

INCREASING EFFICIENCY AND EFFECTIVENESS THROUGH COLLABORATION

First Triennial Audit of Implementing *A Comprehensive Monitoring Program Strategy for California*



FINAL DRAFT August 26th December 10, 2014

Executive Summary

California depends on timely and reliable information regarding the quality of our water resources so that decision makers and stakeholders can 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. The challenges of drought and climate change have considerably elevated the importance of this information. However, California's monitoring is conducted by a myriad of local, state, and federal agencies, non-governmental organizations, universities, regulated ~~parties/entities~~, and water bond grant recipients, with little to no coordination. Often it is not possible to integrate data from different studies, and there is no single user-friendly place to access these data.

In response, California Senate Bill 1070 was signed into law in 2006, mandating the formation of the [California Water Quality Monitoring Council](#) through joint action by California's Environmental Protection and Natural Resources Agencies. The Monitoring Council was tasked with developing recommendations to improve the efficiency and effectiveness of our state's water quality and related ecosystem monitoring and assessment systems and to ensure that the resulting data and information are made available to decision makers and the public via the internet. Those recommendations for *A Comprehensive Monitoring Program Strategy for California* were delivered to the Agency Secretaries in December 2010, as the Council refocused on implementation.

Since its inception in 2007, the Monitoring Council has made major progress toward collaboration and access to water quality information. A few highlight actions include:

- Formed ~~six-eight~~ interagency workgroups to coordinate monitoring, assessment, and reporting;
- Developed a state Wetland and Riparian Area Monitoring Plan, including standardized methods by which to map, classify, and assess the health of California's wetland ecosystems;
- Produced the first statewide assessment of contaminants in sport fish from California's lakes, streams, and coastal waters and the threats that these contaminants pose to public health; and
- Launched six question-based, easy-to-use internet portals delivering water quality and aquatic ecosystem information to decision makers and the public through www.MyWaterQuality.ca.gov.

These accomplishments are even more remarkable considering that they were made largely through voluntary efforts, since SB 1070 came with no dedicated funding and gave the Monitoring Council no direct authority for ~~strategy-Strategy~~ implementation.

Nevertheless, progress through grass-roots voluntary efforts can only go so far. Initiating and sustaining collaborations, opening departmental data systems to outside access, and developing and maintaining web portals requires substantial investments of both staff time and budgetary resources. Full implementation will require a culture shift that integrates the Monitoring Council's ~~Strategy strategy~~ into the very fabric of how California's public agencies do business. ~~Without explicit management direction and dedicated funding, California's water quality and ecosystem monitoring efforts will continue to be siloed in department-specific~~

~~programs with their data largely unavailable to others or to the public. These are the conclusions of the Monitoring Council's first Triennial Audit, a review explicitly required by SB 1070.~~

The Monitoring Council recommends:

To the Secretaries of the California Environmental Protection and Natural Resources Agencies –

~~Provide~~ Encourage the directors of the much-needed top-down direction for your departments, boards, and commissions to support implementation of the Monitoring Council's Strategy. ~~Allocate~~ To be able to sustain and grow our successful efforts, they will need to allow staff time, not just to attend Monitoring Council workgroup meetings, but to perform the legwork needed to integrate their monitoring programs with those of other governmental and non-governmental organizations and to make the resulting data and information accessible through the My Water Quality portals. ~~Direct~~ Encourage departmental staff to use the many tools developed by the Monitoring Council's workgroups, including the My Water Quality web portals, so as to allow data from multiple programs to be integrated to ~~support broader assessments of the state's water quality and aquatic ecosystem health~~ address critical management questions, such as those posed by drought, climate change, wildland fires, ocean acidification, and sea level rise. Increased support could allow the portals to move beyond expressing current conditions and trends to providing predictive data to better inform adaptive management of our water resources. Over the next year, the Monitoring Council's workgroups will develop business plans that outline specific needs (staff positions, budgets, etc.) and highlight existing departmental mandates that can be addressed more effectively through the Monitoring Council's workgroups and My Water Quality web portal infrastructure.

