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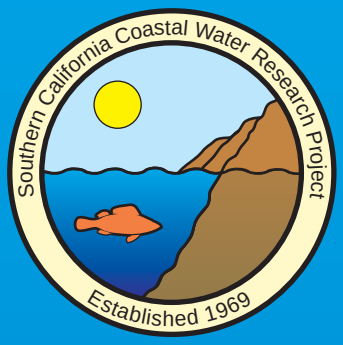
Preliminary Report of the Scientific Planning and Review Committee (SPARC)



A report from the SPARC Committee Members

Southern California Coastal Water Research Project

A PRELIMINARY REPORT OF THE SCIENTIFIC PLANNING AND REVIEW COMMITTEE (SPARC)

SPARC Committee Members

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INTRODUCTION

This report presents the preliminary findings and recommendations of the Scientific Planning and Review Committee (SPARC) (Appendix 1), which was convened in response to a request from the State Water Resources Control Board to conduct an external scientific review of the Surface Water Ambient Monitoring Program (SWAMP). This review is part of the SWAMP's triennial external review and CalEPA's effort to assess and enhance the scientific validity and role of science in all agency programs. The SPARC was presented with a list of eight specific questions (Appendix 2) focusing largely on the technical aspects of study designs, sampling and laboratory methods, data analysis, and data dissemination. In addition, one question asked the SPARC to assess whether the SWAMP's current management structure was appropriate to its mission.

The SPARC heard presentations over a two-day meeting in October 2005 from SWAMP staff and representatives of other related programs, and then met in executive session on the third day to develop its preliminary findings and recommendations. Between October 2005 and March 2006, the SWAMP will consider the content of this preliminary report and develop its plan for addressing the recommendations. The SPARC will then reconvene on March 21 and 22 to hear the SWAMP's formal response to the recommendations. This response will include specific actions, timelines, and suggested benchmarks or performance measures by which the SWAMP's performance over the next two to three years can be assessed. The SPARC will then prepare a final report that will include the SWAMP's formal response and the SPARC's judgment of its adequacy. The final report will also contain additional material in response to the State Water Quality Control Board's request on December 9, 2005 for more specificity with regard to management actions the State and Regional Boards may take in support of the SPARC's recommendations.

Overview

The SWAMP's presentations in October 2005, as well as follow-up comments from the SWAMP Roundtable[1], showed clearly that the SWAMP has achieved notable successes at both regional and statewide levels. The SPARC was particularly impressed by these accomplishments, given the relatively small budget the program has to work with. However, the SPARC also believes the SWAMP is hampered by fundamental structural problems that must be addressed before decisions about appropriate technical approaches can be made.

These more fundamental problems stem largely from the disconnect between the broad scope of the program, envisioned in the November 2000 Report to the Legislature, and the program's actual capacity under existing funding levels. Thus, while the Report to the

[1] The Roundtable is the coordinating entity for the program. Participants include staff from the State and Regional Water Boards, the Department of Fish and Game, the Marine Pollution Studies Lab, Moss Landing Marine Laboratories, US EPA, contractors, and other interested entities.

Legislature estimated that the SWAMP would require from $59 million to $115 million per year, of which $44 million to $87 million represented new funding needs, the current fiscal year's program budget is $3.4 million. While the SWAMP has adjusted to accommodate available funding, such adjustments have been largely ad hoc in nature and the program's underlying mission and strategy have not been explicitly reevaluated. The SWAMP is thus still trying to achieve its original intent without the benefit of a planning exercise that fits current funding realities. Last February the SWAMP Roundtable began an internal program review to prioritize program objectives and develop an implementation strategy. This continuing exercise is an appropriate mechanism for responding to the SPARC's recommendations, but achieving these priorities will also require the support and involvement of higher management within the State Water Resources Control Board and the Regional Water Quality Control Boards.

Because of the importance of these structural issues, the SPARC shifted its charge to encompass a programmatic review of the SWAMP. The SPARC believes that many technical issues (e.g., study designs) cannot effectively be resolved until broader issues of program purpose and strategy have been addressed. The SPARC has expressed its willingness to remain involved with the SWAMP past the March 2006 deadline for this report in order to assist with further in-depth reviews of key technical issues. The challenges facing the SWAMP are not out of the ordinary. To the contrary, they are typical of such programs during their startup phase, which often encompasses five years or more. To its credit, the SWAMP began evaluating the SPARC's findings and implementing its recommendations immediately following the October meeting. Most of the SPARC's recommendations are consistent with the SWAMP Implementation Strategy that was recently accepted by USEPA.

