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**A STRATEGY FOR  
COORDINATED MONITORING,  
ASSESSMENT, AND COMMUNICATION OF  
INFORMATION ON BIOACCUMULATION IN  
AQUATIC ECOSYSTEMS IN CALIFORNIA**



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**BIOACCUMULATION OVERSIGHT GROUP**

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**CALIFORNIA WATER QUALITY  
MONITORING COUNCIL**

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**DECEMBER 2012**

## EXECUTIVE SUMMARY

Pollutants that accumulate in the food web (or “bioaccumulate”) are having detrimental impacts on beneficial uses of water bodies throughout California. Methylmercury bioaccumulation is a particularly widespread and severe problem, and poses a serious threat to human and wildlife health across the state. Monitoring information will provide an essential foundation for control plans and exposure reduction plans to remedy this problem. In addition, effective communication of this information to the public is imperative to enable fish consumers to reduce their exposure to pollutants.

Great strides have been made in the last few years in providing the information needed to manage bioaccumulative pollutants in California water bodies.

- Groundbreaking statewide surveys of contaminants in sport fish, featuring unprecedented coordination of programs, have been conducted across all of the major water body types.
- New or updated safe eating guidelines have been established for many water bodies.
- A “Safe to Eat” Portal has been created to provide public access to information on bioaccumulation.
- A centralized database (CEDEN) has been established as a means for storing and sharing bioaccumulation monitoring data.
- The first statewide study of the impacts of bioaccumulation on wildlife in lakes and reservoirs has been designed and is being implemented.

However, California still lacks the comprehensive monitoring, assessment, and communication needed to adequately support management of bioaccumulative pollutants in California water bodies. There are multiple problems with the status quo:

- insufficient information on spatial extent and long-term trends, high priority topics such as contaminants of emerging concern (CECs) and biotoxins, and the relative importance of different sources and environmental factors that drive bioaccumulation;
- inefficiencies due to a lack of coordination between agencies, and between agencies and regulated entities;
- a need for pilot scale actions to reduce bioaccumulation accompanied by refinement of monitoring tools to track the effectiveness of the actions;
- safe eating guidelines are needed for many additional water bodies, but the current pace of development is slow due to funding limitations,
- a need for optimizing the effectiveness of communication to the public in support of exposure reduction, and
- insufficient access to data and information for regulators, scientists, and the public.

Efficient use of the limited funds available for monitoring, assessment, and communication is of paramount importance. This efficiency can be achieved through close coordination of programs and thoughtful strategic planning. California needs a central entity with the responsibility and authority to attain the degree of coordination and cooperation that is required to address the bioaccumulation problem. The Bioaccumulation Oversight Group has been established as a work group of the California Water Quality Monitoring Council to

1 fulfill this role. This Strategy has been prepared by the BOG to outline steps that should be  
2 taken to improve bioaccumulation monitoring, assessment, and communication in  
3 California.

4  
5 The goals of the Strategy are to promote:

- 6 1. coordinated, cooperative, long-term, statewide monitoring to generate the data  
7 needed to support control plans and exposure reduction;
- 8 2. consistent and timely assessment to support more coherent regulation and to  
9 support exposure reduction for humans and aquatic life (including wildlife), and
- 10 3. coordinated communication and access to information on fish contamination to  
11 allow the public to reduce their exposure to contaminants and to participate in  
12 management processes in an informed manner.

13  
14 The following actions have been identified as priorities for improving bioaccumulation  
15 monitoring, assessment, and communication in California. For each of the planning efforts,  
16 the general approach will be to begin with an inventory of existing activities, then identify  
17 high priority needs, and then develop and implement plans to address the needs.

#### 18 19 General Coordination

- 20 1. Promote enhanced general coordination by strengthening the BOG's role as the  
21 central forum for discussion and planning. The BOG will increase outreach to other  
22 agencies and organizations that conduct and oversee bioaccumulation monitoring  
23 and assessment activities in California, with the goal of coordinating these activities.  
24 The Council and its member organizations can provide crucial support by requiring  
25 (where possible) and encouraging active participation by their organizations and  
26 the groups they regulate, represent, or for which they provide oversight.

#### 27 28 Monitoring

- 29 2. Promote consistency across monitoring programs to optimize comparability and  
30 usability of monitoring data by using the BOG as a central forum for information  
31 sharing, planning, and peer review, and by developing protocols for generating  
32 useful data.
- 33 3. Develop a comprehensive plan for coordinated monitoring that includes support for  
34 advisory development, periodic statewide assessments of status, trend monitoring,  
35 statewide studies to support control efforts (e.g., TMDLs), and source identification  
36 and mitigation studies. Priority contaminant categories include legacy pollutants,  
37 CECs, and biotoxins.