To the California Legislature –

~~To enable continued progress, the Monitoring Council and its workgroups need~~ Provide a dedicated source of funding and staff positions specifically tasked with coordinating water quality and associated ecosystem monitoring, assessment, and reporting efforts for the departments, boards, and commissions within the California Environmental Protection and Natural Resources Agencies. Funding and positions are needed to: (a) enable staff to participate in the Monitoring Council's workgroups; (b) implement technology solutions, which would open up the environmental data systems within these agencies so that the data can be readily accessed by other governmental and non-governmental organizations, and (c) develop and maintain the My Water Quality internet portals that provide water quality and aquatic ecosystem health data and information to decision makers and the public.

~~The letter and intent of SB 1070 cannot be fulfilled without the above-requested support.~~ Members of the Monitoring Council, its Executive Director, and Assistant Director are available to brief agency and departmental executives and managers, members of the legislature, and appropriate legislative committees.

Triennial Audit Roadmap

California Senate Bill 1070 (Statutes of 2006) replaced §13181 in the California Water Code, mandating the formation of the California Water Quality Monitoring Council and tasking it with developing a recommended strategy to improve the efficiency and effectiveness of California’s water quality and associated ecosystem monitoring, assessment, and reporting system. Those recommendations, *A Comprehensive Monitoring Program Strategy for California*, were delivered to the Secretaries of the California Environmental Protection and Natural Resources Agency in December 2010. The purpose of this report is to review the progress made in implementing the *Strategy*, as required by California Water Code §13181(h).

The following information is contained in the remaining sections of this report:

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The Water Quality Information Problem

Many local, state, and federal agencies, regulated ~~dischargers~~entities, 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 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 initial 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 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~~endeavors 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 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 involved 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
<i>Is our water safe to drink?</i>	Safe Drinking Water Workgroup
<i>Is it safe to swim in our waters?</i>	Safe-to-Swim Workgroup
<i>Is it safe to eat fish and shellfish from our waters?</i>	Bioaccumulation Oversight Group
<i>Are our aquatic ecosystems healthy?</i>	
<ul style="list-style-type: none"> • <i>Wetlands</i> 	California Wetland Monitoring Workgroup
<ul style="list-style-type: none"> • <i>Streams, rivers and lakes</i> 	Healthy Streams Partnership
<ul style="list-style-type: none"> • <i>Estuaries</i> 	California Estuary Monitoring Workgroup
<ul style="list-style-type: none"> • <i>Ocean and coastal</i> 	[workgroup forming]

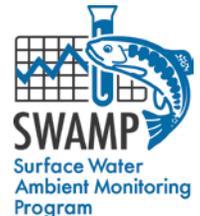
Two additional groups were formed to provide further coordination and support. California’s Water Quality Monitoring Collaboration Network, which conducts regular web-based seminars for agency personnel, citizen monitors and others, fosters information exchange and encourages broader use of sound methods 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: Interest in the Monitoring Council and Its 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 ~~system~~ 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 assessing~~ 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 will~~ ~~soon be~~ 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 ~~access~~ button ~~access provides easy access from~~ ~~link is found on~~ numerous ~~other~~ governmental and non-governmental websites.



Appendix 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~~ ~~developing~~ 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.



While the My Water Quality portals and tools developed by the workgroups have increased our ability to gauge current conditions and trends in water quality and aquatic ecosystems, they could do more to address California's critical management questions, such as those posed by drought, climate change, wildland fires, ocean acidification, and sea level rise. Increased support could allow the portals to provide the predictive data needed to better inform adaptive management of our water resources.

Figure 1: The My Water Quality Website Home Page

The screenshot shows the homepage of the California Water Quality Monitoring Council. At the top, it features the CA.GOV logo, the State of California Environmental Protection Agency and Natural Resources Agency logos, and the Council's name. A search bar and navigation links for Content, Footer, and Accessibility are also present. Below the header is a green navigation bar with links for Home, Safe to Drink, Safe to Swim, Safe to Eat Fish, Ecosystem Health, Stressors & Processes, and Contact Us. A banner below the navigation bar states: "My Water Quality | Monitoring Council | This site is hosted by the Surface Water Ambient Monitoring Program (SWAMP)".

