG to ensure a consistent two-way exchange of information between workgroups. While this was attempted in 2013, it was only partially effective. In all cases the designated individuals were members of the DMWG who for various reasons were already involved with these other workgroups – typically in the capacity of serving a technical rather than a domain-specific role. The DMWG continues to struggle with bridging the gap between the scientists who possess a strong understanding of the questions, data and analysis required in their portals and the technical expertise to translate these effectively to the database, mapping and analytical tools and frameworks that the DMWG can evaluate in light of their requirements. Additionally, given the small number of individuals actively involved in the DMWG, there is simply not time available for these individuals to participate in multiple workgroups at the level needed to effectively evaluate their needs with the data management options available. Furthermore, because the existing workgroups have already developed (fully or partially) their own data frameworks and delivery mechanisms, recommending changes (let alone imposing standards) has proven ineffectual, primarily because the resources to implement such changes are not available.

  As an example the DMWG identified a need to address the deprecation of the Google Map 2.x API which the majority of the existing portals were developed on. The deprecation occurred on November 19, 2013. In anticipation of this change the DMWG conducted an extensive evaluation of mapping platforms and put forward recommendations for a transition to an Open Source stack which would avoid both the forced changes experienced with the Google mapping option as well as the need for any portal developer to have access to expensive commercial software. Despite the recommendation of the DMWG, portals remain a hodge-podge of platforms including use of a commercial (Esri) platform which available to the State Board, who currently maintains many of the portals as well as some legacy Google maps and perhaps others. This limits the opportunity to maintain a consistent software stack (and thus a consistent look and feel) across all portals regardless of who takes the lead in developing them.

  While the DMWG has the ability to assess and recommend tools, approaches and software platforms to achieve consistency and interoperability across the workgroup portals, there is not a means to implement these recommendations effectively. It is clear that maintaining multiple platforms leads to a number of problems relating to the long-term maintenance and upkeep of the portals and should be addressed at the level of the Council going forward.

- A second critical focus for the DMWG should be to ensure water data can be effectively shared (machine to machine) between agencies and other data providers. The DMWG recognizes that data will continue to be collected, managed and maintained by individual agencies and/or organizations as appropriate to their respective mandates and that these agencies will remain the authoritative source for these data.

While choices relating to the internal storage and organization of data will necessarily vary by agency or organization, adoption and documentation of Interoperability standards to support a federated approach to data management should be a primary objective for the DMWG in the next year. As with data formats, common and shared data transfer protocols (e.g. web services, REST endpoints, JSON, XML, etc.) should be defined and documented to ensure that data are accessible to the monitoring council portals via services rather than requiring workgroups to contact data managers within multiple agencies and organizations to manually access, acquire, structure and/or provide data for use by the theme specific workgroups. Essential to both of these goals is the need for management within the relevant agencies to understand the need for developing the necessary updates to data and transfer protocols within their organizations to ensure that necessary data are provided in an appropriate and documented manner. At present, many agencies have perfectly functional systems for their own internal analysis and reporting needs, so developing such services for external access are viewed as unnecessary effort which receives little or no priority and lacks the necessary human and/or financial resources necessary for the implementation and maintenance of such services.

The DMWG noted barriers to sharing of data, particularly outside of State agencies remains a source of trepidation in some cases. Specific concerns include potential for: misunderstanding of data quality and appropriate use; legal liability, extra workload associated with preparing data for use by non-experts or in portals; lack of required expertise (e.g. preparation of data for web access, establishment of web services, etc.).

These issues remain significant barriers to the process as more of these data are made discoverable, and potentially comparable through efforts such as CEDEN, CERES the State Geoportal and other systems. Questions around data typically boil down to those of: (1) who is the authoritative source of a given data set; (2) how will data quality be confirmed and maintained; (3) how is versioning of data handled, meaning as data is changed, updated or edited, who does that and how (if at all) is the previous version maintained.

These concerns may be addressed in part through the development model language regarding data availability (e.g. web services), use constraints, metadata and data documentation standards at the level of the Monitoring Council. The DMWG recommends the Council shepherd a process to develop model language, in consultation with the theme specific workgroups, accounting for specific issues or limitations of data sharing and use relevant to their needs. Furthermore, it will be critical for direction and resources to come from the Council to make this a priority. Without such direction, it is likely the status quo will continue and effective data sharing will be seriously hampered for the foreseeable future.

- In order to develop and promote shared data management practices the DMWG has been working on a data management best practices guide. This publication can explain useful methods to improve the efficiency, accuracy and sustainability of individual portals while also supporting greater data interoperability between the portals and partner organizations. The initial version of the guide could explain commonly accepted best practices for data management supporting a general improvement in portal operation. Continuing draft revisions could then support dialog between the WQMC partners on standards necessary for data interoperability. Development of these standards are essential but would require resources which have not be available.

- A fourth recommendation of the DMWG was to develop and share a common GIS layer for aquatic resources to support portals requiring a similar GIS layer. A joint meeting was held to move that objective forward. While there was general support for a GIS layer that would meet the needs of multiple workgroups, there was some hesitancy to commit to a common standard until additional analysis could be done and options like CARI are available for review. This serves as one (of a number) of examples of the difficulties revolving around the theme of data sharing and transparency. Consensus

was that there is value in updating and/or modifying this common layer to serve the needs of multiple workgroups as well as to provide this (and other commonly requested data) as web services which are maintained by the appropriate agency or organization (e.g. the authoritative source) but available for integration into portals.