The SPARC's recommendations, which are discussed more fully in the following sections, are:

Recommendation 1: Reevaluate the original program goals.
This effort should focus on defining SWAMP's role and authority relative to other programs, match responsibilities to available funding, and ensure that the program retains key elements of its entrepreneurial spirits.

Recommendation 2: Identify key target audiences.
Audiences and clients should reflect the updated program goals, include those with both regional and statewide responsibilities, and expand from existing relationships.

Recommendation 3: Develop and implement a programmatic communications strategy.
The program should produce signature information products that address client needs and are based on program goals.

Recommendation 4: Develop a statewide assessment framework.
The assessment framework should flow from program goals, prioritize management questions, and be implemented through a monitoring design that enables a balance between regional and statewide issues.

Recommendation 5: Take more advantage of available resources.
The program should leverage its own funds by coordinating with other programs, seek external review on a regular basis, and evaluate other programs that can provide useful models for various aspects of the program.

Recommendation 6: Realign program management and decision making with the revised program goals.
The modified management structure should balance collaborative decision making with the need for overall statewide direction and should include specific procedures for managing key processes.

SWAMP BACKGROUND AND HISTORY

Before SWAMP was created, ambient monitoring and special studies conducted by the State and Regional Boards generated valuable data that resulted in a tremendous increase in knowledge about ambient water quality. This information enabled the Water Boards to identify a number of serious water quality issues and make progress in addressing them. However, with limited resources, the individual regions focused primarily on understanding their local watersheds, solving problems, and responding to litigation. Despite a large amount of anecdotal information, it is difficult to systematically summarize what was learned from these early monitoring efforts because there was little coordination and synthesis across regions. Thus, data were collected for multiple purposes with a wide array of methods and little of the original data are easily accessible. Without the necessary resources, the Water Boards lacked an adequate monitoring framework with consistency in field methods, laboratory and statistical analysis, reporting, and quality assurance. In addition, ambient monitoring in the past was secondary to the regulation and compliance monitoring of wastewater discharges from point sources. While this regulatory approach has resulted in substantial improvements in water quality, the current (and more difficult) challenge is to both control pollution from nonpoint sources and to place compliance monitoring in the broader context of watershed and regional condition. This shift in regulatory focus requires a shift to ambient monitoring.

The recognition of the need for improved ambient water quality monitoring in California prompted the 1999-2000 Budget Act, which required the Water Boards to present a plan for comprehensive surface water monitoring. In November 2000, in response to Assembly Bill (AB) 982, the State Board submitted to the Legislature a plan for the Surface Water Ambient Monitoring Program (SWAMP). The legislature asked that the program address all waterbodies and all beneficial uses, and that all the data collected by the Water Boards be coordinated, of high quality, comparable, and easily accessible to the public. The SWAMP staff delivered a report to the Legislature in 2000 that identified a comprehensive set of monitoring objectives for all key beneficial uses, statewide/regional and site-specific monitoring approaches, and specific indicators appropriate to each beneficial use.

Since the delivery of the report, the Water Boards have been implementing this program to the extent possible. However, the program was never fully funded. The 2000 report estimated the annual cost to implement SWAMP ranged from approximately $59 million to $115 million. These cost estimates included 87 to 132 staff at the Water Boards. Currently, $3.4 million and 17 staff positions have been allocated to SWAMP – approximately 7% of the projected need.

In addition to the original program goals, AB1049 and AB1747 have more recently required all Water Bond grant projects that include an ambient monitoring component to make their data comparable with SWAMP quality control and data formatting standards. The Water Board estimates that 880 grant projects will be funded over a five-year period.

No resources were provided to the SWAMP to assist with developing appropriate training and tools to annually assist the hundreds of grant recipients. This has forced the program to make difficult decisions about how to provide immediate benefit while still making progress toward an overall goal of statewide assessment. Staff ultimately decided to focus monitoring primarily on issues of interest to each Regional Board, while retaining some funds for statewide initiatives such as data management and quality control. As a result, SWAMP efforts throughout the state differ in the extent to which they reflect elements of the original comprehensive plan. Some regions are struggling to implement the rotating watershed approach while others focus primarily on issues specific to their region. Despite this inconsistency in design, the SWAMP has made significant progress on developing the quality assurance and data management programs necessary for statewide accessibility and comparability. The SWAMP recognizes the need to focus and establish program priorities and has already initiated this process.

Recommendations and Supporting Findings

The SPARC identified core strengths of the SWAMP, including:

- Motivated staff and leadership
- Aggressive data management and quality assurance programs
- High level of involvement and entrepreneurship at the regional level
- Growing ability to leverage resources at the regional level
- Recognition of the need for a reliable and diverse suite of indicators.