#### 38 39 Assessment

- 40 4. Develop an overarching plan for assessment that supports expedited development  
41 of safe eating guidelines by OEHHA. Include consideration of improvements in the  
42 consistency and other aspects of the application of assessment thresholds.
- 43 5. Develop an overarching plan for assessment relating to aquatic life beneficial uses.  
44 Evaluate needs for threshold development, and include consideration of  
45 improvements in the consistency in application of assessment thresholds.

46

1 Communication

2 6. Develop a coordinated plan for exposure reduction, including safe eating guidelines  
3 and other communication products (such as the Safe to Eat Portal). Include  
4 effectiveness evaluation and consideration of environmental justice concerns.

5 7. Develop a plan for improving communication of bioaccumulation data and  
6 information to regulators, scientists, decision-makers, and the public.  
7

8 Priority tasks for 2012 and 2013 include:

- 9 1. Establish new structure and processes for an expanded BOG  
10 2. Establish requirements for BOG participation (where possible)  
11 3. Inventory existing monitoring and assessment activities  
12 4. Develop SWAMP monitoring protocols as needed to support bringing data together  
13 from disparate sources for use in broader assessments  
14 5. Develop monitoring plans for legacy pollutants, CECs, and biotoxins  
15 6. Prepare multi-year workplan for development of safe eating guidelines – including  
16 monitoring, assessment, and communication  
17

18 Upon completion of these tasks, a longer-term workplan for 2014 and beyond can be  
19 established that identifies funding needs and outlines a schedule and approach for  
20 implementing the workplan.  
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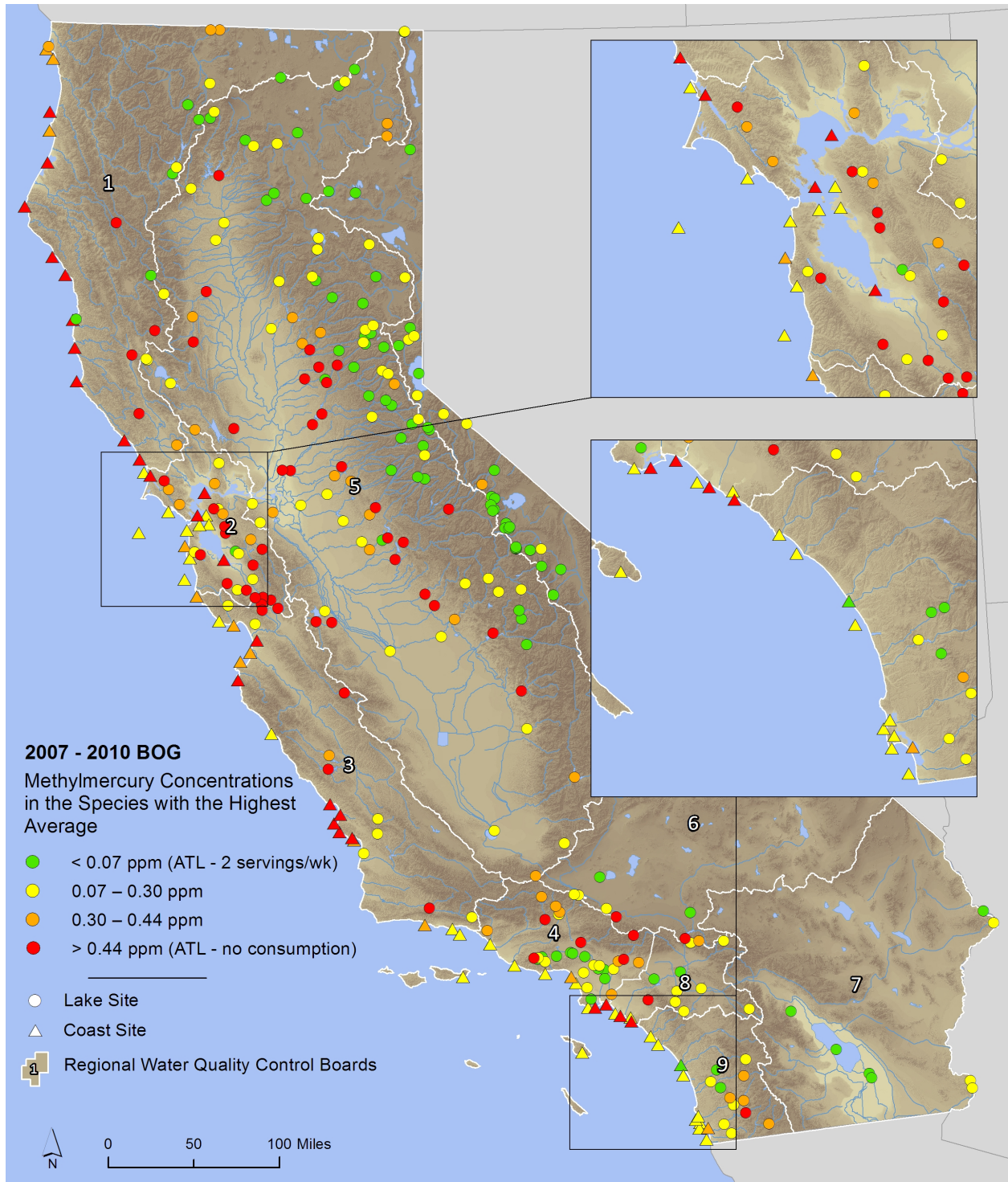
1 **A STRATEGY FOR COORDINATED MONITORING, ASSESSMENT, AND**  
2 **COMMUNICATION OF INFORMATION ON BIOACCUMULATION IN**  
3 **AQUATIC ECOSYSTEMS IN CALIFORNIA**