- As mentioned previously, the DMWG has had difficulty maintaining commitments of time and efforts from the relevant agencies and organizations. Because involvement in the DMWG is not directly supported and/or resources are not made available to facilitate its work, it perpetually suffers from uneven and/or a lack of participation by its members. Where appropriate intersections exist with related efforts, members of the workgroup may find the time and resources to attend meetings or call into them. However, since the real work of the group occurs between meetings as the products of the subcommittees, it is only through the good will and efforts of a limited few that any work products are produced.

  Additionally, because there is no explicit mechanism for supporting interaction between the DMWG and each of the theme specific groups, the ability to gather, aggregate and assess their individual and overlapping data and technology needs is limited. While it would be optimal if the DMWG had the personnel and resources to participate with each of the theme-specific workgroups, this has proven impractical. One means to expedite such a process to coordinate the data needs and approaches across all of the workgroups would be to identify specific one-time resources (staff and/or contractor support) to collect, analyze and develop a report summarizing the data requirements across the workgroups. While the DMWG has made multiple attempts to accomplish this task, it has proven too complex to achieve without direct and sustained effort by individuals knowledgeable in both data management and the environmental and water quality data types required.

  Perhaps, a half-dozen individuals have carried the majority of the weight of our efforts over the past 30 months. Provision of concrete support from the Council and resources to develop and implement recommendations of the workgroup could serve to energize those who have remained active, and potentially reinvigorate those who have dropped off or been wary to become involved. These need not be direct funds (though some support for travel to meetings would be beneficial). Support for agency staff and/or contractors to develop the needed web services to make key data sources available would provide a basis for more effective and rapid development and maintenance of all of the current (and future) workgroup portals. Currently recommendations of the DMWG are of little use to the existing workgroups unless there is a means to implement them. Future workgroups and portals would also benefit from having a documents and available base from which to build as opposed to developing their own approaches based on whatever knowledge and experience their particular membership brings to the table.

Conclusions:

Over these past 30 months the DMWG has made reasonable progress in addressing the Monitoring Council Strategy. However without the authority and support to translate these efforts into documented recommendations for data formats, transfer protocols available to the theme specific workgroups and their portals, it has been a frustrating experience. Enhancing support for implementation (from both management and financial perspectives) would provide the DMWG the opportunity to work more effectively with the existing and future workgroups as then update and develop their respective portals. Without such support, technical recommendations of the DMWG will serve little value as each workgroup continues to take whatever path is most expedient in meeting their own needs and without an eye towards the long-term upkeep and maintenance of the portals and the data sources and services upon which they rely.

Attachment 1 - List of Organizations Participating in the DMWG

State Agencies
• California Department of Fish and Game • California Department of Public Health • California Department of Water Resources • California Natural Resources Agency • California Ocean Science Trust (OST), MPA Monitoring Enterprise • California State Water Resources Control Board (SWRCB) • California Technology Agency • Central Valley Regional Water Quality Control Board
Research and Academic Organizations
• California State University (CSU), Council on Ocean Affairs, Science and Technology (COAST) • California State University, Northridge (CSUN), Center for Geographic Studies • Humboldt State University • Klamath Basin Monitoring Program • Lawrence Berkeley National Laboratory • San Francisco Estuary Institute (SFEI) / Aquatic Science Center (ASC) • San Francisco State University • Southern California Coastal Ocean Observing System (SCCOOS) • Southern California Coastal Water Research Project (SCCWRP)
Non-Governmental Organizations (NGOs)
• Council for Watershed Health • Ecolayers • Heal the Bay
Private Industry and Consultants
• 34 North • Esri • IBM • RimuDB

California Water Quality Monitoring Collaboration Network
Triennial Audit Report
December 2013
Prepared by Erick Burres, CWQMCN Facilitator

The California Water Quality Monitoring Collaboration Network (CWQMCN aka Network) is a voluntary monthly Webinar that allows members of the monitoring community to network and exchange information and ideas on topics of interest. The Network helps support a state framework to coordinate consistent and scientifically defensible methods and strategies for improving water quality monitoring, assessment, and reporting. This report is response to the Monitoring Council's request to review the California Water Quality Monitoring Collaboration Network's activities and progress since 2011.

The CWQMCN was formed in 2009 as a joint effort between EPA Region 9 and the Water Boards with a goal of providing Webinar Sessions designed to create and foster communication and collaboration among water quality monitoring efforts across the state. As the National Water Quality Monitoring Council states*, "Collaboration and Outreach works to build partnerships that foster collaboration among the many elements of the water monitoring community by supporting development of state and regional monitoring councils and promoting the importance of monitoring for decision-making."* As we build these sessions, we enhance the capacity to collect data and information in a more effective and efficient manner that will work towards water quality improvements and maximizing budgets.