The main content area includes a "Welcome to My Water Quality" section with an introductory paragraph and a "Contact Us" link. Below this are four featured articles, each with a small image and a "More >>" link:

- IS OUR WATER SAFE TO DRINK?**: Safe drinking water depends on a variety of chemical and biological factors regulated by a number of local, state, and federal agencies. [Future Portal]
- IS IT SAFE TO SWIM IN OUR WATERS?**: Swimming safety of our waters is linked to the levels of pathogens that have the potential to cause disease. [More >>](#)
- IS IT SAFE TO EAT FISH AND SHELLFISH FROM OUR WATERS?**: Aquatic organisms are able to accumulate certain pollutants from the water in which they live, sometimes reaching levels that could harm consumers. [More>>](#)
- ARE OUR AQUATIC ECOSYSTEMS HEALTHY?**: The health of fish and other aquatic organisms and communities depends on the chemical, physical, and biological quality of the waters in which they live. [More>>](#)

A left sidebar contains a list of links: Cal/EPA, Natural Resources Agency, About the California Water Quality Monitoring Council, Web Portal Partners, Monitoring & Assessment Programs, Data Sources & Reports, Water Quality Standards, Plans and Policies, Regulatory Activities, Enforcement Actions, Research, State & Regional Water Boards, Performance Report, About SWAMP, and SWAMP Tools. At the bottom of the sidebar is the SWAMP logo (Surface Water Ambient Monitoring Program).

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.

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 *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 Executive Director position at Cal/EPA, plus one half-time Assistant Director 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 of the Monitoring Council's *Comprehensive Monitoring Program Strategy* 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 that the workgroups 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, ~~The the~~ California Water Quality Monitoring Council is determined to keep moving forward. The following are our internal recommendations. We will continue to work to build support through increased outreach to departmental and program managers within those governmental organizations specifically listed in SB 1070 as well as others involved in California's system of water quality and associated ecosystem monitoring, assessment, and reporting. Each workgroup will ~~also~~ identify those monitoring, assessment and reporting mandates of governmental agencies and non-governmental partners that can be addressed more effectively through utilization of the Monitoring Council's collaborative workgroup processes, tools, and the My Water Quality portals. Outreach efforts to agency managers will use this information to help build support for the Monitoring Council's program.

As mentioned earlier, the Monitoring Council's workgroups will each develop a business plan 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 water resources information between agencies and with other data providers and users. Standardized data formats and transfer protocols need to be developed and implemented. A soon-to-be-released white paper resulting from the Delta Science Program's Environmental Data Summit is expected to provide the vision that will guide future efforts of the Data Management Workgroup in the areas of data access, integration, and visualization.

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, Executive Director 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.



Since its inception seven years ago, the California's Water Quality Monitoring Council has made amazing progress, with no dedicated funding and largely through voluntary efforts. As compared with other state and regional monitoring councils, California's efforts provide an outstanding example of monitoring program collaboration and improved access to information. However, to reach the goals set by SB 1070, there is still a large amount of work left to do. 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 are 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.

Recommendations

As shown by the above analysis, the Monitoring Council has made substantial progress toward the legislative goal of a collaborative system to monitor and assess California's water quality and associated ecosystems. Continued progress implementing the Monitoring Council's A Comprehensive Monitoring Program Strategy for California will enhance our state's ability to address the effects of drought, climate change, wildland fires, ocean acidification, and sea level rise on the quality of California's water resources. It will allow governmental organizations to see beyond the bean counts in their performance reporting – are California's water resources becoming cleaner and healthier?

Based on the analysis outlined above, however, external supporting actions are needed to enable continued progress. 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 Strategy A Comprehensive Monitoring Program Strategy for California:

To the Secretaries of the California Environmental Protection and Natural Resources Agencies –
Provide the much-needed top-down direction for Encourage the directors of your departments, boards, and

commissions to implement the Monitoring Council's *Strategy*. To be able to sustain and grow our successful efforts, sSpecifically request that they:

- a) ~~Direct~~ Have their staff ~~to~~ participate in the Monitoring Council's collaborative workgroups;
- b) ~~Allocate~~ Allow staff time, not just to attend Monitoring Council workgroup meetings, but to perform the legwork needed to integrate their monitoring programs with those of other governmental and non-governmental organizations and to make the resulting data and information accessible through the My Water Quality portals;
- c) Utilize the many tools developed by the Monitoring Council's workgroups to improve the efficiency and effectiveness of their department's/program's monitoring, assessment, data management, and reporting efforts; 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.