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5 **BIOACCUMULATION MONITORING IN CALIFORNIA: PROBLEM STATEMENT**

6  
7 Pollutants that accumulate in the food web (or “bioaccumulate”) are having detrimental  
8 impacts on beneficial uses of water bodies throughout California. Methylmercury  
9 bioaccumulation is a particularly widespread and severe problem (Figure 1), and poses a  
10 serious threat to human and wildlife health across the state. Monitoring information will  
11 provide an essential foundation for control plans and exposure reduction plans to remedy  
12 this problem. In addition, effective communication of this information to the public is  
13 imperative to enable fish consumers to reduce their exposure to pollutants.

14  
15 Great strides have been made in the last few years in providing the information needed to  
16 manage bioaccumulative pollutants in California water bodies.

- 17 • Groundbreaking statewide surveys of contaminants in sport fish, featuring  
18 unprecedented coordination of programs, have been conducted across all of the  
19 major water body types that support fishing (lakes and reservoirs, the coast, bays  
20 and estuaries, and rivers and streams). Technical reports, fact sheets, and press  
21 releases have been distributed every spring since 2009 providing the latest  
22 monitoring information. Extensive media coverage of these reports is an indication  
23 of the high degree of public interest in this issue.
- 24 • New or updated safe eating guidelines have been established for many water bodies,  
25 including San Francisco Bay and over 40 lake and reservoir or river locations  
26 (OEHHA 2009, Gassel et al. 2011).
- 27 • A “Safe to Eat” Portal has been created to provide public access to information on  
28 bioaccumulation. The Portal has been populated with data from the SWAMP  
29 statewide surveys.
- 30 • A centralized database (CEDEN) has been established as a means for storing and  
31 sharing bioaccumulation monitoring data. Data from the SWAMP statewide surveys  
32 and from some substantial historic datasets (e.g., Fish Mercury Project, TSMP) have  
33 been incorporated into CEDEN. The Portal draws data from CEDEN.
- 34 • The first statewide study of the impacts of bioaccumulation on wildlife in lakes and  
35 reservoirs has been designed and is being implemented. The study is examining  
36 exposure and risk of methylmercury to piscivorous birds on lakes and reservoirs  
37 across the state. The study is evaluating whether concentrations in fish can be  
38 extrapolated to concentrations in their predators, and whether fish tissue targets  
39 are also protective of their predators.



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Figure 1. Methylmercury bioaccumulation is a particularly widespread and severe problem, and poses a serious threat to human and wildlife health across the state. The map is based on sport fish data generated by SWAMP from 2007-2010.



1 However, California still lacks the comprehensive monitoring, assessment, and  
2 communication needed to adequately support management of bioaccumulative pollutants  
3 in California water bodies. There are multiple problems with the status quo.