The webinars have consisted of several types of forums and a variety of topics.
> Forums-
>> 1) Providing information to the Group (e.g., State Program Overviews, technical and support tools, information in various water quality indicators, assessment methods).
>> 2) Providing an expertise dialogue (e.g., Bioassessment, monitoring design, blue-green algae phenomenon).
>> 3) Providing a forum for networking (e.g., recent developments in regional monitoring or citizen monitoring groups), problem solving, and feedback on program and tools.
> Topic Categories-
>> 1) Water Quality Monitoring Programs
>> 2) Water Quality Monitoring Projects
>> 3) Monitoring Tools
>> 4) Quality Assurance
>> 5) Management and Administrative Tools
>> 6) Data Sharing
>> 7) Reporting

Since 2010 the CWQMCN has been facilitated by the Water Board's Citizen Monitoring Coordinator, Erick Burres. The Network has hosted 32 webinars since January 2011 (50 total overall). All webinars were recorded. These recording were made available for viewing, along with a downloadable pdf of any presentation material, at the CWQMCN's webpage (www.mywaterquality.ca.gov/monitoring_council/collaboration_network).

To learn about the webinar series usefulness and to solicit new topic ideas a post-webinar participant survey was launched during the first half of Fiscal Year 2012-2013. By using an online questionnaire, webinar participants were invited to take a survey for each webinar in which they participated. Through the survey it was learned that 88% found the quality of the information presented in the webinar to be

of "high or very high quality" and 63% found the webinar they participated in to be "very useful to extremely useful" in addressing their needs as related to the webinar. Participants also showed a high likelihood that they would recommend the webinar's recording to their colleagues. Providing a glimpse of the value to collaborations and networking nearly a fifth of the survey participants (19%) learned about a given webinar through a forwarded email announcements. In addition, fifteen webinar topics such as Delta Modeling and natural source identification were suggested for future webinars.

The CWQMCN has partnered with national and local organizations (e.g., National Monitoring Council, Delta Stewardship Council, Southwest Association of Freshwater Invertebrate Taxonomists) expanding the webinars' audience and impact. In 2012 the National Water Quality Monitoring Council invited the CWQMCN to present its successes through the "Strengthening Monitoring Programs through Nonprofit/Government Collaboration" tract and also present a poster at the 8th National Monitoring Conference "Water: One Resource-Shared Effort-Common Future" .
- Presentation:
  www.acwi.gov/monitoring/conference/2012/O1/O1Burres1.pdf
- Abstract:
  www.acwi.gov/monitoring/conference/2012/abstracts/abstracts_2012_sessionO1.pdf
- Poster:
  www.waterboards.ca.gov/mywaterquality/monitoring_council/collaboration_network/docs/2012nwmcposter.pdf

The use of online social media has benefited the CWQMCN and greatly enhanced the access and audience for the CWQMCN's archive of webinar recordings and networking ability. Since 2011 the California Water Quality Monitoring Professional Network on LinkedIn.com has provided an opportunity for individuals to network outside of the webinar format and currently has over 340 members. In 2013 the CWQMCN established its own YouTube Channel (www.YouTube.com/CWQMCN) where 13 playlists/62 videos are available. Over 2000 views have been reported in the short time that these videos have been made available. The Lyris email list for CWQMCN currently includes over 1,450 members through voluntary sign-ups.

The CWQMCN is not water quality theme based as are other Work Groups. This triennial review was conducted by analyzing webinar content against the evaluation criteria. The Network's goals are to help water quality monitoring programs which in turn protect and or restore California's waters and their beneficial uses. Perhaps in future years it may be advisable to see how these webinars helped improve California's water quality, monitoring programs and watershed management.

EVALUATION CRITERIA	RATING BENCHMARK	DISCUSSION
1-Strategy, objectives, design	High	Feedback from surveys and other comments suggest the CWQMCN is meeting its goals.
2-Indicators and methods	High	The webinars have been providing current information regarding Indicators and Methods, including QA, with the goal of improving monitoring performance statewide.
3-Data management	High	Webinars are continually being offered regarding data

		management, and sharing, with the goal of improving monitoring performance statewide.
4-Consistency of assessment endpoints	Medium	Although webinars have not been presented directly on assessment endpoints, they have been presented and discussed within many webinars.
5-Reporting	High	The webinar series has provided reporting guidance and has been a forum for water quality monitoring programs and projects to share their reports.
6-Program sustainability	High	At present the CWQMCN is sustainable. Improvements could be made by adding an additional facilitator(s) and seeing greater coordination with other Work Groups. Currently WebEx cannot support all of the CWQMCN's video conversion needs and additional software is needed.

Appendix II: Is the Strategy Sustainable?

While the Monitoring Council's enabling legislation (SB 1070) required the development of the *Strategy* and submittal of the Monitoring Council's recommendations to the Secretaries of California Environmental Protection Agency (Cal/EPA) and the California Natural Resources Agency, neither of the Secretaries has formally endorsed the *Strategy*, even after numerous requests from the Monitoring Council. As a result, implementation has been largely from the bottom up, through volunteer efforts encouraged by the Monitoring Council and its two Coordinators. Given this limitation, the theme-specific workgroups have made tremendous strides to coordinate data gathering and public information dissemination, especially with respect to California's wetlands, streams and rivers, the San Francisco Bay-Delta Estuary, swimming safety, and the bioaccumulation of pollutants in fish that people eat. However, involvement by state governmental and non-governmental organizations has been limited and uneven and the workgroups agree that the current level of effort is unsustainable. As detailed in the workgroup self-evaluations (Appendix I), momentum is slowing for many of the workgroups and it is anticipated that the existing challenges will continue to hinder progress. To get a more precise picture of sustainability, the Monitoring Council asked each of the workgroup leads to respond to the following question:

> *What would be the likely future of each of the workgroup and portal development efforts should we fail to achieve broad management support and sustainable funding for implementing the Strategy?*

The following issues were highlighted in nearly all responses.