These changes will allow data from multiple programs to be integrated to support broader assessments of the state's water quality and aquatic ecosystem health, thereby more effectively addressing management questions about our water resources.

Over the next year, the Monitoring Council's workgroups will develop business plans that outline their specific needs. Their business plans will also highlight existing departmental mandates that can be addressed more effectively by utilizing the Monitoring Council's collaborative workgroup processes, tools, and the My Water Quality portals.

To the California Legislature –

~~Provide~~ To enable continued progress, the Monitoring Council and its workgroups need a dedicated source of funding and staff positions specifically tasked with coordinating water quality and associated ecosystem monitoring, assessment, and reporting efforts for the departments, boards, and commissions within the California Environmental Protection and Natural Resources Agencies. Funding and positions are needed to:

- a) Participate in the coordination activities of the Monitoring Council's workgroups;
- b) Implement technology solutions to open up the environmental data systems within these agencies so that the data can be readily accessed by other governmental and non-governmental organizations; and
- c) Develop and maintain the My Water Quality internet portals that provide water quality and aquatic ecosystem health data and information to decision makers and the public.

~~The letter and intent of SB 1070 cannot be fulfilled without the above requested support.~~ Members of the Monitoring Council, its Executive Director, and Assistant Director are available to brief departmental executives and managers, members of the legislature, and appropriate legislative committees.

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.

[Insert workgroup report summary table here]

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[Insert workgroup reports here]

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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, its Executive Director, and Assistant Director. 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.

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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

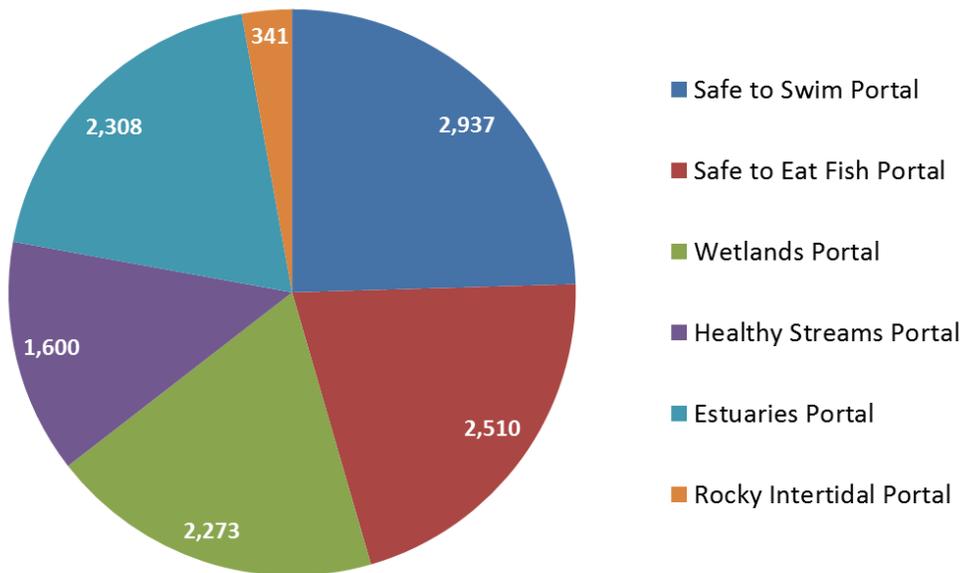
Page views were also tracked for the My Water Quality website home page, for each of the six existing portals, and for other key website pages. Table III-4 presents this information for the first four months of 2014.

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: Total individual portal page views for the period from January 8 through May 7, 2014



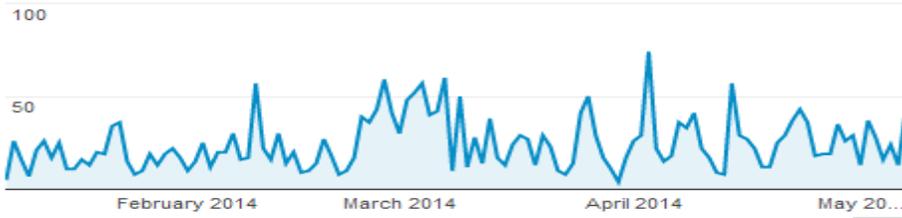
With the exception of the Rocky Intertidal Portal, the portals appear to elicit relatively equal public interest. The higher popularity of the Safe to Swim and Safe to Eat Fish portals over the ecosystem health themes may be tied to the direct public health issues that these two portals reveal. The low 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.