- 4 • Insufficient data
  - 5 ○ Incomplete coverage of many water bodies not monitored sufficiently to protect  
6 public health (support safe eating guidelines) and aquatic life (in this document  
7 this term includes wildlife), or to support cleanup efforts; other water bodies are  
8 not monitored at all
  - 9 ○ Lack of information on trends in pollutants of concern at a regional or local scale
  - 10 ○ Lack of information on contaminants of emerging concern
  - 11 ○ Lack of information on biotoxins
  - 12 ○ Lack of information on drivers of patterns in bioaccumulation across the state  
13 (e.g., lake characteristics and water quality parameters)
  - 14 ○ Lack of information on the fishing beneficial use (fishing pressure and species  
15 preferences across water body types)
  - 16 ○ Lack of information on the aquatic life beneficial use (population status and  
17 basic ecology of sensitive species)
- 18 • Inefficiencies due to a lack of coordination between agencies, and between agencies  
19 and regulated entities. Activities affected include monitoring, data management,  
20 assessment, reporting, peer review, and communication in support of exposure  
21 reduction.
- 22 • A need for pilot-scale actions to reduce bioaccumulation accompanied by  
23 refinement of monitoring tools to track the effectiveness of the actions. Efforts on  
24 both of these fronts are only just beginning.
- 25 • Safe eating guidelines are only in place for some of the water bodies where they are  
26 needed. Due to limited funding, the current pace of development of safe eating  
27 guidelines is slow.
- 28 • A need for optimizing the effectiveness of communication to the public in support of  
29 exposure reduction. Some progress is being made (e.g., in San Francisco Bay  
30 through the San Francisco Bay Fish Project - [www.sfei.org/sfbfp](http://www.sfei.org/sfbfp) and [statewide](http://www.sfei.org/statewide)  
31 [through the Safe to Eat portal](http://www.sfei.org/statewide)), but more work is needed in development of  
32 communication tools and in evaluating how effective they are.
- 33 • Insufficient access to data and information for regulators, scientists, and the public.  
34 Some data are now accessible in raw form from CEDEN. Other datasets should be  
35 added to CEDEN, and tools for summarizing and displaying the data are needed.

36  
37 Funding to address all of these deficiencies is in very short supply. Efficient use of the  
38 limited funds available for monitoring, assessment, and communication is of paramount  
39 importance, as is planning to increase funding. This efficiency can be achieved through  
40 close coordination of programs and thoughtful strategic planning. California needs a  
41 central entity with the responsibility and authority to attain the degree of coordination and  
42 cooperation that is required to address the bioaccumulation problem. In 2009 the  
43 Bioaccumulation Oversight Group (BOG) was established as a workgroup of the California  
44 Water Quality Monitoring Council to fulfill this role. This Strategy has been prepared by  
45 the BOG to outline steps that should be taken to improve bioaccumulation monitoring,  
46 assessment, and communication in California.

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**GOALS OF THE STRATEGY**

- Goal 1            Promote coordinated, cooperative, long-term, statewide monitoring to generate the data needed to support control plans and exposure reduction
- Goal 2            Promote consistent and timely assessment to support more coherent regulation and to support exposure reduction for humans and aquatic life
- Goal 3            Promote coordinated communication and access to information on fish contamination to allow the public to reduce their exposure to contaminants and to participate in management processes in an informed manner

**RECOMMENDED ACTIONS**

The following actions have been identified as priorities for improving bioaccumulation monitoring, assessment, and communication in California. For each of the planning efforts mentioned below, the general approach will be to begin with an inventory of existing activities, then identify high priority needs, and then develop and implement plans to address the needs.

**General Coordination**

1. Promote enhanced general coordination by strengthening the BOG’s role as the central forum for discussion and planning of bioaccumulation monitoring, assessment, and communication in California.

Getting groups involved in bioaccumulation work across California to recognize the BOG’s role and to participate in BOG discussions and activities will be essential. The BOG will increase outreach efforts to enhance participation by entities that monitor and assess bioaccumulated pollutants statewide.

The Council and its member organizations can provide crucial support by requiring (where possible) and encouraging active participation by their organizations and the groups they regulate and represent. For example, the State Water Board could require the use of BOG-developed SWAMP protocols and data submission to CEDEN as conditions in discharge permits and grant agreements.

The BOG will also strive to engage partners by providing valuable information and services. The BOG can serve as a forum for distributing SWAMP monitoring and assessment procedures as necessary to permit the broader use of data and for sharing information on new policies and the latest studies and technical advances. The opportunity to participate in strategic planning can also benefit partners.