Lack of Dedicated Staff and Resources

Implementing the Monitoring Council's *Strategy* involves substantial challenges. Governmental and non-governmental organizational staff time is needed for workgroup members to participate in meetings, to develop and implement measures to better coordinate monitoring, assessment and reporting efforts, and to develop, maintain, and update the My Water Quality web portals. Staff involvement to date has been largely on a short-term voluntary basis. In their self-evaluations, the Monitoring Council's workgroups consistently reported difficulties which stem from a lack of support from departmental and program managers. While limited state governmental staff participation to date has been feasible in the short term, looking forward, many predict that other departmental commitments will cause their participation to be reduced or come to an end. Successful workgroups efforts have also depended on the involvement of specific key participants. If these pivotal workgroup members were unable to participate due to a lack of support or funding, members predict that this could dramatically slow or halt workgroup progress. Without executive management support in the form of long-term dedicated staff time, workgroups will continue to experience inconsistent member involvement and leadership, which will ultimately slow progress on collaboration and portal development.

Unsurprisingly, the workgroups have also indicated that dedicated funding is essential, if they are to continue to improve data management and access infrastructure, as well as ongoing portal development and maintenance. While a number of workgroups are developing business plans to document these needs, they acknowledge that without management level support and funding, it will not be possible to break down the existing silos of data and information between departments and between programs within departments.   Improved data access is essential to the successful implementation of the *Strategy*.

Absence of Key Partnering Agencies and Programs

Another of the challenges encountered by the Monitoring Council and its workgroups is a lack of involvement from key partner agencies and organizations. The Monitoring Council currently lacks participation from numerous state governmental organizations identified in SB 1070, including the California Coastal Commission,

State Lands Commission, Department of Parks and Recreation, Department of Forestry and Fire Protection, and the Department of Pesticide Regulation. The workgroups acknowledge that further outreach is needed to enlist the participation of additional partnering organizations and programs that would enable them to more effectively reach their respective goals. These organizations and programs include:

- Lake and Streambed Alteration program of the Department of Fish and Wildlife
- State Coastal Conservancy
- Shellfish protection and marine biotoxin programs of the Department of Public Health
- Division of Water Rights of the State Water Board
- California Department of Transportation
- Biogeographic Data Branch of the Department of Fish and Wildlife
- Delta Science Program of the Delta Stewardship Council

In order to be successful, workgroup coordination and portal development efforts must be blended into the normal way of doing business for governmental organizations. Some workgroups are currently conducting outreach, trying to identify existing departmental monitoring, assessment, and reporting mandates that can be better satisfied through Monitoring Council and workgroup-related actions and the My Water Quality web portals. For example, The California Estuaries Portal currently hosts the Water Rights Decision 1641 interactive online Delta water quality report, which has replaced the annual DWR reporting to the State Water Board. DWR's Municipal Water Quality Investigations (MWQI) Branch is also exploring the possibility of providing their State Water Project Watershed Sanitary Survey annual reports through the Safe-to-Drink Portal. In theory, this approach could be a very effective means of soliciting staff and departmental buy-in. However, in practice, workgroups continue to experience resistance due to a lack of management support and dedicated funding.

Workgroup Tools Require a Home

Numerous workgroup-developed tools, especially those of the Wetlands Monitoring Workgroup, have no state agency home to provide for long-term maintenance, training and development. For example, the Wetland Monitoring Workgroup has recommended on multiple occasions that the State of California establish stewardship for its portion of the National Hydrography Dataset (NHD) and the National Wetlands Inventory (NWI), key components of the workgroup's California Aquatic Resources Inventory (CARI), the base map for EcoAtlas. A number of local and regional interests have become local stewards for portions of these maps, ground-truthing and refining maps of water resources in various areas of California. For the results of these more intensive mapping efforts to be made available to others and to maintain a master map of California's water resources for a variety of purposes, these mapping efforts need to be fed back into the NHD and NWI national maps. Having a state steward would help to coordinate and facilitate improved mapping of water resources throughout California, would enable easier updating of California's portion of NHD and NWI, and would improve consistent use of a single map of California's water resources. Without dedicated funding and agency support, workgroup leads predict that standardized monitoring methods (e.g., the California Rapid Assessment Method for wetlands) and data management and visualization tools developed by the Monitoring Council's workgroups (e.g., EcoAtlas) would cease to exist.

Lack of Data Transparency

Despite a limited number of key successes in gaining access to monitoring and assessment data, vast amounts of data still reside in departmental and program-specific silos, unavailable to other agencies or the public. Similarly difficulties exist to access data generated by citizen monitoring groups. Some workgroups also continue to experience difficulties, as some agencies and programs lack a commitment to data transparency. In those instances where data are available, many of the workgroups have experienced difficulties using regional datasets to make comparisons statewide. These regional organizations often use inconsistent indicators and

assessment thresholds. Inconsistent formatting and documentation, as well as quality assurance and control procedures, can also make it difficult to rapidly assess these data that would inform timely management decisions (e.g., regarding swimming safety). Without dedicated resources and the needed executive management support, progress in breaking down barriers to data and information sharing between organizations will be greatly hindered.