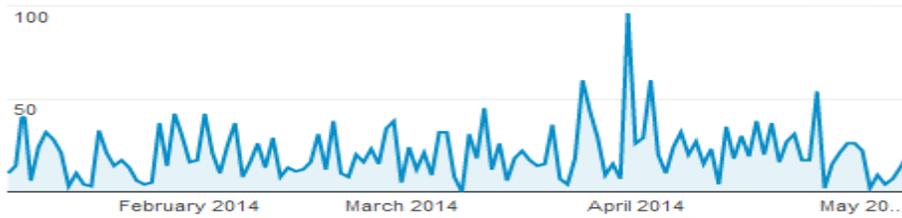
Figure III-2 presents daily page view counts for each of the portals for the first four months of 2014. *Note: the scale of the vertical axis varies from graph to graph, based on the highest daily page view count within the period. This is an artifact of the Google Analytics visualization tools which 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

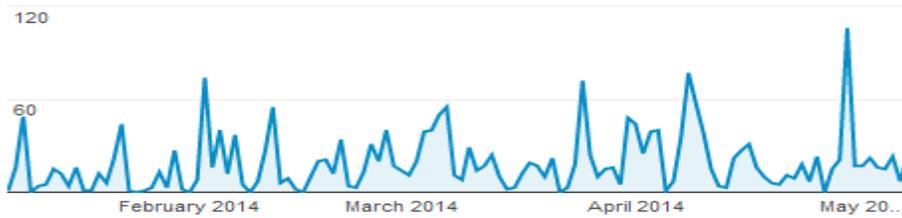
Safe to Swim Portal



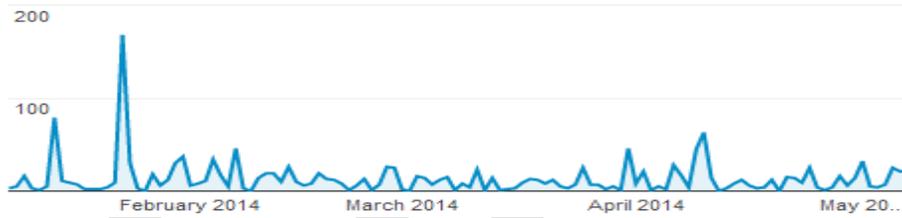
Safe to Eat Fish Portal



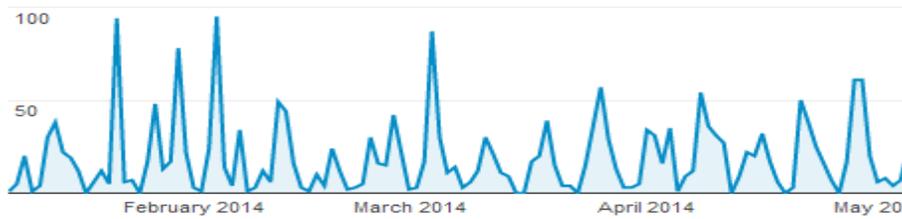
Wetlands Portal



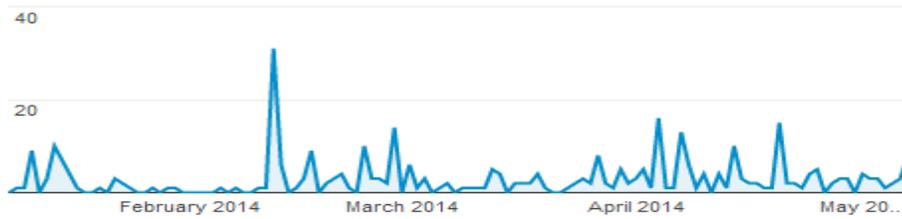
Healthy Streams Portal



Estuaries Portal



Rocky Intertidal Portal

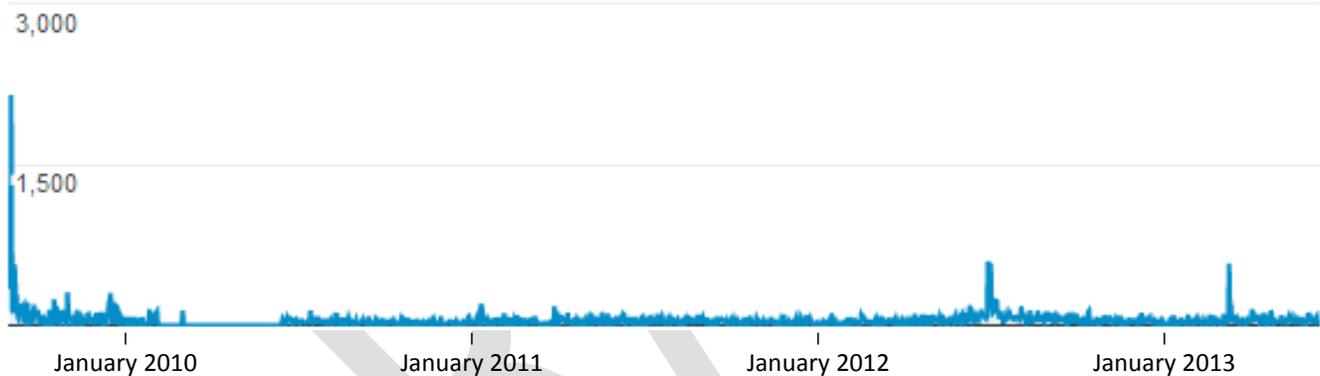


Portal Launch and Daily Peak Use Statistics