1 The structure and processes of BOG meetings should be formalized and improved to  
2 support this expanded role. A regular schedule of meetings should be established, and  
3 efforts should be made to facilitate broad participation from groups across the state.  
4

## 5 6 **Monitoring**

7  
8 2. Promote consistency across monitoring programs to optimize comparability and  
9 usability of monitoring data by using the BOG as a central forum for information  
10 sharing, planning, and peer review, and by developing protocols for generating useful  
11 data.  
12

13 Promoting consistency in the quality and management of monitoring data generated by  
14 different programs is a key to efficient use of available monitoring resources. The BOG  
15 (with support from the SWAMP QA team and the BOG Peer Review Panel) can serve as a  
16 hub for developing and communicating protocols and standards for sampling design,  
17 chemical analysis, data management, assessment, and peer review. The BOG Peer Review  
18 Panel and SWAMP Roundtable can provide guidance to ensure that the monitoring being  
19 performed is of sufficient technical quality to provide reliable answers to the questions that  
20 are being addressed and to permit data from disparate studies to be combined for broader  
21 assessments. The BOG chair and the BOG as a whole can also serve as resources for  
22 technical guidance and review.  
23

24 3. Develop a comprehensive plan for coordinated monitoring that includes support for  
25 advisory development, periodic statewide assessments of status, trend monitoring,  
26 statewide studies to support control efforts (e.g., TMDLs), and source identification and  
27 mitigation studies. Priority contaminant categories include legacy pollutants, CECs, and  
28 biotoxins.  
29

30 A first step in developing a coordinated monitoring plan is to establish an inventory of all of  
31 the existing programs and entities that are generating data and assessment information  
32 that can contribute to meeting statewide monitoring needs. This inventory will serve as a  
33 basis for identifying information needs that are being met, needs that could be met better  
34 with improved coordination, and needs that are not being met. The inventory can highlight  
35 areas where the need for improved SWAMP protocols is greatest.  
36

37 Another important initial step is to develop a thoughtful, long-term vision of the  
38 monitoring information that is needed to support management, including control plans and  
39 exposure reduction efforts. The needs vary by pollutant. For legacy pollutants (e.g.,  
40 mercury and PCBs), this vision could be established fairly easily with existing information.  
41 For CECs, the results of the collaborative pilot study using mussels will soon be available  
42 and will provide a strong basis for a long-term plan. For biotoxins, a workshop held in  
43 November 2012 was focused on this very topic.  
44

45 Supporting the development of safe eating guidelines by OEHHA for all water bodies where  
46 they are needed should be a top priority. Concentrations of methylmercury and PCBs in

1 sport fish across the state are not likely to decline significantly in the near future. While  
2 control plans are being developed and implemented, it is possible to achieve significant and  
3 rapid reductions in human exposure through effective communication of safe eating  
4 guidelines and bioaccumulation monitoring data. This goal should be aggressively pursued  
5 to address this significant public health issue. A multi-year workplan should be developed  
6 for conducting the monitoring, assessment, and communication needed for OEHHA to  
7 establish safe eating guidelines for all water bodies where they would be appropriate.

## 8 9 **Assessment**

- 10  
11 4. Develop an overarching plan for assessment that supports expedited development of  
12 safe eating guidelines by OEHHA. Include consideration of improvements in the  
13 consistency and other aspects of the application of assessment thresholds.  
14  
15 5. Develop an overarching plan for assessment relating to aquatic life beneficial uses.  
16 Evaluate needs for threshold development, and include consideration of improvements  
17 in the consistency in application of assessment thresholds.  
18

19 More thorough monitoring will create an even greater need for timely assessment and  
20 incorporation of new data into safe eating guidelines developed by OEHHA and  
21 determining support for aquatic life beneficial uses. Resources currently available for  
22 these assessments are inadequate, particularly for managing the data that feed into the  
23 assessments. Describing what would be needed to support expeditious advisory and  
24 threshold development will be a step toward obtaining the needed funding.  
25

26 The issue of consistency in application of thresholds among agencies should also be  
27 addressed by the BOG. The possibility of improving the alignment across water board  
28 programs, and across Cal EPA could be explored. Even without changes by the agencies,  
29 agreement should be reached on how to use existing thresholds in presenting  
30 bioaccumulation information to the public. Comprehensive safe eating guidelines for  
31 California water bodies would be the ultimate solution.  
32

## 33 **Communication**

- 34  
35 6. Develop a coordinated plan for exposure reduction, including safe eating guidelines and  
36 other communication products (such as the Safe to Eat Portal). Include effectiveness  
37 evaluation and consideration of environmental justice concerns.  
38

39 Effective communication of safe eating guidelines and other information on fish  
40 contamination is an essential step in exposure reduction. The effectiveness of sign posting,  
41 the fishing license addendum, web sites, community events, media coverage, and other  
42 means of communication in raising awareness regarding safe fish consumption should be  
43 evaluated, and the most effective techniques should be emphasized.  
44