Appendix III: Statistics on Use of the My Water Quality Website and the Theme-Specific Web Portals

Between July 2009 and October 2013, the Monitoring Council and its theme-specific workgroups have released six internet portals to present water quality and associated ecosystem data and assessment information to decision makers and the public. All six portals are available through a single point of entry, the My Water Quality website (www.MyWaterQuality.ca.gov). With a few notable gaps in coverage, statistics on public use of the My Water Quality website and each of the portals have been collected using Google Analytics (http://www.google.com/analytics) from late August 2009 to the present.

Current Use

Public use of the My Water Quality website and theme-specific portals has been summarized for a four month period (17 weeks) from January 8 through May 7, 2014. Current use statistics for the My Water Quality website and all portals together are summarized in Table III-1.

Table III-1: Current total use of My Water Quality website and portals for January 8 through May 7, 2014

	4-Month Use Statistics
Total site visits (sessions)	9,168
Total users	7,096
Total page views	23,660
Average pages per visit	2.58
Average site visit duration	2 minutes, 50 seconds
Average site visits per week	539
Average users per week	417
Average page views per week	1,392
New visitors	6,934 or 75.6%
Returning visitors	2,234 or 24.4%
Total visits by top 100 internet service providers	6,540
Total visits by identified government organization service providers (within top 100 internet service providers)	922 or 14.1%

Over this period, overall usage remained relatively steady, with an average of 539 site visits per week by an average of 417 weekly users. From the relatively low average rate of 2.58 pages per visit, it appears that many users come to locate specific information rather than browsing through a variety of portal pages. This statistic may also be caused by users entering the website from search pages and deciding that the site does not contain information in which they have interest. By contrast, the average duration of site visits of 2 minutes, 50 seconds indicates that many users are spending a significant amount of time viewing information once they reach the site. It would appear that a substantial number of new users are finding the site, since three quarters of visitors are new to the site.

The Monitoring Council has asked whether a significant proportion of visitors to the My Water Quality website and portals are government employees. Statistics were obtained for the top 100 internet service providers of users visiting the My Water Quality website. For the first four months of 2014, it appears that about fourteen percent of visitors are from governmental organizations. Google Analytics does track visitors by internet service provider. While some governmental organizations have provider accounts that can be separately tracked, others are lumped with non-governmental visitors who use the same providers. A number of individual governmental organization-specific internet service providers were able to be identified. Table III-1 presents the number of site visits by individual governmental organizations that were able to be identified within the top 100 internet service providers.

Table III-2: Site visits by individual identified government organization service providers (within top 100 internet service providers) during the period from January 8 through May 7, 2014

Service Provider	Site Visits	Service Provider	Site Visits
Dept. of Water Resources	247	Stanford University	13
U.S. Environmental Protection Agency	66	State of Minnesota	13
Health & Welfare Agency Data Center	53	University of California at Berkeley	13
University of California at Davis	47	University of California at Santa Cruz	13
California Technology Agency	41	North Carolina Research & Education	12
Dept. of Transportation	34	State Coastal Conservancy	11
Delta Stewardship Council	33	Garden Grove Unified School District	11
U.S. Fish & Wildlife Service	31	San Diego County Office of Education	11
San Diego City Schools	20	California State University Network	10
U.S. Geological Survey	19	City of Los Angeles	10
Calif. State University at Chico	18	Humboldt State University	10
Dept. of Resource Recycling (2nd acct.)	17	City College of San Francisco	9
County of Sacramento	16	U.S. Army Information Systems Command	9
University of California at Los Angeles	16	Kings County Office of Education	9
USDA Office of Operations	16	Navy Network Information Center	9
Calif. Polytechnic State University	15	Orange County Dept. of Education	9
Dept. of Resource Recycling	15	University of California at San Diego	9
Dept. of the Interior	14	University of California at Santa Barbara	9
U.S. Forest Service	14		

During the same period, overall site visits were also tracked by county of origin of the visitor. Table III-3 presents the top 10 countries of origin and the number of site visits associated with each. As expected, the vast majority of site visitors are from the United States.

Table III-3:   Overall site visits by country of origin for the period from January 8 through May 7, 2014