The SPARC also identified a set of key challenges facing the SWAMP, including:

- California's sheer size and its heterogeneous natural settings
- A complex and diffuse state environmental management structure
- Beneficial use classifications that in some instances are inaccurate or poorly documented, and thus provide a weak basis for assessment
- The absence of a historical monitoring base for all target habitats and beneficial uses
- Difficulty in consistently demonstrating the management utility of the program's information
- Insufficient funding for a comprehensive monitoring and assessment program
- Insufficient institutional support for monitoring coordination and program development.

The following subsections discuss each of the SPARC's recommendations in turn, taking into account the context above. Please note that the recommendations are interdependent and mutually supportive. They are not intended to be considered and/or implemented in isolation from one another.

Recommendation 1: Reevaluate original program goals

Finding and analysis

A comparison of the monitoring plan and reporting requirements in the Report to the Legislature with the SWAMP's current activities shows clearly that the SWAMP is not completely fulfilling the requirements of AB982. Chief among these requirements are the assessment of all major water bodies in the state, providing systematic monitoring data to support the 303(d) listing and delisting process, and implementing statewide a consistent quality control and data management plan. In addition to these original program goals, AB1049 and AB1747 require all Water Bond grant projects that include an ambient monitoring component to make their data comply with SWAMP quality control and data formatting standards. While the SWAMP is addressing some program goals in some regions, it has not evolved into the statewide assessment program originally envisioned.

In the best of circumstances, achieving the SWAMP's original goals would have taken several years of effort, with initial planning and coordination efforts easily requiring a year or more. For example, Region 5 (Central Valley) spent the first year of the program coordinating internally, with other Regional Board programs, and externally with USEPA. In another instance, Region 4 (Los Angeles) spent over a year working closely with a stakeholder group in the San Gabriel River watershed to coordinate SWAMP monitoring with the new watershed monitoring program. While the SWAMP has achieved individual successes such as these, the program's limited funding has restricted their extent as well as staff's ability to expand them beyond their initial scale.

The SWAMP's limited scope has also hampered its ability to consistently achieve the intended level of coordination among State Board and Regional Board water quality monitoring efforts. Success in this regard is uneven across the state. In regions where there is little permit-mandated discharger monitoring (e.g., Region 6 (Lahontan) and Region 3 (Central Coast)) the SWAMP fills a more prominent coordinating role. In other regions, however, the SWAMP is more peripheral and has little if any direct relationship with the existing large NPDES and TMDL monitoring programs. As a result, the SWAMP's role, viewed from a statewide perspective, is a patchwork of different approaches.

This situation, including the SWAMP's peripheral role in many regions, reflects a predictable set of institutional dynamics. The SWAMP effort in each region has a relatively small budget and no broad management mandate to enforce coordination or collaboration with other Regional Board initiatives. Thus, the SWAMP lacks the budget to fully fund its own monitoring and few "chips" to use in negotiating for collaboration with others. For example, the high priority placed on TMDL development and implementation in many regions makes it difficult for a relatively new program like the SWAMP to achieve any substantial influence. What successes have occurred are often due to the creativity and opportunism of regional SWAMP coordinators (e.g., coordination of agricultural waiver and marine discharge monitoring with SWAMP in Region 3 (Central Coast)), the existence of mature regional monitoring programs that provide useful lessons (e.g., the Regional Monitoring Program for Toxic Substances in

San Francisco Bay (Region 2)), or the development of a completely new initiative that is seeking support (e.g., Regional Harbor Monitoring Program in the San Diego Region (Region 9)). While such flexibility and adaptability have served the SWAMP well to date, it does not provide an adequate foundation for achieving the SWAMP's larger goal of providing an integrated combination of statewide and site-specific assessments.

Recommendations

The program goals and monitoring approaches specified in the 2000 Report to the Legislature should be reevaluated in light of current management policy, scientific knowledge, and funding constraints. While the SWAMP Roundtable is undertaking such a reevaluation now, participation should be expanded to include higher-level management within the State Board.

This planning effort should:

- More explicitly define the role(s) of the SWAMP relative to other State and Regional Board programs
- Provide the SWAMP with specific authorities related to monitoring that parallel those it now has related to quality assurance and data management
- Somewhat enhance the overall statewide control of the SWAMP without losing valuable regional flexibility
- Match responsibilities and funding, without losing the entrepreneurial spirit characteristic of the SWAMP.