45 Consideration should be given to environmental justice concerns given the  
46 disproportionate impacts of fish contamination on communities that are highly dependent

- 1 on consumption of wild-caught fish or that have the misfortune to fish in contaminated  
 2 water bodies.  
 3  
 4 Development of the Safe to Eat Portal should continue as a means for the public to access  
 5 data and information about water bodies where they like to fish. User feedback should be  
 6 gathered and incorporated into the design of the Portal.  
 7  
 8 7. Develop a plan for improving communication of bioaccumulation data and information  
 9 to regulators, scientists, decision-makers, and the public.  
 10  
 11 Communication of bioaccumulation information (regulatory developments, monitoring  
 12 results) to regulators and scientists should be continued and improved, including access to  
 13 data, technical reports synthesizing monitoring results, workshops, and training.  
 14 Communication of bioaccumulation information (monitoring results, status of cleanup  
 15 efforts) to decision-makers and the public should be continued and improved, including  
 16 fact sheets, media releases, and presentations.

17  
 18 **PRIORITY TASKS FOR 2012 AND 2013**  
 19

<b>What</b>	<b>Who</b>
<b>Strengthen the BOG</b>	
Establish new structure and processes for BOG	SFEI, BOG
Establish requirements to participate (where possible)	SWRCB, Monitoring Council
<b>Monitoring and Assessment</b>	
Inventory existing monitoring	SFEI, SWRCB, BOG members
Develop SWAMP monitoring and assessment protocols	Moss Landing, WPCL, SFEI, OEHHA, SWRCB
Develop monitoring and assessment plans for legacy pollutants, CECs, and biotoxins (including safe eating guideline development [see below], statewide assessment, trend monitoring, TMDL support, source identification, and effectiveness evaluation)	SFEI, BOG
Provide technical support	SFEI, Moss Landing, WPCL
<b>Safe Eating Guidelines and Thresholds</b>	
Prepare multi-year workplan for development of safe eating guidelines – including monitoring, assessment, and communication	OEHHA, BOG
Prepare multi-year workplan for development of thresholds to protect aquatic life beneficial uses from bioaccumulated pollutants – including monitoring, assessment, and communication	BOG, SWRCB

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1 Upon completion of these tasks, a longer-term workplan for 2014 and beyond can be  
2 established that identifies funding needs and outlines a schedule and approach for  
3 implementing the workplan.

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APPENDIX 1  
BOG CHARTER (2010)

## 1 **Bioaccumulation Oversight Group (BOG) - CHARTER**

### 2 **Mission**

- 3 » To assess the impacts of contaminants in fish and shellfish on beneficial uses in California water  
4 bodies through statewide monitoring under SWAMP and syntheses of information from other studies,  
5 and to develop an internet portal that presents this information to decision-makers and the public in a  
6 form that they can easily use.

### 7 **Why Is This Workgroup Needed?**

- 8 » Prior to the formation of the BOG and the inception of statewide surveys of bioaccumulation in 2007  
9 under the Surface Water Ambient Monitoring Program (SWAMP), there was a lack of information on  
10 the statewide impact of contaminant bioaccumulation on the fishing and aquatic life beneficial uses of  
11 California waters. SWAMP has addressed this need with the state's first systematic statewide surveys  
12 of contaminants in sport fish in California lakes, coastal waters, and rivers and streams. The BOG  
13 provides the oversight and peer review of the monitoring and synthesis conducted on this topic that is  
14 needed to ensure these efforts are technically sound and of optimum value to water quality managers.
- 15 » The BOG provides the oversight needed for development and maintenance of the “**Is It Safe to Eat**  
16 **Fish and Shellfish?**” component of the California Water Quality Monitoring Council’s “**My Water**  
17 **Quality**” website. This website presents information from SWAMP and other programs on  
18 contaminants in California fish and shellfish to the public in form that they can readily access and use  
19 to reduce their exposure to mercury and other contaminants of concern.
- 20 » The BOG serves as a forum for coordination of bioaccumulation monitoring in California. BOG  
21 discussions have created partnerships between state and regional SWAMP monitoring efforts, and  
22 between SWAMP and other programs such as the **Regional Monitoring Program for Water Quality**  
23 **in the San Francisco Estuary** and the **Southern California Bight Regional Monitoring Program**.  
24 These partnerships promote efficient use of monitoring resources and provide for more coherent  
25 assessment of condition across the state.
- 26 » The BOG advises the California Water Quality Monitoring Council and other agencies on information  
27 needs relating to management efforts to reduce the impact of contaminants on the beneficial uses of  
28 California water bodies.