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 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
 - 307 page views on October 26, 2009
 - 301 page views on December 10, 2009
 - 201 page views on January 3, 2011
 - 594 page views on June 18, 2012
 - 579 page views on June 21, 2012
 - 579 page views on February 26, 2013



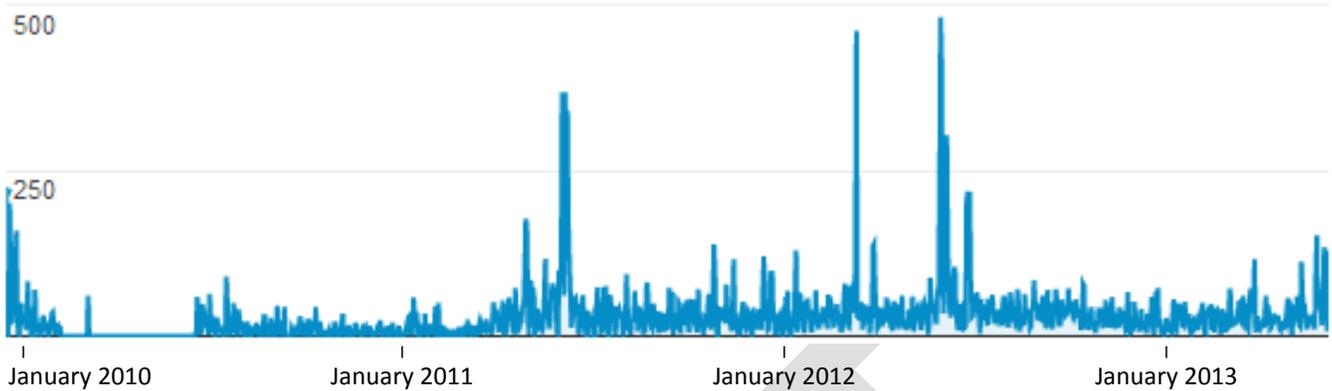
Safe to Eat Fish Portal

- Launched December 8, 2009
- Peak of 225 page views on December 10, 2009
- Subsequent peaks
 - 368 page views on May 26 and May 29, 2011
 - 460 page views on March 4, 2012
 - 481 page views on May 24, 2012
 - 303 page views on May 30, 2012
 - 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 Program reports and in the portal with Water Board press releases for each.