The SPARC believes that the SWAMP must have a more clearly defined set of working relationships with other State and Regional Board monitoring efforts, and the management support to implement these. Further, it would be of great value for SWAMP to receive a strong mandate from state government that other state agencies and programs should collaborate and contribute to SWAMP monitoring efforts to the maximum extent possible. On the other hand, the SWAMP will ultimately flourish only to the extent that it provides valuable information that supports decision making and that cannot be obtained elsewhere. The remaining findings and recommendations address several specific aspects of this challenge.

Recommendation 2: Identify key target audiences and their needs

Finding and analysis

The Report to the Legislature defined three main goals for the SWAMP: assessing all major water bodies in the state, providing systematic monitoring data to support the 303(d) listing and delisting process, and implementing statewide a consistent quality control and data management plan. Each goal implies its own audience(s), which may be somewhat different at the regional and statewide levels. However, because the SWAMP has evolved with an emphasis on adapting to regional issues, its set of clients is somewhat diverse and differs across regions, sometimes including only the SWAMP itself. For example, SWAMP data in Region 5 (Central Valley) have been used

extensively by the Regional Board's TMDL and Agricultural Waiver programs and have provided useful background information for watershed groups. As another example, about 80 new 303(d) listings in Region 3 (Central Coast) have resulted from SWAMP data.

Despite such individual examples, however, there is no consistent set of clients or audiences for SWAMP products across all regions that can support the program and provide guidance on its future structure and direction. In addition, there are elements of SWAMP monitoring efforts that, because they have no clear link to structured assessment or decision-making processes, have no readily identifiable audience or user. Region by region, SWAMP monitoring efforts address various aspects of the original set of program goals to differing degrees, with an equally diverse set of audiences and clients for the program's information. Conversely, there are obvious candidates as SWAMP clients that have no relationship with the program. This situation results in a lack of focus at the overall program level and the absence of a clearly shared mission across all regions.

The SPARC was aware that the program's relative youth and low level of funding compared to what was originally envisioned are to some extent mitigating factors. However, the SPARC also believes strongly that the SWAMP is not sustainable without stronger and more explicit links, across all regions, with clients and target audiences who actively use SWAMP data in key decision-making processes.

Because of recently enacted requirements in AB049 and AB1747 that grant and water supply projects must comply with SWAMP quality assurance and data management standards, the SWAMP has a large number of new clients for those specific services. It is anticipated that 880 grant projects will need to be made comparable with SWAMP over the next five years. These functions have not been integrated with the SWAMP's core monitoring and assessment functions. The press of processing a large number of project plans and data submissions has prevented the SWAMP from exploring the potential for such integration.

Recommendations

Clients for specific SWAMP services and information products should be identified at both regional and statewide levels and their needs carefully assessed. Clients should include a mix of local and statewide perspectives and be directly related to the revised program goals referred to in Recommendation 1. This effort should build in part on the relationships established by the SWAMP regional coordinators to date but also reflect a more explicit statewide perspective. The SWAMP should also take advantage of the many new relationships it now has with grant and water supply programs. Interactions with these programs about quality assurance and data management plans provide opportunities to learn more about these other programs and build stronger links to the SWAMP.

Recommendation 3: Develop and implement programmatic communication strategy

Finding and analysis

The SWAMP does not consistently provide integrative products, particularly at the statewide level. This issue manifests in three specific ways:

- The absence of comprehensive and consistent statewide information products
- Incompatibility between regional assessments that appear, on the surface, to be based on the same indicators and monitoring approaches
- An emphasis on site-specific, issue-specific assessment and reporting.
- The lack of a consistent, statewide approach to indicator development

The SWAMP has been unable to produce the statewide assessments originally envisioned in the Report to the Legislature, due to its inability to implement the comprehensive statewide monitoring program, its decision to focus available resources largely on issues specific to individual Regional Boards, and the fact that the SWAMP has not yet developed an alternative statewide assessment framework. Even where apparently comparable data are available, differences among Board regions in data analysis and interpretation methods lead to results that cannot readily be combined. For example, the numbers and relative total area of 303(d) listings are markedly higher in Region 1 (North Coast) than in Region 5 (Central Valley). In this case, the disparity reflects the fact that sample data in the North Coast were applied to entire watersheds while in the Central Valley sample data are applied to limited stream reaches. In addition, large areas of some regions have never been sampled, leaving large assessment gaps. Bioassessment tools have not been developed using a consistent approach across the state. These and other similar disparities across regions and data types reflect local decisions that have not been evaluated and reconsidered from the standpoint of an integrated statewide perspective. Finally, virtually all assessments and reports produced to date by the SWAMP focus on site-specific issues within individual Regional Board boundaries.