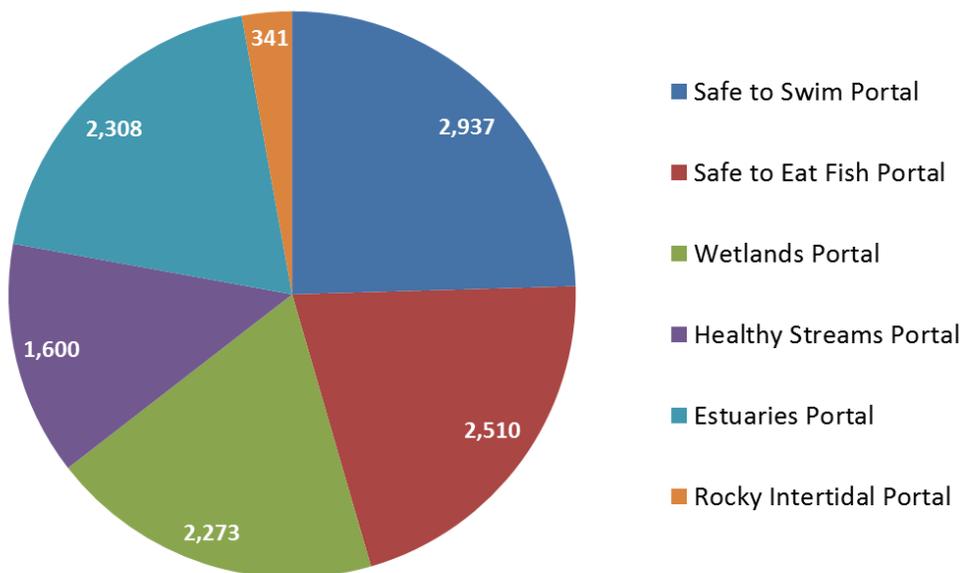| Visitor Country of Origin	Total Site Visits
1. United States	8,550
2. Canada	76
3. United Kingdom	60
4. India	60
5. Philippines	43
6. China	25
7. Germany	19
8. Australia	18
9. Malaysia	18
10. France	16

Page views were also tracked for the My Water Quality website home page, for each of the six existing portals, and for other key website pages. Table III-4 presents this information for the first four months of 2014.

Table III-4: Individual portal and web page use statistics for the period from January 8 through May 7, 2014

Portal or Page	Page Views	Percentage of Total Page Views
My Water Quality home page	5,168	21.84
Safe to Swim Portal	2,937	12.41
Safe to Eat Fish and Shellfish Portal	2,510	10.61
Ecological Health	–	–
Wetlands Portal	2,273	9.61
Healthy Streams Portal	1,600	6.76
Estuaries Portal	2,308	9.75
Ocean	–	–
Rocky Intertidal Portal	341	1.44
Monitoring Council, Meetings, and Workgroups	2,821	11.92
Water Quality Standards	950	4.02
Contact Us	158	0.67

Portal use statistics are also presented in Figure III-1, showing the relative number of site visits to each.

Figure III-1: Individual portal total page views for the period from January 8 through May 7, 2014
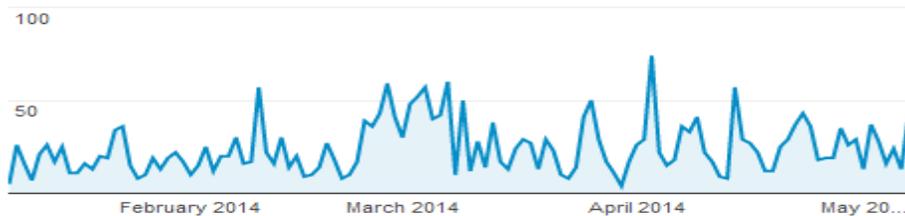

With the exception of the Rocky Intertidal Portal, the portals appear to elicit relatively equal public interest. The higher popularity of the Safe to Swim and Safe to Eat Fish portals over the ecosystem health themes may be tied to the direct public health issues that these two portals reveal. The low number of page views for the Rocky Intertidal Portal may be the result of needing to navigate through a place-holder web page for a future Ocean and Coastal Portal. The Rocky Intertidal information is likely to be incorporated into this future portal. Also notable is the relative page view counts for the My Water Quality home page and each of the portals. It would appear that a large number of visitors enter the portals directly without first viewing the My Water Quality home page.

As shown in Table III-4, the portion of the My Water Quality website devoted to information regarding the Monitoring Council, its meetings, and its workgroups has similar popularity to the public health-related portals. This is likely due to interest in these organizations and their meetings by individuals who are or want to become involved in Monitoring Council and workgroup activities. The 'Contact Us' web page presents information on the development of the portals, access to printable fact sheets on each, and an opportunity to provide comments or ask questions regarding the Monitoring Council, its workgroups and the portals. Low page view counts on this page may reveal a need to develop a more intuitive method for users to provide feedback.
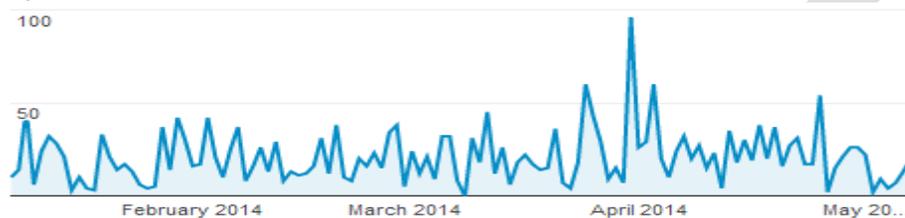
Figure III-2 presents daily page view counts for each of the portals for the first four months of 2014. *Note: the scale of the vertical axis varies from graph to graph, based on the highest daily page view count within the period. This is an artifact of the Google Analytics visualization tools which is not able to be modified by the user.* From these graphs, a weekly cyclical pattern becomes apparent, with higher portal usage on weekdays and lower use on weekends. While page counts for some of the portals (e.g., Estuaries) are more even from week to week, page counts on other portals vary considerably (e.g., Healthy Streams and Rocky Intertidal).