- 1, 138 map queries on the Data and Trends page from June 1, 2013 to January 7, 2014

(see graph at top of next page)



Wetlands Portal

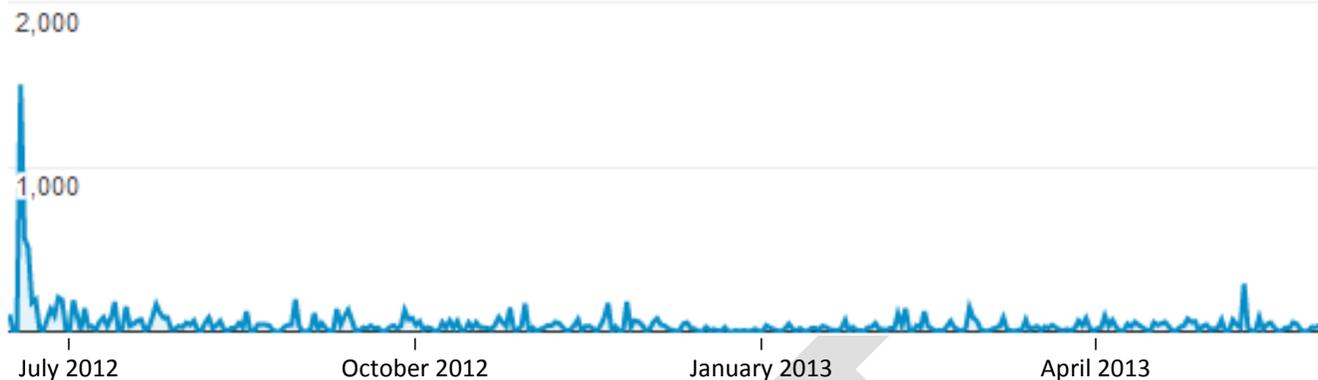
- Launched March 16, 2010 as modification of Wetland Tracker website (californiawetlands.net) by San Francisco Estuary Institute/Aquatic Science Center
- 1,900 visits to the modified Wetland Tracker website from March 16, 2010 to December 31, 2011
- Subsequent peaks
 - 458 page views on October 4, 2013
 - 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
- 1,295 visits and 2,485 page views to the redesigned portal from June 26, 2013 to January 8, 2014



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

(see graph at top of next page)



Rocky Intertidal Portal

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

Estuaries Portal

- Launched October 29, 2013
- Through December 31, 2013:
 - 13,026 unique visits
 - 2 minutes, 31 seconds average visit duration
 - 133, 116 unique page views
 - 1,456 data downloads
- January 1 through May 27, 2014
 - 7,756 unique visits
 - 9 minutes, 24 seconds average visit duration
 - 47,887 unique page views
 - 578 data downloads

Due to an unfortunate oversight, portal use statistics were not tracked by the State Water board 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. Some initial use statistics exist for the redesigned Wetlands Portal and the Estuaries Portal that were captured by contractors that supply data views to those portals, as indicated above. No initial use statistics exist for the Rocky Intertidal Portal.

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Safe-to-Swim Workgroup

- Lara Meeker, Watershed Program Manager Los Angeles Waterkeeper
- Sara Aminzadeh, Executive Director California Coastkeeper Alliance
- Michael Gjerde Ocean Unit, Division of Water Quality State Water Resources Control Board
- Erick Bures, Clean Water Team Office of Information Management and Analysis State Water Resources Control Board

Bioaccumulation Oversight Group

- Jay Davis, Program Director San Francisco Estuary Institute – Aquatic Science Center

California Wetland Monitoring Workgroup

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- Melissa Scianni, Wetlands Office U.S. Environmental Protection Agency, Region 9
- Josh Collins, Chief Scientist San Francisco Estuary Institute – Aquatic Science Center
- Craig Wilson Department of Fish and Game
- Paul Jones, Wetlands Office U.S. Environmental Protection Agency, Region 9
- Eric Stein, Principal Scientist Southern California Coastal Water Research Project

Healthy Streams Partnership

- Lori Webber, Senior Environmental Scientist Surface Water Ambient Monitoring Program State Water Resources Control Board
- Adam Ballard, Senior Environmental Scientist Surface Water Ambient Monitoring Program State Water Resources Control Board
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California Estuary Monitoring Workgroup

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- Alison Webber-Stover, Rivers and Delta Program Associate The Bay Institute
- Val Connor, Science Program Manager State and Federal Contractors Water Agency
- Igor Lacan, Associate, Rivers & Delta Program The Bay Institute
- Jonathan Rosenfield, Conservation Biologist The Bay Institute

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- Brock Bernstein, Consultant

Data Management Workgroup

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Water Quality Monitoring Collaboration Network

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