Individual SWAMP products are well done technical reports. However, there is a lack of products intended for decision makers and/or broader public audiences. This stems, in part, from the issues identified in the previous recommendation, namely that clients and target audiences have not been systematically identified and matched to current program goals. The SWAMP needs focused efforts on data analysis, interpretation and reporting, analogous to focused efforts on data management and QA/AC.

Recommendations

The SWAMP should develop a program-wide communications and education strategy based on program goals and clients' needs. This will involve defining a range of "signature" information products to enhance the value of the program and establish its credibility. These products should range from raw datasets to technical analyses and reports to higher-level syntheses and summaries. The strategy should also include a schedule for the routine production of such products, which may be released on different timeframes, ranging, for example, from yearly for data reports to once every five years

for more comprehensive analyses. Comprehensive analyses should use SWAMP data as well as that available from other sources to assess current conditions, associations between measures, trends over time, and causal mechanisms. The SWAMP should look to other mature programs (e.g., RMP in San Francisco Bay, Chesapeake Bay Program) for examples and should define a consistent set of reporting formats tailored to the purpose and audience for each product.

Recommendation 4: Develop statewide assessment framework

Finding and analysis

The statewide assessment strategy described in the 2000 Report to the Legislature has not been fully implemented and no program-wide strategy has been developed in its stead. As discussed above, the SWAMP made a conscious decision early in its existence to forego implementing the statewide assessment strategy and use its limited funding to address issues specific to each Regional Board. While this was a reasonable decision at the time, the need for statewide assessment remains and the collection of individual SWAMP efforts at the Regional Board level is insufficient to meet this need. The individual regional monitoring designs do not produce data that can be confidently integrated into a statewide picture of conditions and the selection, use, and interpretation of indicators, despite some progress toward improving consistency, remains inconsistent and fragmented (see Recommendation 5). For example, the description of narrative scoring categories for Index of Biotic Integrity (IBI) results differed from region to region. The SPARC believes that the SWAMP will not be sustainable over the long term unless it includes a strategy for developing statewide assessments of key conditions.

The Report to the Legislature described a statewide assessment strategy based on monitoring waterbodies on a five-year rotating schedule and suggested a substantial suite of indicators along with standards and benchmarks for interpreting them. Some Regional Boards are using their SWAMP allocations to begin implementing this strategy, focusing primarily on bioassessment as a common approach. However, the rotating waterbody strategy is not completely suited to all the objectives specified in the Report to the Legislature. It can confound spatial pattern with temporal trends, and monitoring waterbodies once every five years may require an unacceptably long period of time to identify trends for some high-priority issues. Additionally, the SWAMP has not considered the implications of implementing the statewide assessment strategy on a piecemeal basis.

The original statewide assessment strategy clearly cannot be implemented given current funding constraints and newer priorities such as TMDLs. There are also institutional limitations on the SWAMP's ability to independently develop monitoring designs and select indicators. For example, a decision about the use of E. coli as a replacement for the fecal coliform indicator in fresh water is pending at the State Board. Similarly, the State Board is considering a number of other indicators of watershed condition. Thus, while the overall goal of the SWAMP's efforts is to assess the status of beneficial uses within regions, questions about which beneficial uses will be assessed, on what time and space scales, and with what indicators remain unanswered, at least at the statewide scale. In

addition, the relationship between the SWAMP's assessments and other monitoring, assessment, and regulatory efforts are unclear and/or vary from region to region (see Recommendation 5).

Recommendations

The SWAMP should develop a framework for statewide assessment to supplement the efforts currently taking place within regions. This will necessarily involve a budgeting process to determine what proportion of SWAMP funds should be allocated to statewide objectives. The SWAMP's current model for supporting statewide data management and quality assurance efforts could provide a starting point for this exercise. This framework should provide the conceptual structure for the acquisition and use of monitoring information and should include layers of increasing detail, from overall program objectives to definitions of indicators and the methods used to evaluate them on a range of spatial scales.

This assessment strategy should build on an updated set of program goals and should address the needs of key clients and audiences. The framework should include the design of a monitoring network, as well as data mining efforts, that will support both statewide and local/regional objectives and that could be managed at the Regional Board level. The assessment strategy should also provide the ability to prioritize individual issues for further investigation (e.g., specific agricultural chemicals, water withdrawals, endocrine disruptors) and a related approach to indicator tool development. The SPARC has offered to assist in implementing this recommendation by making development of a statewide assessment framework, and accompanying monitoring design(s), one of the subjects of a future technical review.

It is important that the effort to implement this recommendation incorporate lessons learned in other similar efforts both within the state and elsewhere (see Recommendation 5). The resulting strategy should define, at least at a high-level, the conceptual linkages among program goals, user needs, monitoring objectives, study design(s), and data analysis and interpretation.