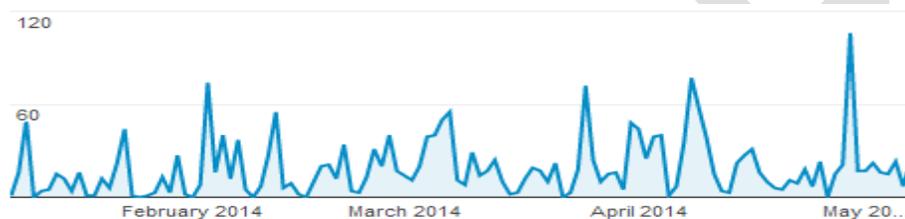**Figure III-2: Daily total page views by portal for the period of January 8 through May 7, 2014**
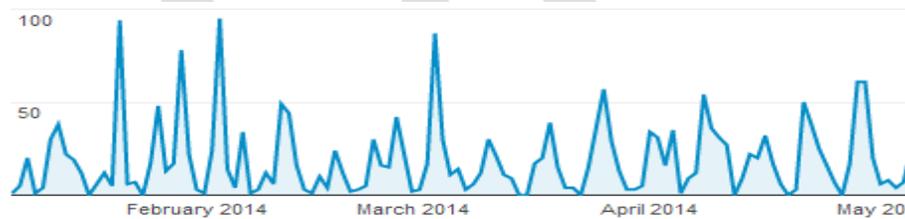
Safe to Swim Portal
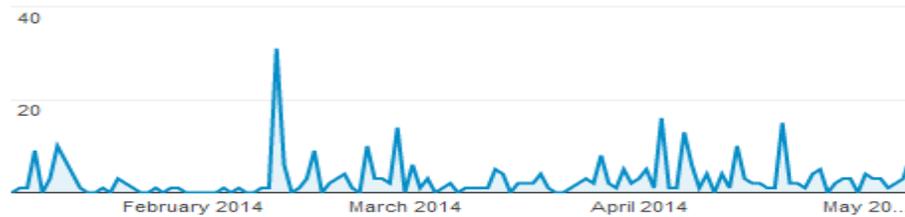

Safe to Eat Fish Portal

Wetlands Portal

Healthy Streams Portal
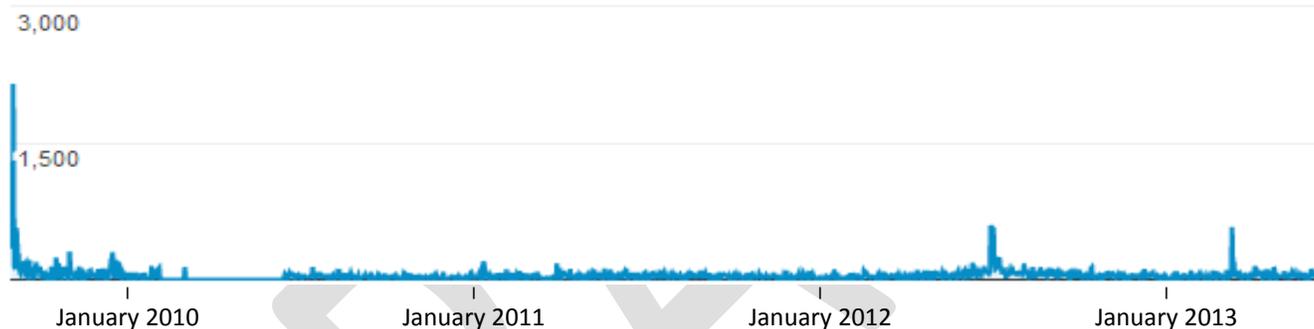

Estuaries Portal

Rocky Intertidal Portal

Portal Launch and Daily Peak Use Statistics

Tracking of earlier portal use presents some perspectives on the effect of portal release publicity and outreach during other key times. Portal launch dates, peak portal page view count dates, and graphs of portal use from their respective launch dates until May 2013 are presented below.