### 30 **Background and Description**

- 31 » California has a long history of employing the technique of “bioaccumulation monitoring” – measuring  
32 the concentrations of pollutants in fish, bivalves, and other aquatic biota to assess impacts on  
33 beneficial uses. In the 1970s, the California State Water Resources Control Board initiated two major  
34 statewide bioaccumulation monitoring programs. The **Toxic Substances Monitoring Program**  
35 **(TSMP)**, initiated in 1976, measured pollutants in fish and invertebrates in freshwater and estuarine  
36 habitats. The TSMP primarily targeted water bodies with known or suspected water quality  
37 impairments, and successfully identified and documented many hotspots of contamination. The **State**  
38 **Mussel Watch Program (SMWP)** was initiated in 1977 to provide information on long-term trends in  
39 water quality in coastal marine waters and to identify specific areas with elevated concentrations. In  
40 1998, a third statewide bioaccumulation monitoring program, the **Coastal Fish Contamination**  
41 **Program (CFCP)**, was established. This program was developed to assess the health risks of  
42 consumption of sport fish and shellfish from nearshore waters along the entire California coast. Over  
43 the years, these programs yielded a wealth of useful information on water quality in California.  
44 However, the datasets generated by these programs had several limitations with regard to answering  
45 questions that are high priorities for water quality managers: much of the sampling was biased toward  
46 characterization of polluted areas; many areas were not sampled adequately, including areas with

1 significant fishing activity; most of the sampling, though focused on sport fish, was not tailored to the  
2 development of consumption advice; the dataset was also not tailored to evaluation of risks to  
3 piscivorous wildlife through monitoring of prey species; and long-term time series for detecting trends  
4 in sport fish or other wildlife contamination were lacking.

5 » In 2000, the State Water Board, responding to a bill passed by the California legislature, developed a  
6 plan to restructure their existing water quality monitoring programs (including TSMP, SMWP, and  
7 CFCP) and create a **Surface Water Ambient Monitoring Program (SWAMP)** for water quality that  
8 addresses all hydrologic units of the state using consistent and objective monitoring, sampling and  
9 analytical methods; consistent data quality assurance protocols; and centralized data management.  
10 Sampling under the three monitoring programs ended in 2003, as SWAMP began to take shape.

11 » In 2005 SWAMP began establishing a foundation for a new monitoring program to provide a  
12 systematic statewide assessment of the condition of California water bodies with respect to  
13 bioaccumulation. The first step taken was to provide funds for a review of the data generated by the  
14 previous statewide programs and other efforts (**Davis et al. 2007**).

15 » SWAMP formed the Bioaccumulation Oversight Group (BOG) in 2006 to provide oversight for the  
16 statewide assessment of the impact of bioaccumulation of contaminants on beneficial uses. In 2007  
17 SWAMP also initiated a new bioaccumulation monitoring program to address the need for systematic  
18 statewide information on this topic. This effort marked the beginning of a new long-term, statewide,  
19 comprehensive bioaccumulation monitoring program for California surface waters.

20 » The BOG has developed and begun implementing a plan to evaluate bioaccumulation impacts on the  
21 fishing beneficial use in all California water bodies. Sampling of sport fish in **lakes and reservoirs** has  
22 been conducted in the first two years (2007 and 2008). In 2009 and 2010, sport fish from the  
23 **California coast**, including bays and estuaries, were sampled. Sport fish from rivers and streams will  
24 be sampled in 2011.

25 » In 2009 the BOG expanded its role by becoming a workgroup of the California Water Quality  
26 Monitoring Council. In this role the BOG has assumed broader responsibilities in guiding development  
27 of the Council's "**Safe to Eat Fish and Shellfish**" portal and in coordinating and planning  
28 bioaccumulation monitoring across multiple agencies.

## 29 Membership and Representation

30 » Membership on the BOG is open to all organizations that have an interest in regional-scale and  
31 statewide monitoring and assessment of contaminants in fish and shellfish from California waters or in  
32 communicating information from this monitoring to policy-makers, agency staff, and the public. The  
33 **current membership of the BOG** includes State and Regional Board staff and representatives from  
34 other agencies and organizations including USEPA, the Department of Fish and Game, the Office of  
35 Environmental Health Hazard Assessment, and the San Francisco Estuary Institute. The members of  
36 the BOG possess extensive experience with bioaccumulation monitoring. Meetings are open, informal,  
37 and consensus driven. To inquire about participation in BOG meetings please contact Jay Davis  
38 (jay@sfei.org).