Recommendation 5: Take more advantage of available resources

Finding and analysis

The SWAMP does not take advantage of available resources and existing programs to the extent that it should at both the regional and statewide levels. This finding appears to be contradicted by the clear evidence of collaboration and coordination with other programs at the Regional Board level. For example, the SWAMP has been collaborating with Department of Fish and Game and others on developing a number of IBIs (Index of Biotic Integrity) for interpreting bioassessment data across the state. Region 9 (San Diego) collaborated with a number of stormwater permittees on the development of a regional harbor monitoring program, while Region 3 (Central Coast) has coordinated SWAMP monitoring efforts with the Monterey Bay marine discharger program and the Salinas stormwater permit. These efforts, and others like them in other regions, are clearly valuable and help to leverage the limited amount of SWAMP funding.

However, the SPARC also found that the SWAMP had no systematic strategy, at the program level, for coordinating with other large monitoring efforts, particularly those driven by permits. Thus, there is no readily identifiable SWAMP infrastructure for coordination, collaboration, and integration with other monitoring. In some instances, major permittees had only become aware of SWAMP through the very recent requirement that their Propositions 13, 40, and 50 grants comply with SWAMP quality assurance requirements. The absence of such a programmatic infrastructure has resulted in a situation where one of the SWAMP's key strengths to date, namely the creativity and initiative of the regional coordinators, has led to a very diverse and fragmented set of approaches and relationships across the state.

The SWAMP Roundtable members argue, with some validity, that this diversity is a necessary reflection of the varied issues, interest groups, and programs from region to region. However, it also reflects the fact that the SWAMP, with regard to the large NPDES and TMDL monitoring efforts, is essentially operating at the margins of the system. As discussed in Recommendation 1, this is a natural result of the SWAMP's relative lack of institutional "chips" (i.e., funding, higher-level management support) to play in the regulatory and management infrastructure.

The SPARC also observed an uneven awareness of other monitoring and science programs, both within and outside the state. For example, the SWAMP QA program is modeled after the successful program in Texas, but the SWAMP has not considered the way many states have successfully designed monitoring programs that address both state and local issues. Similarly, extensive regional monitoring efforts in other states are potentially valuable, but underutilized, sources of ideas and insights. To its credit, the SPARC review represents an assertive effort to obtain such external input, and SWAMP Roundtable members noted that travel restrictions have prevented them from attending conferences and other networking activities.

Recommendations

The SWAMP must develop more consistent, stronger, and broader connections with major monitoring efforts at the local, regional, and statewide levels. This will require not only a systematic strategy with clear goals but also support from higher levels of the State Board management infrastructure (see Recommendation 1). Such support will be needed to break through the marginalization the program now suffers from. However, the development of effective relationships with other monitoring programs will depend on the SWAMP being able to articulate a clear mission and set of program goals.

The SWAMP should also develop working relationships with similar programs in other states and at the federal level. These other programs should be mined for data, approaches, insights, and advice. Such informal sources of input should be combined with periodic formal reviews that can act as mechanisms for exposing the SWAMP to fresh ideas and constructive criticism.

Recommendation 6: Realign decision making with new program goals

This finding addresses question #8 in the list of questions for the review committee (see Appendix 2). This question was the only one dealt with directly.

Finding and analysis

The SWAMP's decision-making and prioritization processes are inadequate for the challenges facing the program. This finding is not intended to disparage or undermine the ways in which the SWAMP's decision making to date has been flexible, adaptive, and effective. The SWAMP Roundtable's collaborative and consensus-based decision process is admirable and has obviously contributed to the program's ability to achieve some notable successes despite the drastic reduction in its intended budget and scope.

The SWAMP's decision making has focused on dividing its budget between statewide responsibilities such as program management, data management, and quality assurance and the Regional Boards, with individual Boards given a large amount of autonomy to pursue their own priorities. This autonomy has been important to the individual boards and should be preserved to the greatest extent possible. As one SWAMP coordinator noted, "The SWAMP allocation is the only funding I have to do discretionary monitoring." However, the program lacks a more formal infrastructure and processes to develop statewide strategy and align the regions toward common program goals.

The SWAMP has finessed a tension between statewide and regional interests since its inception, largely through a collaborative decision process and by foregoing the more ambitious statewide assessment goals in the Report to the Legislature. This tactic proved successful in establishing some support within the Regional Boards and in identifying achievable, smaller-scale projects. It also resulted, however, in sometimes substantial differences among individual Regional Boards in decision-making and prioritization processes. It also left the SWAMP with a less than adequate ability to establish centralized policies and define overall program direction when its consensus-based decision-making process breaks down.