Safe to Swim Portal
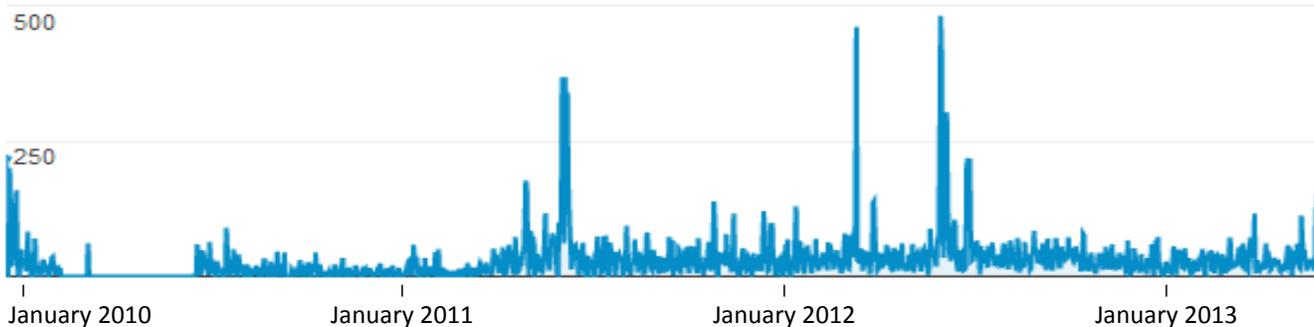- Launched July 28, 2009
- Use statistics tracked beginning August 26, 2009
- Peak of 2,148 page views on August 28, 2009
- Subsequent peaks
    o 307 page views on October 26, 2009
    o 301 page views on December 10, 2009
    o 201 page views on January 3, 2011
    o 594 page views on June 18, 2012
    o 579 page views on June 21, 2012
    o 579 page views on February 26, 2013
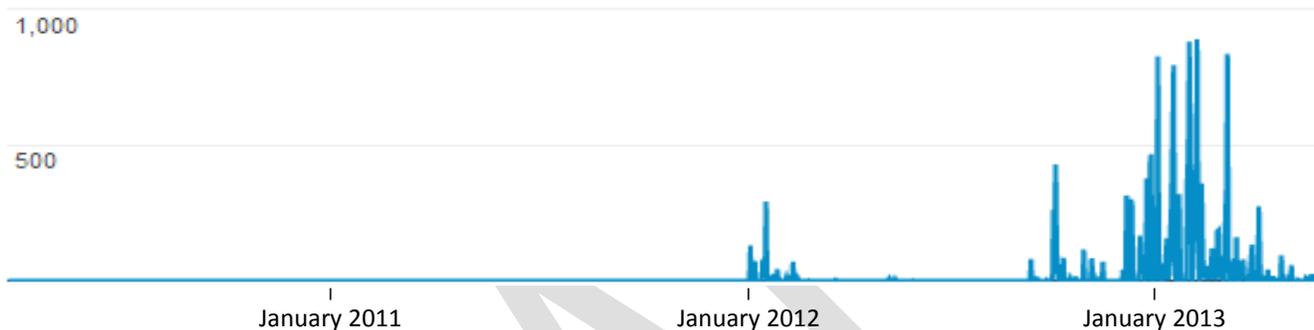

Safe to Eat Fish Portal
- Launched December 8, 2009
- Peak of 225 page views on December 10, 2009
- Subsequent peaks
    o 368 page views on May 26 and May 29, 2011
    o 460 page views on March 4, 2012
    o 481 page views on May 24, 2012
    o 303 page views on May 30, 2012
    o 218 page views on June 19 and June 21, 2013

Many of these peaks coincide with the release of new fish contaminant data simultaneously in Surface Water Ambient Monitoring Pram reports and in the portal with Water Board press releases for each.
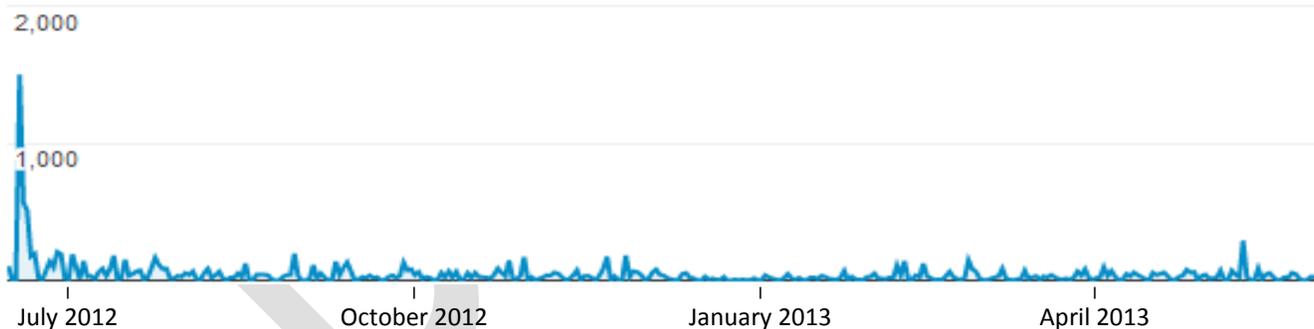
Wetlands Portal
- Launched March 16, 2010 as modification of Wetland Tracker website by San Francisco Estuary Institute/Aquatic Science Center
- Subsequent peaks
    - 458 page views on October 4, 2013
    - 825 page views on January 3, 2013
    - 793 page views on January 17, 2013
    - 879 page views on January 31, 2013
    - 889 page views on February 7, 2013
    - 834 page views on March 6, 2013
- Redesigned portal launched June 26, 2013; no use statistics available at this time (see below).

Healthy Streams Portal
- Launched June 15, 2012
- Peak of 1,498 page views on June 18, 2012
- Subsequent peak
    - 289 page views on May 9, 2013

Rocky Intertidal Portal
- Launched October 24, 2013; no use statistics available at this time (see below).

Estuaries Portal
- Launched October 29, 2013; no use statistics available at this time (see below).

Due to an unfortunate oversight, portal use statistics were not tracked beginning in May 2013, when all content was migrated from the Water Boards' website to its own domain (www.MyWaterQuality.ca.gov), until January 8, 2014. Therefore, no initial use statistics exist for the redesigned Wetlands Portal, the Rocky Intertidal Portal, and the Estuaries Portal.