39 » The BOG has also convened a **Peer Review Panel** that is providing evaluation and review of the  
40 bioaccumulation monitoring program. The members of the Panel are internationally-recognized  
41 authorities on bioaccumulation monitoring.

## 42 Scope

43 » The BOG will promote coordination of major bioaccumulation monitoring efforts across the state and  
44 dissemination of this information in a usable form to water quality managers, policy-makers, and the  
45 public.  
46



1 »

2 **Objectives**

3 » Conduct and promote comprehensive statewide bioaccumulation monitoring for the State of California,  
4 with SWAMP monitoring as a core element

5 » Promote coordination of major bioaccumulation monitoring efforts across the state to ensure efficient  
6 use of monitoring resources and the generation of comparable data to provide for more  
7 comprehensive statewide assessment

8 » Communicate bioaccumulation monitoring information to agency staff and decision makers at the  
9 federal, state, and local levels

10 » To successfully meet these objectives, include appropriate representation by governmental and non-  
11 governmental organizations with a significant role in communicating information on contaminants in  
12 seafood to California citizens.

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## APPENDIX 2

### BOG MEMBERSHIP (2012)

#### Chair

Jay Davis - San Francisco Estuary Institute

#### Participating State Agencies

Rich Fadness, North Coast Regional Water Quality Control Board

Karen Taberski, San Francisco Bay Regional Water Quality Control Board

Karen Worcester, Central Coast Regional Water Quality Control Board

Michael Lyons - Los Angeles Regional Water Quality Control Board

Chris Foe - Central Valley Regional Water Quality Control Board

Tom Suk - Lahontan Regional Water Quality Control Board

Lilian Busse, San Diego Regional Water Quality Control Board

Lori Webber, State Water Resources Control Board

Jennifer Salisbury - State Water Resources Control Board

Jon Marshack - State Water Resources Control Board (Monitoring Council Coordinator)

Bob Brodberg - Office of Environmental Health Hazard Assessment

Dave Crane - California Department of Fish and Game

Gail Cho - California Department of Fish and Game

Gary Ichikawa - California Department of Fish and Game

#### Participating Federal Agencies

Terry Fleming - U.S. Environmental Protection Agency

Tom Maurer, U.S. Fish and Wildlife Service

Josh Ackerman, U.S. Geological Survey

Collin Eagles-Smith, U.S. Geological Survey

#### Other Participating Organizations

Autumn Bonnema - Moss Landing Marine Laboratories

Cassandra Lamerdin - Moss Landing Marine Laboratories

Marco Sigala - Moss Landing Marine Laboratories

Eric von der Geest - Moss Landing Marine Laboratories

Ken Schiff - Southern California Coastal Water Research Project

#### SWAMP Bioaccumulation Peer Review Panel

Jim Wiener - Distinguished Professor, University of Wisconsin, La Crosse

Chris Schmitt - U.S. Geological Survey, Columbia, Missouri

Harry Ohlendorf - CH2M Hill, Sacramento, California

## APPENDIX 3: KEY PARTNERS

- 1
- 2
- 3 • State Agencies
- 4     ○ State Water Board
- 5         ▪ SWAMP
- 6         ▪ TMDL
- 7         ▪ Standards
- 8         ▪ FERC
- 9         ▪ NPDES
- 10        ▪ Ocean
- 11     ○ Regional Water Boards
- 12         ▪ Region 1
- 13         ▪ Region 2
- 14         ▪ Region 3
- 15         ▪ Region 4
- 16         ▪ Region 5
- 17         ▪ Region 6
- 18         ▪ Region 9
- 19     ○ OEHHA
- 20     ○ DPH
- 21     ○ DWR
- 22     ○ CDFG
- 23 • Federal Agencies
- 24     ○ USEPA
- 25     ○ USFWS
- 26     ○ USACE
- 27     ○ USBR
- 28     ○ US Forest Service
- 29     ○ National Park Service
- 30     ○ USGS
- 31     ○ NOAA
- 32 • Other Groups
- 33     ○ Tribes
- 34     ○ Utilities and Water Districts
- 35         ▪ SFPUC
- 36         ▪ Santa Clara Valley Water District
- 37         ▪ EBMUD
- 38     ○ PGE
- 39     ○ SFEI
- 40     ○ SCCWRP
- 41     ○ Universities
- 42         ▪ UC Davis
- 43         ▪ CSU Water Resources Policy Initiative
- 44     ○ Permit holders
- 45     ○ Grantees

- 1
  - 2
- Others