The SWAMP has explicitly allocated a portion of its funds to pilot projects and to methods development that the Roundtable believes may ultimately benefit the entire state. Notable examples include the development of bioassessment methods and a study of conditions in harbors in southern California. In some cases, the Regional Boards have agreed to reduce their budget allocations to fund these broader projects. In addition, there are instances in which efforts undertaken by individual Regional Boards may eventually have statewide applicability. For example, Region 6's (Lahontan) MTBE monitoring in Lake Tahoe served as a template for Region 1's (North Coast) monitoring effort. Similarly, Region 3 (Central Coast) has investigated bioaccumulation of pollutants in sand crabs and the Department of Fish and Game's Oil Spill Prevention and Response (OSPR) program is investigating this method's potential as an indicator of oil contamination.

Examples such as these reflect the SWAMP's creativity, its healthy opportunism, and the regional coordinators' ability to work independently. These are valuable traits that should

be protected. However, they are not adequate, alone, for a program that desires to have a more substantive impact, at both the statewide and regional/local levels. The SWAMP lacks a systematic decision process, in the context of a statewide assessment strategy, for deciding which methods development and pilot projects are of statewide import, and for deciding which regions are the best places to initiate them. The SWAMP also lacks a formal review process for assessing whether such projects are on track to achieving their goals. Pilot projects do not always make best use of available knowledge and experience elsewhere, and relationships with outside scientists are too often based on local working relationships. As one example, the SWAMP's efforts to develop a statewide assessment strategy appear to be completely independent of other similar efforts in nearby western states.

Recommendations

The SPARC believes that the SWAMP's current management has demonstrated strong leadership and clearly has the skills and the support within the program to lead it forward as it addresses these recommendations.

The SWAMP should evaluate its current management structure and decision making and align it more closely with its revised program goals, its role with respect to other regulatory and monitoring efforts, and its statewide assessment strategy. Any revisions to present decision-making processes should balance the benefits of collaborative decision making among the Roundtable members with some mechanism for moving forward in the absence of consensus. This may involve giving the program manager more authority.

More specifically, the SWAMP should develop procedures to address the deficiencies highlighted in the previous section with respect to identification, prioritization, and review of pilot projects. In addition, the program would benefit from a clearing house to facilitate information sharing among the regions.

APPENDIX A: Biographies of SPARC Members

Mr. Rich Batiuk is the Associate Director for Science at the U.S. Environmental Protection Agency's Chesapeake Bay Program Office located in Annapolis, Maryland. He is responsible for providing state-of-the-science environmental monitoring, multi-media modeling, distributed data/information management, and technical data analysis, synthesis and interpretation support to the Chesapeake Bay Program partners. In his 20 years with the Chesapeake Bay Program, he has led the integration of science into multi-partner decision making, recently culminating in the 6-state watershed adoption of new Chesapeake Bay water quality standards and establishment of new, far reaching nutrient and sediment reduction goals and loading caps. Mr. Batiuk received his M.S. in Environmental Toxicology from American University in Washington D.C. in 1985.

Dr. Brock Bernstein is an independent consultant as well as the President of the National Fisheries Conservation Center. He specializes in designing and evaluating environmental monitoring programs, structuring management and research initiatives, and developing policy. He is a former member of the National Research Council's Marine Board, where he helped to identify national priorities for research, management, and technology development. He has served on several National Research Council Committees, including ones to develop database management and data integration strategies for international global change research (NRC Report: Finding the Forest in the Trees - The Challenge of Combining Diverse Environmental Data), to assess marine monitoring practices (NRC report: Managing Troubled Waters) and improving mechanisms for coastal governance on a national scale (NRC Report: Striking a Balance). Dr. Bernstein received his Ph.D. in Biological Oceanography from Scripps Institution of Oceanography in 1977.

Dr. Charles Hawkins is Director of the Western Center for Monitoring and Assessment of Freshwater Ecosystems at Utah State University. His research focuses on facilitating the development and implementation of scientifically sound methods for monitoring and assessing the condition of aquatic resources in the western United States. He is a Member of the EPA Science Advisory Board's Ecological Processes and Effects Committee and is also on their Subcommittee on Biological Criteria. He has published more than 50 research articles and formerly served as an Associate Editor for the Journal of the North American Benthological Society. He has also served as Chair of the Aquatic Ecology Section of the Ecological Society of America. He received his PhD from Oregon State University in 1982.

Dr. Fred Holland is Director of the Hollings Marine Laboratory, which is a National Oceanic and Atmospheric Administration research facility located in Charleston, SC and is one of three NOAA Centers of Excellence for Oceans and Human Health Research. Prior to joining NOAA in 2001, Dr. Holland was Director of the Marine Resources Research Institute for the South Carolina Department of Natural Resources. He has nearly 200 publications and was a co-author of Managing Troubled Waters, the National Academy of Sciences seminal report on aquatic monitoring. Dr. Holland received his

Ph.D. in Biology from the University of South Carolina in 1974. He is presently an Adjunct Professor in the Marine Biology Program of the College of Charleston, Marine Science Program at the University of South Carolina and the Marine Biomedical and Environmental Sciences Department at the Medical University of South Carolina.

Mr. Paul Kazyak is the Ecological Assessment Program Chief for the Maryland Department of Natural Resources, where he oversees the Maryland Biological Stream Survey and its volunteer component, Maryland Stream Waders. He has served on a number of panels and boards, including the Steering Committee for the Maryland Water Monitoring Council, the Mid-Atlantic Highlands Stream Ecology Workgroup, Anne Arundel and Howard County stream monitoring design, EPA's National Lakes Survey, EPA's Goals and Indicators Project, and EPA's Wadable Streams Assessment. Paul has authored more than 75 publications related to aquatic ecosystems. He received his Master's Degree in Environmental Biology from the State University of New York's College of Environmental Science & Forestry in 1988 and has been teaching graduate-level freshwater ecology courses at Johns Hopkins University since 1994.

Mr. John Maxted has recently returned from New Zealand after 6.5 years overseas to take up a lead scientist position at the South Florida Water Management District (SFWMD); effective December 19, 2005. In New Zealand, Mr. Maxted was Senior Freshwater Ecologist for the Auckland Regional Council in New Zealand where he designed, implemented, and managed ecological monitoring programs for streams, lakes, and wetlands. Prior to moving to New Zealand in 1999, Mr. Maxted was Senior Scientist for the Delaware Department of Natural Resources and Environmental Control, where he was responsible for implementing EMAP and other ecoregion applications to the assessment of freshwater and estuarine systems for Section 305(b), 303(d), and TMDL reporting. Mr. Maxted received his M.S. from the University of Michigan in 1976.

Dr. Robert Ward is Director of the Colorado Water Resources Research Institute at Colorado State University, where his principal research areas are in water quality management and monitoring. His research interests include: (1) establishing design criteria for water quality information systems; (2) design of water quality monitoring systems; (3) water quality hydrology; (4) appropriate wastewater treatment technology design and management; (5) data utilization in water quality management; and (6) relating water quality criteria and standards to water quality monitoring practices. He is a member of the National Water Quality Monitoring Council and is Chair of the Water Section for the National Association of State Universities and Land Grant Colleges. He has published two books and over one hundred scientific articles about water quality. Dr. Ward received his Ph.D. from North Carolina State University in 1970.

Dr. Stephen Weisberg is Executive Director of the Southern California Coastal Water Research Project (SCCWRP) where he specializes in the design and implementation of environmental monitoring programs. He serves on numerous federal advisory committees, including the Ocean Research and Resources Advisory Panel, the National Science and Technology Council Joint Subcommittee on Ocean Science and Technology, the US Global Ocean Observing System Steering Committee, the EPA Board of Scientific Counselors Water Quality Committee and the Alliance for Coastal Technology

Stakeholders Council. He also serves on numerous state/regional advisory committees, including those for the Southern California Wetlands Recovery Program, the University of Southern California Sea Grant Program, the Center for Integrated Coastal Observation, Research and Education, and the State of California's Clean Beach Task Force. Dr. Weisberg received his undergraduate degree from the University of Michigan and his Ph.D. from the University of Delaware.

APPENDIX B: Initial Questions Posed to the SPARC

Scientific Planning And Review Committee (SPARC)
October 5-7, 2005

Questions for the Review Committee

1. Are the program goals clearly stated?
    a. Is it clear which subset of goals will be addressed with available funding?

2. Is the design of the program suitable for achieving the stated objectives? Are the goals, assessment questions, indicators and monitoring objectives integrated in a logical way? Do they lead to effective monitoring designs?
    a. At the Statewide level?
    b. At the Regional level?

3. Are the field/laboratory methods, and associated quality assurance procedures, appropriate to meet the program goals?

4. Are the data management and data distribution approaches effective?

5. Are the data being analyzed and interpreted correctly?

6. Is information from the program being adequately communicated and used to support management decisions or change management priorities/directions?

7. Has the program effectively leveraged its resources through coordination with other programs?

8. Is the State best served by its current management structure for SWAMP, which is distributed among the Regional Water Boards? Or, should it consider other options such as the NAWQA model, a more centralized structure, or some hybrid model?